AN ECONOMIC ANALYSIS OF ONLINE SHARING SYSTEMS’ IMPLICATIONS ON SOCIAL WELFARE

Research in Progress

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Abstract

The rise of online sharing systems offers consumers the opportunity to grant other consumers access to infrequent-use goods or spaces they own, or the opportunity to access those they do not. Thereby, consumers’ decision-making and usage behaviors are likely to change, which in turn will affect consumer surplus and thus social welfare. Within this paper, first steps towards understanding the economic implications of online sharing systems upon social welfare are explicated, specifically those relating to consumer decision-making and usage behavior. Preliminary results indicate: (I) The number of uses for consumers (deciding to buy and share) increases in their individual monetary utility per use, increases in aggregate sharing supply, and decreases in aggregate sharing demand. (II) The number of uses for consumers (deciding to share and not buy) increases in their individual monetary utility per use, increases in aggregate sharing supply, and decreases in aggregate sharing demand. Further, a research agenda is presented in order to develop this paper by investigating following steps: (i) how consumers are categorized into different consumer segments; (ii) how sharing system providers set fees for using online sharing systems; and (iii) how online sharing systems affect consumer and producer surplus and how subsequently social welfare is influenced.

Keywords: Sharing Economy, Economic Analysis, Online Sharing Systems, Consumer Decision-Making, Consumer Usage Behavior

1 Introduction

Rifkin predicted that “ownership is steadily being replaced by access” (Rifkin, 2000, p. 4). A couple of years later this prediction came to reality and its evolution is summarized and explicated by Botsman and Rogers (2010b) as the rise of the new sharing economy. Botsman and Rogers (2010b) argue that the primary drivers for the rise of the new sharing economy are information technology (as an enabler), online communities (as users), environmental concerns (as motivating factors), and the global recession (as a motivating factor). Today, the shift described by Rifkin (2000) is observable in the behavior of consumers, as 75% of participants in a Shareable and Latitude study predicted that their sharing of infrequent-use goods or spaces will increase in the near future, which indicates that consumers start to discover benefits of access over ownership (Shareable and Latitude, 2010). This evolution is supported by the rise of online sharing systems (e.g., websites, apps, social media) offering the possibility to share different infrequent-use goods or spaces (specification in parentheses) like airbnb.com (share your place), relayrides.com (car sharing), leihdirwas.de (share infrequent-use goods), divvybikes.com (bike sharing), zipcar.com (car sharing), and landshare.net (share your land). Even though sharing was always possible online sharing systems have become the key enabler to the rise of the sharing economy causing a substantial increase in sharing transactions (Zervas et al., 2014).
Through these online sharing systems today’s consumers have the opportunity to either access infrequent-use goods or spaces, or to provide access to these for other consumers. These two options, to get or to grant access to something, characterize the meaning of the word ‘sharing’ in the new sharing economy.

Thus, if it is possible for consumers to grant access to infrequent-use goods or spaces they own, or to get access to those they do not through online sharing systems, the following four consumer groups can be differentiated: (a) consumers that do not buy and do not share (B intersect S) (b) consumers that do not buy but share (B intersect complement S) (c) consumers that buy and share (B intersect S), and (d) consumers that buy but do not share (B intersect complement S) an infrequent-use good or space. This consumer segmentation\(^1\) (extending the consumer segmentation of Ghose et al. (2006) for exchanging used books through the Internet) evolves because of the rise of online sharing systems that influence the behavior of consumers. Accordingly, some consumers that used to buy and some that did not buy an infrequent-use good or space, without the possibility of sharing these online, might now tend to share those (B intersect S). Thus, some consumers might stop buying some infrequent-use goods or spaces, and as a result the demand for these decreases.\(^2\) However, it may also be the case that some consumers that did not buy an infrequent-use good or space now buy and share these, due to the possibility of sharing. Consequently, this change in consumer behavior will also affect producers as a possible drop or increase in demand will also influence supply (cf., Mas-Colell et al., 1995; Tirole, 2001). Hence, as consumers and producers are influenced in different ways by the introduction of online sharing systems, the following research question arises:

**How do online sharing systems influence social welfare?**

Within online sharing systems, the online sharing system provider first decides the fee for offering an online sharing system. Based upon the fees charged, consumers will then optimize their decision and usage behavior. To analyze the economic effects of online sharing systems it is worked backwards, specifically this research in progress examines how online sharing systems influence the optimal usage behavior of consumers from different consumer segments.

