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YANO, Makoto
RIETI

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Market Quality Theory and the Coase Theorem in the Presence of Transaction Costs*

Makoto Yano**

Abstract

Digital data is a new economic resource not only the ownership of which but also basic transaction rules on which has not yet clearly been established. As the importance of digital data increases, the Coase Theorem has become important once again. The theorem implies that once ownership is established for such a resource, an efficient allocation will be established in the resulting market if transaction costs are ignorable. This paper shows that in the world filled with transaction costs, ownership and other rules on market competition affect transaction costs, which in turn influences the quality of a market to form subsequently. If improper rules are adopted, it is expected to have a long-lasing detrimental effect on resource allocation and terms of trade determination.

Keywords: transaction costs, market quality, efficiency and fairness.
JEL Classification: D23, L22, L25, M10.

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** yano-makoto@rieti.go.jp, RIETI

1. Introduction

The new information and communication technology has been transforming digital data into productive resources of which the ownership has not yet been clearly established. This has renewed the importance of the Coase theorem, which implies that many types of externalities are created by such new resources of which the ownership has not yet determined. Once ownership is established, externalities will be internalized through voluntary transactions. No matter how the ownership is assigned, an efficient allocation will be established in the resulting market if no transaction costs are present.

Although the Coase theorem has been highly influential, the assumption of no transaction costs is rarely satisfied in the real world. This has been pointed out by Coase himself, stating, "The world of zero transaction costs has often been described as a Coasian world. Nothing could be further from the truth" (Coase, 1988, C.6, S.5). In the existing literature, however, the question remains open as to how ownership, and other rules on market competition, should be set with respect to new resources if transaction costs are not ignorable. The present study addresses this issue.

The primary purpose of this study is to demonstrate that in the presence of transaction costs, the ownership of, and other basic rules on competition for, new resources influence the quality of the market to form subsequently. Market quality is a normative criterion that Yano (2001, 2009) introduces to evaluate the performance of a market.[1] It encompasses efficiency in the standard sense and what Yano (2009) calls competitive fairness. He defines competitive fairness as a measure for the degree in which transactions are carried out in observation the three rules that he regards as fundamental: The rules of (1) private ownership, (2) voluntary participation, and (3) non-discrimination. Although the idea of evaluating the performance of a market by means of efficiency and fairness is not common in the modern economic literature, it can bed observed in Smith (1776) and Marshall (1890).[2] The present study gives a formal representation for their ideas.

This study formulates market quality by highlighting the role of transaction costs to relate it to rules and laws on competition. While transaction costs are classified by means of their functions (Dahlman (1979)), in this study I classify transaction costs by their sources into two types: Technologically-fixed and human-controllable. In the absence of transaction costs, as Coase (1988) points out, a market is not necessary. A market becomes necessary in the presence of technologically-fixed transaction costs;

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[1] The idea has been picked up to analyze various issues on development (see Akiyama, Furukawa, and Yano (2011), Furukawa and Yano (2014), Dastidar (2017) and Dastidar and Yano (2017)).

[2] Smith (1776, Book I, Chapter X, Part II) discusses wage inequalities attributable to the policies of European countries. According to him, for example, "[t]he institution of long apprenticeship has no tendency to form young people to industry[,]" resulting in inefficient use of young labor force. At the same time, he explains, "when the regulation is, . . . , in favour of the workmen, it is always just and equitable; but it is sometimes otherwise when in favour of the masters[;]" Smith (1776) regards a law adopted by George III as an example of a law that is in favour of the masters. These ideas are followed by Marshall (1890), introducing the concept of a normal (or fair) price.

today, for example, a variety of markets for blockchain products are forming (see Metcalfe (2020), Dai (2020), and Pu (2020)), which is made possible by the massive reduction in information and communication costs. As is shown in this study, rules and laws may reduce human-controllable transaction costs and contribute to market quality.[3]

The first result of this study is to give a justification for adopting the non-discrimination rule as a reference point for competitive fairness. In general, fairness relating to competition can be defined as a state "conforming to an established commonly accepted code or rules of a game or other competitive activities" (Webster, 1961, fair, 7b (1)). Of the three fundamental rules that Yano (2009) highlights, the first two rules (private ownership and voluntary actions) clearly pass this criterion. In contrast, how widely the third rule is accepted in the market has never been studied in the existing literature, into which this study investigates.

While efficiency is concerned with a resource allocation, Yano's competitive fairness is introduced as a normative measure for pricing and trading process in a market. Although fairness in this sense has not been given any systematic treatment in the existing literature, its importance has been noticed. In his classical treatise, Marshall (1890) emphasizes the importance of fairness as a normative criterion for pricing. He wrote, "the traditions of the trade . . . [determine] the "fair" rate of profit on the turnover which an honest man is expected to charge for making goods to order, when no price has been agreed on beforehand; and it is the rate which a court of law will allow, in case a dispute should arise between buyer and seller;"[4] he related this "fair" rate of profit to his famous normal price and profit. Marshall, however, left unanswered what exactly he meant by "the traditions of the trade" and therefore by the normal price and profit.

The first part of the rule of non-discrimination (Rule 3.1) implies that third-party individuals and direct trading partners must be treated equally. This rule can be traced back to chapter 41 of Magna Carta, which has influenced the subsequent rules on commerce, as is evidence (Montesquieu (1748), Blackstone (1756), *Georgia v. Brailsford* (1794)).

