

The Economics of P2P Online Sharing

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Introduction

Today’s e-commerce landscape has experienced the development of novel markets. While e-commerce was predominantly characterized by business-to-consumer (B2C) structures in the past (Gefen and Straub 2004), today an ever-growing variety of consumer-to-consumer platforms (C2C, often “peer-to-peer,” P2P), enables resource exchange also among private individuals (Sundararajan 2014). Several forms of private resource provision and consumption – casually often referred to as “sharing” – have moved from offline to online environments. This shift, among other reasons, has laid the ground for what made headlines as the sharing economy.¹ Sharing resources, however, is not a new idea. Quite to the contrary, it is probably as old as mankind itself (Sahlins 1974). Also in pre-Internet industrial societies, people were able to lease, rent, re-sale, borrow, and share. Chan and Shaheen (2012), for instance, trace back ride sharing to its early advents during World War II, where the government prompted “four workers to share a ride in one car to conserve rubber for the war effort” (p. 97), and dramatically called upon the citizens’ duties, stating “When you ride alone you ride with Hitler” (poster by Weimer Pursell 1943). The customer approach and lingo have changed since then. Today, car- and ride sharing platforms not only emphasize cost and resource savings but also a variety of further aspects like social experience or hedonic value (Hawlitschek, Teubner, and Gimpel 2016).

Cooperatives, flea markets and garage sales, commercial ride sharing bureaus, bulletin boards, etc. existed long before the advent of the Internet. Today’s peer-to-peer online economy scope, pace, and virtually frictionless operability, however, are unprecedented. The substantial reduction of search and transaction costs has unleashed a vast body of resources, previously lying dormant in our prosperous societies’ cubbyholes.

¹ Information Systems (IS) research has considered the “sharing economy” mainly as an umbrella term covering phenomena such as “collaborative consumption” (Botsman and Rogers 2010), “access-based consumption” (Bardhi and Eckhardt 2012) or “commercial sharing systems” (Lamberton and Rose 2012).

The list of “sharable” products and services includes apartments (Airbnb, Homestay), vehicles (Turo, Drivy, Camplify), rides (Zimride, BlaBlaCar), parking space (Parknow), tools and appliances (Zilok), and many more (we refer to Stephany (2015), Slee (2016), and Sundararajan (2016) for more comprehensive overviews). Making resources available to others usually enables higher utilization through shared consumption and use patterns. These large-scale peer-to-peer networks thus often promise a more social, sustainable, varied, convenient, anti-capitalistic, or inexpensive alternative to other, traditional means of consumption (Belk 2007; Leismann et al. 2013; Matzner, Chasin, and Todenhöfer 2015), whereas the set of individual user motives for and against partaking includes many further aspects (Hawlitschek, Teubner, and Gimpel 2016). Yet with respect to other factors, peer-to-peer sharing can also appear unfavorable compared to traditional modes of consumption. This may be due to a lack of trust, efficacy, or economic benefits (Tussyadiah 2015), or may be grounded in effort expectancy, resource unavailability (Lamberton and Rose 2012), or privacy concerns (Acquisti, Brandimarte, and Loewenstein 2015; Teubner and Flath 2016).

The range of existing platforms illustrates that the sharing economy has also shifted goods and services into the realm of P2P markets which we probably would not have expected to see there. Beyond objects like vacation homes, which have been brokered between individuals offline already, today even hand bags, clothing, and pets can be exchanged from peer to peer (Torregrossa 2014). Some regard this as the dawn of a “Zero Marginal Cost Society” (Rifkin 2014). The poster child players of this sharing economy have well understood to market themselves on the verve towards a novel, more sustainable, more social, more personal, more local, or more ethical mode of consumption. It is unlikely, however, that creating a better world reflects their – or their investors’ – single or core purpose. Likewise, they provide business opportunities for micro-entrepreneurs and participate in each of their transactions in the form of a substantial commission (Malhotra and Van Alstyne 2014). Dörr et al. (2016) point out that the current appeal of the sharing economy may in fact root in a deeper, societal desire for a different way of life: natural, sustainable, independent, connected, to name just a few catchwords. In that sense, the 1970’s oil crisis and the Limits of Growth debate issued by the Club of Rome have laid the ground for the sharing economy’s current popularity and success. From this point of view, the sharing economy’s fascination may be understood as a counter reaction to modern industrial processes, characterized by abundance, anonymity, division of labor, large corporations and chains, low-cost/low-quality products, and the alienation from manufacturing processes. Against this backdrop, many concepts in the sharing economy appear to represent a better, even more human market principle for many.

It is almost ironic that the most successful and most frequently referenced examples are highly commercialized and profit-oriented platforms such as Airbnb, Uber, or eBay. In particular, matchmaker business models are often regarded as a template for successful peer-to-peer

mediation (Mullins 2014). In a working paper, Horton and Zeckhauser (2016) used Google's auto-complete function as a source of market sentiment to survey what users search for online. Entering the partial query "Airbnb for..." triggered telling auto-completions such as cars, office space, food, parking, boats, bikes, and even dogs. This suggests a marked readiness, both to supply and to consume via P2P platforms.

A strong indication of the sharing economy's success is the publicly expressed discontent of industry incumbents such as hotel chains, car rental companies, or taxi service operators.^{2, 3, 4} This has already shed light on some unarguably outdated regulation schemes (Koopman, Mitchell, and Thierer 2014), as for instance local knowledge tests for taxi drivers in times of GPS navigation. But sharing practices have also raised questions about social security. Morozov (2012) pointed out that risks are shifted unilaterally towards workers, while platforms conceive themselves as mere brokers with no further due responsibility. Additionally, the rich supply cumulated by online platforms in combination with total transparency and comparability can lead to fierce competition and pricing, and the narrative of the "empowered micro entrepreneur" in reality becomes "a race to the bottom" (Avital et al. 2015). Morozov (2013) deemed this as a form of "neo-liberalism on steroids," commercializing aspects previously beyond the scope of the market. The Economist⁵ foresaw this societal shift as early as in 2013, stating that "on the Internet, *everything* is for hire."