This research in progress is probably the first that constructs a model that aims at investigating the effect of the sharing economy on social welfare, and thereby deduces the following results as a first step towards answering the research question: (I) The number of uses for consumers that decide to buy and share an infrequent-use good or space increases in their individual monetary utility per use, increases in aggregate sharing supply as the sharing price decreases, and decreases in aggregate sharing demand as the sharing price increases. (II) The number of uses for consumers that decide to share and not buy an infrequent-use good or space increases in their individual monetary utility per use, increases in aggregate sharing supply as the sharing price decreases, and decreases in aggregate sharing demand as the sharing price increases.

The remainder is structured as follows: In section 2 the related literature concerning the sharing economy and online sharing systems is reviewed. The economic implications, especially the change in consumer decision-making and their usage behavior, are investigated in detail in section 3. A research agenda is presented in section 4 outlining the next steps towards answering the research question, and the paper concludes with a discussion of the major findings and limitations of this research.

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\(^1\) Contrary to the consumer segmentation, without the possibility of sharing, where consumers either decide to buy, or not, an infrequent-use good or space.

\(^2\) This is supported by research conducted by, for example, Zervas et al. (2014), Cervero et al. (2007), and Martin et al. (2010), who found that an increase in sharing caused, in their cases, a decrease in demand (i.e., demand for hotel rooms or cars).
2 Related Literature

To provide an overview on the extent to which the sharing economy and online sharing systems are treated by other authors, a literature review is conducted according to Webster and Watson (2002). First, leading journals for the research were identified. Therefore, the top 30 journals of the ranking of the Association for Information Systems were included as the basis for the review. Within these journals a keyword search was conducted. The terms sharing economy, collaborative consumption, access society, sharing systems, and sharing were searched for by their own and in combination with the terms social welfare, consumer surplus, consumer segmentation, and producer surplus. Afterwards, the citations of these articles were analyzed in order to identify further promising articles. Finally, Google Scholar was used to identify articles citing the initially found articles. Thereby, 67 articles were obtained and a title and abstract analysis was conducted. In the following section, the most relevant articles about the sharing economy are discussed.

Belk (2010) explicates a deeper understanding of and gives theoretical insights into the evolution of sharing, the meaning of sharing, sharing in the context of other social behaviors like gift giving, and sharing within the family, the extended family, and the community. John (2013) describes the evolution of the word sharing’s meaning in Web 2.0, also highlighting that the sharing economy is enabled by network technologies. Botsman and Rogers (2010a) discuss that collaborative consumption offers people the benefits of access without the costs of ownership and lower environmental impact.

Other researchers are, for example, developing solutions to match driving demand and vehicle availability, or to manage stations for bike sharing systems (e.g., Shu et al., 2013), whereas Fournier et al. (2013) explicate the issues that a car rental company faces when integrating a car sharing start-up. They highlight that the rise of sharing is due to economic crises and advances in technology. Further, Sun and Supangkat (2013) find that companies will benefit from online sharing systems if the user group is not too large and companies prefer a heterogeneous network when the congestion risk is high. Lamberton and Rose (2012) develop solutions for online sharing systems to deal with the issue of unavailable products. According to them this is the linchpin for consumers to participate in sharing, and thus the consumers’ rivalry for a product with limited supply in online sharing systems has to be considered. They explicate that the risk of unavailable products depends not only on the consumer’s usage but also on the usage of other consumers. Accordingly, Benkler (2004) argues that it is possible to identify a class of goods that should rather be shared through online sharing systems instead of markets. The main characteristic for those goods is that they can provide more capacity over its lifetime than one consumer requires, and by that, sharing is likely to be more efficient than markets if information technology is used to facilitate sharing.