The second part of the third fundamental rule of non-discrimination (Rule 3.2) implies that anyone can freely trade with anyone in any amount or, more broadly on any terms that are feasible under the existing transaction costs. This rule, which may be called the non-discrimination rule on terms of trade, reflects the fundamental nature of markets. The rule can be traced back to 19th century English court decisions (*Acebal v. Levy* (1834) and *Hoadly v. M'Laine* (1834)). In these decisions, the court explained a reasonable price as a price that was determined by third parties or, in other words, outside of a particular transaction in which a proper price was debated.

From the economic viewpoint, the decisions are notable in that they recognized the importance of third party offers in the determination of terms of trade. Although

[3] See Yano, Dai, Masuda and Kishimoto (2020, Ch. 7) for an analysis on blockchain related markets.
[4] See Section 3 for a more extensive quotation.

Acebal and *Hoadly* decisions have not fully been appreciated subsequently, in the latter half of the 20th century, similar ideas have been adopted and become common; examples are fair market value, transfer pricing, the entire fairness test on fiduciary duties of corporate executives (*Unocal v. Mesa Petroleum Co.,* (1985), *Revlon v. MacAndrews & Forbes Holdings* (1986), and *Cinerama, Inc. v. Technicolor*, (1995)), and the reasonable and non-discriminatory clause in contract between technology owners and a standard setting organization (*Microsoft Corp. v. Motorola* (2013)).

The second result of this study is mathematically to formulate competitive fairness and market quality and to develop measures for those criteria that are comparable to dead weight loss. For this purpose, I propose a new equilibrium concept, called a transaction cost equilibrium, by focusing on the rule of non-discrimination. Using this equilibrium, I capture competitive fairness/unfairness by the size of foregone arbitrage opportunities, which I call a competitive fairness loss. The competitive fairness loss and the standard dead weight loss, combined, may be thought of as a measure for market quality.

The third result of this study is to demonstrate that ill-designed rules on competition will raise transaction costs, which in turn reduce the quality of the market to form subsequently. Well-designed rules on competition, in contrast, will reduce transaction costs, which contributes to the formation of a high quality market. Either bad or good, the introduction of a new rule will have a long-lasting impact on market quality.

In order to relate rules and laws on competition to fairness and market quality, this study broadens the standard coverage of transaction costs, which is primarily concerned with the existing markets and the development of organizations that are formed to economize such transaction costs. In addition to the three types of transaction costs classified by Dahlman (1979) ("search and information costs," "bargaining and decision costs," and "policing and enforcement costs"), this study highlights "participation and concentration costs" and "awareness and compliance building costs," which I demonstrate are important in the process in which a new market forms.

Ill-designed ownership of a new resource may raise "participation and concentration costs," thereby negatively affecting market quality for a long time. This is clearly evidenced by the Japanese sunshine law, which holds that an existing house owner can claim a damage from a newly-built neighboring building that blocks sunshine (sunshine right). This law has created dual ownership of a housing lot by the owner of the property and the next neighbors owning sunshine through the lot (*Japanese Supreme Court*, (1972)). The law was formed in the 1970s, which coincides with the period in which a large number of workers were concentrated into urban areas and their demand for housing compound skyrocketed. Under those circumstances, the sunshine law gave strong local monopoly power to the "owners of sunshine" over a neighboring housing lots, which has led to the inefficient use and unfair pricing of unban housing lots.

Another case that demonstrates the problem of an ill-designed rule for new

resources relates to contract of adhesion or of take-it-or-leave-it type. In normal circumstances, such contracts are common; many industries adopt standard contracts, which are of that type. If, however, adopted by firms in a newly developing market, it may enlarge the firms' monopoly power (or raise "participation and concentration costs"). There have been many incidences of commodity bundling by which a monopolist offers a bundle of goods without allowing its customers to purchase individual units by breaking it up. Starting from indentured servitude of American colonial days, there have been many such incidences, which this study reviews and demonstrates that such a practice lowered market quality from the viewpoints of both efficiency and competitive fairness by giving stronger monopoly power to one side of transaction (*Paramount Famous-Lasky Corp v. United States* (1930), *De Haviland v. Warner Bros.* (1944), *United States v. Paramount Pictures*, (1948), and *Flood v. Kuhn,* (1972)).

While a badly designed rule may increase transaction costs, a well-designed rule may raise market quality by reducing "awareness and compliance building costs." Two such cases are presented in this study.

The first case is on the fiduciary duties of corporate executives. In the 1980s, the issue was investigated in several landmark cases by the Delaware court (*Unocal v. Mesa Petroleum* (1985) and *Revlon v. MacAndrews & Forbes* (1986)). Subsequently, these cases influenced corporate executives' actions, on which the entire fairness test on fiduciary duty was formulated (*Cinerama and Technicolor*, 1995). Another example is the fair, reasonable and non-discriminatory (FRAND) clause adopted in the contract between a standard setting organization and technology companies offering their patents to technology standards. This clause is in line with the standard adopted for blanket licensing (*Broadcast Music v. CBS* (1979)).

In relating rules and laws to transaction costs and the development of a market economy, this study is related to North (1992), who emphasizes the role of intellectual property laws in the first industrial revolution. There is a number of studies relating transaction costs to the development of organizations (see Coase (1937), Arrow (1970), (1992), and Williamson (1996)). This study is also related to Anderlini and Felli (2001,2006) and Müllera and Schmitz (2016) in treating the Coase theorem in the presence of transaction costs.

