Privacy in the Sharing Economy

Abstract

Contemporary C2C platforms, such as Airbnb, have exhibited considerable growth in recent years and are projected to continue doing so in the future. These novel consumer-to-consumer marketplaces have started to obliterate the boundaries between private and economic spheres. Marketing personal resources online is inherently associated with the disclosure of personal and sometimes intimate information. This raises unprecedented questions of privacy. Yet, there is so far little research on the role of privacy considerations in the sharing economy literature. Leveraging the theoretical perspective of privacy calculus, we address this gap by investigating how privacy concerns and economic prospects shape a potential provider's intentions to share via different communication channels. We relate privacy concerns back to the provider's perceptions of the audience. We evaluate our research model by means of a scenario-based online survey, providing broad support for our reasoning.

Introduction

Information and communication technology (ICT) has changed the character of social and economic interactions. In an increasingly digital and information-driven world, the so-called “sharing economy,” instantiated by consumer-to-consumer (C2C) platforms such as Airbnb, BlaBlaCar, and many others, enables users to rent out personal resources such as their apartments or spare seats in their cars. In a very short time span these platforms have created global multi-billion dollar markets. A recent EU report estimates annual consumer spending in P2P online markets at €6.6 billion for accommodation, and €1.0 billion for ridesharing (EU 2017). In the US context, the market research firm eMarketer projects that the number of adults using commercial sharing services will grow to over 85 million by 2021 (eMarketer 2017). Going forward, overall market volume is predicted to reach nearly $335 billion by 2025 (PwC 2015, 2016). With regard to individual sectors, investment research group PiperJaffray estimates that by 2025, peer-to-peer accommodation platforms will generate revenues of over $100 billion (up to 10 percent of all bookings) and that ridesharing companies will capture more than 5 percent of the $90 billion global taxi market (Olsen and Kemp 2015).

Already the boundaries between the private and economic spheres have started to erode (Slee 2016; Sundararajan 2016). Enabled by online and mobile ICT, private individuals have gained the ability to monetize their idle or underused personal resources as micro-entrepreneurs on a large scale, but at the cost of revealing personal data. Einav et al. (2015, p. 629) note that peer-to-peer marketplaces “rely extensively on user data and algorithms to match buyers and sellers, set prices, and monitor behavior.” The availability of personal information is considered a crucial prerequisite for creating trust among peers on such platforms (Proserpio et al. 2016;

Teubner and Hawlitschek 2018; Ufford 2015). At the same time Internet users' privacy concerns become increasingly important (Goldfarb and Tucker 2012).

Ten years ago, it was virtually inconceivable to host strangers in one's private home (e.g., during an absence) in order to generate extra income. This has changed and the norms and boundaries between social and economic matters have shifted dramatically – or, as Acquisti et al. (2015, p. 509) put it, "If this is the age of information, then privacy is the issue of our times." The sharing economy pits information disclosure, economic considerations, and privacy concerns against each other.

It is important to understand that these C2C transactions differ in several ways from traditional C2C e-commerce (e.g., eBay): First and foremost, the products on these platforms furnish intimate insights into the providers' most personal realms. It is quite obvious that such intrusions into the providers' personal spheres are considered infringements of their extended selves and may cause physical and psychological discomfort (Lutz et al. 2017). Importantly, however, even before a transaction actually takes place, personal data is revealed as resources are typically marketed through vivid online profiles which often include real names, information regarding one's residence, personal self-descriptions, photographs, and many further aspects (Dambrine et al. 2015; Ma et al. 2017). Such transparency is considered a prerequisite for online trust and reputation (Gebbia 2016; Teubner et al. 2016): Providers can only successfully market their resources if they disclose personal information to signal trustworthiness and quality (Huang and Liu 2010). As providers on C2C platforms are private individuals, this immediately raises the question of how their preference for privacy may be balanced against economic prospects (Dinev and Hart 2006; Krasnova et al. 2012).

Despite the growing importance of C2C platforms, there is still a lack of research and understanding of this implicit *privacy calculus* in the sharing economy (Culnan and Armstrong 1999; Kordzadeh and Warren 2017). In particular, it is important to note that existing conceptualizations of privacy concerns are grounded in B2C e-commerce and hence take a solely consumer-centered perspective (Malhotra et al. 2004; Smith et al. 1996). In these settings, sensitive information such as credit card information, address, or passwords are transferred to an e-vendor. Privacy concerns in this traditional sense must be understood as the apprehension of potential "catastrophic" events due to an e-vendor's error or negligence (e.g., server corruption, mistakes, mischief), resulting in spam, identity theft, or data breaches (Acquisti et al. 2016; Dakhlia et al. 2016). In contrast, providers on C2C platforms publish personal information *prior* to engaging in any transactions. Critically, these platforms emphasize personal attributes and create novel "spaces of domestic entrepreneurialism" (Stabrowski 2017). Thereby, the identities and personal characteristics of consumers, as well as providers, may be revealed.

Figure 1 displays a localization of C2C renting and sharing platforms within the broader sharing economy landscape (Neunhoeffer and Teubner 2018). The tendency towards conceptualizing users as "brands" is amplified by the incorporation of social media and online social networks into such platforms (Ma et al. 2017; Tussyadiah 2016a; Yannopoulou 2013). From the provider's perspective, this introduces the possibility that a *personal connection* with the addressed audience may exist when advertising a resource online. This may include unidirectional or mutual knowing, taking interest in, or other types of social relations (Barasch and Berger 2014; Gremler and Gwinner 2000; Kim et al. 2015). Information disclosure can thus potentially yield

negative social consequences such as gossip and other social repercussions (Debatin et al. 2009; Kordzadeh and Warren 2017; Krasnova et al. 2009).

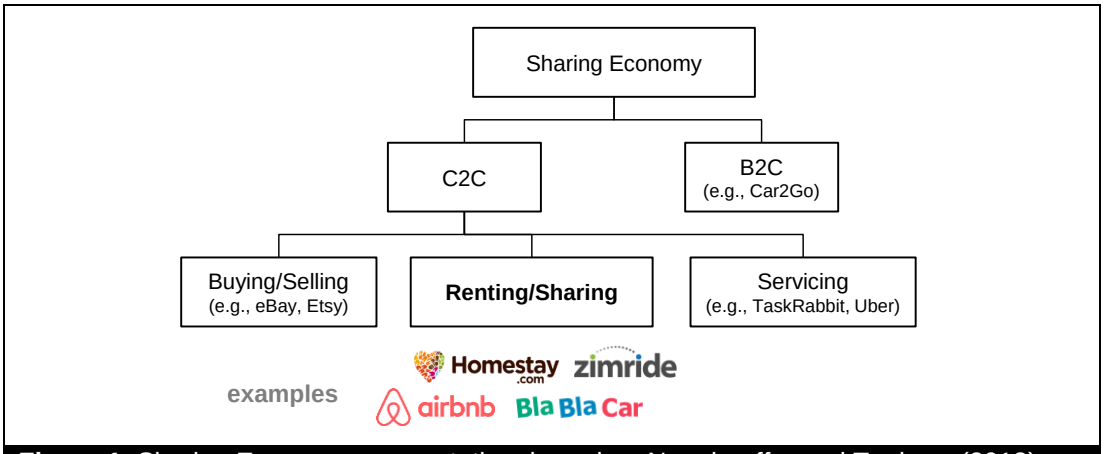

Figure 1. Sharing Economy segmentation; based on Neunhoeffer and Teubner (2018)

Consider, for instance, someone who seeks to occasionally rent out a spare guest room for short-term stays. Besides a high level of trust in a potential guest, this also requires the would-be host to disclose to the addressed audience personal (and potentially intimate) insights into their home. Such detailed information facilitates inferences regarding habits and preferences, and often with respect to personal circumstances and personality traits, as well (Gosling 2009; Gosling et al. 2002). Advertising one's apartment with photos of the living room may reveal preferences and personality traits through furniture, photos, or literature on the bookshelf. In the context of ridesharing, posting a ride (from A to B on day X and time Y) enables inferences as to the provider's whereabouts to any interested observer. The *aggregation* of different informational sources (e.g., from online social networks and C2C platforms) can be particularly revealing (Mitrou et al. 2014). It is easy to imagine that many providers would prefer that personal information regarding their homes and whereabouts not be freely circulated among acquaintances such as coworkers or neighbors.

However, the social dynamics among acquaintances represent largely unchartered territory (Morgan 2009). These acquaintances are defined “not so much as people who are not intimates but as people with whom there are […] fragments of intimacy” (Morgan 2009, p. 4). The distinct role of acquaintanceship can be observed in the most mundane settings. Going to a public sauna or gym with close friends is fine, and the presence of complete strangers in such locations does not typically bother us, but running into colleagues or acquaintances at such places may be awkward (ActiveWanderer 2016). Similarly, we sometimes share surprisingly personal information with the stranger next to us on an airplane – information we would otherwise only share with close friends or family, but certainly not with our coworkers or more casual social contacts (Acquisti et al. 2015). Such examples illustrate that the willingness to share personal information is very likely to depend on the type of audience being addressed.

This paper seeks to demonstrate that a similar logic applies to the communication of information related to personal resources (such as that typically advertised in sharing scenarios). Specifically, we show that a (potential) provider’s privacy concerns associated with a certain communication channel exhibits a curvilinear form whereby information is readily shared on a very small scale, that is, among close circles of friends or family, *and also* on large-scope platforms, publicly accessible and targeted to potentially any Internet user, *but much less* so on intermediate levels. In particular, we investigate

1) the role of privacy concerns and economic prospects in relation to a provider’s intentions to share (i.e., to advertise personal resources via a certain channel),
2) how privacy concerns emerge from the channel-specific factors *perceived audience size* and the provider’s *personal connection* with the audience.