Over the last years, sharing economy platforms have experienced tremendous economic growth and increasing attention both in the academic and popular press. Despite its side effects such as legal and regulatory concerns (Hartl, Hofmann, and Kirchler 2015) and discrimination (Edelman, Luca, and Svirsky 2017; Edelman and Luca 2014), sharing economy platforms attract a wide range of users (Hellwig et al. 2015) and have established themselves as an alternative to traditional business models (Cusumano 2015; Guttentag 2015). Many studies on the sharing economy focus on shared mobility services (e.g., Cohen and Kietzmann 2014; Shaheen, Mallery, and Kingsley 2012; Teubner and Flath 2015) and accommodation sharing (e.g., Ikkala and Lampinen 2015; Karlsson, Kemperman, and Dolnicar 2017; Tussyadiah 2016). The motives to engage in P2P sharing are manifold, including economic, sustainability-related, social, and anti-capitalistic motives (Edbring et al. 2016; Hawlitschek, Teubner, and Gimpel 2016).

Despite the varying orientations and strategies of different platforms, there exist several key factors that most of them share. Many successful platforms rely on transactional standards and designs, i.e., they resemble each other in terms of look and feel, and how transactions are guided (Kulp and Kool 2015). First of all, their business is conducted online, typically based on

² <http://business.time.com/2013/06/06/sharing-is-hard-legal-trouble-for-airbnb-relayrides-flightcar/>

³ <http://www.bloomberg.com/news/articles/2015-10-30/new-york-hotel-group-goes-on-offensive-against-airbnb-rentals>

⁴ <http://www.theguardian.com/technology/2016/feb/10/black-cab-drivers-uber-protest-london-traffic-standstill>

⁵ <http://www.economist.com/news/leaders/21573104-internet-everything-hire-rise-sharing-economy>

web services and mobile applications. Thus, besides societal reasons, the current popularity of shared consumption patterns is inevitable linked to the omnipresence, ease of use, and general acceptance of web services – and hence to e-commerce practices, web design patterns, online trust and verification mechanisms, and privacy concerns. In this part, we consider the question of what are the specific aspects of “sharing online” that make platforms like Airbnb and its fellows so successful in many domains. As we will outline, the P2P online economy encounters some recurring obstacles and issues, and similar patterns and practices have emerged, differentiating current platforms from their predecessors and counterparts from the offline world.

We structure this work as follows. After sketching out a rough demarcation of what we refer to as the P2P Online Sharing Economy in the first part, we illustrate how network effects and decreasing transaction costs shape such two-sided markets. We then consider how, beyond this, information technology and systems create additional value within sharing applications. Next, we take a closer look at the recurring and central theme of trust – and how as well as by which tools it is commonly addressed. Finally, we sketch out some thoughts regarding the emerging and multilayered subject of privacy.

The P2P online sharing economy

To pin down our understanding of the “P2P Online Sharing Economy,” we propose a set of characteristic properties, which we elaborate on in the following. To this end, it is fertile to approach the *sharing economy* from its very literal building blocks – “sharing” and “economy.”

(I) Extended use patterns: First, the notion of *sharing* has experienced a remarkable transformation in its linguistic history. In the 16th century it was used in the sense of splitting something into pieces, just like soil is torn by a ploughshare (John 2013, p. 114). This entails that sharing does not necessarily imply efficiency or utility gains, as it constitutes a zero-sum game. Other meanings of sharing include the more distributive idea of “having something in common,” or co-usage – like in sharing a belief or sharing a room. In particular the latter, i.e., sharing tangible objects, describes the logic of today’s sharing economies well. In contrast to its primordial meaning, it explicitly does not constitute a zero-sum game, since it yields higher utilization than individual use, and thus potentially higher efficiency and welfare. Besides these connotations of sharing, the term has also gained a communicational meaning since the 1930’s, like in *sharing thoughts, emotions* – or stories and photos on Facebook today (John 2012). The boundaries blur when considering concepts such as knowledge sharing (Wang and Noe 2010).

Pure services (e.g., taxi rides) or intangible products (e.g., music files) usually lack the property of non- or underutilized resources. Withal, this property also distinguishes services like Uber (driver effectively works as a chauffeur) from ride sharing (driver travels from A to B anyway).

In this sense, Uber drivers offer a service while ride sharing drivers offer a spare resource, namely available seats on a given ride. Moreover, copying a digital resource (e.g., file sharing) does not increase the utilization of the original resource per se but creates a whole new instance, which then can be used by others. We deliberately distinguish this special property of digital goods from our notion of P2P sharing. Note, however, that it may well apply to other digital resources, that is, if proper copy protection is in place and the possibility and legal rights to access can be transferred (e.g., conceivable for e-books, shared Netflix accounts or digital assets with blockchain-based proof of ownership).

A viable proxy for “extended use patterns” is the condition that a resource is used by two or more individuals where the (original) owner is among those users. This deliberately includes extended use patterns *with* a transfer of ownership. Renting out a room (which is usually used by the inhabitants) meets this criterion, whereas buying an apartment with the purpose to rent it out on Airbnb does not. Selling one’s old MTB on eBay is an example for extended use patterns with a transfer of ownership, whereas manufacturing and selling handicraft art on Etsy ⁶ again violates the contemplated condition. Platforms like Etsy (resources primary produced for the purpose of professional sale or rental), certainly constitute P2P economies, simply not P2P *sharing* economies in the above sense.

(II) Economic compensation: Second, the Meriam-Webster dictionary defines an economy as “the process or system by which goods and services are produced, sold, and bought in a country or region.” An economy thus involves the usage of money or a surrogate currency. Free-of-charge offers like in gifting or lending platforms are hence out of the scope of our definition of economic P2P sharing. The same usually applies for community-based networks (e.g., Couchsurfing). Beyond concepts such as eBay, an increasing share of the economic literature today explicitly considers peer-to-peer rental as a core concept of sharing economy platforms (Tussyadiah and Pesonen 2016; Hawlitschek, Teubner, and Gimpel 2016).