The analysis that I present in this study has an important implication with respect to the assignment of ownership for digital data. A few decades ago, there was no way to gather a large volume of data that can characterize daily life of people accurately, nor were there any computing technologies that can make use of the large volume of data. The ICT has changed this completely. Digital data is about to become important productive resources next to labor and capital; it is often said that the values of internet technology companies like Google, Amazon and Facebook reflect data accumulating in those companies.

Many observers are now concerned with the monopolization of digital data that

internet giants collect.[5] This concern has started influencing the antitrust law approach to predatory actions. Rejecting the "Chicago School approach to antitrust, which gained mainstream prominence and credibility in the 1970s and 1980s," Khan (2016) advocates to switch back to the economic structural approach through the 1960s, which "rests on the idea that concentrated market structures promote anticompetitive forms of conduct." I disagree.

This study argues that the current problem on data monopoly originates from the lack of proper rules on the ownership of, and other basic transaction of, digital data. Perhaps, now is the perfect timing to start investigating how ownership should be assigned with respect to digital data. This is because bland new blockchain technology is being developed that is capable of assigning ownership to all sorts of digital data. As Yano, Dai, Masuda, and Kishimoto (2020, Chs. 1 and 7) explain, this technology may fundamentally change the current state of data utilization, leading to more efficient resource allocation and fairer pricing of digital data. For this purpose, however, it is important to develop a proper legal protection for data ownership. Just like a lock, blockchain technology is a device to protect personal properties and, therefore, is of no use unless a set of good rules is established with respect to the protection of digital assets. In the case of digital data, the ownership of which has not yet clearly been established, it is important first to decide who owns data.

In Section 2, I will present a concept of market quality and introduce my source-based classification of transaction costs. In Section 3, the general rule of non-discrimination is related to Magna Carta and to 19th century English court decisions. In Section 4, I will mathematically formulate competitive fairness and market quality and develop a new measure for competitive fairness loss; the use of this measure is shown in Sections 4.5 and 6.2.5 by using simple models of market transactions. In Sections 5, I introduce two types of function-based transaction costs in order to examine real world cases in which rules and laws affect the formation a new market. In Sections 6 and 7, I demonstrate that the ownership of, and other basic rules on transaction for, new resources affect transaction costs, which in turn affects market quality. Section 8 is for concluding remarks.

2. Coase's Open Question and Market Quality

Since Coase (1960), a question has been left open as to how ownership, and other rules on competition, should be set in the case in which transaction costs matter. In order

[5] This worry is not imaginary but real, as is shown by the recent abuse of data collection by the Cambridge Analytica. The Combridge Analytica is said to have collected 230 million American's personal data through Facebook account and accused to using data to influence voters in favor of Donald Trump when he was a U.S. presidential candidate. The original method of data collection, which was developed by two psychologists, was to offer an Internet service for psychological test for anyone interested and, at the end of the test in exchange for permission to the respondent's Facebook profiles. According to Cadwalladr (2018), 40 percent of the respondents gave permission. By using this data, the psychologists were able to measure personality traits and to correlate scores against Facebook "likes" for millions of people. This method was adopted by the Cambridge Analytica, which obtained personal data and came up with a way to influence such important votes as the U.S. presidential primaries and Brexit.

to answer this open question, the present study focuses on the role of transaction costs, affecting the quality of a market to form once the ownership of resources and rules on transactions are set.

2.1. Source-based Classification of Transaction Costs

In the standard literature, as is noted in the Introduction, transaction costs are classified with respect to their functions (Dahlman, 1979). This study adopts a classification based on their sources, dividing transaction costs into technologically-fixed and human-controllable types. Technologically-fixed transaction costs are defined as those that can be economized only by a technological advance; human factors can affect these transaction costs only by inducing technological advances. Human-controllable transaction costs are defined as those that can be economized directly by human factors such as institutional arrangements, conventions, human relationships, customs, traditions, and deeper human factors like ethics, consciences, and habits. These human factors are, in general, influenced by rules and laws.

My source-based classification of transaction costs is important to study Coase's open question. As Coase (1988) points out, the absence of transaction costs eliminates the need for a market. He writes, "In an economy which assumes that transaction costs are nonexistent, markets have no function to perform, and it seems perfectly reasonable to develop the theory of exchange by an elaborate analysis of individuals exchanging nuts for apples on the edge of the forest or some similar fanciful example." He continues, "In the absence of transaction costs, it does not matter what law is, since people can always negotiate without cost to acquire, subdivide, and combine rights whenever this would increase the value of production." This argument of Coase (1988) leads to two important questions:

Question 1: Why does a market develop?
Question 2: How do rules and laws relate to transaction costs and market quality?

A key to answering Question 1 lies in the existence of technologically-fixed transaction costs. A new market develops when a new technology makes it possible to economize the existing technologically-fixed transaction costs. For example, there were many market towns during the medieval era where markets were held on certain days of week (see Dryer, 2016). Market towns economized travelling costs for shopping, as people were concentrated in cities and started producing and consuming a variety of goods. Today, a variety of markets for blockchain products are forming. This is made possible by the technological advance in computer and telecommunication technologies.

My answer to Question 2 is that rules and laws are to economize the human-controllable-transaction costs, which will contribute to market quality. In order to explain this point, it is desirable to start with explaining what market quality is.

