

**Motivating Third-Party Providers to Avoid Complaints: A Random Field
Experiment from the Perspective of Value Co-creation and Appropriation in
Platform Governance**

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Abstract

Platforms strive to resolve conflicts between different sides, such as providers and customers. While provider-side undesirable behaviors (e.g., mispresent information and delay in the communication) have been recognized as the main cause of renters' complaints, how platforms can effectively motivate providers on platforms to exert their best effort to avoid complaints has been under-investigated. This study aims to develop solutions that motivate the providers to proactively reduce such complaints. We consider two important components of platform governance—value co-creation and value appropriation. We collaborate with a peer-to-peer rental platform in China to design and conduct a field experiment in which third-party providers (i.e., hosts in this context) receive messages regarding the platform's value co-creation perspectives (i.e., provider-emphasized vs. customer-emphasized) and value appropriation mechanisms (i.e., competition-based vs. cooperation-based). The results show that compared to the control message, messages with customer-emphasized value co-creation statements can effectively motivate providers to reduce customers' complaints. Contrastingly, provider-emphasized value co-creation statements lead to more complaints from customers. Moreover, value appropriation statements play a significant role in moderating the impact of value co-creation statements. The providers' granular behaviors are further explored to gain insights into the observed effects. The findings provide actionable implications for platforms on designing effective governance mechanisms.

Keywords: Value co-creation, value appropriation, platform governance, complaint, digital platform, random field experiment

1. Introduction

Digital platforms provide a common place for different user groups, such as third-party providers and customers, to interact and co-create values (Evans and Schmalensee 2007; Guttentag and Smith 2017; Zervas et al. 2017). Take, as an example, the peer-to-peer (P2P) platforms of real estate rental properties (which are also the empirical context in this study). A typical interaction is that renters with idiosyncratic preferences filter heterogeneous property listings provided by hosts and gradually refine their choice sets, leveraging search engines and matching algorithms in the process. The interaction processes involve value units (e.g., listing information), platform participants (i.e., the hosts as the third-party providers, renters as customers), and the supporting technologies (i.e., search engines/matching algorithms) (Parker et al. 2016). During the complex and dynamic interaction processes, conflicts such as misunderstanding or disagreement between participants from different user groups often arise, resulting in customer dissatisfaction and complaints (Boyce 2016).

Information inaccuracy or communication failure are two major causes of complaints from renters. For example, renters complain to the platform that the requested rooms are actually not available or that the hosts do not answer phone calls. Platforms strive to tackle these issues by employing supporting technologies to automate the interactions (Hinz and Eckert 2010). For example, Airbnb tracks online bookings and updates the availability of listings, suspends or removes host accounts that cancel too many times, and boosts the rankings of hosts who update their calendars regularly. These platform design improvements can help reduce the complaints caused by trackable online interactions. However, complaints caused by interactions outside the platforms present complex and difficult to resolve challenges to the platforms. The platforms have very limited control over these interactions but stand to suffer from the ripple effects of any

subsequent conflicts. For example, the hosts provide inaccurate property descriptions or incorrect property images; inattentive hosts do not respond to the renters' phone call inquiries. Both information inaccuracy and communication failure can result in renters spending unnecessary time screening and making requests (Fradkin 2017),¹ resulting in lower customer satisfaction.

The diligence of hosts in information presentation and communication is very important in avoiding potential complaints. For instance, accurate information updates by the hosts help resolve complaints due to *stale vacancies*² (Fradkin 2017). Also, timely response and communication can effectively address the uncertainty that the renters perceive and improve the fill rates (Sittic, 2015). However, third-party hosts are not affiliated with the platform and may not be fully engaged on the platform (Huber et al. 2017). It is therefore crucial for the platform to motivate hosts to proactively exert effort to improve renters' satisfaction and avoid complaints.

We examine this issue from the value perspective of platform governance. Platform governance revolves around the management of platform participants' behavior in the ecosystem (Tiwana 2013). Value perspective concerns how value is created as well as how participants capture their corresponding shares, i.e., value co-creation and value appropriation (Ceccagnoli et al. 2012; Oh et al. 2015). We take the value perspective because value co-creation, as the fundamental goal of a platform ecosystem, and value appropriation, as the sharing mechanisms of the co-created value (Lavie 2007; Tiwana 2013), in combination shape the incentive structures of the platform stakeholders and the consequent engagements.

We focus on the platform's use of messages with the value co-creation and appropriation statements to motivate third-party providers. In our research context, we consider a situation in

¹ Stale vacancy refers to a booked room is still listed as available on the platform because inattentive hosts do not update the room availability information after the room has been booked (Fradkin 2017).

which the platform is concerned about renter complaints about hosts due to information misrepresentation or miscommunication, and hopes the hosts take proactive actions to improve their service aspects. To motivate hosts, the platform sends hosts reminder messages consisting of value co-creation and value appropriation statements.

Our study aims to discover different motivating elements that can be used in reminder messages and their effectiveness in motivating third-party providers. Value co-creation and value appropriation processes in the platform environment involve multiple types of stakeholders (e.g., providers and customers) engaging complex interactions (e.g., competition and cooperation) (Lavie 2007; Sarker et al. 2012). Therefore, it is crucial to understand what elements in a reminder message that third-party providers would be sensitive and responsive to. We specifically focus on the motivating effects of two sets of elements: emphasizing the importance of providers vs. customers in value co-creation and emphasizing the competition vs. cooperation mechanisms in value appropriation.

In the platform environment, value co-creation manifests as the processes that the platform and third-party providers jointly create and offer products and services that are of value to end customers; customers' satisfaction brings in businesses and economic payoffs for the platform and third-party providers (Constantinides et al. 2018). In this regard, both providers and customers are relevant stakeholders in value co-creation but with distinct roles. In motivating providers to better serve customers and avoid complaints, the reminder message may either emphasize the important role of the providers in value co-creation or emphasize the importance of customers to the overall value co-creation processes. It is worthwhile to examine which type of message generates a higher motivating effect. We, therefore, use an experimental setting to examine the messages with different value co-creation statements: the value co-creation

statement that stresses the importance of third-party providers (referred to as *host-emphasized* statement) and the value co-creation statement that stresses the importance of customers (referred to as *renter-emphasized* statement). Such examination helps improve the understanding of the third-party provider's view on value co-creation.

Value appropriation in platform governance concerns how involved parties capture the co-created values (Jacobides et al. 2006; Lavie 2007; MacDonald and Ryall 2004; Saloner et al. 2001), which is important for self-interested third-party providers. Since value appropriation depends on value co-creation, we investigate the joint motivating effects of value co-creation statements and value appropriation statements in the reminder messages. Formal contract arrangements, such as pricing and revenue-sharing contracts, are typical value appropriation mechanisms used in multi-firm alliances or supply chains (Lavie 2007; Tiwana 2013). However, it is infeasible in our experiment to alter the platform and providers' contractual arrangements; therefore, we focus on a reward mechanism that the platform can implement and advocate in the reminder messages. In a platform ecosystem, the providers are engaged in a co-competition relationship—they are *collaborators* in the creation of economic value as well as *competitors* in the extraction of values (Prahalad and Ramaswamy 2004). The platform can use rewards to shift the co-competition dynamics and hence value appropriation. In particular, we consider two possible value appropriation mechanisms: 1) a *competition-based value appropriation* mechanism in which the platform emphasizes the individual performance of providers and rewards providers based on their competition outcome, and 2) a *cooperation-based value appropriation* in which the platform emphasizes the collective performance of providers in groups and rewards providers based on their group achievement. With different reminder statements about value co-creation and value appropriation, we aim to address the following research questions:

1. *Can value co-creation statements with an emphasis on different parties (i.e., host-emphasized vs. renter-emphasized) motivate third-party providers to proactively reduce renters' complaints?*
2. *Can the value appropriation statements (i.e., competition-based vs. cooperation-based) take joint effects with value co-creation statements in motivating providers to proactively reduce renters' complaints?*

To address these research questions, we collaborate with a major P2P platform on real estate rental properties in China to conduct a randomized field experiment on over 11,000 hosts in four major Chinese cities. In our experiment, when a complaint associated with a property occurred and was verified by the platform, the platform sent out messages to other hosts listing properties in the same neighborhood as the complained property. The messages informed these hosts about the complaint possibility and reminded them to put in efforts to avoid potential complaints. Through randomization, each host in our sample receives one of nine messages from the platform: a control message without any value co-creation or value appropriation statements, and eight treatment messages that augment the control message with varying combinations of statements about value co-creation and value appropriation mechanisms.

Our experiment yields interesting findings with important theoretical and managerial implications. First, our results illustrate that compared to the control message, the messages with *customer-emphasized* statements effectively motivate third-party providers to engage in reducing customer complaints. In contrast, the messages with *provider-emphasized* statements do not effectively motivate providers. More surprisingly, providers receiving *provider-emphasized* statements even incur more complaints. These findings extend the theoretical understanding of platform governance by showing that advocating the role of customers can effectively resonate

with and engage third-party providers. It also confirms the theoretical tensions between third-party providers, customers, and the platform in value co-creation, i.e., third-party providers may be self-interested and not cooperate with the platform in value co-creation.

Second, we find that different value appropriation statements generate distinct influences on the motivating effect of value co-creation statements. Specifically, the use of a *competition-based* statement weakens the motivation dampening effect of a host-emphasized statement; it may even take a joint effect with the host-emphasized statement to motivate hosts to avoid potential complaints from renters. The motivating effect of a renter-emphasized statement, however, is not influenced by the use of a competition-based statement. In contrast, the use of a *cooperation-based* statement undermines the desirable motivating effect of a renter-emphasized statement but does not influence the motivation dampening effect of a host-emphasized statement.

These findings highlight the important role of value appropriation in platform governance. While third-party providers may accept the goal of value co-creation on the platform, they may be self-interested and likely to behave opportunistically, i.e., free-riding on other providers' effort in value co-creation. In this regard, rewarding providers based on group performance may exacerbate the free-riding behavior, and encouraging provider competition may generate the desirable motivating effect for providers. These insights are in line with the theoretical view of individual-collective tensions in platform governance (Wareham et al. 2014).

Third, to verify the underlying mechanisms of the observed motivating effects, we also obtained granular observations on the behavior of third-party hosts. We find that the hosts' avoidance of complaints can be explained by improving the information quality of their listed

properties and their response to renters' requests. These findings generate practical implications regarding how the engagement of third-party providers can enhance platform governance.

2. Theory Foundation and Hypothesis Development

2.1 Value Co-creation

This study focuses on the two key components in platform governance: value co-creation and value appropriation. Value co-creation has been identified as the main goal of platforms (Schreieck et al. 2016). The process is complex and involves not only the platform but also its primary stakeholders (including third-party providers and customers). In particular, value is created through the exchange and sharing of resources between the platform and third-party providers in the development of products or the provision of services (Gulati 1998), and the interaction between the customers and the third-party providers in the consumption of the products and services (Gronroos 1994). The combination and alignment of resources and efforts from all stakeholders are critical to value co-creation success (Das and Teng 2000). According to the social interdependence theory, people's interactions and subsequent performances are determined by their beliefs about how their goals are related (Deutsch and Eble 1949). Therefore, nurturing common goals of value co-creation among the stakeholders could be an effective approach to governing the independent third-party providers. In this study, we structure the value co-creation goals with different emphases in the reminder message and compare the impact of the reminder messages on the third-party providers.