(III) P2P resource transfer: Third, we focus on P2P networks in which resources are transferred from one private party (provider) to another (consumer). P2P here refers to both “peer-to-peer” and “private-to-private,” explicitly excluding pooled (and usually professionally managed) resources like in car sharing programs (Shaheen and Cohen 2013). Moreover, forms of collaborative consumption, for instance, buying and drinking a pitcher of beer with friends (Belk 2014) or buyers’ clubs, as frequently formed for acquiring and maintaining high value assets (e.g., sporting aircrafts or boats), are also beyond the scope of our delimitation of P2P online sharing. Transferring a resource implies some degree of tangibility, in particular with regard to legal ownership and exclusivity of access. It may be transferred temporary (e.g., rental) or permanently (e.g., selling).

⁶ “Etsy is a marketplace where people around the world connect, both online and offline, to make, sell and buy unique goods.” (<https://www.etsy.com/about/>)

(IV) Casualness of use: Lastly, a characteristic property of the novel P2P online sharing economy is its short-term and repeated nature. Transactions are typically executed frequently with alternating partners. This property does often not apply to platforms for (re-)selling assets such as apartments and cars (e.g., Realtor.com, Immoscout.com, Autotrader.com, AutoScout24.com). Here, resources are typically not sold or rented casually to mitigate under-utilization, but rather for long-term replacement or capital yield. The casualness-of-use condition hence comprises *en passant* transactions, excluding major “once-in-a-lifetime” events.

Who shares? To better understand the current success of P2P platforms, it is important to highlight that, beyond technological advances, societal transformation processes are at play too. While access (as compared to ownership) was traditionally attributed lower social status (Ozanne and Ballantine 2010), the picture has fundamentally changed. Collaborative and minimalistic lifestyles have gained popularity – particularly among generation Y (Möhlmann 2015) – and represent a novel form of conspicuous consumption, and independence, sometimes referred to as *digital nomadism* (Hart 2015). Without doubt, shared consumption patterns have the potential to contribute to a more sustainable use of resources, especially in urban areas. Here, high financial, timely, and spatial stress (exorbitant rents, congestion, and scarcity of parking space, for instance) intersect with short distances, high density of like-minded people and thus rich supply and demand to tap into. In other words, sharing in metropolitan areas is both indicated *and* particularly easy. People in such areas are prevalently young, well-educated, and technology-savvy – and so are typical sharing economy users (Frick, Hauser, and Gürtler 2013; PwC 2015). These digital natives use Internet and mobile technology naturally and encounter low mental and technical entry barriers. Moreover, they are attuned to the very idea of interacting and trusting online. In the following, we therefore outline the – in our view – most typical and online-specific features in view of the P2P sharing economy, namely transaction costs, network effects, digital added-value, as well as trust and privacy concerns.

Transaction costs and network effects

The global sharing economy is growing rapidly. PricewaterhouseCoopers (PwC) estimated the potential value of the five main sharing economy sectors (including peer-to-peer finance, online staffing, peer-to-peer accommodation, car sharing, as well as music and video streaming) by 2025 to be US\$335 billion with annual growth rates of up to 25%.^{7,8} Comparable to file sharing in the early 2000’s (Aigrain 2012), the sharing economy’s shift from a niche to a

⁷ <http://www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy.html>

⁸ <http://www.forbes.com/sites/tomiogeron/2013/01/23/airbnb-and-the-unstoppable-rise-of-the-sharing-economy/#356d00b36790>

global phenomenon was and is driven by the widespread and inexpensive availability of Internet technology. The Internet has changed the game of sharing economy services due to at least two reasons.

First, search and transaction costs have vanished. Purchasing second-hand goods, a shared ride, or accommodation is as easy as a few mouse clicks. Also advertising one's spare goods involves little effort and is usually free of (upfront) costs, since most platforms only charge transaction-based commissions. Second, this ease of use draws in and connects a myriad of users, formerly separated by time and/or space. Surpassing critical mass is crucial for P2P sharing platforms, representing two-sided market places with direct cross-side network effects (Eisenmann, Parker, and Van Alstyne 2006). Both demand and supply are dispersed across private individuals. Hence, both sides benefit from additional users on the respective *opposite* market side.

In the following, we sketch out a simple model of a two-sided market with cross-side network effects, in which the suppliers, e.g., the hosts on Airbnb or the drivers on BlaBlaCar, determine the price of a homogeneous good. This reasoning differentiates the economic mechanisms of platforms such as Airbnb from most of the literature on two-sided markets, where the main focus was "to address how the intermediary (or 'the platform') sets prices for both sides of the market simultaneously" (Rysman 2009, p. 141). Analogous to traditional products with network effects, e.g., the fax machine (Easley and Kleinberg 2010), the mutual interdependencies across the market sides can be represented by the supply and demand functions $S(d)$ and $D(s)$, where $S(d)$ depicts the number of suppliers in the market, given an expected market size of d demanders. Analogously, $D(s)$ depicts the number of demanders, given an expected number of s suppliers. We assume that both for $D(s)$ and $S(d)$, there exist thresholds for s and d , below which the number of users on the respective other market is negligible. Above these thresholds, $S(d)$ and $D(s)$ increase concavely, that is, at decreasing growth rate. Naturally, threshold values and growth rates may differ, but the general assumptions of thresholds and concavity are readily justified for either side. First, assuming a very limited number of suppliers, demanders are simply too unlikely to find a suitable match. Moreover, for too few demanders, there is no way for suppliers to break even, and thus even small market entry costs prove prohibitive for participation. Second, concavity emerges from the existence of natural constraints. At some point, ever-increasing numbers of demanders (assuming a fixed price level) will surpass the supply side's capacity to serve them. Vice versa, ever-increasing supply will, at some point, generate only little or no effective additional choice.