Further, Zervas et al. (2014) found that an increase in short-term rentals of Airbnb.com will decrease total hotel revenue, highlighting that the sharing economy’s impact on social welfare should be examined. Voight (2013) highlights the importance of information technology in bringing consumers together to share their own goods or offer services, such as running errands for someone. Further, economic implications are mentioned, for example that around 640,000 people used car sharing in North America in July 2011 alone, and that this figure is estimated to reach 4.4 million by 2016. Moreover, car sharing is associated with a decrease in gasoline consumption and car ownership (e.g., Cervero et al., 2007; Martin et al., 2010). Though, the economic implications of these findings are not investigated further in these studies. Galbreth et al. (2012) investigate the implications of sharing information goods on firm pricing and profits under different network structures. They find that firms can benefit from sharing systems if the sharing level is already high, which enables a pricing strategy targeted primarily at sharing groups rather than individuals. Even though they investigate the economic implications of sharing for the producers and information goods, they do not present the economic implications on consumers, social welfare, or abstract from information goods. However, Ghose et al. (2006) go further, and investigate product cannibalization and welfare impacts in the case of exchanging used books through the Internet, although they do not consider the possibility of sharing
books instead of selling them. Finally, Phipps et al. (2013) make a call to investigate how “might (...) sharing, in general, alter acquisition behavior” (Phipps et al., 2013, p. 1231).

Concluding this section, the sharing economy has drawn a lot of attention among different research streams, and most of these agree that a major driving force for the rise of the sharing economy is information technology. Furthermore, the sharing economy influences the decision-making of consumers, producer surpluses, and social welfare and thus, researchers call for further investigation of the economic and decision-making implications of online sharing systems. However, the economic implications of online sharing systems upon social welfare have yet to be investigated. Thus, the first steps towards addressing these calls and the research gap are made in this research in progress.

3 Assumptions and Notation

In this section rational consumers that try to maximize their utility by using an infrequent-use good or space are considered. Further, consumers are heterogeneous in \( \theta \), which is defined to be an individual monetary value that a consumer gains per use of an infrequent-use good or space. \( \theta \) is standardized to be in and uniformly distributed over the interval \([0,1]\); where \( \theta = 1 \) represents the highest individual monetary utility per use. Thus, \( f(\theta) > 0 \ \forall \ \theta \in [0,1] \), \( F(0) = 0 \), and \( F(1) = 1 \). Further, \( x_s \) represents a consumer’s demand to get access to an infrequent-use good or space (e.g., access to washing machine hours; further, it is abstracted from different types of washing machines and thus, only a representative washing machine is considered) with \( x_s \in R^+ \). Aggregate sharing demand of all consumers for an infrequent-use good or space is represented by \( X_s \) and \( X_s = \int_0^1 x_s(\theta)f(\theta)d\theta \) (e.g., all washing machine hours demanded by all consumers in the sharing market). Moreover, \( y \) represents a consumer’s supply in granting access to an infrequent-use good or space by \( y \in R^+ \) (e.g., granting access to washing machine hours). The number of uses \( (x_B(\theta)) \) of a consumer that buys and shares an infrequent-use good or space and the number of their shares \( (y; i.e., to grant other consumers access to washing machine hours) \) have to be between zero and the maximum number of uses (i.e., the capacity limit \( (\bar{x}) \) of, for example, washing machine hours, consequently, \( 0 \leq x + y \leq \bar{x} \)). This is necessary in ensuring that consumers can use or share the infrequent-use good or space not infinitely often; because, for example, they can only share washing machine hours during the times they do not use washing machine hours for their personal use. As consumers maximize their utility by the choice of their number of uses \( (x_B) \), their number of shares \( (y) \) are a consequence of this decision, and thus, are a function of the choice of their number of uses \( (x_B(\theta)) \).

Assumption 1: \( \frac{\partial y(x_B)}{\partial x_B} < 0 \) and \( \frac{\partial^2 y(x_B)}{\partial x_B^2} = 0 \).

