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2011

document version
Early version, also known as pre-print

Link to publication in VU Research Portal

citation for published version (APA)
Meents, S., Verhagen, T., & Vlaar, P. W. L. (2011). *How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal*. (Research Memorandum; No. 2011-14). FEWEB VU University.

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How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal

Research Memorandum 2011-14

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How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal

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Abstract

Existing studies offer myopic insights how intermediaries can reduce consumers' perceived risk in order to make electronic marketplaces more successful. In contrast, the study here acknowledges the role of sellers in enabling these transaction platforms. The study focuses on how sellers may use information about themselves (i.e., seller information) and about their products (i.e., product information) as risk reduction signals to stimulate purchasing. Combining signaling theory with perceived risk theory the authors present a research model that they test using structural equation modeling with data collected in an actual consumer-to-consumer electronic marketplace. The results confirm that while product and seller information are indeed important risk reduction signals, the risk reduction potential of these forms of information may be different across risk types. This article discusses these findings and explains how they augment signaling theory, perceived risk theory and the relatively scarce research on the conceptual associations between these two theories.

Keywords: electronic marketplace (EM); risk reduction; information; signaling theory; sellers; online purchasing.

How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal

1 Introduction

Despite the growth of the popularity of so-called consumer-to-consumer (C2C) electronic marketplaces (C2C EMs) (Lin, Li, Janamanchi, and Huang, 2006), which constitute digital equivalents of the physical marketplaces in which buyers and sellers meet (Rao, Truong, Senecal, and Le, 2007), consumers still perceive buying via EMs to be subject to large amounts of risk. Indeed, opportunistic seller behavior seems to be particularly prevalent and even on the rise in C2C EMs (Hu, Lin, Whinston, and Zhang, 2004; Zhang, 2006), and sellers may willingly take advantage of buyers by misrepresenting products, charging excessive shipping costs or not sending the product (timely) (Pavlou and Gefen, 2005). To cope with these issues and reduce the risks associated with buying, the intermediary that regulates the EM (e.g., the company eBay) applies formal control mechanisms such as monitoring, accreditation, contracts, guarantees, and regulations. Empirical studies so far underline the value of such mechanisms by revealing that they may actually reduce perceptions of risk in EM settings (Pavlou and Gefen, 2005).

An important limitation of past research on the role of risk reduction in C2C EMs is the rather rigid focus on the actions undertaken by the intermediary (e.g., Pavlou and Gefen, 2004, 2005). As such, available research seems to disregard that in practice the intermediary and sellers are co-involved in enabling transactions in a C2C EM. Whereas the intermediary facilitates the online trading environment, including the provision of risk-reducing formal control mechanisms, the seller is responsible for providing the consumer with the transaction-specific information

needed to (further) assess the risks associated with a particular purchase. Two well-known types of such information include product information and seller information. Product information refers to the display of an offering in the form of text, graphics and movies. Seller information means the self-presentation of a seller on the website using textual descriptions or pictures. Together, these types of information serve as quality signals that consumers typically use to support their purchase decision-making process and to assess the risks associated with purchasing in particular (cf. Biswas and Biswas, 2004; Li, Srinivasan and Sun, 2009). Remarkably, the influence of the provision of product information and seller information as risk reduction mechanisms in EMs remains unclear. The relevance of such knowledge seems evident as this provides us with new insights into how sellers may add to the actions undertaken by the intermediary to jointly reduce buyers' risk perceptions and stimulate trading in the EM.

In this study, the authors combine signaling theory (e.g., Kirmani and Rao, 2000; Spence, 1973) with perceived risk theory (e.g., Conchar, Zinkhan, Peters, and Olavarrieta, 2004; Taylor, 1974) to develop and test a research model in order to answer the question how and to what extent product information and seller information function as risk reduction signals for buyers in C2C EMs. Following previous works on risk and purchase behavior in EM settings (e.g., Verhagen, Meents, and Tan, 2006) the selected conceptualization of risk draws upon the fact that consumer behavior in EMs typically is subject to the actions of two parties: the intermediary operating the system and the seller(s) as formal counterpart of the transaction. Accordingly, this paper considers two types of risk: intermediary risk and seller risk. Intermediary risk refers to the potential failure of formal control mechanisms employed by the intermediary. Seller risk reflects the uncertainties that arise since one is unsure about the offers of the counterpart of the transaction and this party's ability and willingness to perform. The adopted two-party

perspective on risk enables a comparison of the findings with previous research in the EM research field and aligns with the typical co-involvement of both the seller and the intermediary in the process of risk reduction. To expand the managerial relevance of the proposed theoretical structure, the attitude towards purchasing completes the model; the inclusion of this concept enables an assessment of whether the perceived provision of the two types of information can be expected to translate into behavior through the two perceived risk types.

