

8 Switching from Offline to Online Shopping: The Role of Gender

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Abstract

Internet retailers face significant competition from brick-and-mortar retailers. Using the theory of planned behavior, this paper investigates gender differences in the switching behavior from offline to online shopping. We test our predictions using an online survey with over 600 respondents. Our findings suggest that women and men differ in their perceptions of online shopping. Women perceive higher risks towards online shopping and are less likely to make future online purchases. These findings suggest that managers of Internet retailers need to realize that the same online shopping environment might be perceived differently by men and women, suggesting that more favorable environment might be created if they want to sell well among female customers.

8.1 Introduction

"Will RFID be useful for supermarket?" - A speaker asked the audience

"How do I know if I haven't been to the supermarket for 25 years!" - Jo answered prompt in the audience

The response is revealing in many aspects, of which two are particularly relevant for this paper: the alleged division of labor associated with gender (whether or not true) and an apparent passion for the many uses of technology in every day life, and especially in logistics.

Intuitively one may argue that women do more shopping than man, as we can see from the response, either because of the traditional division of labor or the enjoyment that shopping may bring to women. If this is true, how about shopping online? Do women do more online shopping in an Internet store than men? Or is it the other way around? And, how can we explain this? More specifically, how do customers' attitude towards online, risk attitude, subjective norm, and past experience with online shopping influence their intention to make online purchases? Do we see gender play a role in these relationships? By answering these questions, we can bring a better understanding of gender differences in online shopping environments and, subsequently, the above-mentioned response of Jo.

In this paper, we will discuss the outcomes of a recent study about switching behavior from offline to online retailers, with an emphasis on gender effects. Internet retailer related issues have attracted considerable attention in the recent literature. There are a variety of reasons associated with online and offline purchasing decisions. For example, online shopping has the relative advantage of lower costs of product and price information search (Brynjolfsson & Smith 2000), a larger choice of products, more shopping convenience due to the absence of travel costs, the possibility of ordering 24x7, the independence of location (Jank & Kannan 2005), the availability of product evaluations by other consumers or expert reviews or recommendations (Chevalier & Mayzlin 2006). But online shopping also has disadvantages, such as the difficulty of assessing non-digital products, the slow delivery, delivery costs, and the hassle related to returns (Forman, Ghose & Goldfarb 2009).

Gender issues also received increasing attention in the information systems literature. Despite the fact that female online population increased by more than 300% compared to 60% for men, academic research reports consistent findings of less-frequent purchase by women (Van Slyke, Comunale & Belanger 2002, Garbarino & Strahilevitz 2004). This is evidenced with various other findings: women are less interested in Internet, spend less time online, view fewer pages, are less likely to make online purchases, or spend less money online. This seems controversial to what we see in the offline environment, where women account for over 70% of purchases. Apart from the idea that men feel

more at ease with computers, as argued by previous study, how can we explain this gender difference in online shopping purchase decisions?

There are numerous theoretical and empirical studies on multi-channel competition. However, it still remains unclear how and why customers substitute between online and offline channels. How to explain the gender difference in making this decision? How can Internet retailers strategically target different groups to increase their online visitors? This paper contributes to two areas of research. First, it contributes to the empirical literature on consumer substitution between offline and online channels. Second, it examines the role of gender in consumer's online shopping decisions.

In Section 8.2, we will introduce theoretical background and develop our hypotheses. In Section 8.3, we will discuss research methods and data collection. Section 8.4 presents the analysis and results and Section 8.5 concludes.

8.2 Theoretical Background and Hypotheses

8.2.1 Internet Retailers and Brick-and-Mortar Retailers

"Frictionless commerce" has been used to characterize electronic markets compared to conventional markets (Brynjolfsson & Smith 2000). This lowered friction exists in reduced prices and frequent price adjustment in Internet retailers. Brynjolfsson & Smith (2000) found that prices on the Internet are 9-16% lower than prices in conventional outlets, depending on whether taxes, shipping, and shopping costs are included in the price. In addition, they also found that Internet retailers' price adjustments over time are more frequent and up to 100 times smaller than conventional retailers' price adjustments. This is in part attributed to the small menu costs of making price adjustments and the incentives to make small price changes because of high market competition.

