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Curation Strategy of Platforms in the Sharing Economy: A Simple Micro Economic Approach

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A Simple Micro-Economic Approach

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Abstract

Platform curation plays a key role in the sharing economy, and suggests challenging perspectives and opportunities in policy-making. This paper focuses on the curation by sharing platforms, and explains its incentives and social welfare effects, using a simple micro-economic theory, and taking into consideration some features observed in the sharing economy. And future policy and research agenda are summarized.

Keywords : sharing economy, platform, curation, social welfare, regulation
JEL Classification : L41　L42　L43

1. Introduction

The early 21st century shows the remarkable development of platform businesses, and in particular of the sharing economy which has emerged and grown as a business model innovation. It is defined in this paper as the "sharing of access to goods and services" following Hu (2019, p.1) (hereafter, goods and services are referred to as 'good(s)' for short), and is a "matchmaker" type of business in which the platform operator (hereafter simply 'operator') "intervenes" between "third-party" providers (hereafter 'provider(s)') and "third-party" users (hereafter 'user(s)') of goods. An overview of the sharing economy is presented in for example FTC(2016) and Sundararajan (2016).

The sharing business has various noteworthy features. One of the most important features is the quality management of a network (ecosystem) by the operator, which is called as "curation" (see Doi, 2020, 2022) (1). Curation has four aspects of note. First, it is in character "self-regulation" or "self-curation" by an operator (see for example Cohen & Sundararajan, 2015 and Cusumano et al., 2021). Second, it is "network integration" by an operator, being similar to "vertical restraints" and "vertical integration" in competition economics (see for example Evans, 2013, 2020 and O'Brien, 2020 for vertical restraints in online platform markets). Third, it consists of a variety of implementation methods such as rating, recommendation, rule-setting and membership (see for example Akbar & Tracogna, 2020, Belleflamme & Peitz, 2021, and Doi, 2022 for more details).

Finally, curation has largely three types of mode in terms of the form of the implementing entities; The operators perform curation individually and independently (henceforth this mode is

called as "corporate self-regulation"), or in industry coordination (henceforth "industry self-regulation"), or jointly with government regulatory authorities (see Cusumano et al., 2021 and Doi, 2022 for the detail). Self-regulation or self-curation corresponds to the classification of standards (2). The former two modes of self-regulation are respectively equivalent to "internal standard" or "company standard" and an "industry standard" (voluntary consensus standards) of management quality (see for example Wiegmann et al., 2017). And the last mode is generally called as "co-regulation", in which the government regulation and the corporate self-regulation or the industry self-regulation are combined to jointly manage the quality of a network (3).

Thus, curation may be discussed applying the micro-economic theories of vertical restraints (and integration), standards, and government regulations. This paper aims to illustrate the platform curation in the "peer-to-peer" (P2P) (or "consumer-to-consumer" (C2C)) sharing economy from a simple theory of micro-economics, taking into consideration some major features observed in the sharing economy. The rest of the paper is organized as follows. Section 2 summarizes the mechanism of the P2P sharing economy and its effects on social welfare. Section 3 presents curation strategy by platforms, the effects of curation and its impacts on social welfare, referring to two opposite views. Section 4 reviews the economic implications from the micro-economic analysis. Final section concludes with future agenda for policy and research (4).

2. Basics of the P2P Sharing Economy

First of all, this section reviews the business model of the P2P sharing economy, and then examines the relation of curation behavior, prevalent in the sharing business, to social welfare as a rationale for public policy.

2.1 Business Model of the P2P Sharing Economy

The sharing economy encompasses a variety of patterns, but is particularly notable for P2P transactions (Doi, 2020). In the business, owners, providers and users of goods are all third-party individuals (general consumers). The platform is an agency or an "aggregator" that aggregates and connects many individuals who are either providers or users of goods. The basic structure of the business model involves the between-individual transactions of goods and the curation by an operator, and can be summarized as shown in Figure 1.

Basically, the business of the sharing economy consists of four players: owners of goods, providers who supply them, users who demand them, and an operator that intermediates between providers and users (henceforth, providers and users are called together as 'participants'). And, the online transaction usually leads to the accumulation and utilization of online information and data (roughly called as "big data"). In a transaction among individuals, the quality of goods and the trust and reputation of participants are important. Businesses generally indicate the quality of goods and of transaction parties through signals such as prices and advertisements, and also through various

types of curation. To clarify the mechanism of the sharing economy and its relationship to public policy, it is necessary to consider curation and its relationship to social welfare.

Figure 1 Business Model of the P2P Sharing Economy
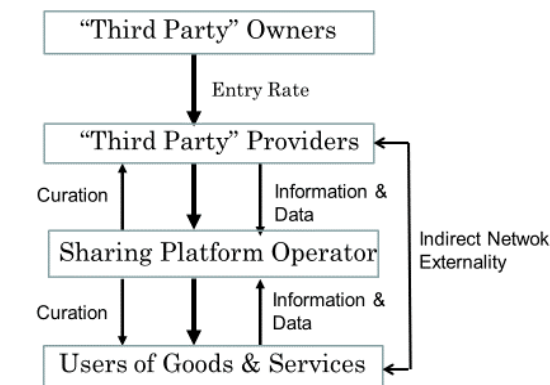
Note: Owners of goods & services, providers of
sharing goods & services
Source: Doi[2022], Figure 1