To this end, we develop a research model applying the theoretical lens of privacy calculus (Dinev and Hart 2006; Krasnova et al. 2012), in which the provider's *intention to share* results as a tradeoff between privacy concerns and economic prospects. Privacy concerns, in turn, emerge from the interacting factors *perceived audience size* (i.e., a user's perception of how large the audience of a given communication channel would be; Chiu et al. 2013) and *personal connection* (i.e., a user's expectation of recognition, public interest, and social relation with the audience; Gremler and Gwinner 2000). To evaluate our research model and to study how users experience novel C2C sharing platforms, we employ a scenario-based online survey.

In doing so, this research makes three core contributions to the IS literature. First, embedded in the theoretical framework of privacy calculus, we consider privacy concerns from the provider's perspective in sharing scenarios. This represents a particularly important contribution since privacy concerns have not thus far applied to the providers in B2C (i.e., the businesses). Consequently, the majority of the existing literature takes a consumer-centered perspective, whereas the *providers'* perspective has received far less attention; see Ikkala and Lampinen (2015) and Karlsson et al. (2017) for exceptions. Moreover, in comparing a variety of different potential advertising channels (e.g., social networks, personal communication), we embed C2C sharing platforms (such as Airbnb) within the broader field of research on privacy and self-disclosure, for instance on social network sites such as Facebook (Bartsch and Dienlin 2016; Debatin et al. 2009; Dienlin and Metzger 2016).

Second, based on the outlined factors, we contribute to an explanation of the driving factors behind privacy concerns with regard to advertising personal resources online. In particular, we explore the roles of audience size and social distance as inhibitors of information disclosure. In this respect, we follow Morgan (2009) in highlighting the

special role of acquaintances. We find that that intimate insights are considered particularly problematic when revealed to audiences of intermediate social distance.

Third, we contribute to the general understanding of novel, peer-based electronic markets and their relation to online social networking. Our study informs the information systems design of such C2C platforms since the appropriate use of elements such as social media integration, user representation, and tools for privacy management determines whether providers will engage in C2C sharing or not.

The remainder of this paper is organized as follows. After locating our study within the broader sharing economy landscape and privacy calculus theory, we derive our hypotheses and research model in Section 2. In this model, the factors of actual and perceived audience size, personal connection, economic benefit, and privacy concerns are linked to explain whether resources are likely to be shared via certain channels or not. The focus of this research lies on the provider's perspective of advertisement and we employ a set of common channels. We then test our hypotheses with data and explore Internet users' willingness to disclose personal information through a variety of communication channels by means of a scenario-based online study with 237 participants. Section 3 lays out the survey design while Section 4 presents the results, which provide strong support for our hypotheses. We discuss implications and limitations of our study in Section 5. Section 6 concludes.

Theoretical Background

Speaking in reference to the emerging technology of photography, Warren and Brandeis (1890, p. 193) first defined privacy as "the right to be left alone." Today's Internet users have come a long way since then. They permissively share personal information online, knowingly or unknowingly, often with the emphatic desire *not* to be

left alone, but to experience feedback, emotional support (Koroleva et al. 2011), and connectedness (Krasnova and Kift 2012).

Advertising personal resources inherently creates an overlap between the private and economic spheres (Sundararajan 2016). Providers must therefore balance economic aspiration and individual privacy preferences by choosing which information to disclose, to whom, and via which channel. While research on audience effects has primarily focused on how tie strength affects communication and self-disclosure behavior, audience size represents a fundamental parameter, as well (Barasch and Berger 2014). Emerging C2C platforms, as one possible type of channel for advertisement, put their users in the tricky position of minding both. They require the disclosure of personal data as an investment in the micro-entrepreneurial endeavor – for purposes of information provision, self-marketing, and for creating trust (Dakhlia et al. 2016). Yet both consumers and providers also "have an interest in disclosing as little information about themselves as they can and to remain anonymous to the extent feasible" (Dambrine et al. 2015, p. 7). For accommodation sharing, specifically, the necessary information includes object description and photos, personal background information (typically name, photo, self-description), information on availability, as well as a pricing scheme (Teubner et al. 2016). Once disclosed, information on any platform can be readily (mis)used for economic and social discrimination, hidden influence and manipulation, coercion, or censorship (Acquisti et al. 2015). In light of the relevance of privacy-related user behavior and associated technology to the field of IS, "the information age has rendered information privacy a core topic in IS research" (Pavlou 2011, p. 977). In this section, we thus first locate our work within the broader literature on privacy in the sharing economy and outline the theoretical

foundations for our research model. We then present our research model and derive our hypotheses.

Privacy in the Sharing Economy

Novel C2C platforms have experienced tremendous growth and increasing attention in the academic and popular press for the past several years (Slee 2016; Stephany 2015; Sundararajan 2016). They continue to attract a wide range of users and have established themselves as a viable alternative to traditional modes of consumption (Cusumano 2015; Hellwig et al. 2015). Most studies focus on shared mobility and accommodation sharing (e.g., Ikkala and Lampinen 2015; Karlsson et al. 2017; Möhlmann 2015; Teubner and Flath 2015; Tussyadiah 2016b), whereby providers advertise and share their vehicles and homes. Despite several critical voices accompanying the rise of C2C platforms,[1] the literature on *privacy* in the sharing economy is still sparse, but the findings suggest that privacy concerns in fact inhibit C2C sharing (Frick et al. 2013; Hawlitschek et al. 2016). In view of the users' online presence on sharing platforms, visual avatars were suggested as a compromise between creating social presence and trust, while at the same time preserving higher levels of anonymity (Riedl et al. 2014; Teubner et al. 2014).

Beyond the direct means of user representation, novel C2C platforms hold yet another potential source for privacy invasions: textual peer reviews on the provider's profile page (Zervas et al. 2015). Many platforms display such written testimonials, authored by prior transaction partners and potentially including highly intimate cues ("... the lavatory was a mess") or character descriptions (Abramova et al. 2015). Accidental

[1] For example, there are reports on false claims made by platforms, the undermining of work standards and regulations, as well as issues of discrimination (Avital et al. 2015; Edelman et al. 2017; Hartl et al. 2015; Malhotra and Van Alstyne 2014; Slee 2016).

privacy invasion may also occur due to items visible in the background of ad photos or from context – for instance, when offering a ride to a certain location on a certain dates gives a broad hint as to one's purpose (e.g., pointing to a certain conference or festival) (Gosling 2009; Gosling et al. 2002). Beyond the limited empirical insights into the role of privacy within the sharing economy, we are not aware of scientific contributions on this matter, marking a clear research gap.

Privacy Calculus

Regarding privacy as an absolute, untouchable value fails to explain behavior in many scenarios involving the voluntary disclosure of personal information, where "the amount of personal information that is revealed in a transaction results from the *trade-off* between privacy protection and the need for information of each party" (Acquisti 2013, p. 552, own emphasis). Although consumer polls regularly suggest that people value privacy, such claims often stand in stark contrast to observed behavior (Acquisti et al. 2015). This deviation of stated preferences and actual behavior is referred to as the *privacy paradox* (Barnes 2006; Jensen et al. 2005; Norberg et al. 2007). This has inspired the idea of a *privacy calculus* according to which users deliberately forfeit some degree of privacy in order to gain economic or other benefits, thus treating personal information as a tradeable commodity (Dinev and Hart 2006; Xu et al. 2010).

Privacy calculus is rooted in libertarian political sciences and economics where authors such as Culnan and Armstrong (1999) and Bennett (2001) turned away from previous, more value-laden views and attributed an economic component to privacy, subject to economic cost-benefit analysis (Culnan and Bies 2003; Smith et al. 2011).[2]

[2] Thereby, privacy calculus builds upon the behavioral calculus theory (Laufer et al. 1973; Laufer and Wolfe 1977). The central idea is that prior to pursuing a social interaction, an individual will balance the benefits against the risks of this interaction. Interestingly, Laufer et al. (1973) anticipated online users' privacy considerations with almost uncanny precision, stating that "in highly technologically complex

Laufer and Wolfe (1977) noted that a calculus of behavior (considering norms of appropriate behavior, anticipated benefits, and unpredictable consequences) represents an important predictor of whether individuals will disclose personal information or not. The concept seems especially useful in the context of voluntary information disclosure as it enables the analysis of the implicit rationale behind such decisions. In traditional e-commerce settings, privacy calculus assumes the perspective of an Internet user who is required to provide some personal data (e.g., address, credit card number) to an e-commerce vendor (Malhotra et al. 2004). This reflects one side of the scale, where individuals either risk a "loss of privacy as a result of information disclosure to an online business" (Xu et al. 2008, p. 4) or "surrender a certain degree of privacy in exchange for outcomes that are perceived to be worth the risk of information disclosure" (Dinev and Hart 2006, p. 61). Rewarding outcomes may come in the forms of enjoyment (Sledgianowski and Kulviwat 2008), financial discounts, or convenience (Dinev 2014). The privacy concern itself is rooted in uncertainty as to whether the e-commerce vendor may (technically) be incapable of securely maintaining the data, whether communications could be intercepted, whether bothersome advertising might occur in the future, or whether users would face the risk of being "vulnerable to a company's potential opportunistic behaviors" in general (Malhotra et al. 2004, p. 338). In that sense, privacy calculus considers the extent of customers' trust in e-commerce operators (Gefen and Straub 2004; Krasnova et al. 2012). Providing some sealed personal data was hence thought of as a necessary precondition for a transaction, as a somewhat risky but profitable part of the deal, or both. In the following, we illustrate that this calculus is just as relevant

societies, the calculus of behavior has a third and dynamic aspect to it at any moment in the individual's life. The person has to decide the probable consequences of behavior in terms of the type of recording and communication devises that exist – is it verbal, is it written, will it be seen and by how many others, etc." (pp. 359-360).