While consumers do benefit from lower prices online, they derive far more value from another important characteristic of Internet markets: the ability of online merchants to help consumers locate, evaluate, and purchase a far wider variety of products than they can via traditional brick-and-mortar channels (Brynjolfsson, Hu & Smith 2003). There is an increased product variety in the Internet store. Empirical research showed that the number of book titles available at Amazon.com is more than 23 times larger than the number of books on the shelves of a typical Barnes & Noble superstore, and 57 times greater than the number of books stocked in a typical large independent bookstore (Brynjolfsson, Hu & Smith 2003). Research showed that this increased product variety significantly enhanced consumer welfare from \$731 million to \$1.03 billion in the year 2000, which is 7-10 times larger compared to the gain from increased competition and lower prices.

Increasingly, Internet retailers compete with brick-and-mortar retailers to attract customers. For example, Internet retailers have invested heavily in delivery centers, customer services, and free-shipping discounts. Do Internet retailers compete with brick-and-mortar retailers across all product categories? A recent study offered empirical evidence that the competition is mainly focused on mainstream products but not niche products (Brynjolfsson, Hu & Rahman forthcoming). This suggests that Internet retailers can develop effective strategies to facilitate the purchasing of niche products that have high search costs in traditional stores to win this battle. This can be achieved through helping customers discover and purchase niche products, by deploying more effective IT-enabled tools or by training customer service representatives in helping customers locate niche products more efficiently.

How does a consumer's physical location shapes the relative benefits of buying from the online world? A recent study offered us some interesting finding (Forman, Ghose & Goldfarb 2009). The authors found that the disutility costs of online purchase matters significantly, which is evidenced by the fact that the opening of local stores drives people away from online purchasing. They argued that as the distance to offline stores decreases, the likelihood of purchasing a commodity product online decreases and online price decreases have a smaller impact on the likelihood of purchasing a commodity product online.

8.2.2 Conceptual Model and Hypotheses

Behavioral intention can be a strong predictor of actual behavior. The theory of planned behavior argues that the intention to perform certain behavior is predicted by people's attitude toward the behavior, subjective norm, and perceived behavioral control (Ajzen 1991). The more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior. The relative importance of attitude, subjective norm, and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations. The theory of planned behavior offers a powerful and parsimonious explanation for behavioral intention. However, it does not include variables that capture risk perceptions, which is particularly important in online environments. Based on the theory of planned behavior, we will extend the model to include risk attitude and examine the role of gender. The conceptual model is depicted in Figure 1.