2.2. Market Quality and Competitive Fairness

Market quality is a normative measure for market performance encompassing efficiency and fairness. While efficiency is concerned with the way in which economic resources are allocated to different individuals, fairness in market quality theory is concerned with pricing and trading process. As such a measure, Yano (2009) introduces what he calls competitive fairness.[6] The word "fair" has a number of meanings. Among them, Yano (2009) adopts the definition of "fair" in Webster (1961, fair, 7b (1)) that refers to a state "conforming to an established commonly accepted code or rules of a game or other competitive activities."

Yano (2009) argues that the following rules play a constitution-like role.

Rule 1 (private ownership): Goods traded in the market must be subject to transferable private ownership.

Rule 2 (voluntary actions): Transactions in the market must be voluntary.

Rule 3 (non-discrimination):
1. Third-party individuals and direct trading partners must be treated equally.
2. Anyone can freely trade with anyone in any amount or, more broadly, on any terms.

There is no doubt that Rules 1 and 2 are commonly accepted. The protection of private ownership (Rule 1) may be one of the most fundamental rules for a human society, which is evidenced by one of the Ten Commandments, "You shall not steal." The Coase theorem shows that it is a foundation not only for voluntary exchange but also for a market economy. No one would object to the fact that the protection of voluntary actions (Rule 2) has been well accepted as a basic rule supporting a civil society. Since Adam Smith (1776), economics has dealt with the economy in which this rule is observed.

The importance of Rule 3 (the rule of non-discrimination) in market competition is pointed out by Yano (2008, 2009). It has however not been examined whether or not the non-discrimination is "an established commonly accepted code" (Webster, 1961). In the next section, I will address this issue.

3. Non-discrimination Rule

A market cannot be formed without competition; competition cannot be conducted without a set of rules. Despite this, the first two of the three rules above (Rules 1 and 2) are primarily concerned with voluntary exchange, which can be conducted without competition. While bits and pieces of rules have been imposed on different markets, in the existing literature, little effort has been made to extract a rule that is essential for putting market competition together. As is shown below, Rule 3 is such a rule.

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[6] For further explanations, see Dastidar and Dei (2014) and Dastidar (2017).

Rule 3 (the rule of non-discrimination) has been formed gradually over a long course of history. The first part of the non-discrimination rule (Rule 3.1) originates from Magna Carta, which has influenced rules on economic activities. More recently, a more specific rule of non-discrimination was adopted in a couple of English court decisions in the early 19th century (*Acebal v. Levy* (1834) and *Hoadly v. M'Laine* (1834)). These decisions recognized that a reasonable price was determined outside conditions. Although this rule had little impact on economic and legal thoughts in the rest of the 19th century, a similar idea was picked up in the middle 20th century by the definition of fair market value and in the rules on transfer pricing. Nowadays, as is shown in Section 7, it is adopted in the definition of fiduciary duties of corporate executives (*Cinerama v. Technicolor*, 1995) and the reasonable and non-discriminatory (FRAND) terms in technology standard contract (*Microsoft v. Motorola*, 2013).

3.1. Magna Carta and Non-discrimination Rule

In England, the importance of treating foreign and domestic merchants equally has been recognized since *Magna Carta* (1215) or even earlier. It guarantees that foreign merchants freely travel in England and that their properties are protected even if they are from a country that is at war with England. More specifically, Chapter 41 states,

> "All merchants may enter or leave England unharmed and without fear, and may stay or travel within it, by land or water, for purposes of trade, free from all illegal exactions, in accordance with ancient and lawful customs. This, however, does not apply in time of war to merchants from a country that is at war with us. Any such merchants found in our country at the outbreak of war shall be detained without injury to their persons or property, until we or our chief justice have discovered how our own merchants are being treated in the country at war with us. If our own merchants are safe they shall be safe too."[7]

Montesquieu (1748, Book 10, Section 14, at 324) praised this section by stating: "It is an honor to the English nation that they made this one of the articles of their liberty." In response, Blackstone (1756, Book 1, p. 260) pointed out that the section originates from "a maxim among the Goths and Swedes, "*quam legem exteri nobis posuere illis ponemus*" (We will impose the same law on foreign merchants that they have imposed on us).[8]

This chapter of *Magna Carta* has had a long lasting influence even on the development of U.S. commercial laws. During the post-revolution period, the U.S. Supreme Court addressed whether or not British merchant's credit extended to a colonist in Georgia before the revolution should be repayable (*Georgia v. Brailsford*, 1794). In fear of draining its wealth, the State of Georgia argued that it had confiscated all debts during the Revolutionary War and was not obligated to repay; under international laws,

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[7] See British Library (2014); see https://www.bl.uk/magna-carta/articles /magna-carta-english-translation.
[8] For this translation, see Blackstone and Jones (1823, p.49).

the war-time confiscation of private assets was regarded as lawful. The Supreme Court found that debts were not confiscated but sequestrated by the State and that, under Chapter 41 of *Magna Carta*, debtors were obligated to pay back, for the British government did protect American colonists' assets in the U.K. during the war. As Huslesbosch (2016) explains, this decision contributed to enhance the willingness of those on the other side of the Atlantic Ocean (or competition) to trade with citizens of the new nation.