when considering the trade-off between privacy and expected economic benefits in online environments in which users have – at best – a vague conception of the size and identity of their audience

Numerical Cognition

We live in a world of numbers, and without the ability to reliably estimate and discriminate between numbers, the human species would presumably go extinct. Numerical Cognition is a sub-area of cognitive science that studies the cognitive, developmental, and neural foundations of numbers and mathematics (Dowker and Kadosh 2015). As with many of the cognitive sciences, it is a highly interdisciplinary subject and involves researchers from cognitive psychology, developmental psychology, neurosciences, and cognitive linguistics (Kadosh et al. 2008). This discipline is primarily concerned with empirical questions and in particular has established that humans process cognitive stimuli in the same manner as physical stimuli (Nieder and Miller 2003). In this regard, the Weber-Fechner law posits that subjective perception is proportional to the logarithm of the corresponding objective (physical) stimulus. From an evolutionary standpoint, the assessment of magnitudes (e.g., how attractive is a foraging patch, how dangerous is a group of enemies) is a central numeric challenge for humans. For instance, cognitive science research established that humans process the magnitude of a diffuse sample (e.g., due to size or lack of separation) by applying a log-relationship to the underlying quantity (Dehaene 2011; Dehaene et al. 2008). In the following, we build on the tenets and findings from numerical cognition to inform our hypotheses regarding how people evaluate different communication channels in terms of audience size.

Research Model and Hypotheses

To better understand a provider's intention to share resources online, we conflate the aforementioned aspects in a concise research model (Figure 2). Privacy calculus suggests that a provider's intention to share *decreases* in the case of higher Privacy Concerns (H_1) and *increases* in relation to higher (expected) economic benefits (H_2), which in our model are driven by larger Perceived Audience Sizes (H_3). Beyond describing the existence of privacy concerns, prior research has called for investigating *why* certain privacy-related behaviors are observed (Pavlou 2011). In this sense, we model privacy concerns as emerging from the *interaction* of the provider's Personal Connection with the targeted audience (which decreases in Perceived Audience Size, H_4) and Perceived Audience Size itself (H_5). Finally, based on insights from numerical cognition (Dehaene et al. 2008; Jackson 2010), we model how the user's *perception* of audience size originates from a channel's Actual Audience Size (H_6).

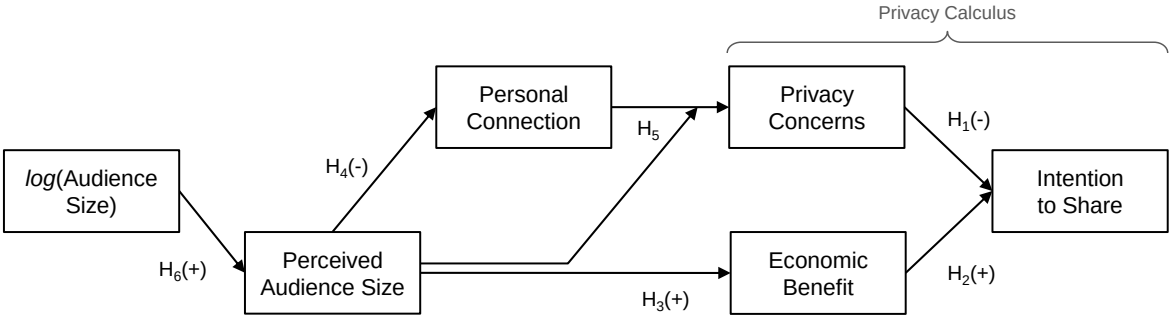

Figure 2. Research Model

Beyond the theoretical lens of privacy calculus, we draw upon the rich privacy literature in closely related contexts, such as electronic commerce (Hong and Thong 2013; Malhotra et al. 2004) and online social networks (von Stetten et al. 2011; Taddicken 2014), to establish our hypotheses. The definitions of all constructs in the

context of our study are summarized in Table 1. We develop our hypotheses in the following subsections.

Table 1. Construct Definitions

Construct	Context-specific Definition	Source
Intention to Share	The provider's intention to advertise (and thus share) a personal resource through a given channel.	Gefen and Straub (2003)
Privacy Concerns	The provider's perception that advertising a personal resource through a given channel negatively affects her privacy.	Dinev and Hart (2006)
Economic Benefit	The provider's expectation that advertising a personal resource through a given channel will benefit her economically.	X. Li et al. (2011)
Personal Connection	The provider's perception that there exists a personal connection with the audience reached through a given channel.	Gremler and Gwinner (2000)
Perceived Audience Size	The provider's perception of a channel's magnitude of communication reach.	Wang et al. (2005)
Actual Audience Size	A communication channel's *actual* reach in terms of audience size as induced by the scenario.	-

The Impact of Privacy Concerns and Economic Benefit on a Provider's Intention to Share (H1, H2)

While our work builds upon the extant MIS literature on Internet information privacy (Bélanger and Crossler 2011; Hong and Thong 2013; Smith et al. 2011), it is important to highlight that peer-based (or C2C) markets introduce an additional, fundamentally different facet of privacy as compared to B2C commerce. In contrast to communication with traditional e-vendors, much of the personal information provided is not meant to remain private between user and platform operator, but is effectively disclosed to all platform users (or even the general public). This may be done with the vague conception that the information is received only by users with an admissible business interest and no social ties to the sender. The platforms, however, do not guarantee this, nor is it in their interest to do so – after all, additional information reduces uncertainty and hence facilitates peer-to-peer transactions (Cheung et al. 2012). In this sense, the source of privacy concerns shifts from *unintended* to *deliberate* information disclosure (Xu and Bélanger 2013). In this vein, platforms such as Airbnb and BlaBlaCar require the provision of comprehensive personal information

such as user demographics, peer reviews, social connections, and behavioral data, which may discourage users from adoption (Lee et al. 2016; Xu et al. 2015).

As one side of the scale of Internet users' privacy calculus, prior research confirms a negative relationship between privacy concerns and online activity. Examples include studies on instant messaging (Jiang et al. 2013; Lowry et al. 2011), purchase decisions in electronic commerce (Dinev and Hart 2006; Eastlick et al. 2006; H. Li et al. 2011; Malhotra et al. 2004; Tsai et al. 2011), self-disclosure in online social networks (Chen et al. 2009; Hajli and Lin 2016; Krasnova et al. 2009; Staddon et al. 2012; Young and Quan-Hasse 2009), and the adoption of other technologies such as biometrics, web-based healthcare services, and mobile applications (Bansal et al. 2010; Kehr et al. 2015; Kordzadeh and Warren 2017; Miltgen et al. 2013). In the context of C2C-based transactions, few studies have considered privacy at all. Hawlitschek et al. (2016) found that privacy concerns, along with other factors, inhibit usage of peer-to-peer rental services. Frick et al. (2013) identified privacy concerns as the single most important reason for users *not* to share certain items. Considering the platforms Lyft, TaskRabbit, Airbnb, and NeighborGoods, Dillahunt and Malone (2015) found privacy concerns to have detrimental effects on sharing among members of disadvantaged communities, including job-seeking or financially struggling individuals.

Based on the principles of privacy calculus and the substantial empirical evidence, we suggest that a provider's privacy concerns will negatively affect their willingness to share information concerning personal resources.

H_1: *Privacy Concerns negatively affect the provider's Intention to Share.*

On the other side of the scale, individuals involved in exchange settings seek to maximize positive outcomes. As economic prospects represent an important behavioral motive in any area of (electronic) commerce, it is not surprising that the primary motivation for C2C sharing is of an economic nature as well (Hamari et al. 2016; Hawlitschek et al. 2016). This is also reflected in how platforms target potential providers, for instance, by promising fuel cost savings (BlaBlaCar) or by emphasizing the potential earnings associated with a requested stay (Airbnb; Earnest 2017). A provider will thus evaluate whether sharing is worthwhile *economically*, leading us to contend that greater economic benefit increases the provider's intention to share.