It should also be noted that in a two-sided market such as the sharing economy, "network externality", economy of scale on the demand side, may be at work. In particular, the "indirect network externality" between provider and user sides, that is, cross-side network externality, is of a greater strategic and policy significance, because it has a positive feedback relationship between the provider and user sides. The positive feedback relation suggests an outward shift in the demand curve for the good (i.e., increase in demand or market share). With network externality, an oligopoly and in particular an asymmetrical oligopoly with a dominant firm is likely to arise at the platform stage.
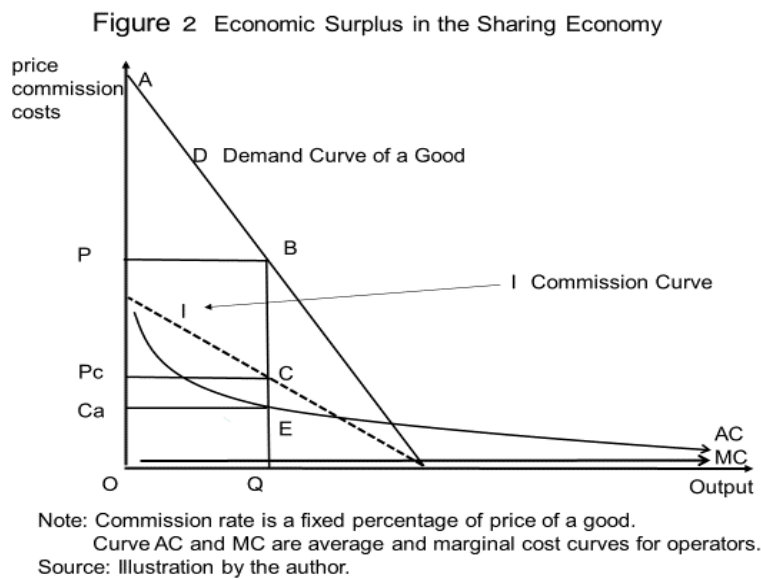
In the model, since business development requires the achievement of indirect network externality, it is essential for operators to sustainably attract users through trust and reputation (positive reputation externality). At the same time, important is the number of providers, which is likely to depend on the number of "entrants" (i.e., new providers), or the "entry rate" of (third-party) owners who become a provider (henceforth shortly 'entry rate') (5). The owners' entry may also depend on the extent of trust and reputation for the operator and participants.

Thus, with indirect network externality at work, the demand curve for a good will shift outward, and the extent of this shift will depend on curation and (owners') entry rate, and consequently on trust and reputation. This is because curation may enhance the quality of the network, i.e., the quality of the sharing good and the trust and reputation on the participants and operators, and may convey information about the quality of the network. In sum, both network externality and curation may be mutually combined to raise the demand. A successful curation or self-regulation is likely to induce a "quality-calls-for-quality" process. It is noted that the shift in demand curve is likely to capture "subjective well-being (happiness, life satisfaction and mental health)" as well as such academic effects (Collis, 2020, p.496).

2.2   Social Welfare in the P2P Sharing Economy

Now, we review the social benefits in the P2P sharing economy. It is shown in Figure 2.

For simplicity, we assume the homogeneity of a good on the platform and thus a uniform price level. The demand curve for the sharing good (hereafter shortly 'demand curve') is a linear curve D (solid line), and the commission curve of the operator is curve I (dotted line), assuming that the commission rate is set as a fixed percentage of a price of the good, and that the operator sets the commission rate discretionarily. This implies that the commission curve is derived from the demand curve. The demand curve may be affected directly by the curation strategy or network quality management, and indirectly by the commission rate through indirect network externality. This figure assumes to fully reflect the influences, i.e., the final quality level and commission rate in a given period. And, the cost structure of the operator is assumed to have fixed costs with the initial costs of building the network and curation system (with a diminishing average cost curve (AC)), and a negligible or low and constant marginal cost curve (MC).

Figure 2 Economic Surplus in the Sharing Economy

Note: Commission rate is a fixed percentage of price of a good.
        Curve AC and MC are average and marginal cost curves for operators.
        Source: Illustration by the author.

If the price of the good is set at price P following a given method (determined by the providers or operator), then the commission fee is Pc, and the output of the transactions is Q (under the system of single price). The output is equal to the quantity supplied by the providers, since the transaction takes place when the intervention is reached. In this situation, the triangle ABP is the consumer surplus of the users, and the rectangle PBCPc is the revenue of the providers (i.e., consumers). The sum of both the area (i.e., the quadrilateral ABCPc) can be said to be the consumers' total benefits or surplus, because of a C2C business. The argument may be further supported by the possibility that providers tend to frequently use sharing goods, since they are likely to know the convenience and benefits of the sharing economy.

Thus, consumers receive greater total benefits from the sharing economy compared to the B2C (business to consumer) type of transactions. But, in Figure 2, the consumers' total benefits may be overestimated, since it includes providers' costs. Therefore, the consumers' total benefits here are 'gross' consumer surplus. Also, if there is "curation failure" – i.e., inability of operators to provide a sufficient and consistent trust and reputation – or "bad behavior" (or malpractice) on the network (see Evans, 2012, 2013, 2020, 2021 and Doi, 2022), then the total benefits might be of a lower level.

On the other hand, the operator's profit from the intervention business (i.e., producer profit) is the rectangle PcCECa (equal to the rectangle PcCQO for commission revenue minus the rectangle CaEQO for total costs). If a price of a good remains unchanged, an increase in the commission rate leads to an increase in profit. However, if an increase in the commission rate is accompanied by an increase in the price of a good, leading to decreased transactions (decreased provisions), then it does not necessarily lead to an increase in operator's profit. It may rather impair the attractiveness to users and lead to a leftward shift in the demand curve, and then to a decrease in the operator's profit. In this sense, there may be an optimal commission rate that maximizes operator's profit, and therefore the commission rate cannot be said to have a monotonous relationship with the operator's profit. From this, it may be understood that the operator determines the commission rate by fully expecting a possible demand curve in the future.

Thus, in a sharing economy market, the total social benefits are the quadrilateral ABECa, which is the sum of the gross consumer surplus and the operator's profit. And it is noted that the weight of the operator's surplus is smaller compared to consumer's total surplus.

Strictly speaking, the total social benefits include the costs of providers (including both fixed and variable costs) and excludes the fixed costs of operators. If the costs borne by providers are negligible or low and the fixed costs of operators are not so high, then the total social benefits roughly reflect social welfare. Assuming that both the demand curve and the operator's cost curve do not change, the lower the price of a good, the greater the total social benefits from the sharing economy. Also, consumers in this case would enjoy greater benefits than in the B2C business that economics usually targets.