It is worth noting that the use of value co-creation statements to motivate providers is in line with the idea of value-based platform governance. Value-based governance focuses on promoting the organizational goals and objectives to platform participants and developing shared norms and spirits in the platform ecosystem (Huber et al. 2017; Tiwana 2013). The value co-

creation statements in the reminder messages in this study are “relatively broad and highly abstract statements” that promote the key goals of the ecosystem and desired spirits of collaboration (Gulati 1998). The platform uses these statements to actively and deliberately instill the key goals and desired spirits into providers (Huber et al. 2017) and intend to elicit desired behavior. Although the advantages of value-based governance in aligning stakeholders’ strategies in value co-creation have been stressed (Huber et al. 2017), the effectiveness of value-based governance has been under-investigated empirically in the literature. This study will fill this gap by empirically examining the value-based governance strategies on a peer-to-peer platform.

2.2 Value Appropriation

Value appropriation guides how the co-created values are distributed among involved parties (Gulati and Wang 2003; Hamel 1991; Khanna et al. 1998). Platform and third-party providers as economic entities must be able to capture the value they created in order to prosper (Lavie 2007; Saloner et al. 2001). Therefore, how to partition the co-created values is a highly relevant and important platform governance issue. The relative share of economic value that a provider can extract impacts its incentive to participate in value co-creation. However, the interaction between value co-creation and value appropriation is still under-investigated. This paper intends to shed light on this issue.

Value appropriation mechanisms often manifest as pricing and revenue sharing contracts in inter-firm alliances and supply chains (Lavie 2007; Tiwana 2010). In addition to the explicit contracting arrangements between the platform and the providers, platforms can alter value appropriation by maneuvering the relationships between providers. In a platform ecosystem, the providers are *collaborators* in the creation of economic value as well as *competitors* in the

extraction of values (Prahalad and Ramaswamy 2004). The platform can shift the competition dynamics by rewarding the providers that perform better than peer providers (i.e., a *competition-based* value appropriation mechanism) or the provider groups that collectively perform better than other peer groups (a *cooperation-based* value mechanism). It is not clear yet the joint effect of the value appropriation statements and the value co-creation statements in motivating the providers' efforts. Our study is therefore interested in investigating the interaction between value co-creation and value appropriation statements.

The aforementioned value appropriation statements spell out rules and therefore correspond to rule-based governance. In contrast to the “broad and highly abstract statements” in value-based governance (Gulati 1998), rules are clear and precise specifications of the rights and duties of the involved parties such as terms, conditions of responsibilities, the enforcement of reward and penalty, and other coordination related issues (Huber et al. 2017). They often manifest as partner programs, contracts, and agreements (Evans and Schmalensee 2007; Park and Ungson 2001; Poppo and Zenger 2002; Reuer and Ariño 2007). Rule-based governance and value-based governance are not mutually exclusive but rather supplement each other in platform governance. This study examines the effectiveness of the joint use of both types of governance mechanisms on a peer-to-peer platform.

2.3 Hypothesis Development

Value creation on the platform is featured by the involvement and engagement of all stakeholders. Value emerges when the providers and the platform pool their resources to co-produce the products or services which meet consumers' needs (Vargo and Lusch 2004). To motivate providers to improve service quality and avoid complaints from customers, the platform can potentially emphasize the importance of either providers or customers in the value co-

creation process. We therefore consider the distinction between value co-creation statements that emphasize providers' contributions and those that emphasize customers' satisfaction in the reminder message.

Provider-emphasized statements stress the important role of third-party providers in co-creating value with the platform. Since value co-creation is based on the joint efforts of both the platform and the third-party providers (Grover and Kohli 2012; Sarker et al. 2012), providers should assume shared responsibilities of achieving consistent satisfactory service quality. Customers' complaints are a typical issue in governance, especially in the P2P platform environment (Moon et al. 2019). As these complaints are often attributable to the lack of diligence on the provider side, engaging providers in governance and motivating their proactive efforts are crucial for the successful prevention of these issues. Emphasizing the importance of providers in the value co-creation statement highlights the providers' contributions in value co-creation and strengthens third-party providers' sense about their shared responsibilities in value co-creation. The providers are more likely to accept the shared norms on the platform and align their interests with the overall mission of the platform. The providers would exert proactive efforts to improve their service quality on the platform. In this regard, we expect that the platform can use the message with a provider-emphasized value co-creation statement motivate third-party providers to avoid complaints.

H1: Compared to a control message, a message that emphasizes the importance of the third-party provider side in co-creating value with the platform can better motivate providers to reduce customers' complaints.

Customer-emphasized statements stress the importance of the customers in value co-creation on the platform. In recent years, the service field has shifted from being company-centric to being

more customer-oriented (Hansen 2019; Tronvoll et al. 2011; Vargo and Lusch 2004). Customers are viewed as an indispensable player for value co-creation (Payne et al. 2008). In the context of P2P platforms, while customers may not directly participate in the development or production processes, the value co-created by the platform and third-party providers ultimately unfolds through the customers' consumption experiences and satisfaction. When a customer consumes a product or service and fulfills his/her needs, the value of the product and service is truly realized. Therefore the values are dependent on customers' experiences and satisfaction (Kohli and Jaworski 1990; Narver and Slater 1990; Payne et al. 2008). In this regard, customers are also co-producers of values (Payne et al. 2008; Prahalad and Ramaswamy 2004; Vargo and Lusch 2004). In addition, satisfied customers could also bring in long-term or repeated businesses, generating a positive feedback loop of spurring more value co-creation activities (Payne et al. 2008).

Emphasizing the importance of customers in value co-creation helps motivate the proactive efforts of third-party providers. The reasoning is twofold. First, the articulation of customers as a key stakeholder can reinforce the providers' sense of value co-creation and align their incentives with the platform. To achieve their value co-creation goals on the platform, third-party providers would be motivated to improve service quality. The efforts, e.g., enhancing information presentation and communication, are aligned with the endeavor to improve service quality and reduce customers' complaints (Normann 2001; Payne et al. 2008). Second, emphasizing customer importance can remind providers about their shared responsibility to satisfy customers. Customer experiences and satisfaction are dependent not only on the availability of service on the platform but also on the diligence of third-party providers. Therefore, providers would have more incentives to exert efforts to satisfy customers and avoid complaints. We expect that the

platform can motivate third-party providers to exert effort and avoid customers' complaints using the message with a customer-emphasized statement of value co-creation.

H2: Compared to a control message, a message that emphasizes the importance of the customer side for value co-creation on the platform better motivates third-party providers to reduce customers' complaints.

Value appropriation concerns the distribution of the co-created values among the participants. In the platform ecosystem, the co-created value is divided not only between the platform and the third-party providers but also among providers themselves. While providers collectively pursue a common goal of co-creating value with the platform, they also compete among themselves, trying to seize a larger share of co-created values (Brandenburger and Nalebuff 2011; Lavie 2007). Therefore, the extent to which individual third-party providers can appropriate value for themselves is dependent on two types of dynamics: 1) how they establish competitive advantages over other peer providers and win a larger share of values; 2) how they collectively create more values on the platform for them to share. The platform can maneuver the dynamics between providers by shifting the cooperation relationships. We therefore consider two types of value appropriation mechanisms that are likely to influence the provider incentives and can be implemented by the platform: *competition-based* value appropriation and *cooperation-based* value appropriation.

In competition-based value appropriation, individual third-party providers can capture more benefits by outperforming other peer providers (Becker and Huselid 1992; Green and Stokey 1983; Lazear and Rosen 1981; Nalebuff and Stiglitz 1983). The sense of competition motivates individual providers to exert more effort (Becker and Huselid 1992; Beersma et al. 2003) to improve their performance. The platform can design mechanisms to implement and reinforce

competition-based value appropriation. For example, the platform operator can promote the providers who receive fewer customers' complaints than other providers.

We expect that a competition-based value appropriation mechanism can enhance the motivating effect of value co-creation statements. With competition-based value appropriation, individual providers anticipate that their own efforts will build their advantages relative to their peer providers and increase their shares of the value. The expected marginal returns of their efforts become higher, which leads to a stronger motivating effect (Lazear and Rosen 1981; Tirole and Jean 1988). In addition, prior studies on alliance portfolios show that the multilateral competition among partners will reduce the likelihood of partners behaving opportunistically (Lavie 2007). When the platform promotes the providers based on their relative performance against each other, the providers compete for the platform's resources and attention. As a result, the providers have incentives to exert more effort to avoid complaints. We therefore develop the following hypothesis.

H3: When the message emphasizes that the platform implements a competition-based mechanism of value appropriation for third-party providers, the motivating effect of a value co-creation statement on third-party providers to avoid customers' complaints becomes stronger.

Cooperation-based value appropriation rewards individual providers based on their collective group-level performance. For example, in the context of real estate rental properties, the platform can promote the neighborhoods in which hosts collectively achieve desirable performances of satisfying customers. The cooperation-based mechanisms potentially work effectively on the platform environment for three reasons. First, providers' behavior often generates externalities on other providers, especially in the context of real estate property rental. A renter's value depends on not only the property that s/he is interested in but also other properties in the same

community. So the property rental value and hence hosts' engagement are interdependent. The cooperation-based mechanisms are more likely to internalize the externalities and optimize the hosts' efforts (Katz 1986). Second, value co-creation requires the involved stakeholders to pool their resources and efforts to collectively provide products and services to customers. The cooperation-based mechanisms award individual providers based on group performance, instilling a sense of cooperation between third-party providers. Therefore such mechanisms are more aligned with the goals and spirits of value co-creation. Third, group-based rewards have been increasingly used by companies to boost trust, foster collaboration, and improve performance³. Prior studies show group-based rewards can help establish psychological bonds with individual group members and unite the group members to achieve group objectives, which drive group members to exert greater effort (Chen et al. 2012). The group-based rewards method is effective even when the task itself does not involve collaboration, such as losing weight (Kullgren et al. 2013). Therefore, such a mechanism can potentially encourage individual hosts to avoid destructive competition, develop a sense of community, and explore mutually beneficial ways to jointly enhance value co-creation (Chen et al. 2009).

A critical issue associated with the mechanism of cooperation-based value appropriation is the free-riding problem, which dampens individual incentives (Albanese and Van Fleet 1985; Latané et al. 1979). When individual benefits are linked with group-level performance, providers may exhibit the shirking behavior and ride on the contributions of others because they cannot fully capture the value that they create (Holmstrom 1982; Lavie 2007). In this regard, the cooperation-based value appropriation mechanism is very likely to undermine the effectiveness of value co-creation statements on motivating third-party providers' efforts to avoid customer

³ <https://www.sesp.northwestern.edu/masters-learning-and-organizational-change/knowledge-lens/stories/2011/team-based-rewards.html>

complaints. The free-riding issue is especially prominent in the platform environment because third-party providers are inherently independent entities that participate in a loose organization for their own benefits (Ceccagnoli et al. 2012; Oh et al. 2015). Higher co-created value fostered by cooperation does not necessarily result in higher appropriated value for individual providers to sustain their engagement (Cennamo and Santaló 2019; Veugelers and Cassiman 1999).

Overall, we expect that the use of cooperation-based value appropriation mechanism weakens the motivating effect of value co-creation statements on third-party providers. We therefore hypothesize that:

H4: When the message emphasizes that the platform implements a cooperation-based mechanism of value appropriation for third-party providers, the motivating effect of value co-creation statement on third-party providers to avoid renters' complaints becomes weaker.