Beyond supply and demand in two-sided platforms, models of P2P sharing economy platforms need to consider pricing. Much of the literature on two-sided markets has addressed the platforms' pricing strategies, i.e., how to charge provisions or fixed fees from one, the other, or both market sides, as well as platform competition (Rochet and Tirole 2003). Much of this

literature considered online advertisement and credit card businesses, where it is usually assumed that transactions between end-users do not involve payments (Rochet and Tirole 2004). Against the backdrop of P2P sharing of tangible resources, it appears worthwhile to also take a closer look at product pricing. For the sake of simplicity, we abstain from platform fees entirely. A common and important characteristic of P2P sharing platforms is that suppliers set product prices themselves, individually, and (mostly) uncontrolled by the platform.⁹ We assume product and cost homogeneity on the platform, and hence a uniform price level. Admittedly, for platforms like Airbnb, this represents an overly stark simplification, acknowledging that there exist offers for house boats, castles, and tree houses. For ride sharing in contrast, the different rides from city A to city B do not differ all that much. Now, given an established price p , it is straightforward to assume that a higher price level will yield more supply for some fixed level of demand. Some additional suppliers will now find it worthwhile to enter the market as there is more to earn than before. Likewise, a lower price will drive some suppliers out of the market. The same reasoning (with opposite signs) applies for the demand side. Here, *ceteris paribus*, higher prices yield lower, whereas lower prices yield higher demand. These comparative statics are depicted in the main diagram of Figure 1.

The market reaches an equilibrium state where the mutual best responses of supply and demand intersect, formally represented by $D(s) = d$ and $S(d) = s$, or simply $D(s) = S'(s)$. Obviously, there may exist multiple equilibria. Given our conceptualization, the origin $(0, 0)$ always represents an equilibrium. Furthermore, given the described curvature, there may exist an intermediate price range with two additional intersection points. The lower of these equilibria is critical, that is, unstable against even small disturbances of either market side into any direction. For such disturbances, $D(s)$ and $S(d)$ will either converge towards the low $(0, 0)$ or the high equilibrium. This convergence dynamic is similar to that of other (one-sided) markets with network effects (Easley and Kleinberg 2010). The high equilibria states are robust against disturbances and hence stable. Mapping these stable equilibria onto demand/price and supply/price charts yields elliptic shapes, where the right edge represents stable and the left edge the critical equilibria (Figure 1).

Assuming, that the high equilibrium state is reached, i.e., the platform manages to surpass critical supply and demand, we now consider the suppliers' pricing decisions. By setting a price, the supply side implicitly determines the number of suppliers and demanders, where their calculus is as follows. A supplier maximizes her individual profit and knows that she will have to share the total of D demanders among all S suppliers. Assuming costs of c for one unit of supply, she hence maximizes the product of D/S -ratio and price-cost margin $D^*(p)/S^*(p)(p-c)$

⁹ BlaBlaCar specifies an upper bound for prices, which drivers (i.e., the supply side) cannot exceed. Besides a certain degree of price predictability and stability, this most likely serves the purpose to render the users' activity non-commercial and hence avert legal issues and inconvenient regulation.

with respect to p . As seen for revenue optimality in other cases (Voigt and Hinz 2015), this does not necessarily result in equal-sized market sides, that is, numbers of suppliers and demanders.

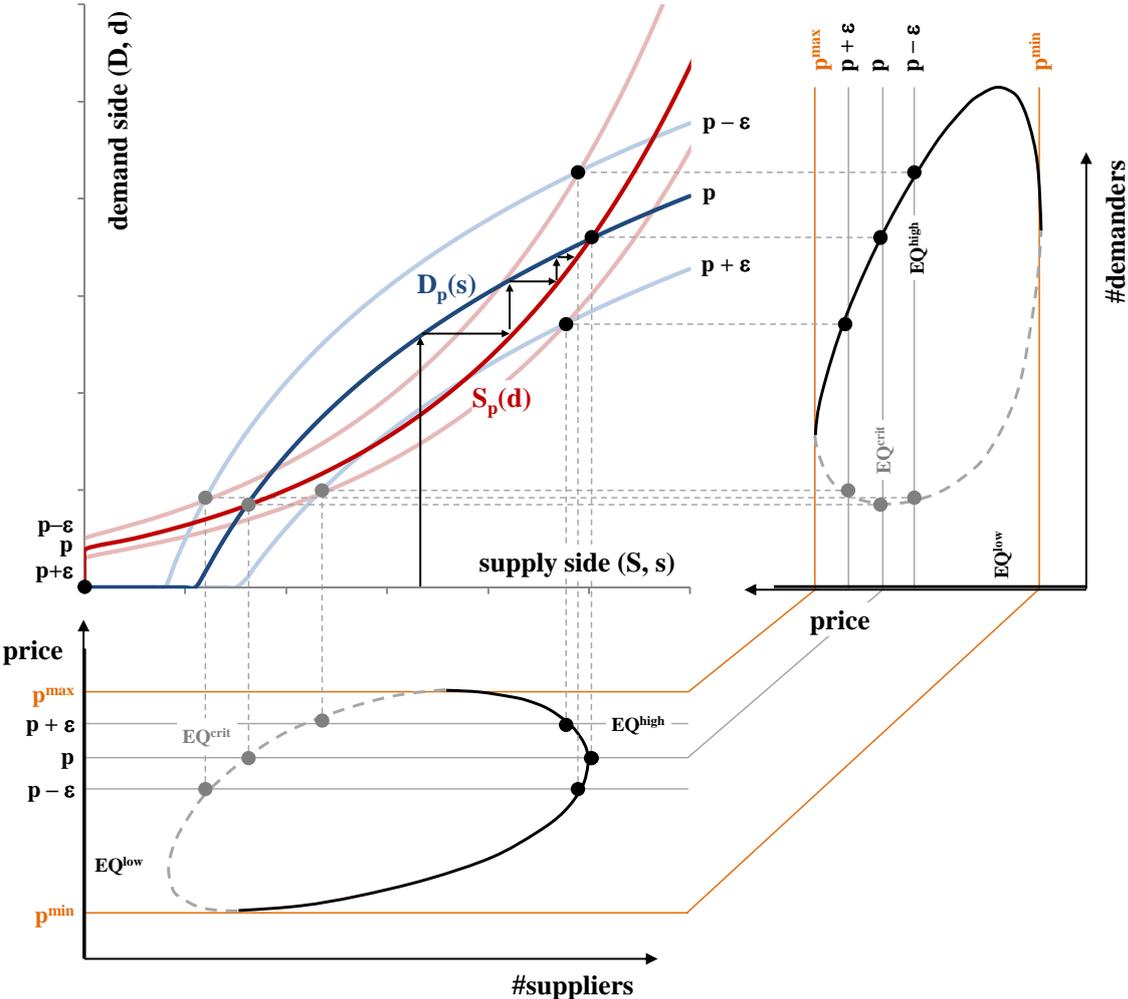


Figure 1: Two-sided platform price dynamics.