Thus, aggregate sharing supply of all consumers is represented by \( Y \) and \( Y = \int_0^1 y(x_B(\theta))f(\theta)d\theta \) (e.g., all washing machine hours offered by all consumers in the sharing market).

Consumer utility \( (U) \) is monetarily measurable and is dependent upon the number of uses of an infrequent-use good or space and its individual monetary utility per use. Additionally, it is assumed that the marginal utility of using an infrequent-use good or space is decreasing in \( x \), bounded from below, and that it has a maximum capacity or number of uses (\( \bar{x} \)).

Assumption 2: \( \frac{\partial u(\theta,x)}{\partial x} > 0 \), \( \frac{\partial^2 u(\theta,x)}{\partial x^2} < 0 \) with \( 0 \leq x \leq \bar{x} \), \( U(\theta, 0) = 0 \), and \( \frac{\partial u(\theta,x)}{\partial \theta} > 0 \).

Transaction costs \( (T) \) arise if consumers have access to an infrequent-use good or space as, for example, they need to find it on the online sharing system or to be able to get to the place where they can physically access it. Further, transaction costs for accessing an infrequent-use good or space are increasing the more often consumers use it, at either a weakly decreasing growth rate or at a constant growth rate. This is because, for example, the consumer knows where to find it on the online sharing
system (i.e., search costs increase at a weakly decreasing rate per use), or they have to get to the place where they can physically access it, as it is, for example, with land sharing (i.e., access costs increase at a constant rate per use). Thus, $T(x)$ is increasing and is weakly concave in $x$.

**Assumption 3:** $\frac{\partial^2 T(x)}{\partial x^2} > 0$ and $\frac{\partial^2 T(x)}{\partial x^2} \leq 0$.

The price to share an infrequent-use good or space will depend on market mechanisms (cf., Mas-Colell et al., 1995; Tirole, 2001). A perfect market is assumed where neither side can exhibit market power. The price is further linearly increasing in aggregate sharing demand and linearly decreasing in aggregate sharing supply. Moreover, the growth rate in aggregate sharing demand and supply are (inverse) equal, meaning if aggregate demand and supply increase at the same rate no price changes will occur.\(^3\)

**Assumption 4:** $\frac{\partial p_S(x_S,y)}{\partial x_S} > 0$, $\frac{\partial p_S(x_S,y)}{\partial y} < 0$ and $\frac{\partial^2 p_S(x_S,y)}{\partial x_S^2} = \frac{\partial^2 p_S(x_S,y)}{\partial y^2} = \frac{\partial^2 p_S(x_S,y)}{\partial x_S \partial y} = 0$.

Given the nature of the consumer’s utility function, there is a relationship between the number of uses and the individual monetary utility per use. This cross relationship is fundamental to the results and is as follows: marginal utility is increasing for consumers with higher individual monetary utility per use.

**Assumption 5:** $\frac{\partial^2 u(\theta,x)}{\partial x \partial \theta} > 0$.

Finally, it is abstracted from the kind of infrequent-use good or space that is shared (e.g., cars, bikes, lawn mowers, apartments, or land). Hence, the results of the analysis will have broader relevance.

### 4 Consumers’ Decision-Making

In this section the economic implications of online sharing systems on social welfare, specifically upon consumer decision-making and their usage behavior, are explicated. Firstly therefore, the effect on the consumer segment $(B \land S)$ is investigated, and secondly, the effect upon the consumer segment $(B \land S)$.

#### 4.1 Implications for Consumers that Buy and Share

For a consumer that buys and shares $(B \land S)$ an infrequent-use good or space through online sharing systems, the net utility is the difference between their utility, the purchase price, a fee for using the online sharing system $(F_{BAS})$, and the revenue generated from sharing it. Thus, the net utility is defined to be:

$$
\phi_{BAS} = U(\theta,x_B) - p_B + p_S(x_S,Y)y(x_B) - F_{BAS}.
$$

For consumers that buy and share an infrequent-use good or space the first order condition by choice of the number of uses is

$$
\frac{\partial \phi_{BAS}}{\partial x_B} = \frac{\partial U(\theta,x_B)}{\partial x_B} + \frac{\partial p_S(x_S,Y)}{\partial y} \frac{\partial y(x_B)}{\partial x_B} + p_S(x_S,Y) \frac{\partial y(x_B)}{\partial x_B} = 0 = \psi_{BAS}(\theta,x_B,Y,x_S).
$$