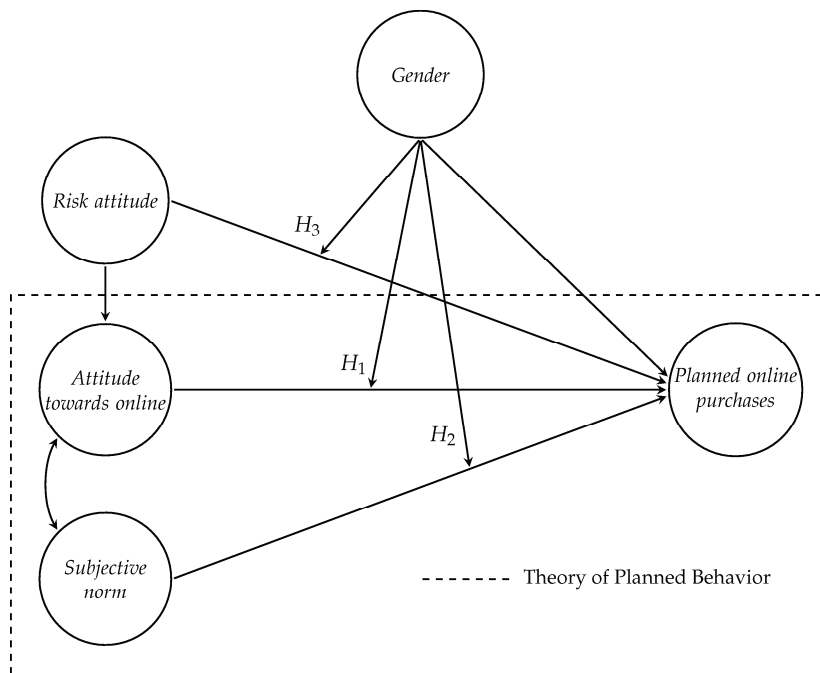


Figure 1: Conceptual Model

Gender issues have been discussed in a number of information systems studies. Socio-linguistic theory argues that men and women have different social norms for conversational interaction. Women are more network-oriented and tend to feel more warm and emotional compared to men who feel more independent and competitive. Using socio-linguistic theory, Gefen & Straub (1997) examined gender difference in email diffusion within organizations. They argued that email is similar to oral discourse in which women perceive higher social presence and have higher rating for the perceived usefulness compared to men. In another study, Venkatesh & Morris (2000) made an extension to the well-known technology acceptance model to examine how gender affects social influence to predict intention to use behavior. In particular, they found that compared to women, men's technology usage was more strongly influenced by their perceptions of usefulness. In contrast, women were more strongly influenced by perceptions of ease of use and subjective norm. A most recent research looked at whether gender moderates the relationship between environment, in terms of overload and autonomy, and workers trying to innovate with IT (Ahuja & Thatcher 2005).

Attitude toward online. Social attitude toward the behavior or personality trait plays an important role in explaining and predicting human behavior. It refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior (Ajzen 1991). Psychology research has studied gender differences in decision making processes and indicated that schematic processing by women and men is different. For example, from an information processing perspective, there are

known differences in determinants of self-esteem between men and women. They process information using different socially-constructed cognitive structures that, in turn, help determine and direct an individual's perceptions. Women frequently reported high levels of computer anxiety and low levels of self-efficacy (Venkatesh & Morris 2000). As a result, this could lead to less favorable attitude toward online shopping. A favorable attitude towards behavior has typically been seen as a driver to behavioral intention (Ajzen 1991). Thus, less favorable attitude toward online shopping can cause a decrease in the salience of such perceptions in determining women's planned online purchases decisions.

Hypothesis 1 (Gender and Attitude toward Online): Attitude towards online will influence planned online purchases more strongly for men than for women.

Subjective norm. Subjective norm is proposed as a predictor for planned behavior (Ajzen 1991). It refers to the perceived social pressure to perform or not to perform the behavior. The more favorable the subjective norm with respect to a behavior, the stronger should be an individual's intention to perform the behavior. Normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior. In practice, subjective norm is usually obtained by asking respondents to rate the extent to which important others would approve or disapprove of their performing a given behavior. Men and women are different in the extent to which they are influenced by others. For example, research shows that women tend to be more compliant, while men are more likely to rebel against requests from others. This suggests women may look at others' opinion as opportunities to learn more about their own abilities (Venkatesh & Morris 2000). Thus we assert that subjective norm plays a strong role for women in making online purchase decisions.

Hypothesis 2 (Gender and Subjective Norm): Subjective norm will influence planned online purchases more strongly for women than for men.

Risk attitude. According to the theory of planned behavior, the third factor that explains behavioral intentions is perceived behavioral control, which refers to the perceived ease or difficulty of performing the behavior. It reflects past experience as well as anticipated obstacles (Ajzen 1991). One important reason that can explain people's perceived ease or difficulty of performing a task is their risk attitude. Risk attitude is considered as a personality trait and stands on the continuum from risk aversion to risk taking. Previous research has shown that there are gender differences in risk perceptions (Weber, Blais & Betz 2002). Women have greater perceived risks in a wide variety of domains including financial, medical, and environmental. This suggests that women are more risk averse and may behave in a similar way when making online purchase decisions, that is, women may perceive purchasing online to be riskier than men do. As a result, women have a lower willingness to make online purchase.

Hypothesis 3 (Gender and Risk Attitude): Perceived risk attitude will influence planned online purchases more strongly for women than for men.