But, online sharing economies may damage or disrupt incumbent offline fields, reducing social welfare in the offline fields. Then, the total social surplus generated by a sharing economy field may be discounted by negative influences due to such intermodal substitutions. Thus, it is necessary to examine social welfare in a sharing economy field, taking into consideration the effects in the relevant fields as well.

３．Evaluations of Curation: Economic Effects

Opinions on the effects of curation and self-regulation by operators in the platform business are diverse. Boudreau & Hagiu (2009), for example, argue that voluntary quality control essentially solves the "market failure" problem. In other words, self-regulation can fully ameliorate market failure through the market internalization of competition and externality. First, as suggested above,

it enhances and stabilizes the level of quality, and provides a sufficient volume of quality information, leading to an increase in user utility through increasing trust and reputation. This results in a rightward shift in the demand curve. And the concomitant consequence is a rightward shift in the commission curve, since the commission is a fixed percentage of the price of a good.

Now, the demand function for a good is shown by Q *(p; Cr, Ns)*, where Q is the quantity demanded, *p* the price, *Cr* the level of curation (*i.e.*, the level of quality or trust and reputation of the network), and *Ns* the number of providers. Thai is, the function implies the number of quantity demanded (or of users), given an expected level of network quality and an expected quantity provided by providers (or an expected number of providers). In this case, the curation effect is a rightward shift in the demand curve: *δQ/δCr > 0*. Therefore, important is the responsiveness of demand curve to curation. Also, as the number of providers (*Ns*) increases, there works an indirect network externality that stimulates demand: *δQ/δNs > 0*. Put alternatively, an increase in the number enhances consumer satisfaction. However, this relationship does not always hold, since the relationship between *p* and *Ns* may be endogenous and sometimes contradictory (i.e., a backward bending relation).

Second, curation may also promote cost efficiency through algorithmic improvements and economy of vertical integration as network integration, thus increasing social welfare.
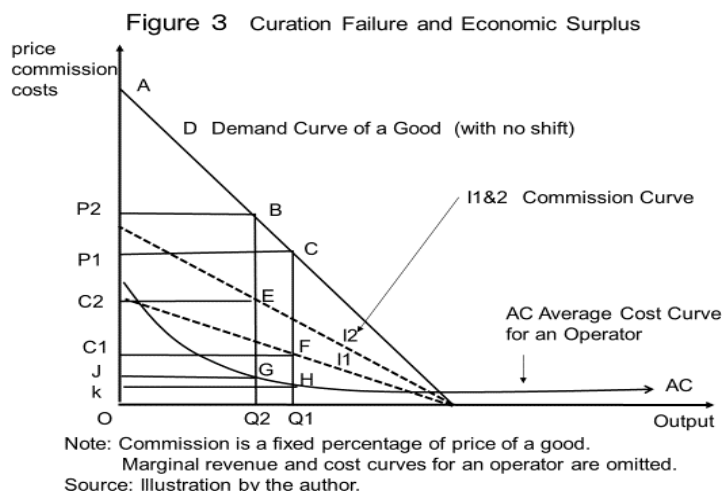
Finally, curation does not lead to restricted competition, due to the inherent pressure for price reduction in a field. In other words, because an indirect network externality works, operators prefer to lower prices to raise the quantity demanded. Increased output in turn makes it more attractive to providers and then increases the number of providers. Such relations eventually stimulate an upward shift in the demand curve. In particular, when the price elasticity of demand is large, the incentive to lower prices is even greater. In addition, online platform businesses frequently have existing fields of substitutes (usually offline businesses) which are likely to stimulate price and quality competition.

Thus, Boudreau & Hagiu (2009) argue that curation works under sufficient incentives to avoid market failure, or to enhance social welfare within the market system.

However, many studies and policy makers emphasize that "curation failures" occur. For example, operators may not always have sufficient curation incentive, and even if curation takes place, it may not be effective enough to reduce market failures. In other words, unlike the above argument, neither a rightward shift in the demand curve nor an improvement in cost efficiency is likely to occur. Moreover, curation rather creates opportunities for "bad behavior," which may involve, for example, market power and restricted competition. It is because with platform business, network externality, economy of scale, and economy of big data favor larger firms, leading to the formation of oligopolistic structure at the platform level. The market structure gives operators a dominant position over network participants. An example is a higher commission rate.

The impact of curation failure is revealed in Figure 3 (marginal curves are omitted for expository clearness). The figure assumes that the failures induce no outward shift in demand curve (D), and that an operator with dominant position raises a fixed commission rate from commission

curve I1 to I2 discretionally. Then, commission fee changes from C1 (a more competitive level) to C2 (a profit-maximizing level due to dominant power under a fixed commission rate), and correspondingly the good's price is increased from P1 to P2 (i.e., output is decreased from output Q1 to Q2). In the case, 'gross' consumer surplus defined above is the quadrilateral ACFC1 pre-curation and the quadrilateral ABEC2 post-curation. The former is greater than the latter (*i.e.*, the quadrilateral ACFC1 > the quadrilateral ABEC2). Operator's profit post-curation (the rectangle C1FHK) is inversely larger compared to the counterpart pre-curation (the rectangle C2EGJ). Therefore, with curation failure, while total social surplus and total consumer surplus both may decrease, operator's surplus may increase.

Figure 3   Curation Failure and Economic Surplus

Note: Commission is a fixed percentage of price of a good.
      Marginal revenue and cost curves for an operator are omitted.
Source: Illustration by the author.

Thus, self-regulation may result in failure, leading to less social surplus. Such an argument is typical of Parker et al. (2016). This argument at the same time recognizes the possibility of effective curation to compensate for market failures as well, supporting the so-called "rule-of-reason" type of policy decisions by assuming the welfare trade-off relationship that includes and compares both positive and negative social welfare effects from curation. Such policy approach is supported by Evans (2012, 2021) as well, although he highly appreciates the effectiveness of self-curation by operators and participants.