\(^3\)This assumption assures a market equilibrium where the sharing market can exist and the sharing price will balance out to an equilibrium sharing price (e.g., the higher the aggregate sharing supply and the lower the aggregate sharing demand, the more consumers will change to the other side due to the resulting lower sharing price). Further, this guarantees that the equilibrium price $y \leq x - x$ holds, meaning that if consumers decide on their number of uses their number of shares will always be lower or equal to the capacity limit, and market equilibrium holds.
where \( \psi_{BAS}(\theta, x_B, Y, X_S) \) implicitly defines the optimal value function \( x_B(\theta, Y, X_S) \) and \( f(\theta) = \frac{\partial y}{\partial y} \). Lemma 1 describes the behavior of \( x_B(\theta, Y, X_S) \).

**Lemma 1.** The number of uses \( x_B \) for consumers that decide to buy and share an infrequent-use good or space increases in their individual monetary utility per use \( \theta \), increases in aggregate sharing supply \( Y \) as the sharing price \( p_S \) decreases, and decreases in aggregate sharing demand \( X_S \) as the sharing price \( p_S \) increases.

**Proof:** From assumptions 1, 4, and 5 follows the effect of \( \theta \) on \( \psi_{BAS}(\theta, x_B, Y, X_S) \)

\[
\frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial \theta} = \frac{\partial^2 \psi_{BAS}}{\partial x_B \partial \theta} = \frac{\partial^2 U(\theta, x_B)}{\partial x_B \partial \theta} + \frac{\partial p_S(x_S, Y)}{\partial y} \frac{\partial y(x_B)}{\partial x_B} \frac{\partial f(\theta)}{\partial \theta} > 0.
\]

The inequality is true as \( \theta \) is uniformly distributed, and thus \( \frac{\partial f(\theta)}{\partial \theta} = 0 \).

From the assumptions 1 and 4 follows the effect of \( Y \) and the effect of \( X_S \) on \( \psi_{BAS}(\theta, x_B, Y, X_S) \)

\[
\frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial y} = \frac{\partial^2 \psi_{BAS}}{\partial x_B \partial y} = \frac{\partial}{\partial y} \left( \frac{\partial \psi_{BAS}}{\partial x_B} \right) = \frac{\partial p_S(x_S, Y)}{\partial y} \frac{\partial y(x_B)}{\partial x_B} + \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_B} > 0.
\]

\[
\frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_S} = \frac{\partial^2 \psi_{BAS}}{\partial x_B \partial x_S} = \frac{\partial}{\partial x_S} \left( \frac{\partial \psi_{BAS}}{\partial x_B} \right) = \frac{\partial p_S(x_S, Y)}{\partial x_S} \frac{\partial y(x_B)}{\partial x_B} + \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_B} < 0.
\]

The sign of the second-order condition follows directly from assumptions 1, 2, and 4, and is:

\[
\frac{\partial^2 \psi_{BAS}}{\partial x_B^2} = \frac{\partial^2 U(\theta, x_B)}{\partial x_B^2} + \frac{\partial^2 p_S(x_S, Y)}{\partial y^2} f^2(\theta) \left( \frac{\partial y(x_B)}{\partial x_B} \right)^2 \frac{\partial y(x_B)}{\partial y} + 2 \frac{\partial p_S(x_S, Y)}{\partial y} f(\theta) \frac{\partial y(x_B)}{\partial x_B} \frac{\partial y(x_B)}{\partial y} + \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_B} < 0.
\]