Furthermore, individuals' past purchase behavior will influence their planned online purchases. One may argue that if a customer less frequently purchases online, she is less likely to plan online purchases in the future. When individuals have more experience with Internet stores, they have better assessment of the benefits of their online experience and are less likely to be influenced by their attitude toward online, others' opinion, or risk attitude. However, according to Ajzen (1991), past behavior can not be considered as a causal factor in its own right, though it may reflect the impact of factors that influence future behavior. The author argued that the model of planned behavior sufficiently contains important determinants to explain planned behavior, thus the addition of past behavior cannot significantly improve the prediction of future behavior. It is for this reason, we will not include past purchase behavior in our conceptual model but include it in our analysis to test the sufficiency of our model to predict future behavior as suggested by Ajzen (1991).

8.3 Data and Methodology

8.3.1 Data Collection

We collected the data using an online questionnaire among a group of bachelor students taking an applied statistics course in 2010. Students were invited to join the survey through an email with explanation about the aim of the survey and a link to the survey website. The survey consisted of six parts. The first part asks questions about people's attitudes toward online and offline shopping and their actual experience with online shopping. This is followed by a choice based conjoint experiment aimed at insight into the relative importance of online and offline purchasing attributes. The third part asks about the likelihood of making purchases when presented with a website of an online retailer. These questions pave the way for the fourth part of the survey, which is concerned with an actual visit to Otto.nl, a major Internet retailer, with an invitation to purchase different products. After online browsing, questions were asked about the experience with this Internet store and the intention to return. A section with demographic questions was included in the last part of the survey. In this paper we mainly focus on the data collected from the first two parts of the survey.

The survey was sent to 1211 students based on enrollment in the course. The overall response rate is 59.04%, which largely reflects the inclusion in the mailing list of a substantial group of enrolled students that do not actually participate in the course. The number of respondents (715) is in line with the number of students who actually took the final written exam; 89.79% of all respondents who started the survey also completed it. The number of usable responses is 610.

The descriptive statistics of the demographic characteristics of our sample indicate that 36.27% of the respondents is female (63.73% male). The majority of respondents (58.82%) is 19-21 of age, while the remaining 41.18% is older. Moreover, 26.96% of the respondents reports to vocational school as the highest pre-university education, while 71.73% comes directly from high school. Most respondents are experienced internet users: only 3.43% reports less than four years of experience with internet usage, while 71.90% is active on the internet for more than two hours per day on average. The shopping budget varies considerably among respondents: 8.67% has a budget less than 500 euro, 36.17% spends 500 to 1000 euro per year, 48.45% (the mode) 1000 to 5000 euro, and the remaining 6.71% more than 5000 euro. Likewise, the location where respondents live, varies widely: most live in urban areas with many shops in the immediate neighborhood (64.98%), others in a city but with fewer shops (20.62%), some in a village with few interesting shops (11.29%), and the remaining ones (3.11%) from outside built-up areas.

8.3.2 Measurement

Apart from usage and gender, the variables in our model are all measured as multi-item Likert quantities using 7-point evaluative rating scales. Past usage of Internet shopping has been measured as the frequency of actual online purchases during the past 12 past months in any product category with response categories varying from 'never' to 'weekly'. All multi-item scales were subjected to scale analysis; factor analysis is applied to validate the one-dimensionality of the scales.

Planned purchasing refers to the respondent's online purchase intentions. It consists of the items 'I definitely intend to purchase from online shops in the future' and 'I intend to make use of internet shops, when I will purchase products or services in the future'. The overall Cronbach alpha is equal to 0.854. The attitude towards online shopping measures the extent in which people find online shopping attractive and interesting. It is measured with five items. Examples are 'Online shopping is very attractive' and 'I preferably buy products and services online'. Attitudes scores vary from very negative to very positive. The Cronbach alpha is equal to 0.854. Subjective norm indicates the extent to which peers (family and friends) have an influence on a respondent's online shopping behavior (Ajzen 1991). The construct consists of two items: 'If I buy products or services online, then people in my circle of acquaintances would think this ridiculous' and 'My friends would certainly criticize me, if I bought products and services online'. The resulting scores vary from no response to a very negative response from important others to one's online purchases. The Cronbach alpha is equal to

0.850. Risk attitude is defined as a person's willingness to take risks (Fiegenbaum & Thomas 1988, Weber, Blais & Betz 2002). We measure risk-attitude with five items such as 'I don't want to run any risk when buying online' and 'I will rarely make risky purchases when there are alternatives'. Item scores are coded such that the overall measure varies from risk averse to risk seeking. The overall scale reliability is 0.825. After the scale analysis, overall measures of attitude towards online shopping, risk-attitude, subjective norm, and planned behavior have been calculated as the average of the constituent item scores.