3.2. Influence of Magna Carta

Influence of the non-discriminatory clause of *Magna Carta* can be detected in modern commercial and international laws. For example, the World Trade Organization (WTO) explains the fundamental principles of the multilateral trading system under the following five titles: (1) Trade without discrimination; (2) Freer trade: gradually, through negotiation; (3) Predictability: through binding and transparency; (4) Promoting fair competition; (5) Encouraging development and economic reform.[9] Of these the most relevant to the present study is the section on trade without discrimination, which is concerned with the principle of treating other people equally (most favored nation treatment) and that of treating foreigners and locals equally (national treatment). Most favored nation treatment may be thought of as an extension of *Magna Carta*'s reciprocity. That is, what a country gives to a trading partner is extended to the rest of trading partners; and that is guaranteed by each of trading nations.

The WTO explains that the principle of national treatment not only applies to imported and locally-produced goods but also "should apply to foreign and domestic services, and to foreign and local trademarks, copyrights and patents." As this shows, the WTO's definition of national treatment is primarily concerned with what are traded in a market. In contrast, the definition of the Organization for Economic Co-operation and Development (OECD), like Magna Carta, covers market participants or, more specifically, "foreign-controlled enterprises."[10] The OECD explains that it "is the commitment by a country to treat enterprises operating on its territory, but controlled by the nationals of another country, no less favorably than domestic enterprises in like situations."

3.3. Non-Discrimination Rule on Terms of Trade

Since the early 19th century, a more specific rule of non-discrimination than Rule 3.1 has been developed, which generally holds that a reasonable and/or fair price for a particular commodity is determined by outside transactions, i.e., other transactions of similar commodities. Section 2 of Rule 3 (the rule of non-discrimination on terms of trade) summarizes this rule.

The importance of outside competition was recognized in English courts as early

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[9] See WTO at https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact2_e.htm
[10] See http://www.oecd.org/daf/inv/investment-policy/nationaltreatmentinstrument.htm

as the 1830s (*Acebal v. Levy* (1834) and *Hoadly v. M'Laine* (1834)).[11] Throughout the rest of the 19th century, however, this was not fully appreciated, as is evidenced by Marshall (1890) and the Sales of Goods Act of 1893. Since the middle of the 20 century, the role of outside competition has been gradually recognized in the legal literature whereas it has been treated only tangentially in economics (see, for example, the literature on free entry).

In what follows, I distinguish an action violating Rule 3.2 from competitive unfairness. That is, I refer to an action that violates one of the three fundamental rules (Rules 1, 2 and 3) as competitively unfair whereas to an action that violates Rule 3.2 as competitively unreasonable. Under this definition, an unreasonable action is unfair, but not *vice versa*.

3.3.1. Early Formation of the Reasonableness Concept

In *Acebal v. Levy* (1834), the plaintiff at the request of the defendant sold at the then usual and common shipping price for nuts at the port of Gijon, Spain, to be delivered by the plaintiff to the defendant at London. When the shipment arrived at London, the defendant was unsatisfied with the merchandize and refused to accept the delivery. The plaintiff suited the defendant for a breach of contract. In this case, the court explained, "A contract to furnish a cargo at a reasonable price, means such a price as the jury, upon the trial of the course, shall, under all the circumstances, decide to be reasonable. This price may, or may not, agree with the current price of the commodity at the port of shipment, at the precise time when such shipment is made. The current price of the day may be highly unreasonable from accidental circumstances, as on account of the commodity having been purposely kept back by the vendor himself, or with reference to the price at other port in the immediate vicinity, or from various other causes."

Although this opinion does not specify what exactly a reasonable price is, it spells out the factors that the jury might consider. The court explains that these factors lie outside of a particular transaction. Stating that the current price may be unreasonable "with reference to the price at other port in the immediate vicinity," the court clearly recognizes that a reasonable price is determined with reference to outside opportunities.

Subsequently, the importance of outside opportunities in the determination of a reasonable price was reinforced in *Hoadly v. M'Laine* (1834). In this case, the defendant (a local dignitary) ordered the plaintiff "to build a new, fashionable, and handsome landaulet." "The carriage was completed by the time agreed on; but in the course of its construction, a great number of alterations and additions were made from time to time at the request of the Defendant." Prompted by the defendant, the plaintiff sent a bill amounting to 480 pounds, which the defendant refused to pay. The specific agreement on price was made at the time of making the contract and, thus, assumed to be a reasonable price held by the court. "A great number of coach makers having proved that the landaulet was of such exquisite workmanship, and so highly ornamented, as to be cheap

[11] These decisions are reported in Bingham (1834).

at the price demanded, the jury gave a verdict for the plaintiff, with 200 [pounds] damages." Reversing the lower court ruling, which set aside this verdict, the Court of Common Pleas affirmed the verdict.

3.3.2. Subsequent Treatment

Acebal v. Levy (1834) and *Hoadly v. M'Laine* (1834) are highly important in that the fundamental economic nature of market competition was recognized in the legal context even before the marginal revolution (Jevons, 1862, Menger 1871, and Walras, 1874). At least until the middle to late 20th century, the idea was not picked up in the literature.