The result of this process depends on the specific shapes of $D(s)$, $S(d)$, and the magnitude of c . While a detailed formal analysis is out of scope here, this simple model yet allows for some valuable inferences. There are scenarios, for instance, in which suppliers will cut prices as much as possible. Below some price level, lowering prices pushes some suppliers out of the market and simultaneously increases demand, based on the price elasticities described above. This increases an individual supplier’s demand share both by increasing the nominator, and decreasing the denominator of the above fraction. At some point however, due to a lack of sufficient supply – and *despite* decreasing prices – the number of demanders will also drop but still improve the situation for the suppliers. This counterintuitive observation may eventually result in market inefficiency and certainly does not match the platform’s best interest since there exist states with higher prices *and* more supply *and* more demand. Platform managers should hence act to prevent such supply-side-driven market contraction. A variety of

arrangements is conceivable. Platforms can set defaults and upper/lower bounds for pricing, such as practiced by BlaBlaCar. Pricing recommendations and analytical tools are possible too (Edelman and Luca 2014). Other measures like deliberately reducing market transparency or the demand side's price elasticity appear less suited or much harder to achieve. More promising, platforms can try to reduce *perceived* competition on the supply side, hence calling upon a supplier's myopic tendency to charge higher prices. Moreover, platforms can reduce *actual* competition, e.g., by allowing for horizontal and/or vertical product differentiation. Airbnb's "Superhost" and "business-travel-ready" badges can be seen as attempts in this regard. Thus, beyond mere technical facilitation, P2P online platforms can (and must) offer some added-value to the sharing economy, where means for product differentiation and pricing are central, as we have seen. In the following, we further explore how digital added-value may be created.

Beyond facilitation: Digital added-value & secondary services

A major advantage of online-mediated services is immediacy. Compared to advertisements in catalogues or on bulletin boards, it is directly visible whether a certain accommodation or ride is still available or already booked, avoiding unnecessary requests. Moreover, given that all parties provide the necessary data (e.g., credit card accounts), immediate booking and payment are enabled, saving time and reducing organizational overhead and uncertainty. For transactions with in-person encounters, the payment process can be shifted to the background decently, avoiding awkward situations, in particular when the atmosphere among the peers was cordially. Furthermore, automated payment processes have a very practical effect, avoiding issues with cash and change money, as often the case at ride sharing.

Moreover, online sharing and information systems allow for an enhancement of sharing services, for instance, based on social media, location-based, traffic, weather, or other real-time data – or by recombination of existing resources, e.g., multi-hop ride sharing (Teubner and Flath 2015). Moreover, platforms can generate novel insights based on historical transactions and user data, which in turn enable recommendations like in other e-commerce settings (Adomavicius and Tuzhilin 2005), assisted pricing tools (Airbnb), or to target apposite ad campaigns. The common business model is to charge a fraction of the payments between supplier and consumer. For obvious reasons, this works best for high-value commodities such as apartments, cars, boats, or high-value equipment – and when the platform can offer additional services which make it inconvenient or risky to circumvent its booking process (secure and convenient billing, insurances, etc.). Since this is vital for a platform's commercial success, added-value and secondary services should be of high priority to P2P platform operators.

The currency of online sharing: Trust

Like sharing itself, the P2P online sharing economy is built on trust (Belk 2010). Trust is a multifaceted and complex construct – often hard to pin down (Keen et al. 1999). Not only the media (e.g., Ufford 2015) but also business consultancies regard trust as crucial for the sharing economy: “To share is to trust. That, in a nutshell, is the fundamental principle [...]” (Freese and Schönberg 2014). Botsman (2012) considers trust as the sharing economy’s currency. Also PwC (2015) concluded that “convenience and cost-savings are beacons, but what ultimately keeps this economy spinning – and growing – is trust.”

Whereas e-vendors face the challenge of winning and maintaining their customers’ trust (Gefen 2000; Tamjidyamcholo et al. 2013), C2C platforms, beyond that, must also consider trust *among* their users. Whether or not customers are willing to auction off or bid for products (Teubner, Adam, and Riordan 2015), offer or seek a shared ride (Teubner and Flath 2015), rent out their apartment temporarily (Hawlitcshek, Teubner, and Weinhardt 2016), or let others use their equipment (Hamari, Sjöklint, and Ukkonen 2016) will hence not only depend on the trustworthiness of the platform (e.g., data security, third party advertisement) but also on the extent to which other users appear trustworthy (e.g., with regard to ability, integrity, and benevolence; Gefen et al. 2008). Moreover, since a rented car, for instance, may break down, in many scenarios, the product itself is subject to trust considerations too. This is reflected in three distinct targets of trust in P2P online sharing: trust towards peer, platform and product – referred to as the “3P” (Hawlitcshek, Teubner, and Weinhardt 2016). As suggested by Bardhi and Eckhardt (2012), it appears beneficial to further investigate the triadic constellation of consumer-consumer, consumer-marketer, and consumer-object relationships.

Hawlitcshek et al. (2016) found trust to be a relevant factor for participation in peer-to-peer rental. It is one, if not the important driving factor for the long term success of sharing platforms (Strader and Ramaswami 2002). Platform operators have established a plethora of design patterns and mechanisms to establish and maintain trust among their users, including verification mechanisms, mutual rating and review schemes, or insurances and web design techniques (Teubner 2014). From the user perspective, meaningful profiles and especially profile *photos* are a driver of trust and sharing behavior in P2P platforms (Teubner et al. 2014; Ma et al. 2017; Karlsson, Kemperman, and Dolnicar 2017). Beyond considering trusting beliefs, recent approaches have begun to assess trust in the sharing economy in terms of actual behavior, that is, based on experiments and behavioral evidence (Hawlitcshek, Teubner, et al. 2016; Edelman, Luca, and Svirsky 2017).