The objectives of the study reported in this paper are threefold. First, the paper aims at adding to signaling theory, perceived risk theory and the relatively scarce research on the conceptual associations between these two theories by investigating the influence of information as a signal on perceived risk in online commercial relationships that, contrary to prior research, involve not just a seller but also an intermediary. Second, the study contributes to the existing literature on C2C EMs by investigating the role of sellers in reducing perceived risks; it shows the relative importance of two common types of information that sellers apply, in relation to two distinct types of risk. The derived insights serve sellers in gaining an understanding of the complexity of risk assessment in EM settings and may assist them in prioritizing the provision of particular types of information. Third, by validating the influence of intermediary risk and seller risk on the purchase attitude, the paper provides insight into the relative importance of the intermediary and sellers, and thus sheds light on consumer buying behavior in online mediated environments.

2 Theoretical background: perceived risk and signaling theory

In daily life, individuals mostly lack the information, time and mental capacity to calculate the actual risk involved in situations. Instead, individuals form subjective assessments of this actual risk (Conchar et al., 2004; Dowling, 1986; Mitchell, 1999). This subjective form of risk, or

perceived risk (e.g., Mitchell, 1999) or subjective risk (e.g., Das and Teng, 2001), has received by far the most attention in the literature on consumer behavior (Conchar et al., 2004; Dowling, 1986) and will be the focus of this paper.

After the introduction of the concept in the consumer behavior literature by Bauer (1960), a multitude of studies has examined perceived risk (Mitchell, 1999; Stone and Grønhaug, 1993). According to the resulting theory on perceived risk, risk perceptions entail an individual's feelings of discomfort or concerns and thus they tend to influence this person's choices (Conchar et al., 2004, Dowling and Staelin, 1994). Therefore, and given that making choices is characteristic of buying behavior, perceived risk theory posits that risk is an important determinant of consumer behavior (Campbell and Goodstein, 2001; Mitchell, 1999).

When the level of perceived risk and the involved feelings of discomfort exceed the levels that the consumer finds acceptable, he or she is likely to adopt a risk coping strategy (Gemünden, 1985; Murray, 1991). In line with the information-processing paradigm of consumer choice (see e.g., Bettman, 1979), one of the most efficient and generally useful of these strategies is additional acquisition and processing of information (Gemünden, 1985; Greatorex and Mitchell, 1994). In some cases the consumer can obtain this information from the environment by directly observing or experiencing the qualities of a company or its offerings or by exchanging messages about these qualities via interpersonal or marketer-controlled communication channels. Sometimes, however, such direct information is not available and the consumer has to resort to interpreting cues or signals provided by a company (Schmidt and Spreng, 1996; Bearden and Shimp, 1982).

Signaling theory, which originates in the work of economists such as Spence (1973), describes the potential influence of such signals provided by a company. The theory has featured

in the work of marketing scientists (e.g., Mishra, Heide, and Cort, 1998) to study the impact of marketing-related activities on consumers in the case of information asymmetry. According to signaling theory, signals are pieces of information about the otherwise unobservable qualities of a company, or of its offerings, that are derived from the actions of that company (Gregg and Walczak, 2008; Kirmani and Rao, 2000). As such, signals have important predictive value and are a major source of information in the consumer decision-making process (Bearden and Shimp, 1982). Accordingly, although the empirical research effort to relate perceived risk and signaling theory remains limited, the existing scientific work on signaling suggests that signals are essential risk reduction mechanisms when buyers face information asymmetry about the true quality of the seller and the offered products. Such a situation is typical of C2C EMs (Li et al., 2009) since buyers commonly engage in transactions with mostly unknown sellers without a brand name, who may easily create and change their identities and who often cannot meet buyers in person (Hu et al., 2004; Pavlou and Dimoka, 2006). Therefore, the remainder of this paper focuses on how sellers may signal their quality to decrease risks and thereby stimulate purchase behavior in C2C EMs.