For example, in *Valpy v. Gibson* (1847), the court stated, "The omission of the particular mode or time of payment, or even of the price itself, does not necessarily invalidate a contract of sale. Goods may be sold, and frequently are sold, when it is the intention of the parties to bind themselves by a contract which does not specify the price or the mode of payment, leaving them to be settled by some future agreement, or to be determined by what is reasonable under the circumstances." This approach was followed by the *Sale of Goods Act*, 1893. Section 8 of the Act states, (1) "The price in a contract of sale may be fixed by the contract, or may be left to be fixed in a manner thereby agreed, or may be determined by the course of dealing between the parties" and (2) "When the price is not determined in accordance with the foregoing provisions, the buyer must pay a reasonable price. What is a reasonable price is a question of fact dependent on the circumstances of each particular case." A similar approach is taken even today; for example, the U.S. commercial code merely states that for a contract in which the price is not settled, "the price is a reasonable price at the time for delivery" (U.S. Commercial Code §2-305). In these cases, unlike *Hoadly v. M'Laine*, what reasonable price might be was not addressed.

Marshall (1890, Book VI.VIII, 17) discusses how the court would treat a contract without specifying a price. He states,

> "We see then that there is no general tendency of profits on the turnover to equality; but there may be, and as a matter of fact there is in each trade and in every branch of each trade, a more or less definite rate of profits on the turnover which is regarded as a "fair" or normal rate. Of course these rates are always changing in consequence of changes in the methods of trade; which are generally begun by individuals who desire to do a larger trade at a lower rate of profit on the turnover than has been customary, but at a larger rate of profit per annum on their capital. If however there happens to be no great change of this kind going on, the traditions of the trade that a certain rate of profit on the turnover should be charged for a particular class of work are of great practical service to those in the trade. Such traditions are the outcome of much experience tending to show that, if that rate is

> charged, a proper allowance will be made for all the costs (supplementary as well as prime) incurred for that particular purpose, and in addition the normal rate of profits per annum in that class of business will be afforded. If they charge a price which gives much less than this rate of profit on the turnover they can hardly prosper; and if they charge much more they are in danger of losing their custom, since others can afford to undersell them. This is the "fair" rate of profit on the turnover which an honest man is expected to charge for making goods to order, when no price has been agreed on beforehand; and it is the rate which a court of law will allow, in case a dispute should arise between buyer and seller."

Acebal v. Levy and *Hoadly v. M'Laine* adopted the doctrine that the reasonable (and, thus, fair) price of a commodity is determined by outside forces created by those who are not directly involved in the transaction of that commodity. In the 20th century legal literature, this doctrine has gradually become common. One early incident is on the definition of fair market value (FMV) in the context of accounting and taxation. According to the U.S. Supreme Court, "The fair market value is the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts" (*United States v. Cartwright*, 1973).

A related concept is the "arm's-length principle" of transfer pricing, which states that the amount charged by one related party to another for a given product must be the same as if the parties were not related. An arm's-length price for a transaction is therefore what the price of that transaction would be on the open market (see USTransferPricing.com).[12]

These concepts are concerned with the case in which goods and services are directly transferred from one agent to another without going through a market; for example, transfers of good between generations through inheritance and from a branch of a multinational corporation to another branch. Those goods and services are supposed to be evaluated as if they were traded in an open market.

4. Competitive Fairness and Market Quality: Mathematical Formulation

In economics, many criteria have been developed to evaluate efficiency. In contrast, no criterion has existed to evaluate fairness. In this section, I formulate the concept of competitive fairness in a mathematical form along the line developed in the previous sections and introduce what I call a competitive fairness loss. A competitive fairness loss together with a standard dead weight loss, a measure for efficiency, provides a measure for market quality.

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[12] http://www.ustransferpricing.com/arms_length_principle.html

A dead weight loss measures the efficiency gain that the economy could realize if an existing trade impediment were removed. Similarly, I design a competitive fairness loss to measure the fairness gain that the economy could realize if an existing transaction cost is reduced. Let C be a vector of transaction costs. With this notation, a competitive fairness loss measures a loss resulting from keeping the existing transaction costs, C, even though there is a way to change them to alternative transaction cost, C'. In order to capture this idea, let $\mathfrak{C}$ be the set of alternative transaction costs that are available for the economy for a given span of time and a given set of technologies.

I measure a competitive fairness loss by means of a foregone arbitrage opportunity. Competitive fairness loss differs from dead weight loss, which measures a foregone economic surplus. I define an arbitrage opportunity as a profit opportunity that could be realized by changing the existing transactions costs to alternative transaction costs. A competitive fairness loss is measure by the size of this profit opportunity that is lost due to the existing transaction costs.

The state in which the three fundamental rules prevail may be thought of as an ideal state of a market. For this reason, I regard a market in which those rules prevail suffers no human-controllable transaction cost to be totally competitively fair.

Another important difference is that a competitive fairness loss takes into account the cost of reducing the existing transaction costs. This is important for dealing with more realistic markets with transaction costs than the standard market models. A similar idea can be found in the Hand criterion, which defines negligence by evaluating the cost of an accident relative to that of avoiding the accident.

As is discussed in Section 2, I distinguish human-controllable transaction costs from technologically-fixed transaction costs. This distinction is related to the span of a period for which fairness is intended to be evaluated. For example, transaction costs affect the process through which an equilibrium is formed. The normal time necessary for a market to reach an equilibrium is determined by the existing technologically-fixed transaction costs. If an arbitrage opportunity appears to exist for a period longer than the normal time necessary for the market to reach an equilibrium, it is attributable to the existence of human-controllable transaction costs, which prevent the arbitrage opportunities from utilized. With these considerations, we denote as C_H a vector of human-controllable transaction costs and C_T that of technologically fixed transaction costs; i.e., $C = (C_H, C_T)$. Moreover, the set of alternative transaction cost vectors is decomposed as $\mathfrak{C} = (\mathfrak{C}_H, \mathfrak{C}_T)$.