Previous research supports this assessment. Hann et al. (2007) found that usage-based economic rewards significantly influence individuals' preferences among financial brokering websites with varying privacy policies. Xu et al. (2010) found that providing financial compensation increases the acceptance of personal information disclosure in the context of location-based services. Similarly, Beldad et al. (2011, p. 220) note that people "often trade their personal information for tangible or intangible benefits." This body of literature coherently suggests that:

H_2: *Economic Benefit positively affects the provider's Intention to Share.*

The effect of Perceived Audience Size on Economic Benefit (H3)

C2C-based business models bring together demand (i.e., consumers) and supply (i.e., providers). Both groups benefit from a larger network size as there exist positive cross-side network externalities (Easley and Kleinberg 2010). These enhance a market participant's likelihood to find a counterparty in a larger rather than a smaller market (Weber 2014), representing a tangible economic benefit. This is particularly relevant in peer-based markets with highly heterogeneous products. Conversely,

limited liquidity impedes users' ability to engage in C2C renting and sharing. This is especially aggravating for providers who "complained that no one had yet requested their items" (Philip et al. 2015, p. 1318). Consequently, potential resource providers will benefit more if they perceive that a platform reaches a larger audience and hence a larger number of potential customers. Concerning the adoption of peer-to-peer file sharing, Song and Walden (2007) found that perceived network size enhances perceived network externalities, which in turn drive adoption. In the case of communication services, this positive effect of (perceived) network size on usefulness is well established (Palka et al. 2009; Strader et al. 2007; Zhao and Lu 2012). Given the maturity of online marketplaces and platforms, we posit that users are well aware of the underlying network externalities and are likely to attribute greater economic benefits to larger networks and audiences. Therefore, we hypothesize:

H_3: *Perceived Audience Size positively affects expectations of Economic Benefit.*

The Interplay of Perceived Audience Size, Personal Connection, and Privacy Concerns (H4 & H5)

Having established the notions of perceived audience size, economic benefits, and privacy concerns as driving forces of a provider's privacy calculus, we now take a closer look at specifically how privacy concerns emerge. Research on Internet-mediated communication has found that larger audiences inhibit (Camacho et al. 2014; Vitak 2012; Wang et al. 2016) or alter disclosure behavior (Barasch and Berger 2014) and increase privacy concerns (Stutzman and Kramer-Duffield 2010). Specifically, larger audiences promote strategies of protective self-presentation on the part of providers – that is, avoiding negative impressions (Barasch and Berger 2014). Often there is a lack of tools for audience management, which makes disclosed

information available to a broad, undifferentiated audience, and hence decreases the amount of information that is considered appropriate for all potential recipients (Hogan 2010; Ollier-Malaterre et al. 2013). In addition, research on differences in disclosure behavior among different types of online communities is lacking (Schrammel et al. 2009). In the context of such undifferentiated online interactions, as Acquisti et al. (2015, p. 512) put it, “we no longer have a clear sense of the spatial boundaries of our listeners.” Consequently, a main source of concern stems from users’ inability to limit, select, or determine their audiences (Tufekci 2008).

Along with such potential effects of perceived audience size, the personal connection between sender and audience was found to raise privacy concerns, for instance, based on the information’s potential for social repercussions and consequences such as individual embarrassment, dismissive evaluations, prejudice, loss of respectability, or calumny and mobbing (Dowling 1986; Hauff et al. 2015). It stands to reason that privacy concerns are positively associated with vulnerability (Dinev and Hart 2004; Mohamed and Ahmad 2012), where closer personal relations entail more intimate knowledge, and therefore higher levels of vulnerability and greater cause for privacy concerns.

Krasnova and Kift (2012) found that Facebook users – remarkably – regard their own (Facebook) friends as greater privacy threats than hackers, criminals, or other third parties. Krasnova et al. (2009) found privacy concerns to be based on underlying social threats, resulting in increased consciousness about the information revealed, and hence higher selectivity in terms of information disclosure. Similarly, Chen et al. (2009) considered user anxieties about their peers’ behavior and found that concerns arise especially if their social networks overlap, suggesting that unintended disclosure is particularly harmful within one’s own inner social sphere. Adams (1999) put forward

the notion that information sensitivity depends on context, specifically on the relationship with the information recipients, with one subject reporting: *"I personally wouldn't mind the supermarket knowing what I consume considering, like many, that it is low sensitivity information. However, if close friends or relatives, who could make valued judgements about me, knew how much chocolate or alcohol I consumed, the information becomes highly sensitive"* (p. 13). In addition, Livingstone (2008) reports that the presence of strangers in their online social networks was of limited concern to many teenagers, whereas closer contacts (e.g., parents) were considered much more problematic. Thus, privacy concerns depend not only on perceptions of audience *size*, but also on one's *personal connection* with the audience.

Research suggests that people maintain about 10 to 20 close relationships (Parks 2007). This suggested natural limit follows directly from the "strong tie" definition based on time spent together, emotional intensity, intimacy, and reciprocity (Krackhardt 1992). Beyond this inner circle, the number of more casual social relationships people manage and maintain is estimated at about 150 (Dunbar 1993). Hence, larger audiences will typically involve people of lower degrees of personal closeness and connection (Watts et al. 2002). After all, people can only present at one place at a time and a day has only 24 hours. In particular, the social spheres and audiences in peripheral and online social networks can be thought of as mainly comprising acquaintances who "have something in common with strangers that can be defined […] as a measure of social distance" (Morgan 2009, p. 5). Consequently, *personal connection* is expected to be less intimate in the case of larger audiences.

H_4: *Perceived Audience Size is negatively associated with Personal Connection.*

For the privacy concerns associated with a given communication channel, we posit that personal connection and perceived audience size interact. Therefore, there is no

monolithic relationship between privacy concerns and perceived audience size or personal connection. The dual of role of audience size is crucial to this argument as perceptions of audience size *increase* and perceptions of personal connection *decrease* in relation to actual audience size. Consequently, privacy concerns may be less pronounced if either audience size is negligible or if the audience is dominated by strangers. Gross and Acquisti (2005, p. 72) insinuated a similar notion when stating that in certain cases "we want information about ourselves to be known only by a small circle of close friends, and not by strangers," but that in other cases "we are willing to reveal personal information to anonymous strangers, but not to those who know us better." We suggest that disclosure of information related to personal resources exhibits a similar pattern.

H_5: *Privacy Concerns emerge as the interaction of Perceived Audience Size and Personal Connections.*

The Impact of Actual Audience Size on Perceived Audience Size (H6)

Users can choose from different communication channels to advertise resources, where a key difference is audience size. As an illustration, consider the following examples as candidate channels. One can send the ad to personal contacts through direct communication – for example, through a WhatsApp chat – or publish it on a personal blog website, which should lead to relatively small audiences.[3] Circular emails or electronic black boards (e.g., for university groups or at the workplace) are typically targeted towards intermediate numbers of recipients, whereas posts on social networking sites (e.g., Facebook, Twitter) will reach larger audiences.[4] Finally,

[3] Seufert et al. (2016) report an average size of WhatsApp groups of 9.

[4] Sagioglou and Greitemeyer (2014) report an average number of Facebook contacts of 352. Bullas (2014) reports an average number of followers on Twitter of 208.

an advertisement on a C2C platform (e.g., Airbnb) may reach very large audiences in the magnitude of 100 million active users, 150 million guests, and around 10 million daily page visits (Airbnb 2017; Smith 2016). These scenarios illustrate to what extent the reach of different platforms may vary. Furthermore, actual audience size – that is, how many people ultimately get to see an advertisement – is essentially impossible to assess for an individual actor, and user estimates are usually far off (Bernstein et al. 2013). Consequently, we adopt a user-centered approach by focusing on an individual's *perceived* audience size (Chiu et al. 2013).

Given the wide range of possible realizations, perceived audience size should primarily be understood as an assessment of *magnitude*. Humans *intuitively* tackle such diffuse quantitative assessment tasks (e.g., due to size or lack of separation) by applying a log-relationship to the underlying quantity (Dehaene 2011; Dehaene et al. 2008). An alternative avenue to establishing a link between perceived and true audience size is offered by the analysis of social networks. In this regard, empirical studies on online communities have shown that compactness – that is, the average shortest path within the community network – increases relative to community size in a logarithmic manner (Lancichinetti et al. 2010). Since this measure is of high functional significance to the community's members, the perceived magnitude of a community is closely linked to it and hence perceived size increases more slowly than the underlying number of community members. Similarly, note that for assessing the group mechanics of social actions, the logarithm of community size is a better measure than actual size. Therefore, numerical cognition theory and sociological principles *both* suggest that perceptions of audience size should increase logarithmically relative to actual audience size, resulting in the following hypothesis:

H_6: *Perceived Audience Size is proportional to the logarithm of actual audience size.*

Figure 3 visualizes the posited relations between the provider's intention to share, privacy concerns, economic benefit, personal connection, as well as perceived and actual audience size.

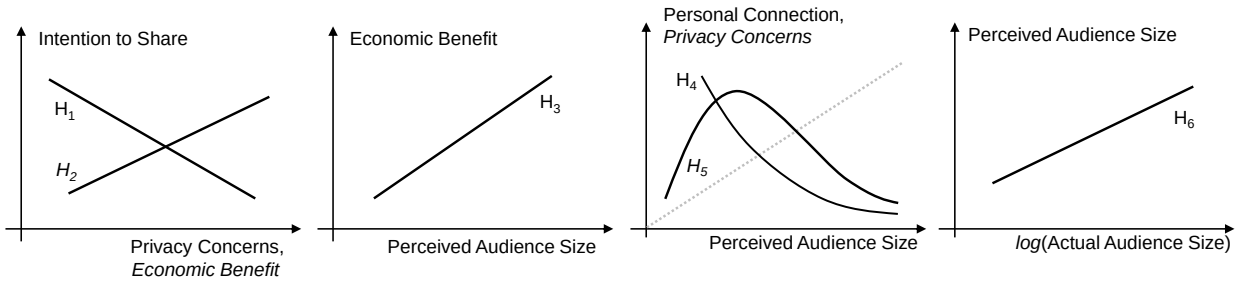

Figure 3. Overview of hypothesized relations between the provider's intention to share, privacy concerns, economic benefit, personal connection, and perceived and actual audience size

Survey Design

To evaluate our hypotheses, we conducted a scenario-based online survey in which participants assume the role of a potential provider in an accommodation sharing scheme. We employ the illustrative case of accommodation sharing for sake of clarity. However, the general reasoning should also apply to other contexts, such as ridesharing.