8.3.3 Methods

We applied various methods to evaluate our hypotheses. We compared mean scores of all variables in sub-samples of men and women and report separate variance t-tests of the assumed equality of means. We also performed pooled variance t-tests, but this did not yield any different outcomes. We obtained additional insights into the dependencies among variables by means of Pearson correlations, which are also used to assess the intermediating effects. Finally, we used hierarchical regression analysis and estimated five models: (i) the base model containing the variables from the planned behavior theory only, (ii/iii) models with the additional effects of risk attitude, past online shopping, and gender, (iv) the extended model with all additive effects and all moderating effects of gender, and (v) a restricted model with a main gender effect and an interaction term for gender and risk attitude. The corresponding table reports estimated parameters, standard errors, and common fit measures. Multiple F-tests indicate the validity of the implied restrictions.

8.4 Results and Discussions

The results in table 1 show that respondents are generally favorable towards online purchasing ($\bar{x}=4.686$) and hold relatively positive online purchase plans for the future ($\bar{x}=5.516$). The mean score for subjective norm is low ($\bar{x}=1.613$) suggesting that students perceive they are relatively insensitive to any negative reactions of family and friends to their own online purchase activities. This suggests that students behave quite atomistically in their own view. Moreover, they tend to be relatively risk averse ($\bar{x}=2.768$), while the average score on the frequency of online purchases during the past twelve months ($\bar{x}=2.768$) suggests that they bought at online shops somewhere between once and a few times during the past year.

Table 1: Results of t-tests of variables by gender

| Variable | All (n=612) | | Men (n=390) | | Women (n=222) | | Difference | | |
|----------|-------------|-------|-------------|-------|---------------|-------|------------|-------|-----|
| | Mean | Std | Mean | Std | Mean | Std | Means | Sig | |
| Atton | 4.686 | 1.210 | 4.882 | 1.139 | 4.343 | 1.257 | 0.540 | 0.000 | *** |
| Norm | 1.613 | 0.889 | 1.583 | 0.901 | 1.664 | 0.866 | -0.081 | 0.273 | |
| Plan | 5.516 | 1.166 | 5.763 | 1.061 | 5.083 | 1.217 | 0.679 | 0.000 | *** |
| Risk | 2.369 | 1.059 | 2.456 | 1.099 | 2.214 | 0.969 | 0.242 | 0.005 | *** |
| Usage | 2.768 | 0.661 | 2.687 | 0.684 | 2.910 | 0.595 | -0.223 | 0.000 | *** |

'*' $p < .10$, '**' $p < .01$, '***' $p < .001$

Gender differences among variables. We observe considerable differences between the ratings by men and women. In fact, the mean values of all quantities differ significantly between men and women except for subjective norm ($diff = \square 0.081$, $p = 0.273$). On average, men express a more favorable attitude towards online purchasing than women ($diff = 0.540$, $p < 0.01$). They are more positive about planned online purchases ($diff = 0.679$, $p < 0.01$), and are at the same time less risk averse than women ($diff = 0.242$, $p < 0.01$). Interestingly, however, women indicate a more intensive use of the internet channel during the past twelve months than men ($diff = \square 0.223$, $p < 0.01$), in spite of their relatively lower planned purchasing intentions. In combination, these findings suggest a substantial gender effects.

Correlations. In table 2, we present the correlation results to examine the dependencies among the various constructs. We find that planned online purchase behavior is significantly positively associated with attitude towards online purchase ($r = 0.702, p < 0.01$) and negatively with subjective norm ($r = 0.169, p < 0.01$), which is consistent with the theory of planned behavior. Moreover, risk ($r = 0.111, p < 0.01$) and past internet shopping ($r = -0.441, p < 0.01$) are significantly related to planned online purchases. The negative correlation between the frequency of past online purchases and planned online purchases is surprising. It suggests that the more frequent the online channel has been used in the recent past, the lower the intention to use online stores in the future. We will elaborate on this outcome below.