4.1. Basic Framework

As is noted above, I define market quality Q as an index that aggregates efficiency E and fairness F. This relationship may be written as

$$Q = Q(E, F). \tag{4.1}$$

To order to specify efficiency and fairness, it is necessary to describe a state of a market, which I call a market state. Market state s is a description of market transactions in which all market participants, either actual or potential, engage (as is shown in the examples below, this could be a list of pairs of a price and an amount each of which describes a transaction between a seller and a buyer).

I assume that the set of feasible market states is constrained by the existing technologically-fixed transaction costs, denoted as $\mathcal{F} = \mathcal{F}(C_T)$. In economics, this set, $\mathcal{F}$, is called a feasible set. An order capturing efficiency is imposed on feasible set $\mathcal{F}$, and the set of efficient market states is the maximal subsets with regard to this order; Pareto efficiency and dead weight loss are standard orders. In short, the efficiency order on market state s is constrained by the existing technologically-fixed transaction costs, C_T, which may be denoted as

$$E = E(s, \mathcal{F}(C_T)). \tag{4.2}$$

The standard dead weight loss may be thought of as a specific form of function $E(s, \mathcal{F}(C_T))$.

In contrast, I view that the set of market states on which fairness (competitive fairness) is defined is constrained by the human-controllable transaction costs; I call this a set of permissible market states and denote it as $\mathcal{P} = \mathcal{P}(C_H, C_T)$. It is reasonable to assume that the permissible set is a subset of the feasible set; $\mathcal{P}(C_H, C_T) \subset \mathcal{F}(C_T)$. The fairness order on market state s is constrained by both the human-controlled and technologically-fixed transaction costs, C_H and C_T, which may be denoted as

$$F = F(s, \mathcal{P}(C_H, C_T)). \tag{4.3}$$

As a specific form of $F(s, \mathcal{P}(C_H, C_T))$, I will introduce what I call competitive fairness loss.

In a market, a particular state is formed through competition. I call this state a transaction cost equilibrium, which I define in the next section 4.2. A transaction cost equilibrium is determined with respect to the existing transaction costs and, thus, may be described as

$$s^* = s^*(C_H, C_T). \tag{4.4}$$

The transaction cost equilibrium, s^*, may be measured in terms of the efficiency and fairness criteria, (4.2) and (4.3), i.e., $E^* = E(s^*, \mathcal{F}(C_T))$ and $F^* = F(s^*, \mathcal{P}(C_H, C_T))$.

As is noted above, the difference between the human-controllable transaction costs, C_H, and the technologically-fixed transaction costs, C_T, is the way in which transaction costs can be influenced. I assume that the technologically-fixed transaction costs depend on the existing technology, T, which may be expressed as

$$C_T = C_T(T). \tag{4.5}$$

In contrast, the human-controllable transaction costs are influenced not only by the existing technology, T, but also by such factors as rules, laws, and codes. Call these factors a behavioral standard, and denote it as S. Then, the human-controllable transaction costs can be describes as,

$$C_H = C_H(S, T). \tag{4.6}$$

The channel through which human hands can influence technologically-fixed transaction costs is creating a new technology T, which takes a relatively long time and is influenced by random factors. In contrast, I assume that behavioral standard S can be influenced by human hands in a much shorter span of time. Assume that at each period, there is a set of behavioral standards $\mathfrak{S}$ that can be controlled by human hands. That is, $S \in \mathfrak{S}$. In contrast, technology T is fixed within that period.[13]

4.2. Arbitrage and Transaction Cost Equilibrium

I define a transaction cost equilibrium as a state in which there are no arbitrage opportunities. That is to say, I define an arbitrage as the exploitation of a profit opportunity that can be realized on the existing transactions by a trading activity that is permissible under the existing transaction costs. By an arbitrage opportunity, I mean room for a profit opportunity that could become available if the existing human-controllable transaction costs were reduced.

More precisely, I assume that an arbitrage, denoted as a, is to form, by exploiting the existing market state, s, an alternative market state that is permissible $a \in \mathcal{P}(C_H, C_T) \subset \mathcal{F}(C_T)$. I call a subset $\mathcal{A}(s, C_H, C_T) \subset \mathcal{P}(C_H, C_T)$ the set of arbitrages if $\mathcal{A}(s, C_H, C_T) \neq \mathcal{P}(C_H, C_T)$; this condition implies that an arbitrage is restrained by the existing market state, s. Denote as G a group of market participants. Denote as $U_i(s)$ the utility that participant $i \in G$ obtains in market state s. It may be said that an arbitrage opportunity exists on market state s for a group of market participants G if there is a feasible alternative market state on s, $a_G(s) \in \mathcal{A}(s, C)$, such that

$$\Gamma_i = U_i\big(a_G(s)\big) - U_i(s) \geq 0 \tag{4.7}$$

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[13] Studying the evolution of technologies, market quality and rules on competition, Yano (2009) shows that in the past, a rapid technological advance (like an industrial revolution) misaligned the existing rules and the new technologies. This lowered market quality, thereby creating a serious economic crisis. As new rules developed, the misalignment was adjusted, which put the economy back to a healthy growth path. This process may be captured by a dynamic system

$$(\mathfrak{S}_{t+1}, T_{t+1}) = (\mathfrak{S}(Q_t, C_t, S_t, \mathfrak{S}_t, T_t), T(Q_t, C_t, S_t, \mathfrak{S}_t, T_t))$$

with $S_t \in \mathfrak{S}_t$ as a control variable, where Q_t and C_t are determined as a function of S_t and T_t by (4.1) - (4.6).