3 Hypotheses

3.1 Using signals to reduce perceived risk in C2C EMs

The use of signals as a risk reduction method seems especially relevant in the case of C2C EMs given that the described information asymmetry between buyers and sellers (Gregg and Walczak, 2008) may subject buyers to even greater risks than in more common online retail environments such as online stores (Pavlou and Gefen, 2004). Prior research (Verhagen et al.,

2006) shows that both seller risk and intermediary risk are relevant forms of risk in C2C EMs. In line with most of the online consumer behavior literature (e.g., Malhotra, Kim, and Agarwal, 2004; McKnight, Choudhury, and Kacmar, 2002; Van der Heijden, Verhagen, and Creemers, 2003), this paper considers seller risk a unidimensional construct that refers to a buyer's perception of (1) the losses that may be incurred from the negative consequences of engaging in a transaction with members of the population of sellers in a particular EM, and (2) the probability of these negative consequences. Comparably, this paper also interprets intermediary risk as a unidimensional construct and defines this construct as a buyer's perception of (1) the losses that may be incurred from the negative consequences of the inability of the intermediary to provide sufficient protection against fraudulent or opportunistic sellers, and (2) the probability of these negative consequences (Meents, 2009; Verhagen et al., 2006).

While signals appear an especially relevant instrument for sellers in C2C EM settings to communicate evidence of their qualities and to mitigate perceived risks, these individuals cannot readily employ the same types of signals as offline, business sellers (see e.g., Bearden and Shimp, 1982; Kirmani and Rao, 2000; Roselius, 1971; White and Truly, 1989). For example, EMs commonly use auctions to determine prices and thus sellers are unable to directly set final product prices. Furthermore, most sellers in these EMs are consumers and thus lack the proper resources to systematically advertise and offer warrantees. In addition, buyers rarely transact with the same seller more than once in C2C EMs and thus commonly engage in transactions with mostly unknown sellers (Pavlou and Gefen, 2004) that have difficulty establishing a name for themselves (Pavlou and Dimoka, 2006).

Sellers active on EMs can, however, signal their quality and that of their products by directly offering information about themselves and their reputation (seller information) and about their

products (product information) (cf. Li et al., 2009). Seller information may include information about the seller's location, his username or real name (Resnick, Zeckhauser, Friedman, and Kuwabara, 2000), and the level of satisfaction of his other customers (Kim and Benbasat, 2006; Lim, Sia, Lee, and Benbasat, 2006), that is, his reputation. Product information refers to information about and proper representation of the particular products that sellers offer and may consist of text, photos, three-dimensional graphical models and movies.

Following signaling theory and perceived risk theory, providing appropriate, that is clear and sufficient, product information and seller information is likely to lower the perceived risks of purchasing in a C2C EM since this conveys that the seller is emotionally and economically impelled to behave properly (Biswas and Biswas, 2004; Kirmani and Rao, 2000). More specifically, when the seller provides detailed and clear background information about himself this may support the customer in making a well-considered choice, and may thus signal that the seller puts effort into helping the customer and that he will refrain from opportunistic behavior (Biswas and Biswas, 2004). Furthermore, by offering sensitive or personal information (e.g., his real name or location) the seller makes himself appear less of a stranger and shows that he trusts the buyer not to invade his privacy, which is likely to improve the buyer's impression of his likely future conduct (Ridings, Gefen, and Arinze, 2002). Finally, by publishing testimonials and endorsements, sellers show the satisfaction of their existing clientele and indicate their reputation for living up to agreements, which, according to existing empirical findings, limits seller risk (Bearden and Shimp, 1982; Pavlou, 2003). This suggests that:

H1: Providing appropriate seller information reduces seller risk.

According to such studies as Kim, Song, Braynov, and Rao (2005), Shankar, Urban, and Sultan (2002) and Shneiderman (2000), the provision of explicit and meaningful information about and proper representation of the particular products that sellers offer is conducive to buyers' confidence in appropriate, future seller conduct. When a buyer perceives that such information and representation is detailed, explicit and accurate, he is likely to infer that sellers are professional, dedicated and responsible and will thus behave honestly and sincerely during a transaction (cf. Belanger, Hiller, and Smith, 2002; Xiao and Benbasat, 2007). Contrariwise, a buyer may believe that sellers who provide limited or inaccurate product information withhold or misrepresent this information purposefully to deceive him, and he is thus likely to see these sellers as swindlers. Accordingly, and following Kambil and Van Heck (1998) and Kim and Forsythe (2008):

H2: Providing appropriate product information reduces seller risk.

Consumers tend to use any readily attainable form of information as a basis for judging objects, parties or settings and for decision making, even if this information is secondary and does not directly relate to these objects, parties or settings (Kardes, Posavac, and Cronley, 2004). The same is likely to apply to C2C EMs. Based on seller and product information, buyers can also make inferences about the need for the intermediary's regulatory measures and judge the ability of the organization to effectively apply these measures. For instance, when these types of information make a good impression on buyers, they may conclude that the intermediary apparently selects and monitors sellers properly. Since selection and monitoring are important forms of institutional control that increase the perceived safety of conducting transactions in an EM (Pavlou, 2002; Pavlou and Gefen, 2004), this is likely to convey that the company will

continue applying these and other forms of control effectively during actual transactions to protect buyers from opportunistic seller behavior. Therefore, we anticipate:

H3: Providing appropriate seller information reduces intermediary risk.