Stimulus Material

Participants were asked to imagine a scenario in which they would think of renting out a spare guest room within their apartment. The survey introduction as presented to the participants illustrated the scenario. It read as follows:

> *Welcome and thank you very much for participating in this survey. Please consider the following scenario. You seek to rent out a spare guest room in your apartment occasionally for short-term stays. For this purpose, you have already taken several*

photographs of the room itself, but also of the other parts of the flat and its environment. Now you have to find a suitable subtenant and consider different marketing channels, or means of communication, to this end. Independent of whether these channels are suited to finding a tenant, you notice that (depending on the channel) different audiences will gain quite detailed insights into your personal and private life and in particular where and how you live (e.g., pictures and location of the apartment, cost of the rent, descriptive texts and equipment, etc.). In this survey, we present you with eight possible channels for advertising your guest room. For each possibility, please indicate your agreement or disagreement with a set of repeated questions. Please try to project your thoughts as much as possible into the depicted scenario. Assume that on all channels the same information will be disclosed. Please answer all questions as honestly and intuitively as possible.

This scenario touches upon a typical personal resource that is often targeted by C2C platforms such as Airbnb, but may be readily advertised via other channels. After being familiarized with the general scenario, participants were presented eight potential channels for advertising their room. These were (1) WhatsApp group chat, (2) personal blog, (3) electronic blackboard, (4) circular email, (5) Twitter post, (6) Facebook post, (7) ImmobilienScout24[5] listing, and (8) Airbnb listing.

Our channel scenarios were guided by actual numbers and archetypical assumptions. First, WhatsApp group chats typically comprise three to ten members (magnitude ~10^0-10^1; Seufert et al. 2016 report an average group chat size of nine). Next, the vast majority of personal blogs are usually viewed by only few readers – typically family, friends, maybe a few colleagues or acquaintances – where most blogs have fewer than 50 visitors per day (magnitude ~10^1-10^2; Brotherton 2015).[6] The electronic blackboard is described as providing access to 30 colleagues directly and may reach

[5] ImmobilienScout24 is the largest German broker platform for private and commercial real estate (rental and buying/selling).

[6] Richard Jalichandra, CEO of Technorati (blog index and publisher ad platform), stated that "there's a joke within the blogging community that most blogs have an audience of one" (Quenqua 2009).

a small fraction of the company's other members (magnitude ~10^2). The circular email is said to reach 100 immediate recipients and may be forwarded by some of them via other lists (magnitude ~10^2-10^3). The Twitter posting is presented as reaching 200 followers directly, which is in line with the average number of followers (209) as reported by Bullas (2014). Several (e.g., 25%) of the followers are said to retweet the ad, yielding a magnitude of ~10^4. The propagation on Facebook works in a similar manner, where the average number of contacts is higher than on Twitter (Sagioglou and Greitemeyer 2014 report a mean of 352; the reported numbers of Facebook friends for our sample are in line with these values; see Table 3). Thus, the Facebook posting is described as reaching 350 contacts directly. Several (e.g., 25%) of the friends are said to like, comment, or share the ad, yielding a magnitude of ~10^4-10^5. To assess the magnitudes of audience size on the platforms ImmobilienScout24 and Airbnb, we leveraged data from Alexa.com, the leading source for web traffic data, which has been widely adopted by academic and practical researchers (Luo et al. 2013; Palmer 2002). ImmobilienScout24 is reported to have 3.26 million page visits daily, yielding a magnitude of $10^{6.5}$. Lastly, Airbnb is reported to have 7.92 million page visits daily, yielding a magnitude of $10^{6.9}$.

All channels and descriptions are illustrated in Table 2. After being introduced to a particular channel, participants were asked to evaluate the channel with regard to our research model's constructs. The questions were presented in random sequence. The sequence of channels was also randomized.

Table 2. Communication channels and descriptions as presented in the survey

Channel		Audience Type	Communication Mode	Commercial	Description
	WhatsApp Chat	Personal	Push	No	The advertisement is posted within a WhatsApp group with few good friends (1 – 10 people).
	Blog Website	Public	Pull	No	The advertisement is presented on your own, personal website or blog (10 – 100 people).

Table 2. Communication channels and descriptions as presented in the survey

Channel		Audience Type	Communication Mode	Commercial	Description
	Blackboard	Periphery	Pull	No	The advertisement is posted on your department's intranet on the electronic blackboard (addressing 30 colleagues). The ad will not actively be presented company-wide (3,000 employees), but may be found via active search or at random by a small percentage of those.
	Email	Periphery	Push	No	The advertisement is sent via bulk email (e.g., your university or sports club) reaching approximately 100 recipients, of whom you do not know all personally. This email may be forwarded by these recipients to their contacts and email lists.
	Twitter	Online Social Network	Push	No	The advertisement is posted on Twitter, where you have approximately 200 followers. It is likely that several (e.g., 25%) of your followers will retweet your ad.
	Facebook	Online Social Network	Push	No	The advertisement is posted on Facebook (assume 350 contacts). It can be expected that several (e.g., 25%) of your Facebook contacts will like, comment on, or share the post and hence it will receive the attention of several of your second-degree contacts, too.
	Immoscout24	Public	Pull	Yes	The advertisement is posted on Immoscout24.
	Airbnb	Public	Pull	Yes	The advertisement is posted on Airbnb.

To better understand the different scopes of these potential channels, we distinguish between "push" messages that will trigger the recipient (e.g., email, WhatsApp, Facebook) and "pull" messages that the recipient will only observe when actively looking for them (e.g., Blackboard, Airbnb). Also, we distinguish between channels explicitly designed for the purpose of advertisement ("commercial," e.g., Airbnb, ImmobilienScout24) and those channels with different primary purposes.

To better understand the different scopes of these potential channels, we distinguish different audience types, since the communication channels also differ with respect to the social composition of the targeted audience. While small-scale personal communication (WhatsApp, blog) addresses intimates (e.g., friends and family), a post on major C2C platforms (Airbnb, ImmobilienScout24) will, by and large, only be

seen by strangers. The other channels sit in between these extremes, as they will also address acquaintances. In particular, a post in one's wider social periphery (e.g., on a corporate blackboard or a circular email) typically addresses acquaintances only (e.g., colleagues, neighbors, loose contacts, etc.), while a posting on a social network site addresses a both intimates and acquaintances. An illustration is provided in Figure 4.

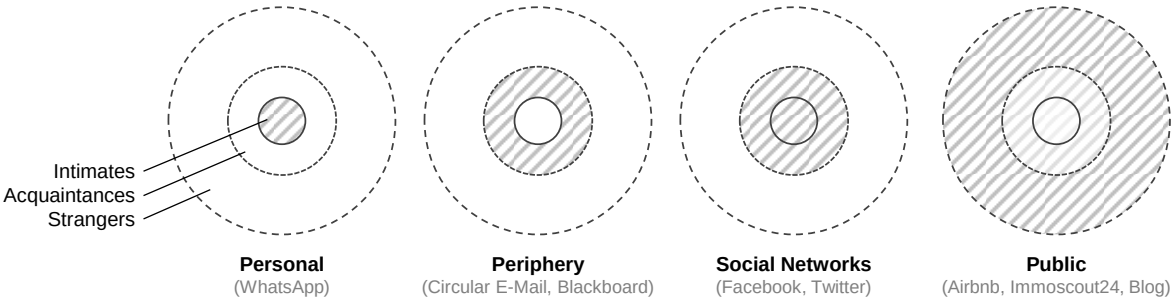

Figure 4. Audience scenarios.

Measurements

In order to ensure content validity, previously validated scales were used and adapted to the context of this study. The (provider's) Intention to Share was adapted from Gefen and Straub (2003), Privacy Concerns from Dinev and Hart (2006), Personal Connection from Gremler and Gwinner (2000), Economic Benefit from X. Li et al. (2011), and Perceived Audience Size from Chiu et al. (2013). All items were measured on 7-point Likert scales (from 1 = "strongly disagree" to 7 = "strongly agree"), representing a common and established method for privacy research (Pavlou 2011). All items are shown in Table A1 in the Appendix. In addition to these focal constructs, demographic and trait information was collected as control variables. This data included age, gender, individual risk propensity (Dohmen et al. 2011), number of Facebook contacts, and WhatsApp usage (yes/no). Moreover, we assessed the participants' willingness to accept a monetary discount on a fictive online purchase if

the e-vendor would be allowed to forward some accrued personal data (clothing size, gender, age, email address) to its marketing partners in exchange. The participants entered a number between 0 and 40 EUR (the price of the assumed product), representing a proxy for the individual valuation of privacy (Hann et al. 2007).

Procedure

Participants were recruited from the subject pool at (blinded for review). Participation was incentivized by a prize draw of 2 × 50 EUR and 20 × 20 EUR among all participants who completed the survey. To take part in this lottery, participants could enter their email address at the end of the survey on a voluntary basis. The survey was accessible for 7 days. Altogether, 258 participants completed the survey. To ensure data quality, we excluded subjects who did not pass understanding or attentiveness questions. This resulted in a final set of n = 237 observations. All demographic control variables are summarized in Table 3.