Table 2: Correlations between variables

| <i>Variable</i> | <i>Mean</i> | <i>Std</i> | <i>Gender</i> | <i>Atton</i> | <i>Norm</i> | <i>Plan</i> | <i>Risk</i> |
|-----------------|-------------|------------|---------------|--------------|-------------|-------------|-------------|
| <i>Gender</i> | 1.363 | 0.481 | | | | | |
| <i>Atton</i> | 4.686 | 1.210 | -0.215 *** | | | | |
| <i>Norm</i> | 1.613 | 0.889 | 0.044 | -0.147 *** | | | |
| <i>Plan</i> | 5.516 | 1.166 | -0.280 *** | 0.702 *** | -0.169 *** | | |
| <i>Risk</i> | 2.369 | 1.059 | -0.110 *** | 0.155 *** | 0.162 *** | 0.111 *** | |
| <i>Usage</i> | 2.768 | 0.661 | 0.162 *** | -0.573 *** | 0.043 | -0.441 *** | -0.146 *** |

'*' $p < .10$, '**' $p < .05$, '***' $p < .01$

Mediating effects. In view of the observed dependencies as well as the expected relations in the conceptual model in Figure 1, the question arises whether gender, risk attitude, and past online purchases have direct effects on planned online purchases behavior, or whether their influences are mediated by the determinants of the original planned behavior model, namely, attitude towards online purchase and subjective norm. We explore this question by evaluating the effects of gender, risk attitude, and past online purchases after controlling for attitude towards online shopping and subjective norm. We find that the effect of risk attitude ($p = 0.942$) is completely mediated by the attitude towards online shopping. The influence of past online purchases ($p = 0.104$) is to a large extent mediated. However, the influence of gender on planned behavior remains significantly negative ($p < 0.01$). Controlling for subjective norm does not reveal any mediation effects.

Multivariate analysis. Table 3 shows the outcomes of various hierarchical regressions with planned behavior as the dependent variable. The basic model *I* reflects the theory of planned behavior as in Ajzen (1991), except perceived behavioral control. The results for this model are consistent with expectations: attitude towards online purchasing has a strongly significant positive influence on planned behavior, whereas perceived negative pressure from family and friends adversely affects intentions to purchase online. Extending the basic model with risk attitude and past online purchases (model *II*) gives an insignificant effect for risk, but a significantly negative effect for past online usage. The absence of a significant risk attitude effect is expected on the basis of the previous analysis of mediating effects; its influence is fully mediated by the attitude towards online shopping.

The negative effect of past online purchases, which has been added as a test of model sufficiency (Ajzen 1991), captures the influence of individual factors that determine online shopping. It might be interpreted as a measure of habit, but the fact that it is negative makes this somewhat unlikely, as it would mean that the higher the frequency of online purchasing in the past, the lower the intention of future purchases. Ajzen (1991) suggests that past behavior rather be interpreted as as a measure of other, not explicitly specified factors that affect online purchasing intentions (p. 203). This is supported by the results of model *III*, which includes gender as an explanatory variable. The results demonstrate that there is a significantly negative impact of gender, while past behavior is no longer significant. This suggests that women are less likely to plan online purchases than men do, which is consistent with the results in table 1. The interesting thing, though, is that they do so, despite their more frequent online purchases in the recent past. Note that the addition of gender, risk attitude, and online shopping in the past, leaves the outcomes for the planned behavior determinants unchanged.