Verification and signaling

A commonly pursued approach is to offer ways for users to verify i) their existence as actual human beings (as opposed to fake accounts), and ii) their qualification in the given context,

e.g., as a driver in ride sharing. For this purpose, the platform serves as a mutually trusted party. Potential suppliers and consumers send a scan of their ID card to the platform which verifies its authenticity and matches actual and user names. The same is possible for email addresses and cellphone numbers, verified by clicking a link or confirming a sent password. Note that the actual information (ID number, email address, phone number, etc.) is usually not displayed on the platform. A badge, however, indicates that it was provided and verified.

For special purpose platforms, users may want to signal competence, for example, when seeking to rent a boat (boating certificate), or when offering a shared ride as driver (driver's license; "zero accidents in x years" statement issued by their insurance). Another possibility is social signaling. Based on social media integration, users can demonstrate their willingness to rely on their social environment as good repute. Likewise, it can be understood as an act of strategic self-commitment, increasing incurred social cost if a transaction partner raises complaints. Making malicious behavior costly for oneself ex ante signals a high willingness to behave benevolently. Moreover, a reasonable number of Facebook friends may casually be regarded as indication for not being a psychopath, e.g., based on presumed popularity or attractiveness (Tong et al. 2008). Social media integration also taps into the trust potential of social similarity (McAllister 1995), for instance when discovering shared interests or even common friends.

Another verification and – at the same time – quality management strategy is followed by Airbnb. Eligible hosts are offered a professional photographer service, free of charge. Airbnb's partner photographers visit the hosts, arrange rooms, and thereby make sure the apartments are presented in the best possible light. Such watermark-verified photos are trustworthy as they believably depict the actual apartment. Beyond credibility and increasing trust towards the product, this is likely to make advertisements more appealing, benefiting both hosts and platform.

Ratings and reviews

Beyond verification and signaling, data on prior transactions and evaluations is informative and hence entails high trust-building potentials. Therefore, a common approach for establishing trust in P2P platforms is the use of reputation systems. Such systems allow for collecting, aggregating, and providing feedback on past user behavior (Resnick et al. 2000), typically based on five-star ratings on different aspects and text reviews. From a theoretical perspective, the effectiveness of this approach is grounded in social proof, stating that in situations of uncertainty, individuals derive behavioral cues from the previous actions of others (Cialdini and Garde 1987). Consequently, if aggregated feedback comprises credible information about the past behavior of other market participants, reputation systems can help to establish trust towards potential interaction partners online (Fuller, Serva, and Benamati 2007).

With the rise of the sharing economy, the importance of online reputation systems has increased tremendously. Here, “reputation serves as the digital institution that protects buyers and prevents the market failure that economists and policy makers worry about” (Sundararajan 2012). From a customer’s perspective, the decision of which host, guest, driver, passenger, seller, buyer, or lender to pick becomes much more informed when it is based on the aggregated experiences of many other users. We refer to Zervas et al. (2015) for a more comprehensive description of such processes.

One early and intensely investigated reputation system in C2C e-commerce was implemented by eBay (Dellarocas 2003). From the 2000’s until today, much effort was put into understanding and improving such systems (Bolton, Katok, and Ockenfels 2004). One recent modification addresses collusive behavior (i.e., undesired reciprocity) in peer review processes (Bolton, Greiner, and Ockenfels 2013). To limit tit-for-tat and hence inflationary positive reviews, Airbnb switched from sequential to simultaneous reviews in July 2014 (Zervas, Proserpio, and Byers 2015; Airbnb 2014).

The importance of ratings and reviews becomes evident when considering the associated value as *reputation*, or *social capital* (Huang et al. 2017), which particularly applies to the sharing economy. The information enclosed in positive or negative ratings not only affects “soft” factors like loyalty, satisfaction, or peer-trust (Bente, Baptist, and Leuschner 2012), but has also immediate ramifications for the involved parties. Host on Airbnb, for instance, capitalize a good reputation (i.e., positive reviews), either by demanding higher prices or by choosing guests more selectively, representing tangible economic value (Gutt and Herrmann 2015; Ikkala and Lampinen 2015). To demonstrate this, Teubner et al. (2016) consider the impact of average rating scores on prices, based on actual market data (Airbnb listings from Germany), including prices and a variety of control variables. Multivariate regression analysis reveals that higher average scores are indeed capitalized by *higher* prices. Sharing economy providers and consumers alike are hence compelled to actively manage their online reputation. Considering that single but particular negative reviews can have ruinous effects, and also that peer feedback can be very subjective, many platforms now allow for a response (Abramova et al. 2015). The latter authors found that different reasons of critique (self-inflicted or not) imply different best response strategies (e.g., confession, denial, apology, excuse).

Despite the success of reputation systems in P2P sharing, their effectiveness and informativeness has not remained uncontested. As discussed by Slee (2013) and Zervas et al. (2015), ratings on Airbnb (also compared to those of the same apartments on other platforms) are strikingly positive.¹⁰ This, however, reduces the possibility to differentiate between different offers based on the review score. This “j-shaped” distribution of online reviews is not

¹⁰ Zervas et al. (2015)’s article on Airbnb pointedly reads: “Where Every Stay is Above Average.”

a new phenomenon and was already observed on Amazon.com (Hu, Zhang, and Pavlou 2009). The characteristic distribution of P2P ratings can be traced back to herding behavior (prior ratings subtly bias the evaluations of subsequent reviewers), under-reporting of negative reviews (fear of retaliatory reviews), self-selection (higher *a priori* likelihood of satisfaction of users compared to non-users), and strategic manipulations, e.g., through bought reviews (Zervas, Proserpio, and Byers 2015). On Airbnb, as pointed out by Mulshine (2015), hosts not only get to see the reviews potential guests *received*, but also those they *wrote*. Hence, guests may want to avoid providing (honest) critical feedback, because future hosts might be reluctant to rent to them, fearing they will receive an all too honest review, too (Mulshine 2015).