3. Methodology

3.1 Research Context

We collaborated with a major P2P platform of real estate rental properties in China to conduct a field experiment. The platform was established in 2015 and has been growing steadily. Its operation expanded from one city in 2015 to ten major cities in 2019. The business model of this mobile-based platform is similar to that of Airbnb. It provides a marketplace for hosts (i.e., property owners) to list their rental properties and for prospective renters to discover and rent properties. Different from Airbnb and some other platforms that mainly facilitate short-term rental transactions, this platform focuses on relatively long-term rental periods that usually span at least three months. Therefore, it is more critical for the platform to implement effective governance mechanisms to better serve renters and reduce complaints.

The platform operates with an open business model with a simple screening process. The third-party providers provide the attributes (e.g., location, size, amenities, and rent), pictures, and descriptions about to-be-listed properties. The platform screens the information and approves the listings. Hosts pay the platform listing fees, which are based on the rental rates. The renters use the platform for free. Prior to the completion of the lease contract, there is a matching process with several steps. The prospective renter browses a list of properties using the platform's app. If a prospective renter is interested in a particular listed property, she/he can call the host for further inquiry, negotiation, and on-site inspections via the app. Similar to other P2P platforms, phone calls are mediated by the platform without disclosing personal contact information to protect the privacy and prevent harassment for both sides. If needed, the platform also assists in managing the appointments and scheduling on-site tours, interviews, and inspections.

The platform regulates the providers based on their behaviors. Before our experiment, this platform mainly relied on renters to monitor undesirable hosts' behavior – it provides renters the option of filing a complaint on a host. On the page of each listed property, there is a link for renters to submit a complaint (see Appendix A). To facilitate the complaint process, this platform classifies the complaints into seven types: 1) property has been leased out; 2) wrong rental rate; 3) wrong picture; 4) phone is disconnected; 5) charge additional fees; 6) wrong property type; 7) others. If “others” is selected, renters have to manually enter a reason. Types (1-3, 5, 6) are related to information inaccuracy, and type (4) is related to miscommunication. The platform employs a standard procedure to investigate each complaint and identify the hosts and/or renters with undesirable behaviors. Once a complaint is submitted, a worker in the call center will contact the corresponding host to verify whether the complaint is valid. In the presence of a significant discrepancy between the involved parties, a manager of the platform will investigate

the involved properties on-site. Usually, renters will receive a response about the complaint from the platform within 24 hours. If the complaint is valid, the platform will remove the listing of the involved property from the website for a month and record verified complaint incidence. If a provider has accumulated three verified complaints, the platform will suspend the providers' account for three months. If the complaint is invalidated, the renter will be recorded by the platform. If a renter has accumulated more than three invalid complaints in a month, this renter will be blocked from contacting and renting properties on the platform in the future.

3.2 Field Experiment Design

We design and conduct the field experiment in four major Chinese cities. The listed properties are grouped into residential neighborhoods based on the location. The platform keeps track of the verified complaints in each residential neighborhood. Once a complaint is verified in a residential neighborhood, the residential neighborhood becomes a target neighborhood for the platform to examine the preventative governance strategies. The platform subsequently sent text messages to the hosts in the same residential neighborhood and informed these hosts that a listed property within the same neighborhood had received a complaint⁴. The messages serve as reminders to the hosts who are not involved in the complaint and can be embedded organically in the platform's day-to-day operations. Such targeting design is less intrusive to the hosts. The target residential neighborhood is randomly assigned to one of the experiment groups, i.e., all hosts within the same neighborhood are assigned into the same experimental group. The randomization is conducted at the residential neighborhood level rather than the individual host

⁴ Once a complaint is verified, the platform removes the listed property from the website. The platform did not send the reminder messages to the removed properties and we hence removed the hosts with verified complaints in the data analysis.

level for two reasons. First, from the experimental design perspective, all hosts in the same neighborhood receive the same treatment message to avoid potential contamination issues. That is, the hosts in the same neighborhood may interact and learn each other's messages⁵. Second, from the theoretical perspective, the cooperation-emphasized value appropriation statement promotes the collective efforts between hosts in a neighborhood. It is more sensible that all hosts in the same neighborhood receive the same messages. Since the randomization is at the neighborhood level and the size of the neighborhood varies significantly, the numbers of hosts in the groups are not completely balanced. We further apply matching methods to balance the group size and individual hosts' characteristics across groups. It is possible that a host has listed properties in different residential neighborhoods and is assigned in multiple experimental conditions simultaneously. These hosts were removed in the following data analysis⁶.

As aforementioned in the paper, we are interested in the motivating effects of the value co-creation and value appropriation statements in reminder messages. Specifically, we consider two distinct statements about value co-creation emphases, i.e., *host-emphasized* and *renter-emphasized*, and two distinct statements about value appropriation mechanisms, i.e., *competition-based* and *cooperation-based*. For comparison purposes, we have also considered scenarios that only a value co-creation statement, or a value appropriation statement, or neither was included in the reminder message. We therefore adopt a 3×3 design with nine messages—one control message and eight treatment messages (see Table 1). All groups, including the control group, received a message to control the potential “reminder effect of a

⁵ The hosts in different residential neighborhoods are less likely to interact compared with those in the same neighborhood. Based on the services provided by the collaborating platform and our conversation with their senior managers, we learn that this platform does not provide any channels that facilitate the hosts to interact with each other. The platform site also does not host any online communities or forums for hosts or renters. The only online communication channel is to facilitate conversations between hosts and renters. Therefore, the major communication among hosts should happen offline, e.g., in the same neighborhoods.

⁶ The percentage of these hosts is 9.5%.

message,” which has been extensively examined in the prior literature (Fjeldsoe et al. 2009; Hurling et al. 2007; Liu et al. 2019).

Each message consists of two or more of the following four statements. The first statement informs the target host that a property in the host’s neighborhood has received a verified complaint. The statement does not provide any information about the complaint type or reason. The second statement is a value co-creation statement, which emphasizes either the importance of hosts or renters (i.e., a host emphasized statement vs. a renter-emphasized statement). The third statement is a value appropriation statement, which indicates whether the platform recommends properties based on individual performance or group performance (i.e., a competition-based statement vs. a cooperation-based statement). The fourth statement urges the host to ensure information accuracy and engaging communication. The control message consists of the first and fourth statements, while the treatment messages augment the control message by including varying combinations of the second and third statements.

Specifically, the message for Group 1 (i.e., *Control Group*) does not include any statement about value co-creation emphasis or value appropriation mechanism. The message for Group 2 (i.e., *Renter Only Group*) includes a renter-emphasized statement, i.e., “Our platform is keen on the businesses from renters. The success of value-co-creation by the platform and third-party hosts hinges on the satisfaction of renters.” It does not include any statement about value appropriation mechanisms. The message for Group 3 (i.e., *Host Only Group*) includes a host-emphasized statement, i.e., “Our platform is keen on the contributions from third-party hosts. The success of value co-creation by the platform and third-party hosts hinges on the diligence of hosts.” It does not include any statement about value appropriation mechanisms.

The message for Group 4 (i.e., *Competition Only Group*) includes a competition-based statement, i.e., “Our platform would recommend the properties with high service quality to renters. The property with complaints will be in a disadvantageous position relative to other properties.” It does not include any value co-creation statement. The message for Group 5 (i.e., *Renter Competition Group*) includes a renter-emphasized statement and a competition-based statement. The message for Group 6 (i.e., *Host Competition Group*) includes a host-emphasized statement and a competition-based statement.

The message for Group 7 (i.e., *Cooperation Only Group*) includes a cooperation-based statement, i.e., “Our platform would recommend the residential neighborhood with high overall service quality. Residential neighborhoods with properties that receive complaints will not be prioritized in the recommendation.” It does not include any value co-creation statement. The message for Group 8 (i.e., *Renter Cooperation Group*) includes a renter-emphasized statement and a cooperation-based statement. The message for Group 9 (i.e., *Host Cooperation Group*) includes a host-emphasized statement and a cooperation-based statement. Table 1 lists the groups followed by the corresponding messages.

—— Insert Table 1 here ——

3.3 Data

The field experiment was implemented between May and July 2019. Our dependent variable is the number of complaints that a host receives, i.e., *Complaints*. Our data indicate that the number of complaints about each host was relatively low, and there were a large number of zero. The number of complaints aggregated at the daily level does not entail sufficient variations. Therefore, the observation window was one week before and after the intervention.

In this experiment, the level of randomization is residential neighborhood. Larger neighborhoods with more listed properties are likely to receive more complaints. Therefore, the sample size (i.e., the number of hosts) between groups is imbalanced. In order to perform host-level analysis across experiment groups, we follow (Blackwell et al. 2009) and use the coarsened exact matching (CEM) to match the hosts from different groups, balancing the sample size between groups. As a monotonic imbalance-reducing matching method, CEM requires fewer assumptions and possesses more attractive statistical properties for many applications than do existing matching methods (Blackwell et al. 2009). After matching, the hosts in each matched pair are similar in all observational characteristics. The difference in their outcome variable (i.e., the number of received complaints) can be attributed to the treatment. Our data set includes rich information about the hosts. The covariates that we used in CEM include gender of the host, being a professional host or not, tenure of the host, size of the listed property, rental rate, number of other listed properties within the same residential neighborhood, distance to city downtown, historical phone call counts, and past complaint counts. The city where a host lives was also matched across the different groups. The sample size of Group 6 (Host Competition Group) is the smallest. We used the CEM technique to match each host in Group 6 with the closest host in other groups. After matching, each group has 1,325 hosts who received the messages. The total number of hosts in our analysis is 11,925 ($=1,325 \times 9$).

Table 2 summarizes the descriptive statistics. According to our data, 53.4% of the hosts are males, and 58.3% of the hosts are professional hosts. The average tenure of the host on the platform is 49.062 weeks. The statistics also indicate that the average size of properties listed by the hosts is 49.546 square meters. The monthly rental rate per square meter is around 86.150 Chinese Yuan. The average number of listed properties in a residential neighborhood is 1.871.

The average distance between the listed properties and the city downtown is 11.834 kilometers. We conducted randomization checks on these variables. The F-statistics show that there is no significant difference in these variables across the nine experimental groups (Table 3). Thus, the data passed the randomization check.

—— Insert Table 2 here ——

—— Insert Table 3 here ——

We first present some model-free evidence of our data. We plot the average number of complaints received by a host within one week after the treatment across nine groups. Figure 1 suggests that compared with the control group (Group 1), all three groups received messages with a renter-emphasized statement, i.e., Renter Only Group (Group 2), Renter Competition Group (Group 5), and Renter Cooperation Groups (Group 8) had fewer verified complaints. In contrast, two out of three groups received messages with a host-emphasized statement, i.e., Host Only Group (Group 3) and Host Cooperation Groups (Group 9), had more verified complaints. The findings suggest that the renter-emphasized statement motivates hosts to reduce complaints, whereas the host-emphasized statement does not have the equivalent motivating effect. To further explore the potential joint effects of value co-creation statements and value appropriation statements, we compare the groups that received the same value co-creation statement. For the three groups that received the renter-emphasized statement, the group that received a message with the competition-based statement (Renter Competition Group or Group 5) has fewer verified complaints than the group that received a message without any value appropriation statement (Renter Only Group or Group 2). The latter group, however, received fewer complaints than the group that received a message with a cooperation-based statement (Renter Cooperation Group or Group 8). The three groups that received a host-emphasized statement show the same pattern,

which suggests that the value appropriation statements moderate the motivating effect of the value co-creation statement in reducing complaints.