H4: Providing appropriate product information reduces intermediary risk.

3.2 Seller risk and intermediary risk as purchase determinants in C2C EMs

The marketing discipline has long considered seller risk a critical factor in the purchase-related decision making of consumers (cf. Grewal, Gotlieb, and Marmorstein, 1994). When a buyer believes that sellers are likely to harm his interests, he will try to minimize this harm and be less inclined to transact with these sellers (Mitchell, 1999; Peter and Tarpey, 1975). The outcomes of empirical studies of the determinants of online purchase behavior strongly confirm this (e.g., McKnight et al., 2002; Pavlou, 2003). More specifically, existing empirical research findings suggest that seller risk influences purchase behavior through a negative impact on the buyer's attitude towards purchasing (e.g., Jarvenpaa, Tractinsky, and Vitale, 2000; Van der Heijden et al., 2003). This leads to the following assumption:

H5: Seller risk negatively influences a buyer's attitude towards purchasing in a C2C EM.

According to the literature, people are generally less positive about conducting themselves in a particular way if they believe that the risks pertaining to this conduct are subject to merely limited institutional control (Renn, 2008). McKnight et al. (2002) presents evidence that this also applies to online purchasing; consumers are less likely to purchase online in an apparently insufficiently safeguarded purchase environment. Therefore and in line with the work of Verhagen et al. (2006), if buyers perceive that the intermediary is unable to provide sufficient

formal control to safeguard buyers, this is likely to have a negative impact on buyers' attitude towards purchasing from the population of sellers in the C2C EM:

H6: Intermediary risk negatively influences a buyer's attitude towards purchasing in a C2C EM.

Previous empirical research shows that perceptions regarding the potential improper behavior of a party are transferable to another party associated with the first party (see e.g., Stewart, 2003). More specifically, the outcomes of this research (e.g., Pavlou and Gefen, 2005) indicate that when a buyer perceives that the intermediary will be unable to regulate the C2C EM and protect buyers against fraudulent and opportunistic seller conduct, this is likely to increase the perceived risk of such seller conduct. Thus, in addition to the direct effect proposed in the above, intermediary risk may also influence the purchase attitude via seller risk. In line with this rationale, the following hypothesis completes our research model:

H7: Intermediary risk negatively influences seller risk.

4 Research method

4.1 Procedure

An online survey design was used to test the research model. The sample consisted of visitors of the digital camera section of eBay.nl, the Dutch version of eBay.com, with whom the authors had a research agreement. The selection of eBay as well-known EM ensures that the research data represents true buying behavior (cf. Wu, Chen, and Chung, 2010), adding to the external validity of the research. The survey focused on digital cameras since these are typical experience

products that are relatively susceptible to perceptions of risk (Girard and Dion, 2010), making the product very suitable as frame of reference. Banners were placed in the digital camera section, inviting visitors to participate in the survey voluntarily by clicking on a hyperlink to an online questionnaire. As incentive, respondents could engage in the raffle of a book token of 20 Euro by entering their e-mail address.

4.2 Measurement

The constructs were operationalized with existing, validated multi-item scales. The measures for product information and seller information were directly taken from Meents (2009). The measures for seller risk, intermediary risk and attitude towards purchasing were derived from Verhagen et al. (2006). Given that both underlying papers also used the measures to explain behavior in a particular C2C EM, adaptations to the context of this research were unnecessary.

The study here centers on transactions between consumers. Yet, some buyers or sellers in C2C EMs can also be business buyers or sellers (see Pinker, Seidmann, and Vakrat, 2003). Therefore, the questionnaire clearly stated that it addressed respondents' perceptions of, beliefs about, and attitudes towards non-professional sellers.

The questionnaire was constructed and translated into the language in which it was to be administered (i.e., Dutch) using the following procedure. First, a bilingual speaker whose base language is Dutch translated the English questionnaire into Dutch (cf. Malhotra, Agarwal, and Peterson, 1996). A second bilingual speaker whose base language is English then compared this Dutch questionnaire to the original English questionnaire. Afterwards both bilingual speakers discussed the appropriateness of the translation (cf. Song and Parry, 1997). To judge the

interpretability of the translated questionnaire, focus group interviews with 10 undergraduate students and 2 practitioners working for eBay.nl were held. Some minor refinements were made.