These different arguments would also apply to the sharing economy, one of the platform businesses. Below, we use simple microeconomics to explain the economic effects of curation in the sharing economy. The above relationship can be observed not only in the case of corporate self-regulation, but also in other modes of regulation, specifically industry self-regulation or co-regulation. The latter modes also may create opportunities for misbehavior which leads to welfare losses.

By the way, an operator's curation incentive generally occurs, when the expected profit from curation is greater with curation than with no curation (i.e., $\pi > \pi_0$, where π is profit with curation, and π_0 profit with no curation). In other words,

$$\{\sum_{t=1}^{T}(PtQt - mtQt)e^{-\gamma t} - FCo\} = \pi > \pi o > 0$$

where t and T are the expected duration of curation (t = 1 to T), P the commission of an operator (the sum of charges to both providers and users), Q the volume of transactions, m the marginal cost, γ the discount rate, and, FCo the initial costs to build the system for networking and curation. The initial costs are assumed to be the only fixed cost.

Curation may affect the combination of P and Q (commission curve) and m or FCo (cost curves). Commissions would depend not only on the level of commission rates under a fixed commission rate system, but also on the relation of price and output (i.e., the volume of transactions) of goods which is equal to the demand curve. Thus, the operator profit, i.e., the incentive for curation, depends on the demand curve (pricing, shape and shift), the commission rate (level and its allocation between participants), and the operator's costs, as also shown in Figure 2. Thus, the impacts of curation on these three factors are of interest. In the following, we will focus primarily on the first two factors.

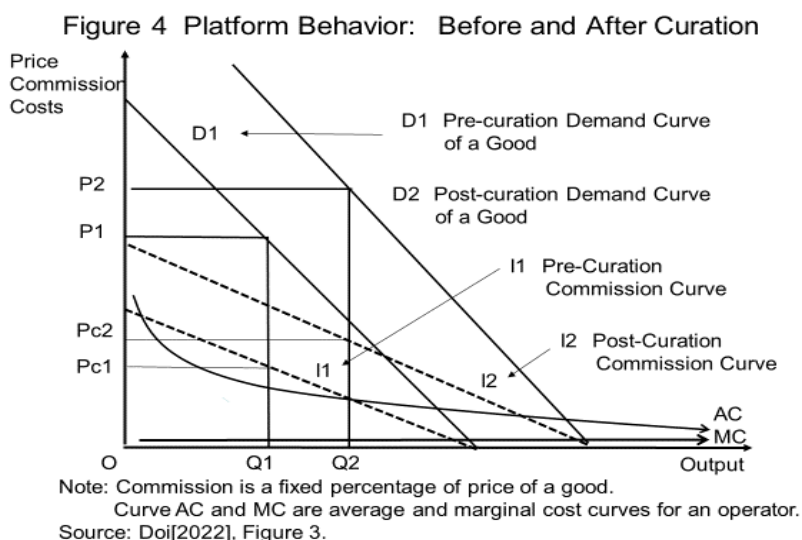## 4．Curation Strategy: Price and Commission of Sharing Goods

In the sharing economy, in general, the price and commission of goods are an important strategic variable for operators to coordinate the demand and supply of goods. When indirect network externalities work, operators may have a power to set prices of the sharing goods themselves to expand their revenue as much as possible. This is especially true in fields where the price elasticity of demand for a good is large (e.g., Uber for ride-sharing). Also, many operators in reality use a fixed percentage of the price of goods as a commission rate, regardless of market conditions. For example, Uber and Lyft, both in ride-sharing business, started their business by charging a single commission rate of 20% for all transactions, and then have increased the rate in consideration of driver entry and user demand (Chen et al., 2019, p. 145).

However, the pricings (i.e., commission and a good's price) on platforms vary. For example, "dynamic pricing", in which prices fluctuate in response to demand conditions, is practiced, but the pricing method is beyond the discussion here. We also do not cover "subscription" pricing (a flat commission fee) found in some sharing economies (e.g., HomeAway for private accommodation. Oskam, 2019, p. 24). The pricing is basically an attempt to enclose users, and has the effect of inducing a shift in the demand curve toward the right. Then, it can be viewed as setting a fixed rate of commission corresponding to the expected total sales of the sharing good over a given period of time.

This section argues for simple and illustrative results based on two cases of pricing; cases with platform determining price of a good, and with providers determining its price (see for example Nowag, 2018 and Chen et al., 2019 for pricings in the sharing economy).

4.1 Case with Operators Determining Prices of a Good

We now examine the effects of curation, assuming that the platform market is imperfectly competitive, and that the operator can determine the commission rate at discretion (6). In this case, the commission includes total rate charged to both providers and users (or zero for one or the other, see Appendix 1). This method is found for example in Uber business (UberX for ride-sharing and UberPool for carpooling) and Lyft. The effect is illustrated in Figure 4, which consists of the prices of goods and the output of transactions intervened by the operator as an agent (i.e., supply by the provider), assuming that the operator can determine the price of the sharing goods. In the case, the market is understood as a continuum of buyers who are willing to purchase only one independent unit of a good.

Figure 4 Platform Behavior: Before and After Curation

Note: Commission is a fixed percentage of price of a good.
Curve AC and MC are average and marginal cost curves for an operator.
Source: Doi[2022], Figure 3.

Curation induces a rightward shift in the demand curve. If there is no price ceiling, the demand curves (solid and linear line) are shifted in parallel from curve D1 (before curation) to curve D2 (after curation). And the corresponding commission curve (dotted line) for the providers shifts to curves I1 to I2. The commission rate, which is, as above-mentioned, the sum of charges to both providers and users, is assumed to be a fixed percentage of the price of each given output (the composition of commission rate is out of scope in this paper).

It should be noted that this figure, including Figure 5 below, is only an illustrative example, and is not uniquely derived from a certain theory. In other words, it cannot be assumed that curation always works effectively to shift the demand curve out. Therefore, the demand curve is in a different position with various directions and degrees, depending on factors like network externality and curation. We also assume here that curation has no effect on costs (7).