——— Insert Figure 1 here ———

3.4 Model Specification

To further study the effect of value co-creation and value appropriation statements, we employ the difference-in-difference model to examine the relationships between the number of complaints and various message statements. The difference-in-differences analysis compares the treatment and the control group before and after the time of treatment. By looking at the before and after changes in the treatment group relative to the control group, the difference-in-difference model allow us to control for many obvious sources of heterogeneity across groups and rule out most alternative explanations (Goldfarb and Tucker 2014). Because complaint incidents occur infrequently and excessive zero values exist for *Complaints*, we employ a zero-inflated negative binomial count model to examine the impact of message statements on the number of complaints. Compared with traditional regression, the zero-inflated negative binomial regression corrects the rare event biases and standard error inconsistency and can thereby generate more accurate estimates (Greene 2018). Our first model specification is:

$$Complaints_i = \begin{cases} 0 & \text{with probability } \varphi_i \\ NegativeBionomial(Complaints_i | X_i) & \text{with probability } 1 - \varphi_i \end{cases} \quad (1)$$

where i is the host index and φ_i is the probability that is determined by the zero-inflated link function, which is specified as a logistic regression (Sheu et al. 2004). X_i represents the key independent variables and interaction terms, including $After_i$, $Renter_i$, $Host_i$, $Competition_i$, $Cooperation_i$, $After_i \times Renter_i$, $After_i \times Host_i$, $After_i \times Competition_i$, $After_i \times Cooperation_i$, and control variables. *Renter* is a dummy indicator with a value of 1 if the host received a message that

includes a renter-emphasized statement, and a value of 0 otherwise. *Host* is a dummy indicator with a value of 1 if the host received a message that includes a host-emphasized statement, and a value of 0 otherwise. *Competition* is a dummy indicator with a value of 1 if the hosts received a message with a competition-based statement, and a value of 0 otherwise. *Cooperation* is a dummy indicator with a value of 1 if the host received a message that includes a cooperation-based statement, and a value of 0 otherwise. The coefficients of $After_t \times Host_i$ and $After_t \times Renter_i$ are the coefficients of interest. They reflect the effect of two distinct value co-creation statements on the treatment group relative to the control group. The control variables capture host characteristics and property characteristics, including (1) *Host_Gender*, the gender of the host; (2) *Professional_Host*, whether the host is a professional host or not; (3) *Host_Tenure*, the weeks elapsed since the host registered on the platform; (4) *Property_Size*, the size of listed property in square meters; (5) *Rental_Rate*, the rental rate per square meter of the listed property; (6) *Property_Neighborhood*, the number of other listed properties within the same residential neighborhood, (7) *Distance*, the distance of the listed property to the city downtown in kilometers; (8) *Historical_Call*, the number of phone calls received by a host in the last six months; (9) *Complaint_History*, the number of verified complaints received by a host in the last six months; and (10) *city dummies*.

In order to examine the moderating effect of the value appropriation statements, we set the control group as the baseline and use eight dummy indicators to indicate which treatment group that the host was assigned to. Our model specification is:

$$Complaints_i = \begin{cases} 0 & \text{with probability } \phi_i \\ NegativeBinomial(Complaints_i|Z_i) & \text{with probability } 1 - \phi_i \end{cases} \quad (2)$$

Similar to φ_i in Model (1), ϕ_i is a probability determined by a zero-inflated link function, which is specified as a logistic regression. Z_i includes eight treatment dummies: *Renter_Only_i*, *Host_Only_i*, *Competition_Only_i*, *Renter_Competition_i*, *Host_Competition_i*, *Cooperation_Only_i*, *Renter_Cooperation_i*, *Host_Cooperation_i*, their interactions with *After_t*, and control variables as in X_i . The coefficients of the interactions between treatment dummies and *After_t* are the coefficients of interest.

4. Results

4.1 Hypotheses Testing

The estimation results are shown in Table 4. We first assess whether value co-creation statements motivate third-party hosts to reduce complaints. The coefficient of the *After* × *Host* was positive and significant ($\beta = 0.398$, $p < 0.05$, column 1 in Table 4). It suggests that, compared to the host who received the control message, a host has more complaints after receiving a message with a host-emphasized statement. Specifically, the complaint number would increase by a factor of 48.9% on average while holding all other variables in Model (1) constant. This suggests that emphasizing the importance of hosts in the value co-creation statement would dampen the hosts' incentives to avoid complaints. Therefore, H1 is not supported. A potential explanation is that when the platform operator emphasizes that the platform values the importance of hosts, hosts may feel more assured that the platform operator would side on them when handling the renters' complaints (Orsingher et al. 2010). Therefore they are less motivated to take action to avoid complaints.

—— Insert Table 4 here ——

Regarding renter-emphasized value co-creation, the coefficient of *After* × *Renter* is negative and significant ($\beta = -0.401$, $p < 0.05$, column 1 in Table 4). Compared to a host who received the

control message, a host has fewer complaints after receiving a message with a renter-emphasized statement. The inclusion of a renter-emphasized statement would result in the host's complaint number reduced by a factor of 33.0% on average while holding all other variables in Model (1) constant. In contrast to the host-emphasized statement, the renter-emphasized statement motivates hosts to proactively avoid complaints. Therefore, H2 was supported. Combining the findings regarding H1 and H2, we can conclude that reminding hosts of the importance of customers and customer satisfaction in value co-creation would motivate the hosts to assume the responsibility of satisfying customers.

We further examine how the impact of the value co-creation statement is moderated by the value appropriation statements. We summarize the coefficients of the interaction terms between treatment dummies and *After* indicators in Table 5 to better illustrate the difference-in-differences results of Model (2). The coefficient for the *After*×*Host_Competition* is negative and significant ($\beta = -0.647$, $p < 0.10$), which is in stark contrast to the positive but statistically insignificant coefficient for *After*×*Host_Only* ($\beta = 0.495$, n.s). The t-test ($t = -2.131$, $p < 0.05$) further shows that the difference is significant. The combination of a host-emphasized statement and a competition-based statement will reduce the renters' complaints by a factor of 47.6%, which is higher than the case of using a host-emphasized statement only. The results suggest that the combination of the value co-creation statement emphasizing the importance of hosts and the value appropriation statement about host competition will jointly motivate the host to avoid complaints. The implication is that although the platform cannot increase the host's incentive to avoid complaints by emphasizing the importance of hosts in value co-creation, stressing rewarding hosts based on their individual performance would motivate the hosts to do so.

—— Insert Table 5 here ——

The coefficient for *After×Renter_Competition* is negative and significant ($\beta = -1.005$, $p < 0.01$). Although it is smaller than the coefficient for *After×Renter_Only* ($\beta = -0.809$, $p < 0.05$), the t-test ($t = -0.343$, n.s) shows that the difference is not significant. The inclusion of a competition-based statement does not moderate the effect of a renter-emphasized statement on the number of complaints. The use of a renter-emphasized statement will decrease the renters' complaints by a factor of 55.5%. The inclusion of a competition-based statement along with a renter-emphasized statement will not significantly further decrease the number of complaints. The results suggest that adding a statement highlighting the competition between individual hosts to the message emphasizing the importance of renters does not change the motivating effect of the renter-emphasized statement on the hosts. One possible reason for the insignificant moderating effect is that as the renter-emphasized statement has a strong enough motivating effect on hosts in avoiding complaints, it becomes difficult to incentivize the host further. Hence, H3 is partially supported.

We then examine the moderating effect of a cooperation-based statement. We first look at the coefficients of the treatment groups that received the messages containing a cooperation-based statement (Groups 8 and 9). The coefficient of *After×Renter_Only* is negative and significant ($\beta = -0.809$, $p < 0.05$, columns 2 in Table 4) but the coefficient of *After×Renter_ Cooperation* is positive and significant ($\beta = 0.750$, $p < 0.10$, columns 2 in Table 4). The t-test shows that such difference is significant ($t = -2.745$, $p < 0.01$). Specifically, the use of a renter-emphasized statement only in the reminder message will lead to renters' complaints reducing by a factor of 55.5%. But the inclusion of a cooperation-based statement along with a renter-emphasized statement will increase the complaints by a factor of 111.7%. The results suggest the existence of the free-riding effect in cooperation. When the platform rewards the hosts based on

group performance, they can only appropriate a portion of the value they created and free ride on their peers' effort. The motivating effect of a renter-emphasized statement is therefore weaker.

The coefficient of *After×Host_Cooperation* is positive and significant ($\beta=1.919$, $p<0.01$), which is stronger than the positive but insignificant coefficient for *After×Host_Only* ($\beta=0.495$, n.s). The t-test ($t = 2.494$, $p < 0.01$) further shows that the difference is significant ($t = 2.494$, $p < 0.01$). The combination of a host-emphasized statement and a cooperation-based statement will dramatically increase the renters' complaints by a factor of 581.4%, which is in stark contrast to the insignificant changes in the number of complaints when using a host-emphasized statement only. The results suggest that a cooperation-based value appropriation statement imposes an undesirable effect on the hosts who received a host-emphasized statement. As we discussed before, in the cooperation-based mechanism, the platform promotes cooperation by rewarding the hosts based on the performance of the residential neighborhood rather than individual performance. The hosts would shirk because of the free-riding incentives. Therefore, H4 is partially supported.

The analysis also shows some interesting results about control variables, including the host characteristics and property characteristics. The coefficient of *Professional_Host* is positive and significant ($\beta=1.150$, $p<0.01$, column 2 in Table 4). It means that a professional host has more complaints than an amateur host while holding all other variables in Model (2) constant. Professional hosts are property management agents. Presumably, they are more experienced in handling online listing and communication with renters and are less likely to have complaints. However, our analysis identifies the opposite, suggesting that potential agency issues and moral hazards exist (Rosenberg and Corgel 1990). The coefficient of *Host_Tenure* is negative and significant ($\beta=-0.005$, $p<0.01$, column 2 in Table 4). The results show that the hosts with longer

tenure receive fewer complaints than hosts with shorter tenure. The implication is that as the hosts gain more experience on the platform, they receive fewer complaints, likely because they become better at managing their listing and interacting with renters. The coefficient of *Host_Gender* is statistically insignificant, so the gender of the host does not affect the number of complaints.

Regarding the property characteristics, the coefficient of *Rental_Rate* is positive and significant ($\beta=0.007, p<0.01$, Column 2 in Table 4), which means that the hosts with higher rental rates receive more complaints. The increase is likely because the renters who seek more expensive property normally expect a higher quality of services. The hosts with higher rental rates serve a group of more critical renters, who are more likely to file complaints. In addition, the coefficients of *Size* and *Distance* are negative and significant ($\beta = -0.007, p<0.01$; $\beta = -0.015, p<0.10$, Column 2 in Table 4). The results indicate that when the properties are larger or far from the city downtown, their hosts receive fewer complaints. The positive and significant coefficient of *Property_District* ($\beta = 0.002, p<0.10$) implies that if the number of properties in the same district is higher, the hosts receive more complaints.