4.3 Sample

A total of 928 completed online questionnaires were received. Table 1 displays the sample demographics.

Table 1: Sample demographics (*n* = 928)

Characteristic	Category	Percentage	Count
Gender	Male	48.6	451
	Female	51.4	477
Age	<21	3.8	35
	21-30	20.9	194
	31-40	34.1	316
	41-50	25.9	240
	51-60	12.2	113
	>60	3.2	30
Frequency of visiting eBay.nl	This is the first time	0	0
	A couple of times per year	0.3	3
	Once a month	1.9	18
	Once a week	6.5	60
	A couple of times per week	91.3	847
Times bought via eBay.nl	Never	0.5	5
	Once	1.5	14
	Twice	2.5	23
	Three times	2.8	26
	Four times or more	92.7	860

The demographics show that 48.6 % of the respondents were men and 51.4% women. The majority of the respondents was between 31 and 50 years old (*n* = 556, 60%). 91.3% of the respondents reported to visit eBay.nl a couple of times per week, 92.7% of them indicated to

have bought via eBay.nl four times or more. Although a sample bias was noticed (i.e., the vast majority consisted of middle-aged, extensive users and experienced buyers), eBay.nl confirmed that the sample profile matches their own customer profiles and thus seems representative for the kind of EM under examination.

5 Results

This study applies Anderson and Gerbing's (1988) two-step Confirmatory Factor Analysis (CFA) approach (using Amos 7 with maximum likelihood estimation (MLE)) to assess the psychometric properties of the measures and to estimate the structural model. This implies an estimation of the measurement model prior to a simultaneous estimation of the measurement and structural submodel(s) (cf. Del Río-Lanza, Vázquez-Casielles, and Díaz-Martín, 2009). Following Chin and Todd (1995), the dataset concerns two independent, randomly split subsamples of the original sample: one calibration sample (n = 464) for estimating the measurement model, and one validation sample (n = 464) for the simultaneous estimation of the measurement and structural model.

5.1 Measurement model

The initial fit indices demonstrate an unacceptable overall fit with the data. An assessment of the pattern of residuals to locate the source(s) of misspecification indicates that three of the original items (see Appendix) share large residuals with other items (cf. Gerbing and Anderson, 1988). Given that these items are also subject to wording redundancy with other items within the scale, it is appropriate to drop them and rerun the CFA (cf. Netemeyer, Bearden, and Sharma,

2003). The resulting fit indices demonstrate a good fit with the data (CMIN/*df*: 2.747; GFI: 0.91, AGFI: 0.89, NFI: 0.95, IFI: 0,97; TLI: 0.96, CFI: 0.97, RMSEA: 0.061), except for the chi-square statistic ($\chi 2 = 390.096$, $df = 142$, $p < 0.001$). Taking into account that the chi-square statistic is known to be overly sensitive to sample size (Millsap, 2007), the fit indices provide clear evidence for unidimensionality, convergent validity and discriminant validity of the measures. The computed factor loadings, Cronbach's alphas, composite reliabilities, minimum item-to-total correlations and Average Variance Extracted (AVE) (Table 2) give additional evidence for convergent validity and reliability of the measures since all scores exceed accepted rules of thumb (Fornell and Larker, 1981; Jayanti and Burns, 1998; Ping, 2004; Yi and Davis, 2003).

Table 2: Dimensionality, reliability and convergent validity statistics

Construct (no. of items)	**Factor loadings measurement model (CFA)**	**Factor loadings structural model (SEM)**	**α**	**Composite reliability**	**Minim. item-to - total correlation**	**AVE**
Product information (5)	0.81	0.85	0.89	0.93	0.69	0.72
	0.83	0.86				
	0.84	0.87				
	0.81	0.82				
	0.74	0.73				
Seller information (3)	0.71	0.77	0.89	0.93	0.69	0.82
	0.92	0.93				
	0.95	0.94				
Seller risk (4)	0.93	0.90	0.93	0.95	0.80	0.83
	0.97	0.95				
	0.81	0.86				
	0.79	0.86				
Intermediary risk (4)	0.78	0.82	0.92	0.94	0.74	0.79
	0.92	0.93				
	0.89	0.92				
	0.81	0.80				
Attitude (3)	0.89	0.89	0.95	0.97	0.87	0.92
	0.97	0.97				
	0.95	0.95				

All inter-construct correlations and inter-item correlations between the constructs are below the 0.70 threshold (Ping, 2004). Additionally, the AVE of each construct is greater than the squared correlation coefficient between the constructs. These outcomes confirm the discriminant validity (Fornell and Larker, 1981; Ping, 2004; Yi and Davis, 2003).