From the implicit function rule the following results can be deduced:

\[
\frac{\partial x_B(\theta, Y, X_S)}{\partial \theta} = - \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_B} \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial \theta} > 0, \quad \frac{\partial x_B(\theta, Y, X_S)}{\partial y} = - \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial y} > 0, \quad \text{and} \quad \frac{\partial x_B(\theta, Y, X_S)}{\partial x_S} = - \frac{\partial \psi_{BAS}(\theta, x_B, Y, X_S)}{\partial x_S} < 0.
\]

**Q.E.D.**

### 4.2 Implications for Consumers that only Share

For a consumer that only shares (\( B \land S \)) an infrequent-use good or space through online sharing systems the net utility is the difference between their utility, the price to share it times the number of shares, a fee for using the online sharing system (\( F_{BAS} \)), and the transaction costs. Furthermore defined to be:

\[
\phi_{BAS} = U(\theta, x_S) - p_S(x_S, Y) x_S - F_{BAS} - T(x_S).
\]

4 It would also be true so long as the distribution is upward sloping, or if the last term is small as it would be with any reasonably flat distribution.
For these consumers the first order condition by choice of the number of uses is:

\[ \frac{\partial \psi_{BAS}}{\partial x_s} = \frac{\partial^2 \psi_{BAS}}{\partial x_s \partial \theta} - \frac{\partial p_s(x_s, y)}{\partial x_s} f(\theta) x_s - p_s(x_s, y) - \frac{\partial T(x_s)}{\partial x_s} = 0 = \psi_{BAS}(\theta, x_s, Y, X_s). \]

where \( \psi_{BAS}(\theta, x_s, Y, X_s) \) implicitly defines the optimal value function \( x_s(\theta, Y, X_s) \) with \( f(\theta) = \frac{\partial x_s}{\partial \theta} \).

Lemma 2. The number of uses \( x_s \) for consumers that decide to share an infrequent-use good or space increases in their individual monetary utility per use \( \theta \), increases in aggregate sharing supply \( Y \) as the sharing price \( p_s \) decreases, and decreases in aggregate sharing demand \( X_s \) as the sharing price \( p_s \) increases.

Proof: From assumptions 4 and 5 follows the effect of \( \theta \) on \( \psi_{BAS}(\theta, x_s, Y, X_s) \)

\[ \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial \theta} = \frac{\partial^2 \psi_{BAS}}{\partial x_s \partial \theta} - \frac{\partial p_s(x_s, y)}{\partial x_s} x_s \frac{\partial f(\theta)}{\partial \theta} > 0. \]

The inequality is true as \( \theta \) is uniformly distributed and thus \( \frac{\partial f(\theta)}{\partial \theta} = 0 \).

From assumption 4 follows the effect of \( Y \) and the effect of \( X_s \) on \( \psi_{BAS}(\theta, x_s, Y, X_s) \)

\[ \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial y} = \frac{\partial^2 \psi_{BAS}}{\partial x_s \partial y} = \frac{\partial}{\partial x_s} \left( \frac{\partial \psi_{BAS}}{\partial y} \right) = \frac{\partial}{\partial x_s} \left( - \frac{\partial p_s(x_s, y)}{\partial y} \right) x_s = - \frac{\partial^2 p_s(x_s, y)}{\partial y^2} x_s = 0. \]

\[ \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial x_s} = \frac{\partial^2 \psi_{BAS}}{\partial x_s^2} = \frac{\partial}{\partial x_s} \left( \frac{\partial \psi_{BAS}}{\partial x_s} \right) = \frac{\partial}{\partial x_s} \left( - \frac{\partial p_s(x_s, y)}{\partial x_s} x_s \right) = - \frac{\partial^2 p_s(x_s, y)}{\partial x_s^2} x_s = 0. \]

The sign of the second-order condition follows directly from assumptions 1, 2, and 3 and is

\[ \frac{\partial^2 \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial x_s^2} = \frac{\partial^2}{\partial x_s^2} - \frac{\partial^2 p_s(x_s, y)}{\partial x_s^2} f^2(\theta) x_s - 2 \frac{\partial p_s(x_s, y)}{\partial x_s} f(\theta) x_s - \frac{\partial^2 T(x_s)}{\partial x_s^2} < 0. \]

The inequality is true as the second order condition of \( T(x) \) is close (or equal) to zero and thus its effect is negligible in this case.