4.2 Robustness Checks

We conducted several additional analyses to verify the robustness of our results. First, our main analysis used the zero-inflated negative binomial count model to examine the factors influencing the number of complaints. To verify the robustness of this analysis, we use the negative binomial count model and Poisson count model as alternative estimation methods. The results, as summarized in Table B1 (Appendix B), were qualitatively consistent with the main results. Specifically, the renter-emphasized (host-emphasized) statement has a negative (positive)

and significant effect on the number of complaints. The moderating effect of competition-based statement offsets and overturns the undesirable positive effect of the host-emphasized statement. So combining these two statements in the treatment message helps reduce the number of complaints. But the cooperation-based statement only disincentivizes the hosts to proactively avoid complaints. It dampens the motivating effect of the renter-based statement.

Second, we observed the incidents of complaints within one week after the hosts receiving the message. It is possible that a host received the assigned treatment message more than once, and the one-week examination windows overlap⁷. Multiple interventions may influence the hosts' subsequent behavior and the occurrence of complaints. To control the potential chain effect, we conducted a robustness analysis by adding a binary indicator variable (*Overlap*). This variable has a value of 1 if the host had already received one or more treatment messages within one week prior to receiving the focus message and a value of 0 otherwise. The results are qualitatively consistent with the main results (see Table B2 in Appendix B). It is also interesting to note that the coefficient of *Overlap* is statistically insignificant, suggesting that the effects of multiple treatments do not add up.

4.3 Underlying Mechanisms: Hosts' Proactive Efforts

Our main analyses illustrate that certain value co-creation and appropriation statements used by the platform to remind third-party hosts can effectively lead to the reduction of customers' complaints. The following question is that whether the observed decreases in complaints are attributable to the hosts' proactive efforts. We therefore further explore the potential underlying mechanisms that drive the observed results in the main analyses. As mentioned earlier, the

⁷ This could happen when a neighborhood receives more than one complaint. Each host is only exposed to one condition/treatment message.

incidences of renter complaints are mainly caused by inaccurate property information posted by hosts and their slow or lack of response to renters' requests. Therefore, if hosts indeed take proactive efforts to avoid renter complaints, we should observe more hosts' activities that help to mitigate renter complaints, such as more frequent information updating and longer voice call duration. To dig deeper into these potential mechanisms, we link a data set on host operations obtained from the platform and perform additional analyses.

For each listed property, the platform's operational database records the history of voice calls answered by prospective renters about a property (e.g., the starting time and ending time) and the history of information updates made by the corresponding hosts before the property is leased out. We therefore focus on the average length of voice calls and the number of information updates as the objective measures of hosts' proactive efforts and examine whether they are potential mediating factors.

The results are summarized in Table 6. The average length of voice calls and the number of information updates both have a negative and significant impact on the number of complaints ($\beta = -0.002$, $p < 0.01$ for the average length of voice calls; $\beta = -0.006$, $p < 0.01$ for the number of information updates, Table 6 Panel A). So more frequent information updates and longer phone communication with renters would effectively help hosts avoid complaints. The renter-emphasized statements have a positive and significant impact on the average length of voice calls ($\beta = 4.431$, $p < 0.05$, column 1 in Table 6 Panel B) and on the number of information updates ($\beta = 2.310$, $p < 0.05$, column 3 in Table 6 Panel B). The hosts update their listing more frequently and communicate with the renters for a longer time after they received a message emphasizing the importance of renters. The host-emphasized statement has a negative and significant impact on the number of information updates ($\beta = -2.484$, $p < 0.05$, column 3 in Table 6 Panel B). This

suggests that the statement emphasizing the importance of hosts actually makes hosts update the listing less frequently. These results can explain why renter-emphasized (host-emphasized) statement leads to fewer (more) complaints.

The coefficient of *After×Host_Competition* is positive and significant for the number of information updates ($\beta = 3.253, p < 0.01$, column 4 in Table 6 Panel B), which is in stark contrast to the insignificant coefficient of *After×Host_Only* ($\beta = -0.242$, n.s., column 4 in Table 6 Panel B). The results suggest that combining a competition-based statement with a host-emphasized statement motivates hosts to enhance the information quality, which consequently leads to fewer complaints. The coefficient of *After×Renter_Cooperation* for average length of voice calls is insignificant ($\beta = -2.390$, n.s., column 2 in Table 6 Panel B) but the coefficients of *After×Renter_Only* is positive and significant ($\beta = 6.233, p < 0.05$, column 2 in Table 6 Panel B). The t-test shows that the difference is significant. The results suggest that the cooperation-based value appropriation statement dampens the motivating effect that the renter-based statement generates on hosts, which results in more complaints. The coefficient of *After×Host_Cooperation* for number of information updates is negative and significant ($\beta = -5.714, p < 0.01$, column 4 in Table 6 Panel B) but the coefficient of *After×Host_Only* is insignificant ($\beta = -0.242$, n.s., column 4 in Table 6 Panel B). The t-test shows that the difference is significant. The results are consistent with the previous findings that the cooperation-based value appropriation statements dampen the effect of value co-creation statements on the hosts. Overall we find that value co-creation and value appropriation jointly affect providers' incentives, so effective design of treatments can nudge the hosts to take actions, such as update listing information more frequently and increase the length of voice calls, so as to improve service quality and avoid consumers' complaints.

—— Insert Table 6 here ——

4.4 Manipulation Checks

One potential issue is that the reminder messages may not carry out the intended manipulations. We therefore conducted a follow-up survey to address this concern. The respondents of the survey are the hosts on the platform. However, these hosts did not participate in our prior field experiment. The survey contains one of the nine reminder messages that we used in the experiment. The survey participants are randomly assigned to nine groups, each of which receives the survey with one version of the reminder messages. We invited the subjects to read the reminder message and fill in a questionnaire including items about manipulation checks, perceptions, and behavioral intentions. The measurements of the main constructs are shown in Appendix C. We received 488 valid questionnaires.

We conducted independent sample *t*-tests to confirm the manipulation of the independent variables. The results show, on average, the respondents receiving the renter-emphasized statement ($M = 4.267$, $SD = 0.561$) perceived a higher level of renter-emphasized value co-creation than those not receiving the renter-emphasized statement ($M = 4.086$, $SD = 0.629$). The *t*-test shows that the difference in the average level of renter-emphasized value co-creation between these two groups is significant ($t = 3.243$, $p < 0.01$), indicating that the renter-emphasized value co-creation was successfully manipulated. We also found that on average the respondents receiving the host-emphasized statement ($M = 4.027$, $SD = 0.501$) perceived a higher level of host-emphasized value co-creation than those not receiving the host-emphasized statement ($M = 3.867$, $SD = 0.614$). The *t*-test shows that the difference between these two groups is significant ($t = 3.068$, $p < 0.01$), suggesting that the host-emphasized value co-creation

was successfully manipulated. We also observed the manipulation of value appropriation statements is successful. In particular, on average, the respondents receiving competition-based statement ($M = 4.099$, $SD = 0.534$) perceived a high level of competition-based value appropriation than those not receiving the competition-based statements ($M = 3.894$, $SD = 0.722$). The difference between these two groups is statistically significant ($t = 3.536$, $p < 0.001$). Therefore, the competition-based value appropriation statements carried out the intended manipulation. Finally, the results show that the respondents receiving the cooperation-based statement ($M = 4.323$, $SD = 0.578$) perceived a higher level of cooperation-based value appropriation than those not receiving the cooperation-based statement ($M = 3.939$, $SD = 0.726$). The t-test shows that the difference is significant ($t = 6.290$, $p < 0.001$), so the cooperation-based value appropriation was successfully manipulated too.

4.5 Free-Riding

We use the free-riding effect in cooperation to explain the moderating effect of the cooperation-based value appropriation mechanism. To verify this potential mechanism, we have also invited the subjects to evaluate their free-riding intentions in the follow-up survey. The measurements of the free-riding intentions are shown in Appendix C. Table 7 reports the average levels of free-riding intentions of the nine groups. The results show that the respondents receiving the cooperation-based value appropriation statement ($M = 3.742$, $SD = 0.748$) have stronger intentions than those not receiving the cooperation-based value appropriation statement ($M = 3.519$, $SD = 0.766$). A significant difference in the means between these two groups exists ($t = 3.019$, $p < 0.01$). The results suggest that the host free-riding effect exists during cooperation. In particular, the level of freeriding intentions is highest in the Host Cooperation group ($M = 3.820$, $SD = 0.668$) across

nine groups, which is consistent with the experiment results. The survey results confirm that the free-riding incentives explain the motivation dampening effect of cooperation-based value appropriation statements.

—— Insert Table 7 here ——

5. Discussion

This study takes a value perspective of platform governance to examine how to address the complaint issues on digital platforms. We specifically focus on how the platform can use the concepts of value co-creation and appropriation to motivate third-party providers to take actions to increase customer satisfaction and reduce complaints proactively. Using a randomized field experiment on a peer-to-peer rental property platform, we examine messages that consist of different conceptual elements of value co-creation and value appropriation. The findings generate both important theoretical contributions to the existing platform research and practical guidance for the operators in the platform business.

5.1 Theoretical Implications

The theoretical implications of our study are threefold. First, our results provide indicative evidence of the motivating effect of value co-creation and value appropriation statements on third-party providers. In our context of the real estate rental property platform, a major finding is that using reminder messages that emphasize the value of renters (i.e., the customers in this context) and the provider-side competition, the platform can motivate third-party providers to take proactive actions to avoid potential complaints from renters. This finding adds to the theoretical perspective of platform governance (Huber et al. 2017; Tiwana 2010). We show that the messages based on the notion of value co-creation and value appropriation can effectively

resonate with third-party providers and engage them in the process of improving the overall platform governance. In this regard, the value perspective of platform governance is not only sensible but also executable. This finding contributes to the understanding of the platform ecosystem by incorporating more perspectives from the third-party provider side, which have been relatively overlooked in governance (McIntyre and Srinivasan 2017). A general implication is that platform governance does not have to assume the sole responsibility of platform operators. When incentivized properly, third-party providers can also play an important role in addressing the potential conflict and improving the overall platform ecosystem for value co-creation.

The second contribution of our study is to consider different designs of reminder messages used by the platform for governance purpose and their differential effectiveness in motivating third-party providers. This consideration is informed by the view that value co-creation involves various stakeholders who may play distinct roles (Gulati 1998), and defining values is critical for designing platform governance practices (Huber et al. 2017). Therefore, which aspects of value co-creation in the platform ecosystem could have more desirable motivating effects on third-party providers is worthwhile to examine. A salient finding is that providers respond more proactively when they are reminded about the importance of customers (i.e., renters) than when they are reminded about their own roles in value co-creation. A key implication is that value messages should be designed in accordance with the features of a two-sided or multi-sided platform ecosystem that involves end customers. Providers are likely to care more about the impacts of their value creation activities on the other side, i.e., satisfying customers, than by their own duties in these activities. This is especially true if value-based governance is used to address issues that are cross-sided in nature, such as complaints between providers and customers. A narrow sense of value co-creation that misses the role of customers may make providers

underestimate their responsibilities and eventually constrain the effectiveness of value-based governance.