Table 3. Sample statistics on demographic control variables (n = 237)

	Mean	**St. Dev.**	**Median**	**Min**	**Max**
Gender: Female	.31	-	-	-	-
Age	24.65	3.05	24	19	40
Risk Affinity	5.35	1.98	6	0	10
Individual Valuation for Privacy	23.39	13.55	20	0	40
# Facebook Contacts	362.40	271.90	300	0	1324
Uses WhatsApp	.93	-	-	-	-

Results

As a first step, we assess our hypotheses with regard to the various channels. For each of the eight channels, we aggregate the stated values for sharing intentions, economic benefit, privacy concerns, perceptions of personal connection, and audience size. Figure 5 depicts plots and fits between these main constructs. Intention to Share exhibits a negative slope in Privacy Concerns (H_1, $R^2 = .444$, $p < .10$) and a positive slope in Economic Benefit (H_2, $R^2 = .531$, $p < .05$). Economic Benefit, in turn, exhibits a positive slope in Perceived Audience Size (H_3, $R^2 = .847$, $p < .01$). Turning to Personal Connection, we observe a negative slope in Perceived Audience Size (H_4, $R^2 = .599$, $p < .05$). Moreover, the second-order polynomial fit between Perceived Audience Size and Privacy Concerns provides support for our fifth hypothesis (H_5, $R^2 = .776$, $p < .05$). Lastly, Perceived Audience Size exhibits a positive slope in the logarithm of Actual Audience Size (H_6, $R^2 = .964$, $p < .001$). Overall, these observations provide strong initial support for our hypotheses.

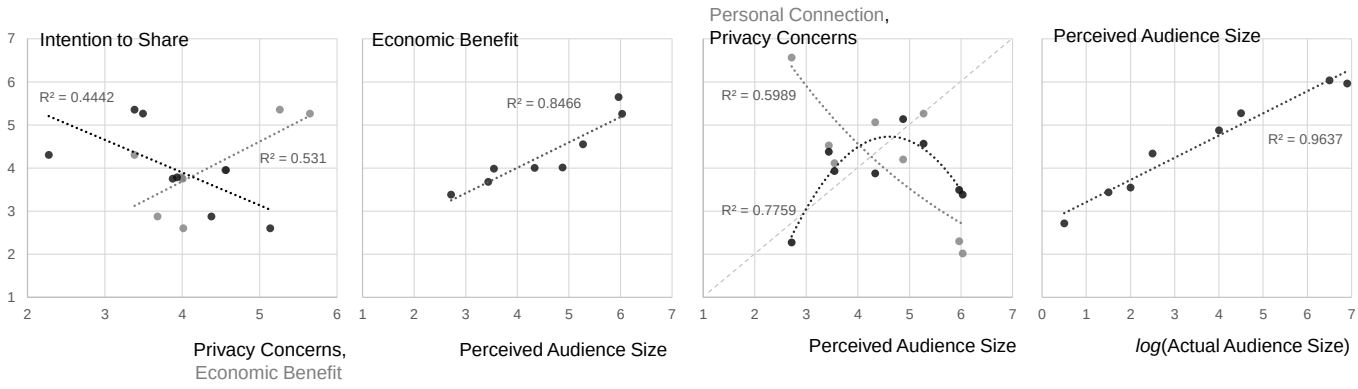

Figure 5. Hypotheses graphical evaluation

Next, we consider the data at subject level via different methodological approaches to ensure robustness. First, the research model was validated using Partial Least Squares structural equation modeling (PLS-SEM; Ringle et al. 2015). PLS-SEM was

chosen for the approach's broad scope and flexibility of theory and practice without any additional requirements or constraints (Hair et al. 2012, 2017; Richter et al. 2016). With regard to the requirements of sample size, G* power analysis suggests that for our model a sample size of n_{min} = 130 is sufficient to detect minimum R^2 values of 10% with a 1% probability of error and statistical power of 80% (Cohen 1992; Faul et al. 2007; Hair et al. 2017). Our data set should therefore be large enough to detect existing effects with sufficient certainty, thus allowing for a robust interpretation of our findings.

Measurement Validity

Table 4 provides descriptive statistics on construct, reliability measures, and correlations. Composite reliability (> .60) and construct reliability (Cronbach's alpha, > .70) were established (Bagozzi and Yi 1988; Nunnally and Bernstein 1994). Next, construct validity was established by testing convergent validity (Average Variance Extracted, AVE > .50 for all constructs; Fornell and Larcker 1981) and discriminant validity (HTMT criterion below .90; Henseler et al. 2015). Moreover, item reliability was established (all indicator loadings larger than .70; Chin 1998).

Table 4. Construct Descriptives, Reliability Measures, and Correlations

	Descriptives		**Composite**	**Cronbach's**	**AVE**	**Q^2**	**Correlation Matrix**				
	Mean	**SD**	**Reliability**	**Alpha**			**ITS**	**PRV**	**EB**	**CON**	**PAS**
ITS	3.99	1.87	.963	.942	.897	.409	*.947*	-.501	.465	-.172	.317
PRV	3.88	1.74	.960	.938	.890	.077		*.943*	-.032	-.076	.141
EB	4.32	1.43	.893	.831	.736	.218			*.858*	-.324	.543
CON	4.26	1.79	.959	.935	.885	.151				*.941*	-.425
PAS	4.52	1.69	.973	.959	.924	.386					*.961*

Note: Diagonal elements in the correlation matrix contain the square root of AVE (average variance extracted) for each construct. ITS = Intention to Share; EB = Economic Benefit; PRV = Privacy Concerns; CON = Personal Connection; PAS = Perceived Audience Size.

Structural Model and Hypotheses Testing

The model was evaluated based on PLS bootstrapping (5,000 samples, no sign changes, complete bias-corrected and accelerated bootstrapping, two-tailed testing). The results of the structural model are provided in Figure 6. Overall, the hypothesized relationships are supported, explaining 48.2% of the variance in a provider's intention to share through the paths of privacy concerns (H_1, b = -.484, p < .001) and economic benefit (H_2, b = .481, p < .001). As hypothesized, perceived audience size represents a potent antecedent of economic benefit (H_3, b = .585, p < .001) and personal connection (H_4, b = -.425, p < .001). We also find significant evidence that privacy concerns indeed depend on an interaction between perceived audience size and personal connection (H_5, b = .277, p < .001). Lastly, the log-relationship between actual and perceived audience size is confirmed (H_6, b = .665, p < .001).

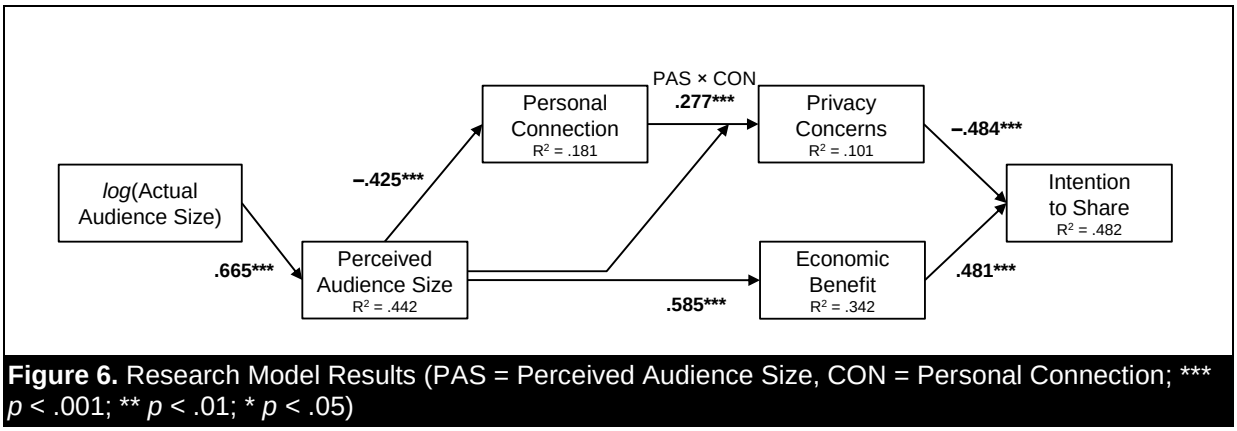

Figure 6. Research Model Results (PAS = Perceived Audience Size, CON = Personal Connection; *** p < .001; ** p < .01; * p < .05)

Overall, the effect sizes obtained in the model are consistent with the results of previous research in the social sciences (Ferguson 2009). Moreover, we utilized the Stone-Geisser criterion whereby Q^2 values larger than zero indicate the path model's predictive relevance for a construct. As can be seen in Table 4, all Q^2 values exceeded this threshold, pointing to predictive validity in terms of how well the model reconstructs the observed variables (Chin 1998).

To assess our results' robustness, we replicated the model by a set of regression analyses based on the construct item's averaged values (Table 5). This included a set of control variables such as the survey participants' gender, age, risk affinity (Dohmen et al. 2011), and an approximation of their individual valuation for privacy (IVP; Hann et al. 2007). Moreover, in order to better understand the non-linear behavior of privacy concerns in relation to perceived audience size, we conducted an additional analysis including a squared term (PAS^2).