Table 3: Discriminant validity: AVE versus squared correlation coefficients between the constructs.

Construct	Product information	Seller information	Seller risk	Intermediary risk	Attitude
Product information	**0.72**				
Seller information	0.21	**0.82**			
Seller risk	0.15	0.10	**0.83**		
Intermediary risk	0.10	0.16	0.37	**0.79**	
Attitude	0.16	0.06	0.33	0.17	**0.92**

Note: the bold scores (diagonal) are the square roots of the AVEs of the individual constructs. Of the diagonal are the squared correlations between the constructs.

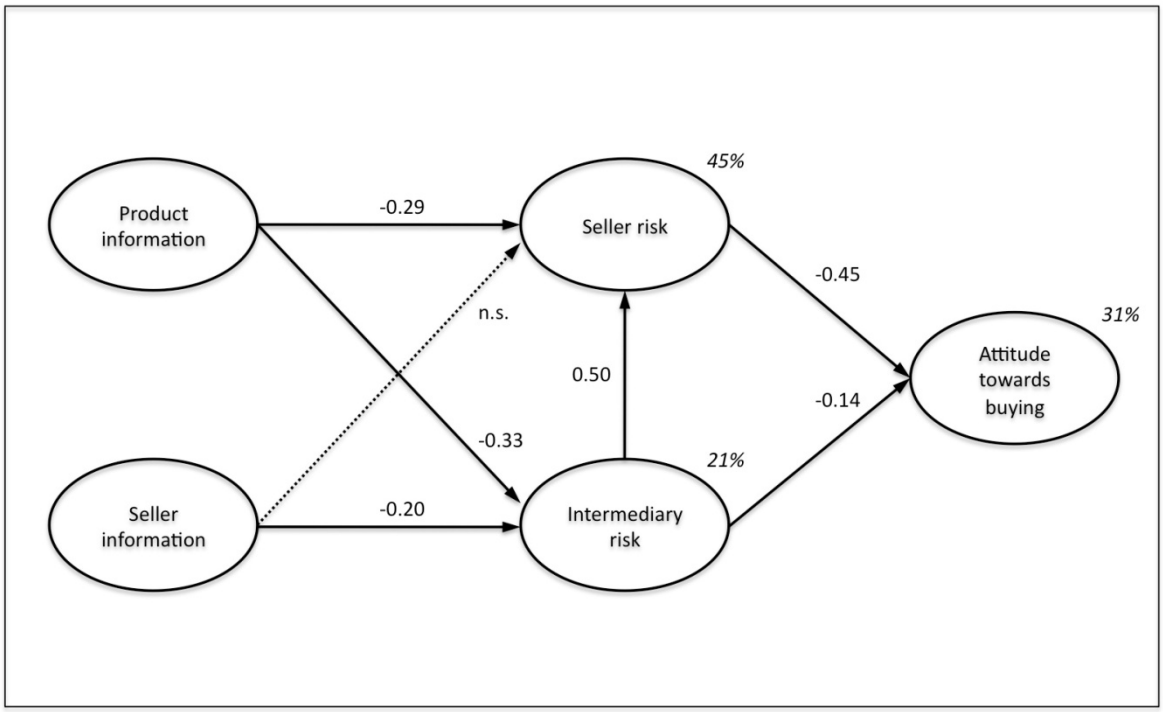
Finally, the fact that the data collection concerns a single source of information and one point in time necessitates a test for common method bias. Harmon's single-factor test, loading all measurement items into one exploratory factor analysis (PCA) and assessing whether one single factor emerges or one factor emerges that accounts for the majority of the variance (see Podsakoff, MacKenzie, Lee, and Podsakoff, 2003), yields the following results. As the factor solution contained five factors, each of the items strongly loads solely on the underlying factor, and the first factor does not account for the majority of the variance, the test gives no indication for common method bias. An additional CFA confirms the absence of common method bias; the

fit of a single factor model (all items loading on one factor) shows very poor fit ($\chi 2$ = 4530.30, *df* = 151, $p < 0.001$; CMIN/*df*: 29.805; GFI: 0.44; AGFI: 0.30; NFI: 0.46; IFI: 0.47; TLI: 0.40; CFI: 0.46; RMSEA: 0.249) compared with the fit indices for the five-factor measurement model.