Third, our study contributes by integrating the value co-creation perspective and the value appropriation perspective in consideration of platform governance. While third-party providers can potentially benefit by engaging in value co-creation with the platform (Constantinides et al. 2018), capturing value is also a challenging issue for them (Ceccagnoli et al. 2012; Oh et al. 2015). Our findings show that a value appropriation mechanism designed based on the host-side competition, rather than the host-side cooperation, can effectively motivate third-party hosts to attend to the complaint issues. The identified ineffectiveness of the cooperation-based value appropriation mechanism is in line with the theoretical awareness of the free-riding problem in platform ecosystems (Cennamo and Santaló 2019), suggesting that individual providers may lose their contribution incentives if their contributions are rewarded collectively. In a broader theoretical sense, this issue in value appropriation is also in accordance with the tension between individual and collective actions in the governance of platform ecosystems (Wareham et al. 2014). Our unique contribution is to illustrate the relevance of this issue to platform governance and the related nuance that platform operators need to be careful about in advocating value co-creation.

5.2 Practical Implications

Our findings have important practical implications. Our study provides useful guidelines for platform operators on how to engage third-party providers in platform governance to reduce complaints. Platform operators can use reminder messages as an effective approach to induce proactive efforts from third-party providers. In this process, platform operators should carefully

design their message content to stress customer-related value aspects to better motivate third-party providers. Also, platform operators can benefit from incentivizing more virtuous competition between third-party providers. It is important for third-party providers to be educated about how they can be rewarded individually from the improved governance of the platform ecosystem and the reduced complaints. Platform operators should be cautious not to let the free-riding problem disrupt the collective effort of value co-creation.

For third-party providers, our study guides them to better understand the imperativeness of collectively improving the governance of the ecosystem environment in which they reside. They need to proactively engage in preventative activities, such as enhancing their information presentation and communication with customers, to increase customers' satisfaction and reduce complaints. Achieving customer satisfaction ultimately helps them better realize the value that they co-create with the platform. From a value appropriation perspective, providers should also realize that making an effort to avoid potential conflicts with customers is also key to their success in a competitive environment. Peer providers in the same environment are likely to race to establish their competitive advantages by better addressing their conflicts.

5.3 Future Research

Our study also has some limitations, and future research can extend this line of investigation in several promising directions. First, while we believe that our main insights are generalizable, some potential constraints by our specific experimental setting are worth noticing. For example, our study focuses primarily on the short-term efforts of third-party providers that can be evoked by reminder messages. Whether such efforts can be persistent over time is worth further exploration. Also, in this market of long-term real estate rental property, the interactions of

customers and providers with the platform are in general less frequent than those on other types of platforms. Different types of interaction activities may influence the sense of value co-creation and the resulting governance efforts differently. Future research may extend this investigation in other platform contexts.

Second, given our main theoretical objective, our experimental design focuses primarily on the variation of the message and addresses other types of heterogeneity through randomization and matching. Therefore, our study speaks little about how third-party motivations may be influenced by other sources of heterogeneity, such as their backgrounds, experiences, and various characteristics of complaints. For example, the reminder messages in our field experiment do not provide any information about the type of complaints. As a result, these targeted hosts did not know the type of complaints. Therefore, we are unable to examine how heterogeneous treatment effect of the complaint types. Another possible extension is to examine the cultural difference in the intervention effect. Our experiment was conducted in China, which has a collectivist culture. Third-party providers in regions with a collectivist culture may resonate with customer-emphasized value co-creation messages differently from those in regions with individualism culture. Prior studies on cultural differences show that individualism increases customers' psychological benefits from selected products and services, and individualism positively moderates the effects of customer satisfaction on the repurchase intent (Frank et al. 2015; Hennig-Thurau et al. 2005; Paul et al. 2009; Steenkamp and Geyskens 2006). So in the regions with an individualistic culture, the customers could gain a higher benefit from the product use and co-create a higher value. As a result, the hosts may more greatly appreciate the co-creation opportunities with the customers, and the customer-emphasized statements have a higher motivating effect. We therefore expect that our results hold in the region with

individualism culture such as North America, Scandinavian countries, etc. But this moderating role of culture is still worth in-depth empirical investigation.

Third, this study focuses on a prevention strategy. It would be interesting and valuable to compare the effectiveness of reactive and proactive prevention strategies, i.e., sending the reminder messages to the hosts after complaints vs. before complaints. However, it is infeasible to conduct such a comparison in this study. The platform followed its routine complaint resolution procedures and removed the involved listings of verified complaints, so it did not send the reminder messages to the hosts of the involved listings. We therefore cannot observe these hosts' responses after receiving the messages. Future research would be valuable to examine this topic.

Fourth, we expect the findings and implications hold on two-sided platforms such as crowdsourcing platforms, car-sharing platforms, C2C e-commerce markets, and short-term property rental platforms. On these platforms, third-party providers offer products or services to customers for monetary returns. The business models and cross-sided interactions are similar to the long-term rental platforms in our study. Customer satisfaction is a critical factor impacting the providers' continuing success. However, the findings may not apply to the two-sided platforms such as online review sites (e.g., Yelp and Foursquare) and content-sharing websites (e.g., Youtube, Pinterest, and Twitter). On these platforms, the content providers voluntarily contribute content (e.g., comments, ratings, videos, pictures) for free. Although the content providers value the viewers' attention, the viewers' satisfaction is less of a concern to them compared to the property rental platforms. Therefore we expect the intervention effects of the messages on these platforms are not as strong as those on the for-profit property rental platform, and our findings may not apply to these two-sided platforms. Future research can examine the design of effective motivating mechanisms on these platforms.

Fourth, our study has illustrated the free-riding issues that may confound the engagement of third-party providers in the collective governance effort. It is worth noting that our experiment focuses on a specific cooperation strategy—a reward mechanism based on group performance delivered to hosts in the form of value appropriation statements. Other forms of messages or value appropriation mechanisms may better motivate hosts to improve their service quality on the rental platforms. For example, positive framing, which emphasizes community building and responsibilities, could be more effective in motivating hosts. Further research could explore other cooperation-based platform governance approaches on the platform.

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Table 1. Experiment Design

		Value Co-creation Statement		
		No	Renter-Emphasized	Host-Emphasized
Value Appropriation Statement	No	<p><u>Group 1</u> <u>(Control Group)</u> Receive a control message with no statement about value co-creation or value appropriation.</p>	<p><u>Group 2</u> <u>(Renter Only Group)</u> Receive a message with a value co-creation statement that emphasizes the importance of renters.</p>	<p><u>Group 3</u> <u>(Host Only Group)</u> Receive a message with a value co-creation statement that emphasizes the importance of renters.</p>
	Competition-Based	<p><u>Group 4</u> <u>(Competition Only Group)</u> Receive a message with a statement about a competition-based value appropriation mechanism.</p>	<p><u>Group 5</u> <u>(Renter Competition Group)</u> Receive a message with both a value co-creation statement that emphasizes the importance of renters, and a statement about a competition-based value appropriation mechanism.</p>	<p><u>Group 6</u> <u>(Host Competition Group)</u> Receive a message with both a value co-creation statement that emphasizes the importance of hosts, and a statement about a competition-based value appropriation mechanism.</p>
	Cooperation-Based	<p><u>Group 7</u> <u>(Cooperation Only Group)</u> Receive a message with a statement about a cooperation-based value appropriation mechanism.</p>	<p><u>Group 8</u> <u>(Renter Competition Group)</u> Receive a message with both a value co-creation statement that emphasizes the importance of renters, and a statement about a cooperation-based value appropriation mechanism.</p>	<p><u>Group 9</u> <u>(Host Cooperation Group)</u> Receive a message with both a value co-creation statement that emphasizes the importance of hosts, and a statement about a cooperation-based value appropriation mechanism.</p>

- **Group 1 Message (control message without any value co-creation statement or value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Please ensure the information accuracy of your listed properties and active interactions with renters.
- **Group 2 Message (with renter-emphasized value co-creation statement but no value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the businesses from renters. The success of value co-creation by the platform and third-party hosts hinges on the satisfaction of renters. Please ensure the information accuracy of your listed properties and active interactions with renters.
- **Group 3 Message (with host-emphasized value co-creation statement but no value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the contributions from third-party hosts. The success of value co-creation by the platform and third-party hosts hinges on the diligence of hosts. Please ensure the information accuracy of your listed properties and active interactions with renters.

- **Group 4 Message (with competition-based value appropriation statement but no value co-creation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform would recommend the properties with high service quality to renters. The property with complaints will be in a disadvantageous position relative to other properties. Please ensure the information accuracy of your listed properties and active interactions with renters.
- **Group 5 Message (with both renter-emphasized value co-creation statement and competition-based value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the businesses from renters. The success of value co-creation by the platform and third-party hosts hinges on the satisfaction of renters. The platform would recommend the properties with high service quality to renters. The property with complaints will be in a disadvantageous position relative to other properties. Please ensure the information accuracy of your listed properties and active interaction with renters.
- **Group 6 Message (with both host-emphasized value co-creation statement and competition-based value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the contributions from third-party hosts. The success of value co-creation by the platform and third-party hosts hinges on the diligence of hosts. The platform would recommend the properties with high service quality to renters. The property with complaints will have a disadvantageous position relative to other properties. Please ensure the information accuracy of your listed properties and active interaction with renters.
- **Group 7 Message (with cooperation-based value appropriation statement but no value co-creation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform would recommend the residential neighborhood with high overall service quality. Residential neighborhoods with properties that receive complaints will not be prioritized in recommendation. Please ensure the information accuracy of your listed properties and active interaction with renters.
- **Group 8 Message (with both renter-emphasized value co-creation statement and cooperation-based value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the businesses from renters. The success of value co-creation by the platform and third-party hosts hinges on the satisfaction of renters. The platform would recommend the residential neighborhood with high overall service quality. Residential neighborhoods with properties that receive complaints will not be prioritized in recommendation. Please ensure the information accuracy of your listed properties and active interaction with renters.
- **Group 9 Message (with both host-emphasized value co-creation and cooperation-based value appropriation statement):** Dear host, it is a kindly note that a property in your residential neighborhood has been complained by the renter and investigated. Our platform is keen on the contributions from third-party hosts. The success of value co-creation by the platform and third-party hosts hinges on the diligence of hosts. The platform would recommend the residential neighborhood with high overall service quality. Residential neighborhood with properties that receive complaints will not be prioritized in recommendation. Please ensure the information accuracy of your listed properties and active interaction with renters.