Insurances and support

Another way to mitigate users' trust concerns is to deliberately address worst case scenarios and offer insurances and support for such cases. Airbnb, for instance, offers a 1,000,000 dollar insurance for damages incurred by guests. It is argued, however, that if needed, the platforms' guidelines make it difficult to obtain recovery (Hooshmand 2015). The ride sharing platform Carpooling.com even used to offer compensatory train tickets for passengers in case a driver canceled a ride on short notice or did not show up. In cooperation with the insurance company AXA, BlaBlaCar offers services such as roadside assistance, additional insurances, legal advice, and even return shipments of forgotten items.¹¹

Web design

Beyond such approaches towards engineering trust, there also lies a passive trust potential in a platform's appearance. Jones and Leonard (2008) found that "a consumer's perceptions of that [web site's] quality can result in a feeling of trust about the owner of the site" (p. 93) and concluded that maintaining a high level of quality is crucial for C2C platforms. Joe Gebbia – co-founder of Airbnb – states to actively address trust issues by deliberate design choices, where "building the right amount of trust takes the right amount of disclosure." This is nudged by the size of text input forms to suggest the right length, and guiding prompts intended to encourage communication.¹²

Moreover, as indicated by Cyr et al. (2010), the choice of colors in online market platforms is relevant too and may even affect trusting and reciprocating behavior (Hawlitshchek, Jansen, et al. 2016). Colors can induce specific perceptions of warmth since humans tend to associate different colors with different degrees of warmth (Fenko et al. 2009). Most studies agree on the general notion that blue is perceived as a cool, while red is perceived as a warm color (Fenko et al. 2009). Remarkably, cold and warm temperatures affect the perception of interpersonal warmth and in turn trusting behavior (Williams and Bargh 2008; e.g., Kang et al. 2010). The

¹¹ <https://www.blablacar.de/news/start-onlinezahlung-axa>

¹² http://www.ted.com/talks/joe_gebbia_how_airbnb_designs_for_trust

effect of temperature priming on trust was found in Prisoner's Dilemma (Storey and Workman 2013) and trust game situations (Kang et al. 2010). Whether or not the evolution of Airbnb's logo is to be seen from a color-trust perspective remains unclear. Airbnb's blog¹³ referred to the new color as one "which delivers the emotion and passion around the brand, without the aggression of pure red."

Many e-commerce vendors also rely on third-party certification to signal high service quality, reliability, and hence trustworthiness. Such certification is often designated by a graphical seal on their website, as for instance the Trusted Shop Guarantee.¹⁴ The provider's promise is to approve high levels of data security, cost transparency, variety of payment options, adequate shipping, and a fair management of return shipments and cancellations. Plonka and Janik (2013) investigated users' gaze paths on apparel shopping websites containing such trust seals, employing eye-tracking devices. Rather than paying attention to the e-trust seal, however, user primarily looked at the face of the female model presenting the product, the brand logo, and the main text headings. In fact, the model's face was the *first* focal point of user attention, as humans "are social animals, [...] perfectly wired to automatically read the subtle social cues" (Plonka and Janik 2013).

User representation

This paramount importance of faces as one type of pictorial stimuli leads us to one of the most commonly adopted elements for trust building in e-commerce: expressive user profiles and photos in particular. User representation draws upon several streams of research. First, research on e-commerce and Information Systems has, starting from the early 2000's, extensively investigated how images and representations of humans in product websites affect shopping behavior. They were found to stimulate social presence, trust, and e-loyalty (Cyr et al. 2009; Hassanein and Head 2007). Perceived social presence, i.e., "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (Short, Williams, and Christie 1976, 65), was identified as a central construct in this regard. It is increased by the presence of visual user representations and mediates their effect onto behavioral and trust dimensions. For the case of C2C platforms, however, only few studies considered the impact of providing actual user photos on sharing behavior (Bente, Baptist, and Leuschner 2012; Teubner et al. 2014; Ert, Fleischer, and Magen 2016) – but results are unambiguous: faces create trust. Many P2P platforms rely on this effect. Carpooling.com, for instance, literally reminded its users that "faces create trust" and prompted them to complete their profile accordingly.¹⁵ Also Fliinc.org asks its users to "upload

¹³ www.underconsideration.com/brandnew/archives/new_logo_and_identity_for_airbnb_by_designstudio.php

¹⁴ <http://www.trustedshops.com/>

¹⁵ <http://www.mitfahrgelegenheit.de/news/viewNews/464>

a picture” and hence to “create trust.” BlaBlaCar even offers a filter in its search to show ride offers only by drivers *with* a photo.

Secondly, user representation by avatars as an alternative to actual photos is also considered in a variety of domains, e.g., in e-commerce, online gaming, and e-learning (Nowak and Biocca 2003; Qiu and Benbasat 2005; Lee, Kozar, and Larsen 2009; Blascovich et al. 2002; Slater and Steed 2002; Bente, Baptist, and Leuschner 2012). In particular, the emerging field of NeuroIS – using neuro imaging techniques – has revealed that almost any reasonable form of avatar faces (cartoon, animal, photorealistic, animated) is perceived very similar to actual human faces by the brain. In fact, the fusiform face area is activated not only for human, but also for animal and cartoon faces (Tong et al. 2000; Kanwisher, McDermott, and Chun 1997). Things that look like faces are hence processed like faces by the brain, which appears reasonable from an evolutionary point of view, since for most of human history – without artificial images – everything that looked like a face in fact was a face. And indeed, even macaque monkeys have been found to exhibit specific brain cell activation when exposed to cartoon faces (Freiwald, Tsao, and Livingstone 2009). Such representations hence have the potential to convey the same positive effects (i.e., social presence, trust). Much of the research in this context considers behavior in hypothetical scenarios, whereas recent studies also use experimental, incentivized approaches and investigate user behavior in P2P scenarios (Teubner et al. 2013; Teubner et al. 2014).