5.2 Structural model

An estimation of the structural model using the validation sample to test the hypotheses results in fit indices that, apart from the chi-square statistic ($\chi 2$ = 421.687, *df* = 144, $p < 0.001$), indicate acceptable fit with the data (CMIN/*df*: 2.928; GFI: 0.91; AGFI: 0.88; NFI: 0.95; IFI: 0,97; TLI: 0.96; CFI: 0.97; RMSEA: 0.065). Figure 1 shows the estimated path coefficients (ß) and R^2 values of the structural model.

Figure 1: Results structural model



Note: all path coefficients are significant at p < 0.001, except for party risk → attitude (p <0.01)

Overall, the results confirm the predictive power of the model. The amount of explained variance is rather high. The results support 6 hypotheses (H2, 3, 4, 5, 6 and 7) and reject one (H1).

6 Discussion and conclusion

This study generates insight into how sellers can stimulate purchasing in EMs by using information as a risk reduction signal. As such, the study contributes to the existing theory by (1) establishing that product and seller information are important risk reduction signals for buyers in C2C EMs, (2) demonstrating that the risk reduction potential of product and seller information may be different across risk types, (3) showing that through perceived risk the provision of seller and product information is likely to contribute to the commercial success of the EM.

First, the reported path coefficients and explained variances demonstrate that, overall, product and seller information have a direct and considerable negative effect on perceived risk in C2C EMs, indicating that both sources of information are important signals that buyers may use as a risk coping approach. Accordingly, this research contributes to signaling theory by stressing the relevance of product and seller information as quality signals in online mediated trading settings. In addition, the results indicate that product and seller information seem a valuable addition to the range of antecedents of risk contained within the existing theory on perceived risk (see e.g., Conchar et al., 2004). The combination of these separate contributions to signaling theory and perceived risk theory is a contribution in itself, since this paper adds to the limited number of studies that address how to bridge the conceptual gaps between signaling theory and perceived risk theory in order to increase the scientific knowledge of how sellers may facilitate risk coping by buyers.

Furthermore, and this is the second scientific contribution, this study is among the first to focus specifically on the relative importance of risk reduction signals in buyer-seller relationships that are mediated by a third-party company. The research outcomes augment the work of several authors who argue that different forms of signals may have discrepant effects on particular types of risk in commercial relationships (e.g., Biswas and Biswas, 2004). More specifically, the results demonstrate that the effectiveness of product and seller information as risk reduction methods may be different across risk types. Although the data show that the effect of product information on seller risk and intermediary risk is direct and quite strong (standardized path coefficients: -0.29 and -0.33 respectively), seller information has a smaller direct effect on intermediary risk (standardized path coefficient: -0.20), and contrary to prior expectations, does not have a significant impact on seller risk. The used sample of quite experienced buyers may be the cause of the latter, insignificant finding. As past research on consumer inference indicates (for an overview see Kardes et al., 2004), it is conceivable that as consumers gain experience with sellers in a C2C EM, they learn that they can rely on their aggregated perceptions of these sellers, instead of the seller information that an individual seller provides. Future research may shed light on how the predictive value of the two studied signal types is moderated by factors such as user experience. Overall, the aforementioned research outcomes appear to be quite interesting as they indicate that by providing more appropriate information, sellers are capable to directly influence buyers' risk perceptions regarding the intermediary to a far larger extent than risk perceptions regarding themselves. While seller information does not appear to have a direct impact on seller risk, this form of information does remain an important indirect method to reduce seller risk. Just like product information, seller information reduces intermediary risk, and this type of risk has a strong positive effect on seller

risk in this study (standardized path coefficient: 0.50) and previous research alike (Verhagen et al., 2006). These findings, combined with insights that previous research generates on the impact of the intermediary's actions on seller risk (e.g., Pavlou and Gefen, 2004, 2005) underline the important interplay of sellers and the intermediary in C2C EMs; apparently sellers can exercise an influence on buyers' risk perceptions regarding the intermediary and vice versa.

As a third contribution, the study also expands existing research on the determinants of purchase behavior in EMs. More specifically, it demonstrates that an appropriate provision of seller and product information by sellers is likely to have a positive effect on this purchase behavior through an influence on buyers' perceived risk. As to the impact of perceived risk on purchase behavior, the results corroborate the outcomes of the exploratory empirical study of Verhagen et al. (2006) by showing that especially seller risk has a strong, direct effect (standardized path coefficient: -0.45) on the attitude towards purchasing. In all, the outcomes of our study emphasize that sellers have a more active and influential role in C2C EMs than existing research models suggest. Obviously, the operation of such EMs does not only depend on the provision of an effective infrastructure by the intermediary, but also on the transactional services that sellers provide when using this infrastructure. The findings underline that information provision is an essential element of these services, particularly given that information search is one of the phases in the consumer purchase decision making process in which marketing related actions have the most impact (Schmidt and Spreng, 1996). This has clear implications for practice. Sellers have to realize the risk reduction potential and thus the commercial value of disseminating clear and sufficient information about themselves and their products. In addition, it seems wise if intermediaries go beyond their own provision of formal control mechanisms and acknowledge this potential. After all, product and seller information