The effect of curation is reflected in a rightward shift of the demand curve from the pre-curation curve D1 to the post-curation curve D2, capturing the effects of increased buyer satisfaction (utility) and reduced transaction costs (8). In line with this, the commission curve of the platform also shifts in parallel from curve I1 to I2, assuming that the rate is unchanged. When an operator maximizes

profit (equal to commission revenue minus total costs), the commission also moves from Pc1 (transaction volume or output Q1) pre-curation to Pc2 (output Q2) post-curation, and correspondingly the price rises from P1 pre-curation to P2 post-curation. As a result, both the operator's profit and the sales (i.e., revenues) of providers (i.e., consumers) rise. In addition, social welfare (including consumer surplus), may also increase along with the rightward shift of the demand curve. Thus, this figure suggests the micro effects (price, revenue and profit) and then the social welfare effects of curation. Put alternatively, both consumer surplus and operator surplus may be increased roughly proportionately.

Conversely, if the platform fails to avoid and improve market failures, it will lose trust and reputation, causing a leftward shift in the demand curve and, at the same time, in the commission curve, and will face declining sales and profits. It eventually may be forced to exit the market. In other words, without effective curation, the parties concerned could be severely damaged. In fact, in both the ridesharing and private accommodation businesses, first-movers have been replaced by latecomers and forced to exit from the markets. Such exits are equivalent to the case of the so-called "first mover advantage myth".

The figure assumes that the commission rate is unchanged before and after curation. But if the rate changes, the slope of the commission curve changes. As the commission rate rises, the slope of the commission curve increases, resulting in higher commission. Therefore, the mechanism that determines the commission rate of a platform needs to be clarified. The determination would depend on the market structure and competition at the platform stage, the bargaining power balance between operators and participants, and entry rate, following traditional competition economics. For example, as the market structure becomes more oligopolistic and stable, operators like Airbnb may increase their commission rates (see for example Chen et al., 2019 and Oskam, 2019). The regional features (e.g., business cities and sightseeing regions) of each market may also have an impact, as the sharing economy is often a regional market. In addition, curation may involve only restricted competition and market dominance, with no effect of demand expansion and efficiency described above. As a result, social welfare may be reduced.
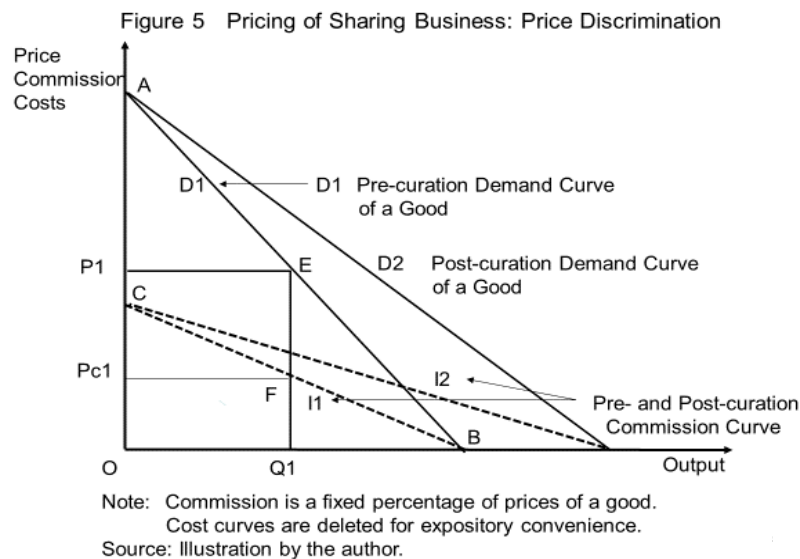
Thus, curation does not always induce a large shift-out in the demand curve and an increase in social welfare. The social welfare effect will depend on, among other things, the extent of the shift in the demand curve and the competition-restricting effects of curation. The extent of the shift in the demand curve would depend on the size of the curation effects and, because of the existence of indirect network externality, would also depend on the number and participation of providers reflecting the variety of a good enjoyed by users. This is because providers may stimulate demand among users, and users may stimulate an incentive for owners to enter more. In addition, as mentioned earlier, curation can involve a variety of methods such as rating, recommendation, membership and monitoring, and its eventual effects will depend on the difference in methods and in their compositions. Finally, most of economics researches assume that firms behave according to rules, but practically firms may break or distort the rules. Such behavior constitutes "bad behavior" by participants, or "double bad behavior" or "double moral hazard" by both operators and

participants (see for example O'Brien, 2020, Evans, 2021 and Doi, 2022). The malpractices may destroy trust and reputation, thus rather leading to an inward shift of the demand curve.

4.2 Case with Providers Determining Prices of a Good

Next, we consider the case in which providers can set prices. A pricing feature in the sharing economy is the question of whether an operator or a provider can set prices of goods, and whether price discrimination takes place (9).

Here, it is assumed that providers determine the price of goods and then the commission of the operator is determined according to a fixed commission rate system. This situation is illustrated in Figure 5. This business pattern can be seen in many P2P sharing economies, such as Airbnb for private accommodation and BlaBlaCar for carpooling. This business model differs from the traditional monopoly/oligopoly model (for market makers) in the sense that in the sharing goods market, the operator does not directly determine the goods' prices. However, it would be the same as the traditional monopoly/oligopoly model in the sense that the operator can determine the commission rate as a price of intervention service. In the sense that commissions affect a price of a good, a sharing economy market is not divided into a sharing good market and an intervention service market, thus collectively including operators as well as providers and users.

Figure 5 Pricing of Sharing Business: Price Discrimination

Note: Commission is a fixed percentage of prices of a good.
       Cost curves are deleted for expository convenience.
Source: Illustration by the author.

However, this case may differ from the case in the section above. We now assume that in private accommodations the providers are an individual and that each person provides one room (the number of rooms is equal to the number of providers) (10). Existing empirical studies show that there is a positive correlation between quality level and price level, suggesting "price discrimination". In other words, if different prices reflect the price and quality level (willingness to pay) demanded by users, as in the case of smartphone games with an "in-app payment" ("freemium" or "paidmium"), then the demand curve of a good reflects price discrimination, and may be also of price inelasticity.