It can be assumed that the role of user representations in P2P platforms is more potent than in traditional e-commerce, due to the fact that these pictures refer to actual human beings, as compared to human props for product advertisement (Teubner et al. 2014). Moreover, the effect is most likely stronger for P2P rental (e.g., Airbnb) than for selling (e.g., eBay), due to stronger social interaction among the peers. Thus, social and personal cues, and especially human faces create trust as a prerequisite for peer interaction. Recent research is increasingly concerned with regulatory and other “dark sides” of the sharing economy (Malhotra and Van Alstyne 2014). Edelman and Luca (2014), for instance, suggested that there exist distinct race-based price differences on Airbnb (controlling for all other visible data on the platform). They concluded that profile pictures as a “seemingly-routine mechanism for building trust” entail important unintended consequences (p. 2). Beyond being a potential source of discrimination, providing a photo of oneself immanently reduces anonymity and may hence give rise to privacy concerns, evoking discomfort or even discouraging registration and activity in the first place. We consider this flipside of the medal in the next section.

Privacy

Under the impression of the emerging technology of photography, Warren and Brandeis (1890, p. 193) defined privacy as “the right to be left alone.” Today’s Internet users have come a long

way since then. They share personal information online quite permissively, knowingly or unknowingly; and for the case of social network sites (SNS) often with the emphatic desire *not* to be left alone, but to provoke feedback, the experience of emotional support (Koroleva et al. 2011), and connectedness (Krasnova, Veltri, and Günther 2012). Privacy in the sharing economy is fundamentally rooted in theories of privacy regulation, which define privacy as people's desire to determine "when, how, and to what extent information about them is communicated to others" (Westin 1967), or as the "selective control of access to the self" (Altman 1975, 24). P2P online platforms inherently create an audience for personal information. Moreover, the sharing economy has started to blur the lines between personal and commercial spheres (Sundararajan 2016). Seeking to offer personal economic assets online requires actively balancing of economic aspiration (e.g., target group size) and individual privacy concerns, by choosing which information to disclose, to whom, and via which channel(s).

Once disclosed information on any platform can be (mis-)used for economic and social discrimination, hidden influence and manipulation, coercion, or censorship (Acquisti, Brandimarte, and Loewenstein 2015). In particular the aggregation of different information sources, e.g., from SNS and C2C platforms, enables far-reaching inferences, exploitable for personalized advertising, behavior prediction, profiling, or the extraction of sensitive information like political views (Mitrou et al. 2014). In light of this relevance of privacy-related user behavior in online contexts and the associated technologies, "the information age has rendered information privacy a core topic in IS research" (Pavlou 2011, p. 977).

P2P sharing platforms are the most promising channels for advertising many types of personal assets. They put their users into a quite controversial position, requiring disclosure of personal data for providing information, marketing, or to create trust (Teubner 2014). Against this backdrop, personal information disclosure, economic considerations, and privacy concerns interact in manifold ways. "If this is the age of information, then privacy is the issue of our times" (Acquisti, Brandimarte, and Loewenstein 2015, 509). Despite the facilitation of economic peer-to-peer sharing, renting, and selling and the growing importance of C2C platforms (PwC 2015), there is a lack of understanding under which circumstances such advertisements are realized – and when they are not (Teubner and Flath 2016). Overall, the willingness to disclose and share intimate information appears to be on the decline (Acquisti, Brandimarte, and Loewenstein 2015). One may assume that this is due to perceptions of psychological privacy risks (Hauff, Veit, and Tuunainen 2015), emerging from the potential reach of online communication and the dramatic scale of some social media outrages in particular. However, any inhibiting concerns take a backseat in some of the most expansive communication channels such as platforms such as Airbnb. This notion is supported by research on concerns related to information disclosure in such platforms, following a

curvilinear form in perceived communication reach (Teubner and Flath 2016). Potential concerns mitigated in small, secluded settings (intimacy) and also on very broad platforms (anonymity). Platform operators should hence carefully consider whether to jeopardize their size-related anonymity advantage by creating close proximity to (less anonymous) social media channels.

Conclusion

The P2P online sharing economy has started to impact many domains of our daily lives, including retail, hospitality, mobility, work, and financial services. The extended use of underutilized assets seems to catch the spirit of our age. In this respect, the transition from *offline* to *online* represents a key driver of this development, marginalizing search and transaction costs, as well as enabling to surpass critical market size in two-sided economies. Moreover, the use of IT yields very direct advantages such as real-time information, use of location-based data, and convenience.

In online environments, however, there occur novel problems. For operators and users of platforms alike, trust plays a crucial role. Trust building in peer-to-peer online economies, however, is intricate. The terms and conditions simply differ to heirloom offline transactions, where people meet in person, shake hands, and remain personally accessible and accountable. As we have outlined, the designers and engineers of P2P platforms have developed means to establish trust among peers as well as towards platform and products, including verification and signaling, insurances, ratings and reviews, and meaningful user profiles.

Economic peer-to-peer interactions may be seen as a form of re-connection with and re-appreciation of underlying production processes of goods and services, but coincidentally also as a form of economization of civic life. In economics, markets are usually assumed to be inert, i.e., not changing the meaning of the goods being exchanged. Platforms like Airbnb, in contrast, advertise in a value-laden way, claiming to broker *local, sustainable, social, or personal* products and services. This blurring of lines between the personal and economic spheres and the corresponding novel relationships between peers, platforms, and products give rise to new questions. Where one's friends in an online social network serve as a certification of credibility to potential interaction partners, they inevitably also become an asset. Moreover, P2P platforms extend market principles to domains formally out of the scope of commerce. Beyond this societal dimension, P2P economies also create issues and the need for trade-offs on an individual level, e.g., with regard to privacy. The fate of sharing economy services but also broader societal developments will depend on how the outlined issues are addressed, but also on asking the right questions. The increasing orbit of the P2P online sharing economy will hence urge the need for answers from academic, practical, and regulatory perspectives.

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