Table 3: Results regression analysis planned online purchases

| <i>Variable</i> | <i>I</i> | <i>II</i> | <i>III</i> | <i>IV</i> | <i>V</i> |
|--------------------|----------------------|----------------------|-----------------------|----------------------|-----------------------|
| Intercept | 2.534 *** (0.156) | 2.977 *** (0.314) | 3.501 *** (0.329) | 4.364 *** (0.937) | 4.076 *** (0.392) |
| Attitude | 0.667 *** (0.028) | 0.631 *** (0.034) | 0.609 *** (0.034) | 0.585 *** (0.044) | 0.608 *** (0.034) |
| Subjective norm | -0.088 ** (0.038) | -0.095 ** (0.039) | -0.089 ** (0.038) | -0.121 ** (0.047) | -0.095 ** (0.038) |
| Risk | | 0.013 (0.033) | 0.002 (0.032) | -0.046 (0.038) | -0.053 (0.038) |
| Usage | | -0.107 * (0.062) | -0.094 (0.061) | -0.091 (0.072) | -0.099 (0.061) |
| Gender | | | -0.322 *** (0.070) | -0.908 (0.661) | -0.734 *** (0.170) |
| Gender × Attitude | | | | 0.049 (0.070) | |
| Gender × Norm | | | | 0.069 (0.080) | |
| Gender × Usage | | | | -0.040 (0.135) | |
| Gender × Usage | | | | 0.159 ** (0.070) | 0.180 *** (0.068) |
| df | 609 | 607 | 606 | 602 | 605 |
| rmse | 0.828 | 0.827 | 0.814 | 0.811 | 0.810 |
| R^2 | 0.497 | 0.500 | 0.517 | 0.524 | 0.522 |
| R^2_{adj} | 0.496 | 0.497 | 0.513 | 0.517 | 0.518 |
| F (model) | 200.824 *** | 121.392 *** | 107.972 *** | 66.177 *** | 94.496 *** |
| p -value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| F (restrictions) | 4.756 *** | 5.982 *** | 2.201 * | | 0.570 |
| p -value | 0.000 | 0.000 | 0.067 | | 0.635 |

Multicollinearity issues. The complete model *IV* including all gender interaction effects is used to evaluate our research hypotheses. The results suggest that none of the gender interactions is significant except for the interaction with risk (H3), and that even the significance of the main gender effect has vanished. We also use other modeling techniques, notably partial least squares (PLS), which lead to similar model outcomes. A closer look at the results of model *IV* reveals the presence of strong multicollinearity. Tolerance values are particularly low in the case of the gender×attitude interaction ($tol = 0.04$) and the gender×usage interaction ($tol = 0.03$), while they are below 0.2 for the interactions between gender and subjective norm and between gender and risk attitude. Also, the tolerance value for the main gender effect has dropped to 0.01 (from 0.95 in model *III*). The issue of multicollinearity between main and interaction effects is a known problem in this type of analysis (Friedrich 1982). Previous research suggested various solutions, such as not to model these interactions, use hierarchical regression analysis, or mean center the explanatory variables involved in the interactions. The hierarchical analysis solution would amount to considering the main effects from model *III* and only the added interaction effects from model *IV*. As for mean centering, Echambadi & Hess (2007) demonstrate mathematically that it does not at all affect the information content of the regression models, and that this practice masks rather than solves the problem.

To further uncover the source of the multicollinearity issue, we revert to the simple tool of graphical displays. Figure 2 shows the scatter plots of planned online purchases against attitude (left) and risk (right), with responses from men marked by circles and from women by solid dots. The interesting message from these charts is that there is no interaction between attitude towards online purchase and

gender. The regression lines for men and women are almost exactly parallel, which denies the interaction effect. Regardless of risk attitude, men and women differ in their planned online purchases intentions by an almost fixed and positive amount. This suggests the inclusion of a fixed gender effect with no interaction. In the case of planned purchase behavior and risk, the regression lines for men and women are not parallel but intersect at high values. Moreover, the regression line for men is almost horizontal (no effect of risk attitude on planned purchase behavior), while that of women is upward sloping (gender differences become less when risk attitude increases). This suggests that there might be an interaction between risk and gender on planned behavior in addition to a main gender effect. The graphs for past online purchases and subjective norm offer similar insights.