Table 5. Regression models (Standard errors in parentheses)

	Intention to Share (ITS)	Economic Benefit (EB)	Personal Connection (CON)	Privacy Concerns (PRV)		Perceived Audience Size (PAS)
PRV	-.522*** H1					
	(.018)					
EB	.590*** H2					
	(.022)					
PAS		.462*** H3	-.454*** H4	-.589***	1.107***	
		(.016)	(.022)	(.060)	(.117)	
CON				-.791***		
				(.063)		
PAS × CON				.160*** H5		
				(.012)		
PAS^2					-.115*** H5	
					(.014)	
log(n)						.515*** H6
						(.013)
Female	.069	-.127*	.290***	-.017	-.012	.268***
	(.071)	(.062)	(.084)	(.085)	(.087)	(.065)
Age	.021*	-.014	-.005	-.002	-.001	.005
	(.011)	(.009)	(.012)	(.013)	(.013)	(.010)
Risk Affinity	-.051**	.027	.002	-.078***	-.079***	.033*
	(.017)	(.015)	(.020)	(.020)	(.020)	(.015)
IVP	-.008***	-.001	-.001	.014***	.015***	-.004
	(.002)	(.002)	(.003)	(.003)	(.003)	(.002)
Intercept	3.390***	2.497***	6.369***	7.201***	1.653***	2.389***
	(.297)	(.246)	(.331)	(.467)	(.393)	(.252)
R^2	.460	.300	.186	.121	.073	.448

Note: *** $p<.001$; ** $p<.01$; * $p<.05$; IVP = Individual Valuation for Privacy

This analysis confirms all reported effects as the hypothesized relationships (H_1–H_6) exhibit robust magnitude, sign, and significance values also when controlling for demographic factors. Thus, controlling for gender, age, risk propensity, and individual valuations of privacy does not alter the conclusions derived from this study.

We observe several noteworthy effects related to the demographic variables. First, women appear to systematically perceive higher levels of personal connection to a channel's audience than men do (b = .290, p < .001). This observation is in line with literature on social roles, suggesting that women attribute greater importance to communication and bonding with others (Eagly 1987; Kimbrough et al. 2013). Moreover, compared to men, woman also tend to perceive larger audience sizes (b = .268, p < .001). Next, risk affinity is associated with lower degrees of privacy concerns (b = -.078/-.079, p < .001). Finally, the participants' individual valuations for privacy (IVP) negatively affect their intention to share (b = -.008, p < .001) and emerge as a rationale for privacy concerns (b = -.014/-.015, p < .001).

As with all survey-based research, common method bias may be a concern here. Harman's single-factor test (based on exploratory factor analysis) reveals that the factors accounted for 23%, 21%, 21%, 20%, and 15% of the variance. These results suggest that common method bias is not a concern in this study (Podsakoff et al. 2003).

As an additional assessment of our model, we control for the specific types of targeted audiences, as illustrated in Figure 4. To this end, we use the binary variables "Periphery," "Social Network," and "Public" as contrasts against the baseline ("Personal"). The results of these additional regressions are summarized in Table B1 in the Appendix. Overall, we make the following observations. First, the additional factors contribute markedly to explaining variance for the constructs Personal

Connection (R^2 = .473 ≫ .186) and Privacy Concerns (R^2 = .216/.213 ≫ .121/.073). Second, all hypothesized effects persist in terms of sign, magnitude, and significance. This confirms that the perceived audience size is indeed a crucial component in assessing the two constructs.

In a further set of regressions, we control for type of communication. For this, we distinguish between "push" messages that will trigger the recipient (e.g., email, WhatsApp, Facebook) and "pull" messages, which the recipient will only observe when actively looking for them (e.g., Blackboard, Airbnb). Also, we distinguish between channels explicitly designed for the purpose of advertisement ("commercial," e.g., Airbnb, ImmobilienScout24) and those channels with different primary purposes. All results of these additional analyses are summarized in Table B2 in the Appendix, yielding no impairments to the reported effects and findings of this study.

Discussion

Platforms and business models for sharing personal resources have experienced considerable growth over the last several years and are projected to continue doing so in the future (PwC 2015). Advertising to large audiences enables the exploitation of otherwise idle economic assets and hence allows one to take up micro-entrepreneurial activity at putatively no cost. However, bringing such assets to market is inherently associated with the disclosure of personal, sometimes intimate information. While Internet users are accustomed to privacy-related peculiarities in online social networks and B2C e-commerce, C2C platforms have introduced a novel factor to the game. Yet there is still a lack of understanding of privacy in the sharing economy where only few studies have thus far empirically investigated the role of privacy concerns for the adoption and usage of peer-based platforms such as Airbnb

(Dillahunt and Malone 2015; Frick et al. 2013; Hawlitschek et al. 2016; Lutz et al. 2017).

As we have pointed out in this paper, the providers' intention to share is subject to an implicit privacy calculus weighting economic benefits against privacy concerns. Overall, the willingness to disclose and share intimate information was reported to be declining (Acquisti et al. 2015; Goldfarb and Tucker 2012), presumably due to the perception of privacy risks (Hauff et al. 2015). Still, any inhibiting concerns apparently take a backseat in some of the most expansive communication channels conceivable (e.g., Airbnb). With this paper, we have set out to explore this puzzling observation by building on theories drawn from fields of research outside of Information Systems, as social issues studied in other disciplines are often highly relevant to our own lines of inquiry (Crane et al. 2016).

Theoretical Implications

This research makes three core contributions to Information Systems literature. First, we propose an approach by which to explain Internet users' willingness (or reluctance) to engage in C2C sharing, based on the inherent privacy calculus associated with this kind of novel e-commerce activity. We validate our research model empirically and, in doing so, provide the first systematic and documented insights into how users evaluate different channels for marketing personal resources. The inherent privacy trade-off between economic benefits and the associated disclosure of embedded personal information for providers in the sharing economy adds a new facet to the literature on the economics of privacy (Brandimarte and Acquisti 2012).

Second, we relate the involved economic and privacy-related factors back to the more grounding concepts of perceived audience size and type (i.e., one's personal

connection with the audience). In doing so, we provide a novel perspective on exactly *how* privacy concerns emerge (Pavlou 2011). By identifying such audience-related factors as crucial drivers in the privacy calculus, we extend previous research on personal (e.g., self-efficacy; Mohamed and Ahmad 2012), system-related (e.g., control, opt-in/out; Dinev and Hart 2004; Eastlick et al. 2006), situational (e.g., affect, own anonymity; Jiang et al. 2013; Kehr et al. 2015), general (e.g., perceived risks; Dinev and Hart 2006), and demographic antecedents of privacy concerns (e.g., gender; Phelps et al. 2000). The non-monolithic relationship between audience size and privacy concerns originates, first, from *a loss of intimacy* when transitioning from close relationships to the social periphery and, second, from *anonymity by scale* when moving from loose ties to stranger-dominated spheres.

Finally, this study contributes to the general understanding of novel forms of electronic commerce and their relation to online social networking. We provide clues for the design of platforms and communication channels for sharing personal resources. This is an important aspect as the skillful use of social media integration, tools for privacy management, and user representation may greatly determine whether providers engage in C2C transactions or not.

Practical Implications

C2C platforms constitute two-sided markets and as such, their success critically hinges on the activity of customers *and* providers. Our research provides first evidence that both economic and privacy motifs govern the providers' intention to engage in resource sharing. Therefore, we put forward the following guiding principles to improve platform viability in the face of privacy calculus settings.

Limit social media integration: In their effort to create trust and promote their service, C2C platforms often borrow elements from online social networks and social commerce, that is, “a form of commerce that is mediated by social media” (Wang and Zhang 2012, p. 106). While social shopping mainly relies on social influence, C2C platforms would rather embed a user’s contacts to establish a trustworthy identity or to discover shared interests or even common friends. We suggest, however, that integrating social network information can be detrimental from a privacy perspective since it may establish an uncomfortable proximity to contacts with a much higher level of personal connection than anonymous strangers. C2C platforms should therefore carefully evaluate whether an aggressive social media strategy may harm their business interests by exacerbating customers’ privacy concerns. In this regard, the failure of Facebook’s early attempt to establish a marketplace may also be due to linking users’ economic affairs to an (inappropriate) social environment (Hickey 2015). Similarly, local neighborhood sharing schemes for goods and services with a very limited audience failed to gain meaningful traction (Kessler 2015).

Offer privacy management tools: Platforms may seek to mitigate the effects of uncertainties regarding audience size and social appropriateness by providing tools for privacy management. First, this may be achieved by limiting which information is demanded from the users (Dambrine et al. 2015) or by providing mechanisms to mask this data with some degree of obscurity – for instance, by using abbreviations, pseudonyms, blurred photos, avatars, hazy location data, and so on. Second, tools for privacy management on C2C platforms could include settings to manage which other users can access one’s data. This may deliberately exclude visitors from the same geographical region (e.g., based on IP address) or from close social circles (e.g., as inferred from social network data). From a practical perspective, however,

the implementation of such measures may be challenging, as it would stand in contrast to the platforms' paramount need to create trust among users.

Nevertheless, providing users with the tools to better *control* their information disclosure may be worthwhile. In this regard, Brandimarte et al. (2012) found that greater explicit control over which personal information could be published led subjects to share more sensitive information – also with broader audiences.

Another way to potentially guide user behavior and safeguard privacy to some extent is *privacy nudges* (Almuhimedi et al. 2015). Based on visual processing of uploaded images, a platform's privacy protection system could alert users to highly informative clues – such as one's license plate number (in car or ridesharing) or faces (e.g., in photographs in the background of one's Airbnb profile) – and offer to automatically blur this information. Moreover, platforms could *emphasize* privacy protection measures to mitigate their users' concerns.