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In fact, in Airbnb, it is found that the price the consumers are willing to pay depends on the characteristics offered by the providers, and specifically location characteristics, quality level, and provision of quality information. Also, for example, Oskam (2019, p.25) shows that the demand curve for private accommodation in Vienna, Austria is price inelastic. Thus, users make decisions to use a good at different prices depending on its quality level. From these features, we assume that providers set higher prices by offering higher quality of the good through curation. Thus, price discrimination is one of the important characteristics of the sharing economy, and also broadly of the platform businesses.

Figure 5 assumes that on the Y axis, consumers' (or users') prices (i.e., prices they are willing to pay) are ordered from highest to lowest. If we assume a so-called "perfect discrimination" (i.e., first-degree price discrimination) as one extreme case, the total revenues of the providers corresponds to the area under the demand curve (the triangle ABO), and the commission revenue (sales) of the operators corresponds to the area under the commission curve (the triangle CBO). Thus, the both players' revenues are respectively larger than in the single price/single commission case (P1, Pc1): the triangle ABO > the rectangle P1EQ1O, and the triangle CBO > the rectangle Pc1FQ1O. If different types of price discrimination are practiced as well, then their revenues are similarly larger than in the single price/single commission rate case.

Thus, price discrimination leads to an increase in both sales (revenues) of the providers (general individuals) and commission revenues/profits of the operators. A rightward shift of the demand curve (increase in market and market share) and an increase in commission rates have the same effect. In particular, it can happen that even if the commission rate is lower, the negative effect is more than offset by the higher sales and profits of price discrimination. Thus, operators may have an incentive to price discriminate through non-price types of curation. Also, operators may charge lower commission rates, since the possible damages may be offset by larger benefits through price discrimination. Then, lower rates are likely to improve providers' revenue and welfare. These relationships may increase "entry rates" defined above. In addition, because the operators usually have a strong bargaining power over the providers with respect to the composition of the commission rate, they may charge a higher percentage to the providers and a lower percentage to the users, as long as this approach does not increase provider's dissatisfaction. Sometimes, the commission is charged entirely to the providers and not to the users. In fact, Airbnb adopts this strategy (11).

Now, we examine the case where the demand curve shifts to the right with a constant price ceiling (i.e., point A - the Y-intercept - is unchanged in Figure 5) due to curation (in the figure, the cost curve is omitted for expository convenience because of no effect on costs). In this case, both total revenues of the providers and operators (respectively the area under the demand curve and the area under the commission curve) would increase, and the profits of the operators would also increase, if the cost curve were unchanged. In addition, compared to the single price system described above, even if the commission rate is lower, the sales and profit of the operator may increase due to price discrimination for a good. Therefore, operators and providers would have a greater curation incentive, and social welfare would increase as well.

4 Economic Implications from Curation Strategy: Effects and Problems

In a curation strategy, operators must decide 1) whether to self-curate, 2) if so, how and to what extent, and 3) how to relate self-curation to industry collaboration and public regulation. Several implications can be drawn from the above-mentioned brief theoretical case studies for these issues.

First and foremost, from the above discussion, operators have an incentive to self-curate when the benefits from quality control that enhances trust and reputation are large. In this case, the prices of goods, platform commission and social welfare depend on the shift in demand curve, the level of commission rates and the pricing method. In addition, although the cost structure of the providers was discussed as given in this paper, if the initial costs (fixed costs) are larger, then the first movers and larger firms may be in a better position in terms of costs and may benefit more from curation. But, strictly speaking curation may affect costs. For example, as noted above, curation may raise operational costs such as contacting to participants, providing guidance, and monitoring. It is necessary to examine those effects.

Second, curation generally induces a rightward shift in the demand curve, but the effect may vary because it takes many different methods and forms. As pointed out by Doi (2022), it is necessary to clarify each effect and its impact on social welfare. In addition, curation is almost always conducted using multiple methods (hereafter the 'multi-method curation'). Since each pattern of the multi-method curation has effects in various directions and degrees, it is necessary to clarify the net effect of each pattern. This is why economics is interested in business models.

Third, an operator may self-curate in various ways to differentiate himself or herself from rivals. This is because the demand curve depends on the market share of rivals and thus on their curation strategies. In fact, curation varies not only between fields, but also between operators within the same field. This leads to competition among networks, especially quality competition. And it may also induce price differences through differences in quality and reputation among the providers even within the same network. The issue of price discrimination in the sharing economy has not yet been fully discussed.

Fourth, industry self-regulation or co-regulation may be preferred, when the effect of corporate self-regulation is not significant, or when the overall trust and reputation of the industry is bad, and corporate self-regulation is not effective enough to improve such deteriorated industry reputation. If curation is assumed to be of a "multi-mode" type (hereafter the 'multi-mode curation') that includes both "corporate self-regulation" and cooperative self-regulation ("industry self-regulation", "co-regulation") as shown in Figure 6, then the composition of self-regulation is an important issue (see for example Ofcom, 2008, Coglianese & Mendelson, 2010, OECD, 2015, Cusumano et al., 2019 and Cusumano et al., 2021). The difference in the modes is likely to have an influence on the responsiveness of demand curve to curation.

Figure 6 Modes of Self-Regulation
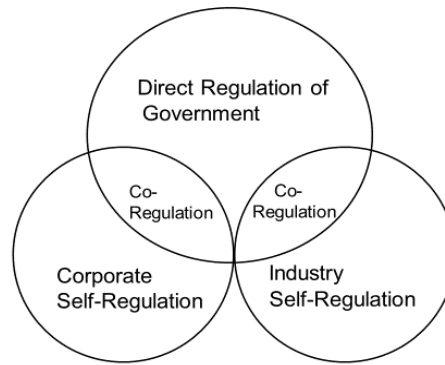
Source: Illustration by the author

In relation to competition, corporate self-regulation is seen as a competitive area, and cooperative self-regulations as a non-competitive area, similarly to standards (Doi et al., 2008). Therefore, the relationship between the two areas is an important issue. Another important issue is the impacts of the composition on corporate self-regulation. For example, to avoid government intervention or industry cooperation, operators may prefer to self-regulate independently. Thus, in public policy, attention should be paid to the composition and relationship between corporate self-regulation, industry self-regulation and co-regulation. Although being of greater importance, this issue in the sharing economy has not yet been subject to a fuller discussion.