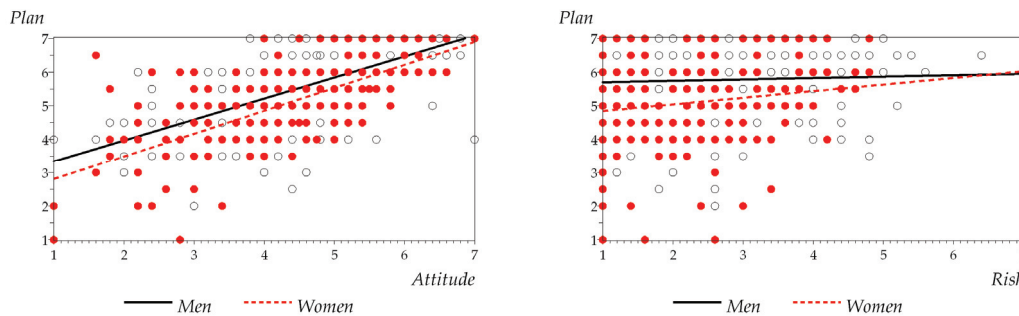


Figure 2: Scatter plots of planned online purchases against attitude (left) and risk (right) marked by gender

We obtained similar results in model *V* as in model *III* after removing the non-significant interaction terms. That is: gender has a significantly negative effect on planned purchases, and there is evidence of a moderately significant interaction between risk attitude and gender. The fact that the estimated effect of gender is almost double its effect in model *III* reflects the consequences of remaining multicollinearity between gender and the interaction term, which even in this model is still considerable ($tol = 0.16$). The *F*-test of the implied multiple restrictions (as compared with model *IV*) indicates we cannot reject the assumption that the effects of the removed interaction terms are zero.

8.5 Conclusions

In this paper, we developed a theoretical model to explain customer planned online purchases based on the theory of planned behavior. We suggested that customer's decisions about future planned online purchases are influenced by their attitude towards online shopping, subjective norm, and risk attitude. In particular, we examined the role of gender in making planned purchase decisions. Our study provided consistent results as the theory of planned behavior. That is: attitude towards online shopping and subjective norm significantly affect planned purchase (Ajzen 1991).

The results demonstrate the existence of significant gender effects in the online shopping environment. We found that, on average, men have a more favorable attitude towards online purchasing than women. They are more likely to plan future online purchases. Women, on the contrary, are more concerned about the risks of buying online and more risk averse than men. This is consistent with previous research (Garbarino & Strahilevitz 2004). Moreover, women are less likely to make future online purchases, despite their indication of a more frequent usage of Internet stores in the recent past.

Nevertheless, we did not find empirical support for moderating gender influences on the effect of attitude towards online shopping on planned purchases. Our results also did not offer support to the claim that women are more influenced by subjective norm when planning future purchases.

We further tested the mediating effects of risk attitude and past purchase behavior. We found they are mediated through the determinants of planned behavior. The influence of the perceived risk of purchasing online is fully mediated by the attitude towards online shopping, whereas past online purchases is partially mediated. This is in line with the suggestion of Ajzen (1991) to view past behavior as a test of model sufficiency capturing the influence of unspecified personal traits.

This paper has a number of limitations, which also provide avenues for future research. First, we were limited in exploring customers' perceptions of online shopping before they were presented with actual online stores. To further examine customers' switching behavior from offline and online shopping, we will need to study how customers react to the online store we present to them, and combine this with the actual online shopping behavior. Second, this study gathered data from a homogeneous population between 18 to 22 years in the same university. This poses challenges for the external validity of the study and the generality of the results. However, given the exploratory nature of the study, this was perhaps inevitable. Third, this study used multiple regressions for hypothesis testing. Future research can continue investigate the use of structural equation modeling or partial least square techniques in order to have a more comprehensive analysis of the hypotheses involved.

This research has strong practical implications to business practice. First, the findings suggest that managers of Internet retailers need to realize that the same online shopping environment might be perceived differently by men and women, suggesting that more favorable environment might be created if they want to sell well among female customers. Second, Internet retailers need to innovate and create online environments that are perceived as being more friendly and less "risky" for women to attract their attentions.

"25 years? Haven't you been shopping for that long? " - The speaker frowned and asked Jo

"If shopping online is considered as shopping, the answer is YES. By the way, it's a 24x7 express checkout without RFID ..." - Jo shrugged and nodded to the authors of this paper

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