appears to be able to help create a climate in which consumers feel more comfortable with the prospect of purchasing in the particular EM. Accordingly, intermediaries may stimulate sellers within their EM to better the way in which they represent themselves and the products they sell. For example, intermediaries can explain sellers the value of providing an easy to comprehend, detailed and faithful indication of the condition of the offered product using, for example, textual descriptions and photographs. Additionally, they can provide sellers with tutorials and offer financial incentives to those sellers who use certain methods for product or seller representation.

7 Limitations and future research

Although this study provides interesting insights into the effectiveness of information provided by sellers as a risk reduction instrument, this study has several limitations. First of all, due to practical limitations this study only examines one instance of a C2C EM. Therefore, although the findings of this study are quite promising, it remains to be seen whether they can be generalized to other EMs. Other academics are encouraged to investigate this further using data collected in a number of EMs with different characteristics, in multiple countries.

Second, differences between new and used products or between products with dissimilar levels of purchase risks are not considered in this empirical study. Consequently, generalizing the results of this study to different types of products demands for caution. For example, purchasing used products may be perceived to be more risky (cf. Ba and Pavlou, 2002) and may thus lead to a different impact of the studied risk variables. Consequently, it seems appropriate for future research to examine whether the reported research findings are also applicable to other types of products.

Finally, existing research (Verhagen et al., 2006) clearly supports that seller risk and intermediary risk are two separate forms of perceived risk that are relevant in C2C EM settings. Accordingly, and in line with the objectives, this study centers on further investigating perceived risk at this actor level. This is not to say that studying perceived risk at a product level is inappropriate or uninteresting. On the contrary, the literature on buyer-seller relationships in general describes the potential impact of product risk and of its multiple facets (such as functional, psychological, social, and monetary risk) on consumers' purchase behavior (e.g., Dowling and Staelin, 1994; Roselius, 1971). For example, product information in C2C EMs may reduce perceived product risk even more than seller risk and intermediary risk since this information directly targets at conveying the quality of the products. Other scholars can address this issue by, for example, testing the influence of the provision of product and seller information by sellers on risk perceptions at both the actor and product level. Such a multi-perspective approach is likely to result in valuable new insights.

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Appendix: Measurement scales

Product information (Seven point semantic differential; response categories: very-quite some-neutral- some, quite, very). Mean (SD) = 4.63 (1.076)

1. Unclear/Clear descriptions of <name products>
2. Incorrect/Correct descriptions of <name products>
3. Bad/Good representation of <name products> (images/photos)
4. Difficult/Easy to assess the quality of <name products> **
5. Insufficient/Sufficient photos of <name products>
6. Unclear/Clear whether <name products> are used **
7. Unclear/Clear condition of <name products>

Seller information (Seven point semantic differential; response categories: very-quite some-neutral- some, quite, very). Mean (SD) = 5.48 (1.199)

1. Insufficient/Sufficient information about sellers
2. Unclear/Clear indication of sellers' reputation
3. Insufficient/Sufficient information about sellers' reputation

Seller risk (Seven point Likert scale ranging from highly disagree to highly agree). Mean (SD) = 4.11 (1.412)
As I consider to purchase a <product> through this online marketplace, I become concerned about:

1. whether sellers will commit fraud
2. whether sellers will swindle
3. whether sellers offer products that will not perform as expected
4. whether sellers will behave opportunistic

Intermediary risk (Seven point Likert scale ranging from highly disagree to highly agree). Mean (SD) = 3.71 (1.501)
If I were to purchase a <product> through this online marketplace, I become concerned about:

1. whether <name intermediary> will take care of transaction security **
2. whether <name intermediary> will preclude theft of money
3. whether <name intermediary> will protect me against fraudulent sellers
4. whether <name intermediary> will prevent fraudulent seller from doing business via the EM
5. whether <name intermediary> will trace sellers in case of disputes

Attitude towards purchasing (Seven point Likert scale ranging from highly disagree to highly agree). Mean (SD) = 4.36 (1.648)

1. I am positive towards buying a <product> on the <name> website.
2. The thought of buying a <product> at the website of<name> is appealing to me.
3. I think it is a good idea to buy a <product> at the website of <name>.

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