Fifth, as noted above, this paper assumed a case of combined commission rates to both providers and users. However, not only the level of commission rate, but also the allocation and composition to both of them may affect the behavior of both parties (for example entry by providers and demand curve by users). The operators may determine the allocation and composition in light of the impacts. As a result, social welfare might also be affected. Thus, optimal commission rates and prices of goods are important decisions for operators, and their impact on social welfare is also important from a public policy perspective.

Finally, operators may not only control "indirectly" the quality of participants by providing information or instructions to steer the latter in a certain direction, but may also "directly" enter into the business of providing sharing goods to present a certain quality model to third-party participants (see Doi, 2022). The dual operation (called as the "duality model") of the intervention business and the supply business may have a different impact on the extent of shift in the demand curve. The model may involve cannibalization, where users in the intervention business switch to the supply business by the operator (the measure of switching is called as "diversion ratio"). As a result, the duality may lead to a rightward shift of the demand curve in the direct supply business, and a leftward shift in the intervention service business. However, even if such a cannibalization occurs temporarily, vertical integration may lead to an increase in trust and reputation of the providers by improving their quality following the quality management model of the operator. The duality model may eventually induce a rightward shift in the overall demand curve of the operator. Thus, the duality model may not only directly enhance trust and reputation, but may also have the

same effect by stimulating the providers.

In the duality model, the cost curve of an integrated operator may be different from the cost curve with no vertical integration. It is necessary to examine the model with change in costs. Now, the model is one of the most controversial problems on the public policy for online platform businesses.

Thus, curation is considered important to the development of the sharing economy, and also with its effective working, it is likely to have a social-welfare-increasing effect. Curation strategy, which plays a pivotal role, is likely to be affected by the factors such as the extent of indirect network externality (including the solution of the so-called "chicken-and-egg problem"), operators' vertical power, methods for self-regulation, and modes of self-regulation. The extent of participant lock-in (e.g., multi-homing or single-homing) and the entry rate of owners may also have an influence on curation.

But, curation may have a negative effect on competition and social welfare, since an operator may have an incentive to engage in a predatory behavior such as coercive controls and "self-preferencing" (i.e., preferential treatment to its own good in the duality model). And operators may exert a monopoly power on commission and goods' prices. Therefore, it is important to examine how competition policy should treat platform's curations and also operator's pricing strategies for commission and providers' prices (see for example Nowag, 2018).

5　Conclusion: Extensions of Analysis

Curation is imperative for the economic success of a P2P sharing economy. We have examined the incentives and social welfare effects of curation, taking into consideration the main features of the sharing economy, and particularly matchmaking, network externality, and trust and reputation (12). With the rise of the sharing economy, the business models promote greater social welfare. At the same time, the models may have undesirable effects such as unfair strategies and market power of operators.

This paper may have some qualifications because of the simple graphical approach as an illustrative example. However, it also involves essential issues concerning the mechanism of the sharing economy beyond the qualifications that merely come from the approach of a static analysis in which the demand and cost curves are assumed to be exogenously given. In addition to those described above, some more issues of significance are added and summarized.

First, this paper does not explicitly consider uncertainty in the sharing economy. For example, users may not have full prior knowledge of the quality of goods even through curation by operators, and they may not have sufficient knowledge and trust in the content of curation. Uncertainty in market conditions is also not taken into consideration. Therefore, it is necessary to explicitly consider the impacts of uncertainty on the method and mode of curation and the pricing of goods.

Second, curation by operators may also affect the entry of good's owners into sharing economy ("entry rate") and, further back, the decision of potential owners to purchase from manufacturers or

second-hand sellers. This is because an operator's curation imposes monetary and non-monetary burdens on providers, and fosters and reflects the perceptions of trust and reputation toward the operators and users. Taking into consideration those problems, owners are likely to decide whether to participate in the sharing network and, in turn, whether to purchase goods. Thus, operators determine the patterns of curation by considering their impacts on an owner's incentive to enter or purchase. These relationships need to be clarified.

Third, while this paper assumes that operators have a dominant position over participants and force them to curate, participants may not necessarily follow the operators' requests and rules. An example of this would be participants' moving to rival platforms, and "multi-homing" (using several platforms). Thus, participants' behavior must also be explicitly taken into consideration.

Fourth, although this paper focused on operators, it is also important to ask about the information participants use to evaluate and form trust and reputation, and also about the combination of curation methods they focus on. Participants' reactions may influence the curation methods. The operators might then determine the method and level of curation, taking into consideration the participants' preferences and reactions. Thus, the relationship between operators and participants is a problem of interest.

Fifth, this paper assumes an exogenous fixed commission rate based on the facts observed in many sharing economies. If, as suggested above, operators strategically or endogenously determine the commission rate, then the dynamic decision mechanism and its effects on prices and social welfare are an interesting issue. These issues have not yet been fully clarified.

Finally, we note an interesting finding that is not discussed in this paper. That is the tendency of operators to diversify into homologous or proximate businesses (neither complement nor substitute), which may lead to "competition for market". Such platforms with several fields are called as "multi-sided platform (or market)". For example, the ride-sharing operators like Uber and Lyft have entered other fields (e.g., UberPool and Lyft Line in carpooling and UberEats in food delivery) and has a large presence in each field. Diversification has the effect of inducing a rightward shift in the demand curve for each business. This is often referred to as the "one stop shopping effect," which is analogous to convenient experiences in a shopping mall, because it allows users to complete multiple errands in a single visit, increasing users' benefits (Belleflamme & Peitz, 2021, p.135).