Table 2. Variable Definition and Descriptive Statistics

Variables	Measurement	Mean	S.D.	Min	Max
Complaint	Number of complaints received in a week	0.036	0.341	0.000	7.000
Renter	=1 if message includes renter-emphasized statement; =0 otherwise	0.333	0.471	0.000	1.000
Host	=1 if message includes host-emphasized statement; =0 otherwise	0.333	0.471	0.000	1.000
Competition	=1 if message includes competition-based statement; =0 otherwise	0.333	0.471	0.000	1.000
Cooperation	=1 if message includes cooperation-based statement; =0 otherwise	0.333	0.471	0.000	1.000
After	=1 if after the treatment; =0 before the treatment	0.500	0.500	0.000	1.000
City1	=1 if Beijing; =0 otherwise	0.120	0.325	0.000	1.000
City2	=1 if Hangzhou; =0 otherwise	0.291	0.454	0.000	1.000
City3	=1 if Shanghai; =0 otherwise	0.494	0.500	0.000	1.000
Host_Gender	Gender of the host (=1 if male, =0 otherwise)	0.534	0.499	0.000	1.000
Host_Professional	Whether the host is a professional host (=1 if professional host; =0 otherwise)	0.583	0.466	0.000	1.000
Host_Tenure	Number of weeks since the host registered on the platform	49.062	47.930	1.196	210.160
Property_Size	Property size of the listed property (in square meters)	49.546	39.714	10.000	405.000
Rental_Rate	Per-square meter rental rate of the listed properties (in Chinese Yuan)	86.150	74.026	34.783	387.500
Property_Neighborhood	Number of other listed properties within the same residential neighborhood	1.871	1.911	0.000	12.000
Distance	Distance of the listed property to city downtown (in kilometers, log-transformed)	2.471	0.577	0.051	3.862
Historical_Calls	Number of phone calls received by each host in the last six months (log-transformed)	0.307	0.577	0.000	2.411
Complaint_History	Number of verified complaints received by each host in the last six months (log-transformed)	0.027	0.123	0.000	1.483

Table 3. Randomization Checks

Group	Host_Gender	Host_Professional	Host_Tenure	Property_Size	Rental_Rate	Property_Neighborhood	Distance	Historical_Calendar	Complaint_History	Pre_Complaint
Neutral	0.519	0.570	48.688	48.967	81.416	2.078	2.600	0.282	0.024	0.034
RenterOnly	0.552	0.581	47.484	48.692	84.451	1.725	2.492	0.281	0.025	0.035
HostOnly	0.497	0.567	49.891	49.522	89.976	1.714	2.421	0.302	0.031	0.036
CompetitionOnly	0.534	0.585	48.841	52.582	87.131	1.825	2.343	0.321	0.030	0.033
RenterCompetition	0.504	0.599	50.912	47.164	84.750	1.711	2.368	0.322	0.029	0.031
HostCompetition	0.544	0.563	49.328	47.958	84.315	1.729	2.622	0.313	0.030	0.029
CooperationOnly	0.549	0.585	48.399	50.388	90.936	2.106	2.413	0.293	0.027	0.027
RenterCooperation	0.539	0.603	47.274	51.441	87.227	1.934	2.370	0.325	0.026	0.028
HostCooperation	0.567	0.598	50.743	49.203	85.150	2.013	2.607	0.324	0.027	0.029
<i>F</i> -value	1.335	1.183	0.960	0.702	0.584	1.681	1.652	1.519	1.527	1.276
<i>P</i> -value	0.356	0.337	0.457	0.653	0.783	0.132	0.144	0.193	0.184	0.272

Note: The Distance column shows the log transformed data.

Table 4. Estimation Results on Number of Complaints

	(1)	(2)
<i>After</i>	0.049 (0.199)	0.149 (0.243)
<i>Host</i>	-0.108 (0.182)	
<i>Renter</i>	-0.131 (0.171)	
<i>Competition</i>	-0.072 (0.174)	
<i>Cooperation</i>	-0.448* (0.240)	
<i>Renter_Only</i>		-0.268 (0.274)
<i>Host_Only</i>		0.037 (0.268)
<i>Competition_Only</i>		-0.267 (0.280)
<i>Renter_Competition</i>		-0.105 (0.282)
<i>Host_Competition</i>		-0.105 (0.302)
<i>Cooperation_Only</i>		-0.074 (0.349)
<i>Renter_Cooperation</i>		-0.584 (0.347)
<i>Host_Cooperation</i>		-1.121*** (0.409)
<i>After×Host</i>	0.398** (0.198)	
<i>After×Renter</i>	-0.401** (0.207)	
<i>After×Competition</i>	-0.563*** (0.192)	
<i>After×Cooperation</i>	1.074*** (0.210)	
<i>After×Renter_Only</i>		-0.809** (0.403)
<i>After×Host_Only</i>		0.495 (0.361)
<i>After×Competition_Only</i>		-0.377 (0.372)
<i>After×Renter_Competition</i>		-1.005*** (0.404)
<i>After×Host_Competition</i>		-0.647* (0.396)
<i>After×Cooperation_Only</i>		0.248 (0.429)
<i>After×Renter_Cooperation</i>		0.750* (0.400)
<i>After×Host_Cooperation</i>		1.919*** (0.443)
<i>City1</i>	-0.356 (0.238)	-0.351 (0.240)
<i>City2</i>	-0.215 (0.205)	-0.255 (0.208)
<i>City3</i>	-0.042 (0.195)	-0.034 (0.197)
<i>Host_Gender</i>	-0.214 (0.169)	-0.239 (0.173)
<i>Host_Professional</i>	1.090*** (0.377)	1.150*** (0.378)
<i>Host_Tenure</i>	-0.005** (0.001)	-0.005*** (0.001)
<i>Property_Size</i>	-0.007*** (0.002)	-0.007*** (0.002)
<i>Rental_Rate</i>	0.007*** (0.002)	0.007*** (0.002)
<i>Property_District</i>	0.003** (0.001)	0.002* (0.001)
<i>Distance</i>	-0.015* (0.008)	-0.015* (0.008)
<i>Historical_Call</i>	-0.206*** (0.063)	-0.201*** (0.064)
<i>Complaint_History</i>	-1.261*** (0.326)	-1.298*** (0.350)
<i>N</i>	23,850	23,850
<i>Log likelihood</i>	-2911.531	-2902.466
<i>Chi-Square</i>	164.62***	182.21***

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; standard errors reported in parentheses.

Table 5. Comparison of the Differences between Groups

		Value Co-creation Statement		
		No	Renter-Emphasized	Host-Emphasized
Value Appropriation Statement	No		-0.809** (0.403)	0.495 (0.361)
	Competition-Based	-0.377 (0.372)	-1.005*** (0.404)	-0.647* (0.396)
	Cooperation-Based	0.248 (0.429)	0.750* (0.400)	1.919*** (0.443)

Note: (1) The Control group is the comparison baseline. (2) The table presents the coefficient values of the treatment group dummy indicators in Model (2).

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Standard errors reported in parentheses.

Table 6. Behavioral Mechanisms to Reduce the Complaints

<i>Panel A</i>				
	Number of Complaints			
	Included			
Average Length of Voice Calls	-0.002*** (0.001)			
Number of Information Updates	-0.006*** (0.002)			
<i>Control Variables</i>				
<i>N</i>	23,850			
<i>Log likelihood</i>	-2259.915			
<i>Chi-Square</i>	78.21***			
<i>Panel B</i>				
	Average Length of Voice Calls (1)	Average Length of Voice Calls (2)	Number of Information Updates (3)	Number of Information Updates (4)
<i>After</i>	-5.351***(2.045)	-1.468 (2.691)	-0.371 (1.010)	0.503 (1.321)
<i>Host</i>	0.414 (1.615)		-0.507 (0.799)	
<i>Renter</i>	0.684 (1.617)		0.096 (0.801)	
<i>Competition</i>	-2.568 (1.680)		0.102 (0.792)	
<i>Cooperation</i>	-0.940 (1.631)		-1.689**(0.806)	
<i>Renter_Only</i>		2.821 (2.851)		-1.900 (1.399)
<i>Host_Only</i>		1.964 (2.827)		-1.734 (1.387)
<i>Competition_Only</i>		-0.877 (2.807)		-2.504* (1.378)
<i>Renter_Competition</i>		-3.172 (2.759)		0.026 (1.354)
<i>Host_Competition</i>		-2.461 (2.789)		-1.131 (1.370)
<i>Cooperation_Only</i>		2.325 (3.033)		-2.149 (1.489)
<i>Renter_Cooperation</i>		0.745 (2.794)		-2.923** (1.372)
<i>Host_Cooperation</i>		-0.701 (2.703)		-3.476*** (1.327)
<i>After×Host</i>	1.516 (2.062)		-2.484**(1.117)	
<i>After×Renter</i>	4.431**(2.084)		2.310**(1.128)	
<i>After×Competition</i>	3.658* (2.029)		0.394 (1.102)	
<i>After×Cooperation</i>	-0.999 (2.103)		-2.317**(1.137)	
<i>After×Renter_Only</i>		6.233**(2.960)		0.195 (1.544)
<i>After×Host_Only</i>		-4.347 (2.890)		-0.242 (1.510)
<i>After×Competition_Only</i>		2.781 (2.806)		1.205 (1.468)
<i>After×Renter_Competition</i>		7.300*** (2.805)		0.654 (1.469)
<i>After×Host_Competition</i>		3.118 (2.805)		3.253*** (1.468)
<i>After×Cooperation_Only</i>		-7.291**(3.166)		-1.352 (1.645)
<i>After×Renter_Cooperation</i>		-2.390 (2.862)		-3.187*** (1.496)
<i>After×Host_Cooperation</i>		0.196 (2.801)		-5.714*** (1.463)
<i>Control Variables</i>	Included	Included	Included	Included
<i>N</i>	23,850	23,850	23,850	23,850
<i>Adjusted R²</i>	0.093	0.083	0.103	0.128

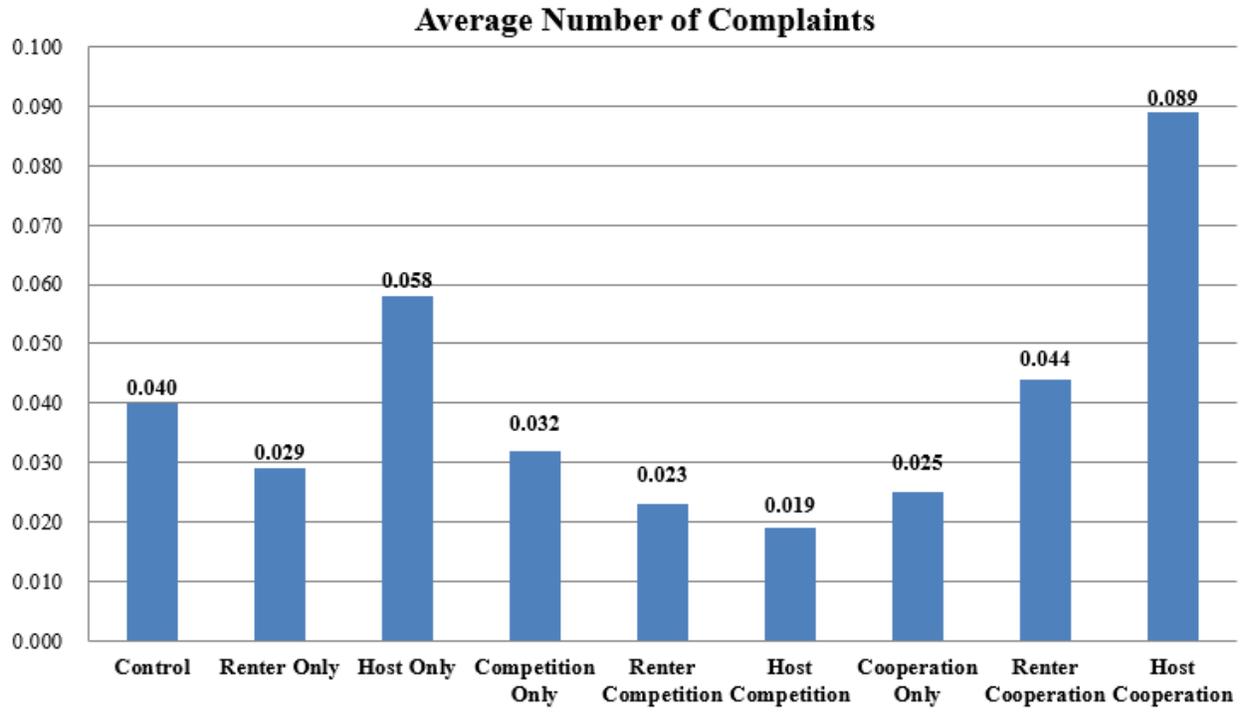
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Standard errors reported in parentheses.