The mechanisms described in this paper may have contributed to the rapid growth and success of C2C sharing. Before the advent of such dedicated online platforms, the promotion of personal resources was limited to narrow, personal circles. Any expansion was accompanied by the unease of operating in intermediate social spheres, for instance by posting bills in the neighborhood (e.g., for private tutoring) or advertising on social networking sites. Today, C2C platforms allow users to tap into large and anonymous audiences, explicitly *not* rooted in one's immediate or peripheral social spheres. We suggest that the design and management of how peers and audiences are linked is crucial to the success of C2C platforms but has thus far only attracted very limited research attention.

Limitations and Future Work

There are several considerations that should be taken into account prior to drawing generalized conclusions from this study's results. First, our assessment of the interactions between privacy and the sharing economy rests on a scenario-based survey approach. There exist natural methodological limits in view of external validity, that is, for transferring results from hypothetical situations to the actual behavior of actual subjects on actual platforms. Similarly, introducing scenarios with respect to varying audience size is potentially less robust than relying on real cases. By eliciting participants' intention to engage in a sharing activity together with multiple demographic control variables, we follow a well-established approach to ensuring reliability in view of the methodology's boundaries and limitations. Future research may consider data collection from actual transactions, that is, based on natural experiments or field studies.

Second, while accommodation constitutes a major segment of the sharing economy, our survey's focus on this setting may limit the generalizability of some of our findings. For example, privacy concerns may be particularly pronounced in the context of someone's home compared to other personal resources (e.g., ridesharing). Similarly, other scenarios may require more direct communication patterns and/or shorter response times, thus creating a need for other modes of communication such as chat or live audio/video conferencing, thereby introducing additional privacy hazards. Corroborating our findings' applicability to other areas of the sharing economy will hence require further investigation into other contexts. After all, insights into the users' bed- and living rooms on Airbnb are certainly more sensitive than insights into their attics and storage rooms (e.g., on eBay).

Third, our study's generalizability may be limited by the nature of our sample group, comprising mainly young, well-educated, and tech-savvy participants from a Western cultural background. Since the behaviors and perceptions under investigation are grounded in social and cultural norms, cross-cultural and cross-generational studies should further enrich our initial findings (Bellman et al. 2004; Harris et al. 2003).

Finally, our research has not explicitly explored the potential of introducing tools for privacy management. While we argue that privacy management techniques are difficult to apply when marketing personal resources in general, it may be worthwhile to identify which aspects of information disclosure are particularly problematic. Operators of C2C platforms could leverage such insights by incorporating appropriate functionalities into their information systems. In creating explicit scenarios for our survey's participants, we created comparable settings in terms of the disclosable information across all communication channels. While holding as many factors constant as possible represents a methodological necessity, in reality subjects will intuitively adapt the type and amount of disclosed information to the respective channel and expected audience (e.g., publishing an ad *without* pictures on a social network). Future research should hence explore which information *is actually* disclosed in relation to different audiences (Barasch and Berger 2014).

We want to point to another relevant aspect. When thinking of different communication channels for advertisement, different scopes are usually associated with different *spatial* distances and hence also imply different social distances to the audience. Potential guests in an accommodation sharing scenario are most likely not to live in one's own home town. In contrast, potential passengers for a shared ride are. In view of our findings on the role of personal connection, this distribution skewness of potential customers may also affect the calculus of information disclosure. This should

benefit platforms with complementary effects in terms of spatial or social distance (e.g., accommodation sharing). Yet, by the same token, it may impair those with complementary effects of co-location (car sharing, tools, etc.). We suggest that future work will have to account for this important dependency.

Conclusion

In this paper, we developed a set of tangible conjectures for addressing information disclosure of personal resources via different communication channels. In doing so, we extended the theoretical concept of privacy calculus to C2C scenarios. Moreover, we proposed a rationale for a non-linear structure of privacy concerns within this context. An online survey provided support for this perspective on Internet user psychology. Our study suggests several implications for players in the sharing economy, particularly with regard to social media integration, which we suggest should be reviewed carefully. It is not yet foreseeable how social norms regarding the conflict between personal advertisement and privacy will evolve. Novel C2C platforms such as Airbnb, however, have already shaped how users deal with this conflict, what information they provide, and upon which aspects of their private life they allow markets to encroach. We hence call for more research to better understand how users can play an active and responsible role in this arena and how Information Systems can offer tools for the betterment of such platforms in all aspects – not solely for the sake of commercial development.

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Appendix

Appendix A: Measurement Items

The constructs in this study were assessed using the items summarized in Table A1, measured on 7-point Likert scales from "strongly disagree" to "strongly agree."

Table A1. Measurement Items
Intention to Share (ITS); Gefen and Straub (2003)
I am very likely to advertise my guest room through this channel. I would offer my guest room through this channel. I would not hesitate to provide the necessary information about me for advertising my guest room through this channel.
Privacy Concerns (PRV); Dinev and Hart (2006)
I am concerned that the information I provide through this channel could be misused. I am concerned that anyone will be able to find private information about me through this channel. I am concerned about submitting information through this channel, because it could be used in a way I did not foresee.
Economic Benefit (EB); X. Li et al. (2011)
Advertising through this channel will increase the likelihood of renting out my guest room. Advertising through this channel will generate financial profits. Advertising through this channel will improve my economic situation.
Personal Connection (CON); Gremler and Gwinner (2000)
I feel like there is a "bond" between the recipients and myself. The recipients are likely to take a personal interest in me. It is likely that there exists a close relationship between the recipients and me.
Perceived Audience Size (PAS); Wang et al. (2005)
It is likely that my ad will be read by many people. It is likely that my ad will reach a lot of recipients. It is likely that a wide range of people will get to see my ad.

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Appendix B: Additional regression analyses

Table B1. Regression models including control variables for audience type (personal, periphery, social network, public)

	Intention to Share (ITS)	Economic Benefit (EB)	Personal Connection (CON)	Privacy Concerns (PRV)		Perceived Audience Size (PAS)
PRV	-.500*** H1					
	(.020)					
EB	.579*** H2					
	(.024)					
PAS		.438*** H3	-.226 *** H4	-.321***	.492***	
		(.019)	(.020)	(.063)	(.115)	
CON				-.328***		
				(.071)		
PAS × CON				.071*** H5		
				(.013)		
PAS^2					-.061*** H5	
					(.013)	
log(n)						.515*** H6
						(.013)
Female	.068	-.121*	.229***	.022	.033	.268***
	(.071)	(.062)	(.068)	(.081)	(.081)	(.065)
Age	.021 *	-.014	-.007	.001	.001	.005
	(.011)	(.009)	(.010)	(.012)	(.012)	(.010)
Risk Affinity	-.049**	.027	-.006	-.071***	-.072***	.033*
	(.017)	(.014)	(.016)	(.019)	(.019)	(.015)
IVP	-.009***	-.001	~.000	.013***	.013***	-.004
	(.002)	(.002)	(.002)	(.003)	(.003)	(.002)
Personal	(omitted)					
Periphery	-.076	.077	-1.702***	1.334***	1.503***	
	(.115)	(.097)	(.106)	(.150)	(.131)	
Social Network	-.260*	-.133	-1.303***	2.272***	2.489***	
	(.124)	(.104)	(.114)	(.157)	(.139)	
Public	.075	.417***	-3.071***	-1.357***	-1.457****	
	(.114)	(.099)	(.110)	(.160)	(.131)	
Intercept	3.407***	2.455***	7.308***	4.095***	1.550***	2.389***
	(.299)	(.247)	(.272)	(.524)	(.364)	(.252)
R^2	.464	.324	.473	.216	.213	.448

Note: *** p<.001; ** p<.01; * p<.05; $^+$ p<.10; IVP = Individual Valuation for Privacy

Table B2. Regression models including control variables for communication mode (push vs. pull) and commerciality

	Intention to Share (ITS)	Economic Benefit (EB)	Personal Connection (CON)	Privacy Concerns (PRV)		Perceived Audience Size (PAS)
PRV	-.495*** H1					
	(.018)					
EB	.486*** H2					
	(.024)					
PAS		.365*** H3	-.193*** H4	-.167*	.927***	
		(.019)	(.020)	(.072)	(.115)	
CON				-.647***		
				(.065)		
PAS × CON				.090*** H5		
				(.014)		
PAS^2					-.074*** H5	
					(.014)	
log(n)						.515*** H6
						(.013)
Female	.068	-.101	.220***	-.007	-.055	.268***
	(.070)	(.060)	(.064)	(.083)	(.085)	(.065)
Age	.020 +	-.014	-.007	-.003	-.001	.005
	(.010)	(.009)	(.009)	(.012)	(.013)	(.010)
Risk Affinity	-.045**	.030*	-.007	-.083***	-.083***	.033*
	(.016)	(.014)	(.015)	(.019)	(.020)	(.015)
IVP	-.009***	-.001	~.000	.014***	.015***	-.004 +
	(.002)	(.002)	(.002)	(.003)	(.003)	(.002)
Push Type	.153*	.141*	1.109***	-.083	-.403***	
	(.076)	(.067)	(.071)	(.099)	(.095)	
Commercial	.837***	.706***	-1. 677***	-1.497***	-1.369***	
	(.097)	(.089)	(.094)	(.152)	(.130)	
Intercept	3.460***	2.801***	5.131***	6.362***	2.083***	2.389***
	(.295)	(.240)	(.253)	(.463)	(.387)	(.252)
R^2	.483	.347	.532	.169	.128	.448

Note: *** p<.001; ** p<.01; * p<.05; + p<.10; IVP = Individual Valuation for Privacy