This effect is the relation between the increase in the provision of one good (field) and the increase in the use of another good, and therefore is a "tucking-up" type of indirect network externality that crosses over different fields. It is here referred to as a "cross-field network externality". The effects are illustrated in Figure 7 with two goods (fields A and B). If the providers in field A are increased in number (i.e., quantity), then the value that a user attaches to the platform or the good is increased as well, leading to the increase in the use or demand (an "indirect" network externality within field A). And then the effect increases the attention of and provisions by the providers in field B who pay attention to the users in field A. The latter relation in turn stimulates the increase in use (demand) of field B. At this point, participants may not only expect the benefits of network externality in one field, but also the benefits of the cross-field network externality with

another field. Therefore, both the participants may keep or enlarge the participation in the platform. As a result, industry concentration in both the fields may be intensified. Thus, the cross-field network externality may shift outward the demand curves in both the fields.

Figure 7 Multi-Sided Business Model
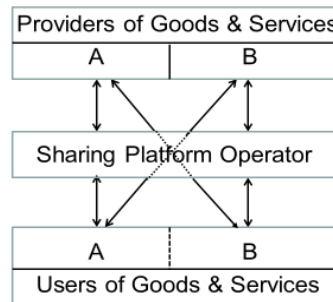
Note: A and B are separate good or service.
Source: Illustration by the author.

Also, diversification may have no negative effect on cost performance. It has little or no effect on costs because the business processes may be technically almost the same between the fields. Rather, it may induce the "economy of scope", thus leading to the effect of lowering costs.

In a situation where such a relationship is observed, a diversified operator may have an incentive to self-curate consistently in each field to avoid the conflicts of interest among the fields and to increase their overall sales and market shares. This is because, as expected from the above discussions, the demand curve for goods may shift outward in each field, resulting in an increase in both consumer surplus and operators' profits. In addition, social welfare may also increase in each field. But, the relationship between curation and cross-field network externality has not been fully discussed.

The exploration of these issues is respectively left to another paper. In addition, the present discussions which just suggest possible theoretical relationships need to be confirmed empirically. Among the major empirics are, for instance, the determinants of curation and then the effects of curation on the price of goods, operators' profits, users' decision, and the entry rate of owners (13).

Note

members of the research project and workshop participants for helpful comments and suggestions. All remaining errors and incompleteness are attributable to the author.

(1) This paper is based on Doi (2020, 2022) which examine the methods and forms of curation. See Sundararajan (2016), Teubner & Hawlitschek (2018), Doi (2020, 2022), Koczetkow & Klimczuk (2022), Miguel et al. (2022), and Rojanakit et al. (2022) for the business and regulatory features of the sharing economy.

(2) An industry self-regulation is equivalent to "voluntary consensus standard" in an industry. The government regulation and co-regulation are equivalent to "regulatory standard" or "compulsory consensus standard", which is usually called as "social standard". See Doi et al. (2008), Blindt (2017), Wiegmann et al. (2017) and Hudson & Orviska (2017) for standardization.

(3) See for example Cannon & Chung (2018), Griffith (2018) and Finck (2018) for curations in the US and EU sharing economies.

(4) The P2P sharing economy largely includes two types: an offering type without ownership transfer and a marketplace type with ownership transfer (see Doi, 2020). This paper focuses on the former. In addition, the business includes both "product sharing" and "services offering". Although there may be differences in the behavior of the involved parties between the two types, this paper does not take the differences into consideration.

(5) More precisely, this business model may include manufacturers of a good and its second-hand sellers. Figure 1 should include the column for manufacturers or second-hand dealers above the column for owners of goods. This is because as we will see below, the discussion involves not only the owner-provider relationship (entry rate), but also the relationship where the potential owner purchases from the manufacturers or the used-product distributors. Here, we assume that manufacturers and second-hand dealers have no influence. See for example Horton & Zeckhauser (2016), Benjaafar et al. (2019a, b) and Jiang & Tian (2019) for the relation from potential owners to users in a network.

(6) There is no study that explicitly examines competition among operators in the sharing economy.

(7) But, curation in reality may affect costs. For example, operators may incur the costs of contacting, negotiating, guiding and monitoring. Also, they may have costs due to the revision of algorithms.

(8) In Figure 3, the post-curation demand curve was assumed to move in parallel to the pre-curation demand curve. But, the same argument can be applied when the curve moves to the right with the same Y-intercept as in Figure 4.

(9) In this paper, we assume a case in which either the provider or the operator determines the price of goods. In reality, there is a hybrid type of both. For instant, BlaBlaCar, a carpooling service operator, sets an upper-limit for prices, and then the providers determine the prices discretionarily within that range. On the other hand, in the case of Turo, a car rental service operator, a provider first determines a lower-limit for prices, and then the operator sets the price at or above the floor level. See Doi (2020, 2022).

(10) A provider includes, in reality, two types: an individual who provides only one facility and a

business who owns and provides many facilities. This paper focuses on the former. The latter is one of the major policy issues to be addressed.

(11) Airbnb has revised its commission rate ("Simplified Pricing"): from the previous system of 3% for hosts (providers) and 14.2% for guests (users) to the new system of a 15% commission rate for providers only (effective on December 7, 2020). This revision may reflect that the new system aims to achieve greater indirect network externality, assuming that the entry rate of providers is larger, and that users are more commission-sensitive. It may also induce providers to have a greater business sense, and to strive for fuller quality management. See Appendix 1.

    https:www.airbnb.jp/simplifiedpricing-anzxzq0yu3b1mz7

(12) One of the challenges to the sharing economy is its relationship to "social performance" (e.g., income inequality, provider satisfaction, political influence, relations to regions). This paper does not discuss the issue.

    This paper's discussion can also be applied to flea market platform and e-commerce in which the ownership of goods is transferred from providers to users.

(13) Many of the empirical analyses have been based on case studies, and in econometric analyses, methodologies such as OLS and structural estimation are used. See for example Gerwe et al. (2022), Rezvani & Rojas (2022) and Rojanakit et al. (2022) for recent studies.

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Appendix 1 Level and Structure of Commission

Note: Both the axes are measured by rate(%) as well.
Source: Illustration by the author.