Table 7. Level of Free-Riding between Groups

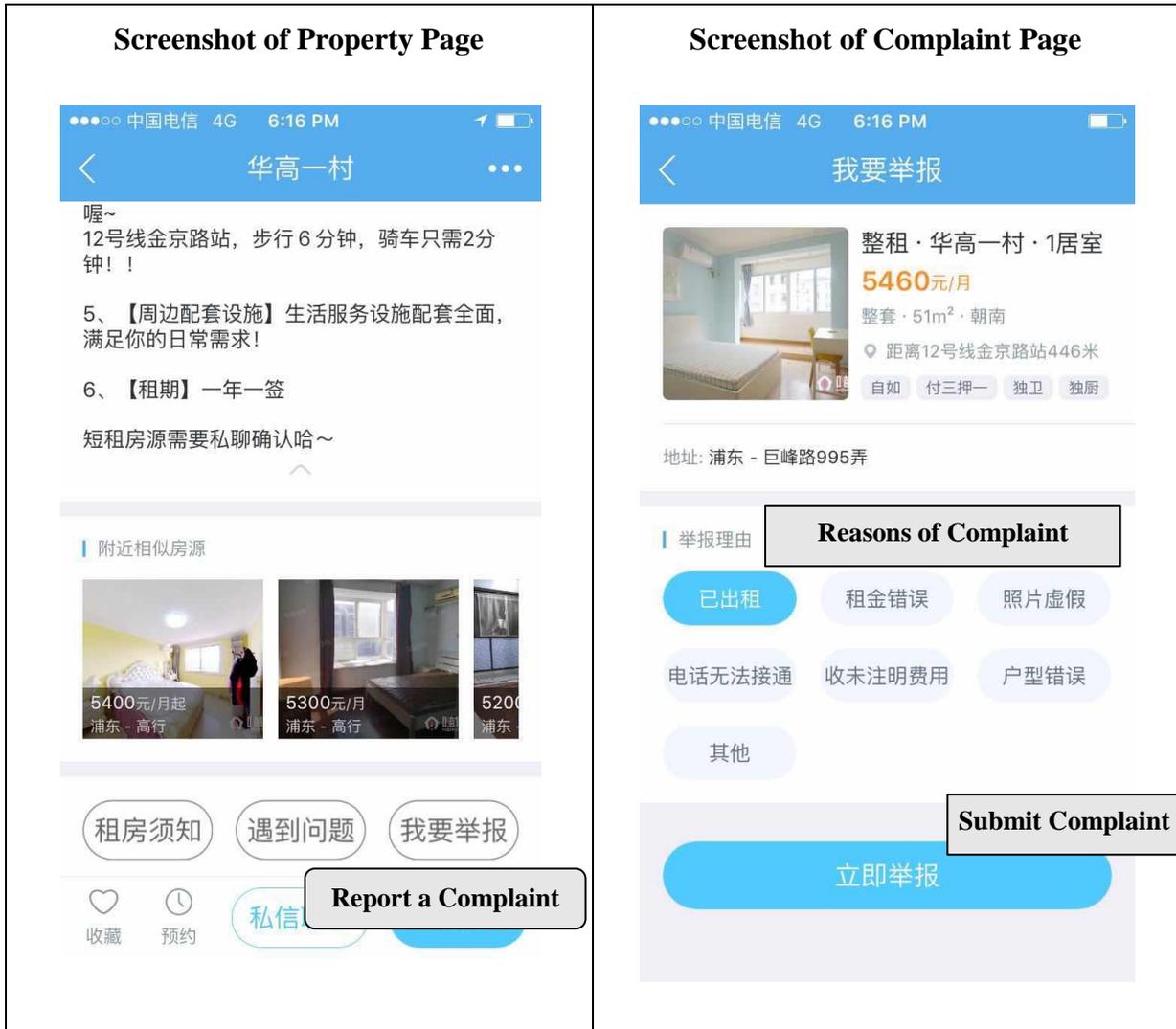
		Value Co-creation Statement		
		No	Renter-Emphasized	Host-Emphasized
Value Appropriation Statement	No	3.696 (0.625)	3.463 (0.868)	3.475 (0.692)
	Competition-Based	3.306 (0.689)	3.592 (0.826)	3.598 (0.837)
	Cooperation-Based	3.717 (0.805)	3.694 (0.767)	3.820 (0.668)

Note: Standard deviations reported in parentheses.

Figure 1. Average Number of Complaints across Nine Groups



Appendix A. Screenshots of Complaints



Appendix B. Robustness Tests

Table B1. Estimation Results on Number of Complaints Using Alternative Estimation Methods

	Negative Binomial Count Model		Poisson Count Model	
	(1)	(2)	(3)	(4)
<i>After</i>	-0.065 (0.201)	0.047 (0.248)	-0.169 (0.136)	-0.086 (0.164)
<i>Host</i>	-0.379**(0.178)		-0.350***(0.130)	
<i>Renter</i>	-0.251 (0.174)		-0.259**(0.127)	
<i>Competition</i>	-0.331**(0.168)		-0.315***(0.120)	
<i>Cooperation</i>	-0.914***(0.190)		-0.927***(0.148)	
<i>Renter_Only</i>		-0.387 (0.283)		-0.328 (0.207)
<i>Host_Only</i>		-0.151 (0.276)		-0.221 (0.189)
<i>Competition_Only</i>		-0.443 (0.282)		-0.414** (0.196)
<i>Renter_Competition</i>		-0.431 (0.278)		-0.508***(0.197)
<i>Host_Competition</i>		-0.630**(0.294)		-0.562***(0.204)
<i>Cooperation_Only</i>		-0.570*(0.318)		-0.588***(0.232)
<i>Renter_Cooperation</i>		-1.083***(0.310)		-1.099***(0.239)
<i>Host_Cooperation</i>		-1.749***(0.360)		-1.792***(0.301)
<i>After×Host</i>	0.551**(0.209)		0.659***(0.167)	
<i>After×Renter</i>	-0.545**(0.217)		-0.619***(0.181)	
<i>After×Competition</i>	-0.509***(0.210)		-0.482***(0.176)	
<i>After×Cooperation</i>	0.989***(0.216)		1.118***(0.180)	
<i>After×Renter_Only</i>		-0.690*(0.417)		-0.578**(0.301)
<i>After×Host_Only</i>		0.410(0.364)		0.555**(0.241)
<i>After×Competition_Only</i>		-0.317(0.381)		-0.159(0.273)
<i>After×Renter_Competition</i>		-0.959**(0.412)		-0.670**(0.312)
<i>After×Host_Competition</i>		-0.734*(0.407)		-0.378(0.299)
<i>After×Cooperation_Only</i>		0.243(0.419)		0.389(0.301)
<i>After×Renter_Cooperation</i>		0.854**(0.396)		0.964***(0.292)
<i>After×Host_Cooperation</i>		1.872***(0.432)		2.269***(0.335)
<i>Control Variables</i>	Included	Included	Included	Included
<i>N</i>	23,850	23,850	23,850	23,850
<i>Log likelihood</i>	-2962.053	-2953.364	-3591.021	-3577.190
<i>Chi-Square</i>	368.20***	385.58***	835.84***	863.50***

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Standard errors reported in parentheses.

Table B2. Estimation Results on Number of Complaints Considering Overlap of Treatment Effects

	(1)	(2)
<i>After</i>	0.074 (0.199)	0.174 (0.243)
<i>Host</i>	-0.117 (0.183)	
<i>Renter</i>	-0.131 (0.172)	
<i>Competition</i>	-0.081 (0.173)	
<i>Cooperation</i>	-0.432* (0.238)	
<i>Renter_Only</i>		-0.254 (0.273)
<i>Host_Only</i>		0.035 (0.267)
<i>Competition_Only</i>		-0.253 (0.282)
<i>Renter_Competition</i>		-0.104 (0.281)
<i>Host_Competition</i>		-0.113 (0.301)
<i>Cooperation_Only</i>		-0.069 (0.347)
<i>Renter_Cooperation</i>		-0.552 (0.346)
<i>Host_Cooperation</i>		-1.113*** (0.407)
<i>After×Host</i>	0.398** (0.198)	
<i>After×Renter</i>	-0.400** (0.207)	
<i>After×Competition</i>	-0.563*** (0.202)	
<i>After×Cooperation</i>	1.076*** (0.209)	
<i>After×Renter_Only</i>		-0.807** (0.403)
<i>After×Host_Only</i>		0.496 (0.351)
<i>After×Competition_Only</i>		-0.373 (0.373)
<i>After×Renter_Competition</i>		-1.001*** (0.403)
<i>After×Host_Competition</i>		-0.643* (0.393)
<i>After×Cooperation_Only</i>		0.268 (0.429)
<i>After×Renter_Cooperation</i>		0.744* (0.400)
<i>After×Host_Cooperation</i>		1.933*** (0.444)
<i>Overlap</i>	-0.047 (0.062)	-0.036 (0.062)
<i>Control Variables</i>	Included	Included
<i>N</i>	23,850	23,850
<i>Log likelihood</i>	-2906.406	-2898.003
<i>Chi-Square</i>	160.27***	177.08***

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Standard errors reported in parentheses.

Appendix C. Scales Used in the Follow-Up Survey

Host-emphasized value co-creation Source: Grover and Kohli (2012)

- (1) The success of value-cocreation by the platform and hosts hinges on the contributions of hosts.
- (2) Third-party providers play an important role in co-creating value with the platform.
- (3) Hosts are important and valuable to the platform.

Renter-emphasized value co-creation Source: Payne et al. (2008)

- (1) The success of value-cocreation by the platform and hosts hinges on the satisfaction of renters.
- (2) The satisfaction of renters plays an important role in co-creating value with the platform and third-party hosts.
- (3) Renters are important and valuable to the platform.

Competition-based value appropriation Source: Beersma et al. (2003); Becker and Huselid (1992)

- (1) I can obtain more benefits by outperforming other peer hosts in competition.
- (2) To obtain more benefits on the platform, I need to establish competitive advantages over other peer hosts.
- (3) The hosts that provide a low service quality will be in a disadvantageous position relative to other hosts in competition.
- (4) I have intensely competitive relationships with other peer hosts in the same residential neighborhoods.

Cooperation-based value appropriation Source: Beersma et al. (2003)

- (1) Other peer hosts in the same residential neighborhoods and I collectively create value and benefit the platform.
- (2) My benefits on the platform are linked with the residential neighborhood-level performance.
- (3) If other peer hosts and I collectively improve the service quality, I will gain more reward.
- (4) The platform rewards individual hosts based on their collective residential neighborhood-level performance.

Free-riding Source: Albanese et al. (1985); Latane et al. (1979)

- (1) It is beneficial to me if my neighbor hosts collectively improve their service quality.
- (2) If my neighbor hosts collectively improve their service quality, I can free ride on their effort.
- (3) If my neighbor hosts collectively improve their service quality, I will exhibit shirking behavior.