From the implicit function rule the following results can be deduced

\[ \frac{\partial x_s(\theta, Y, X_s)}{\partial \theta} = - \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial y} \frac{\partial y}{\partial \theta} x_s > 0, \quad \frac{\partial x_s(\theta, Y, X_s)}{\partial y} = - \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial x_s} \frac{\partial x_s}{\partial \theta} > 0, \]

and

\[ \frac{\partial x_s(\theta, Y, X_s)}{\partial x_s} = - \frac{\partial \psi_{BAS}(\theta, x_s, Y, X_s)}{\partial x_s} \frac{\partial x_s}{\partial \theta} < 0. \]

Q.E.D.

5 Research Agenda and Conclusion

This research in progress has examined the manner in which the rise of online sharing systems offers the consumer the opportunity to grant other consumers access to infrequent-use goods or spaces they own, or the opportunity for them to gain access to those that they do not. Consequently, consumers’ decision-making and usage behaviors change, which in turn impacts upon consumer surplus, producer surplus, and thus social welfare. Herein, first steps towards understanding the economic implications of online sharing systems on social welfare, specifically upon consumer decision-making and their usage behavior, are explicated. The major findings are: (I) The number of uses for consumers that decide to buy and share an infrequent-use good or space increases in their individual monetary utility per use, increases in aggregate sharing supply as the sharing price decreases, and decreases in aggregate sharing demand as the sharing price increases. (II) The number of uses for consumers that decide to share and not buy an infrequent-use good or space increases in their individual monetary utility per use, increases in aggregate sharing supply as the sharing price decreases, and decreases in aggregate sharing demand as the sharing price increases.
utility per use, increases in aggregate sharing supply as the sharing price decreases, and decreases in aggregate sharing demand as the sharing price increases.

To further develop this research in progress the following Steps I-III will be investigated:

The effects of online sharing systems upon the ways in which a consumer may be categorized into one of the different consumer segments shall be investigated (Step I). Specifically, different upper and lower bounds of θ will be derived that categorize a consumer with a specific θ into one of the consumer segments. Further, the bounds of θ where consumers convert from one segment to the other shall be examined. Additionally, the manner in which a sharing system provider sets fees for using online sharing systems based on a two sided platform approach will be analyzed (Step II). From the consumers’ decisions a pricing mechanism shall be constructed, which will maximize the profits of a monopoly sharing system provider. This pricing decision will lead to the sharing system provider’s profits as well as the net utility of a consumer and aggregate consumers’ net utility. Further, consumer and producer surplus will be explicated to investigate the impact on social welfare. As consumer surplus for the groups \( (B \land S) \) and \( (B \land S) \) is likely to increase, it can be deduced that the overall consumer surplus, which can be assumed to be the sum over the consumer surpluses of each individual consumer group (cf., Mas-Colell et al., 1995; Tirole, 2001), also increases. An approach towards investigating consumer surplus from one state of the economy to another that can be applied to this case is given, for example, by Brynjolfsson et al. (2003). Further, the impact of online sharing systems on producer surplus will be investigated. As some consumers stop buying infrequent-use goods or spaces and instead start sharing them, it can be expected that revenues of producers will decrease. Hence, prices of these are likely to change, which also influences producer surplus (cf., Mas-Colell et al., 1995; Tirole, 2001). Thus, the producer surplus might decrease. Finally, the impact of online sharing systems on consumer surplus and producer surplus will lead to an explication of their combined effect on social welfare (Step III). If, for example, the consumer surplus increases, and the producer surplus decreases, the implications on social welfare depend on the absolute value of both effects, specifically if one overcompensates for the other.

Although the assumptions of this research in progress were rigorously deduced and argued for, there are some limitations to mention. It was, for example, abstracted from price changes for buying an infrequent-use good or space, although it is likely that market mechanisms will lead to a price change if the demand to buy an infrequent-use good or space changes.

References