for all market participant $i \in G$ with strict inequality holding for at least one i. Denote as $\mathcal{A}_G(s, C)$ the set of arbitrage opportunities on s for group G. By definition, a transaction cost equilibrium is a state in which no arbitrage opportunities are left unused. This means that if, given a market state, s, there is no group G such that (4.7) holds, the market state, s, is in equilibrium (transaction cost equilibrium).

4.3. Competitive Fairness Loss

Like a dead weight loss, a competitive fairness loss measures the foregone gain that could not be realized due to transaction costs (trade impediments). This foregone gain is captured by a potential arbitrage opportunity that is not permissible under the existing transaction costs, $C = (C_H, C_T)$, but would be permissible under an alternative transaction cost vector, $C' = (C'_H, C_T)$. A potential arbitrage opportunity could be used (or internalized) only if those transaction costs were changed from C_H to C'_H. A competitive fairness loss measures the part of the arbitrage opportunity that cannot be economically justified by the cost of reducing transaction costs.

In order to express this, take an equilibrium market state under transaction costs C, $s \in \mathcal{F}(C)$, and an arbitrage opportunity of group G on market state s under alternative transaction costs, C'. Denote it as $a \in \mathcal{A}_G(s, C') \subset \mathcal{F}(C')$. It is important to take it into account that it is costly to make a change in human-controllable transaction costs from C to C'. Denote this cost as $K = K(C, C')$. Then, whether or not transaction costs should be changed from C to C' depends on whether or not the change in transaction cost creates an arbitrage opportunity exceeding the cost of reducing the transaction costs, i.e., if there is $a_G(s) \in \mathcal{A}_G(s, C')$ such that $l(C, C') > 0$ where

$$l(s, C, C') = \sum_{i \in G}[U_i(a_G(s)) - U_i(s)] - K(C, C') \tag{4.8}$$

With these considerations, I say that a market state in the presence of transaction cost C, $s \in \mathcal{F}(C)$, is competitively fair if there is no alternative human-controllable transaction cost, C'_H, that presents a potential arbitrage opportunity the value of which exceeds the cost of changing transaction costs, i.e., there is no $a_G(s) \in \mathcal{A}_G(s, C')$, $C' = (C'_H, C_T)$, such that (4.8) holds. The degree of competitive unfairness of a market state, $s \in \mathcal{F}(C)$, may be measured by the difference between the benefit and the cost. That is,

$$L(s, C) = max_{a, C'}[\sum_{i \in G}[U_i(a) - U_i(s)] - K(C, C')],$$

$$subject\ to \quad a \in \mathcal{A}_G((s, C'),\ C' = (C'_H, C_T),\ and\ C'_H \in \mathfrak{C}_H \tag{4.9}$$

which I call a competitive fairness loss.

Recall that market quality Q is determined by efficiency and competitive fairness by (4.1). This implies that market quality can be measured by the sum (weighted sum) of a competitive fairness loss and a dead weight loss, which is a standard

measure for the efficiency of a market state.

The competitive fairness loss, (4.9), is concerned with the loss coming from the existing transaction costs, C. It is measured by the largest foregone loss from sticking to the existing transaction costs, C. That is, loss function $l(s, C, C')$ in (4.8) captures the benefit that the market participants would have acquired if the existing transaction costs, C, were changed to the alternative transaction costs, C'. As (4.9) shows, the competitive fairness loss, $L(\mathrm{s}, C)$, is the maximum of such a benefit, which captures the foregone loss in the case in which the existing transaction costs are kept. If the transaction costs C are changed to C', the arbitrage opportunities are presented to market participants and will be internalized through arbitrage activities.

The competitive fairness loss may be used for measuring the unfairness of an existing rule and/or a law, which I call a behavioral standard. For this purpose, think of a behavioral standard $S \in \mathfrak{S}$ that supports the existing human controllable transaction costs, $C_H = C_H(S)$. Then, an alternative human-controllable transaction cost, C_H', is achievable so long as there is an alternative standard $S' \in \mathfrak{S}$ such that $C_H' = C_H(S')$. In this case, the competitive fairness loss of standard S is given by $L = L(C_H, C_T)$ with

$$\mathfrak{C} = \{C' = (C_H', C_T):\ C_H' = C_H(S'), S' \in \mathfrak{S}\} \tag{4.10}$$

Loss function $l(C, C')$ may be adopted to capture the benefit from innovation. If the existing technologically-fixed transaction costs, C_T, change to C_T' by innovation, cost $K(C, C')$ may be interpreted as the associated cost of innovation. If $l = l(s, (C_H, C_T), (C_H, C_T')) > 0$, the arbitrage opportunity that the innovation creates is larger than the innovation cost, in which case the innovation may be beneficial from the fairness viewpoint.

4.4. Total Competitive Fairness

As is noted above, Rules 1, 2 and 3 may be thought of as a constitution-like rule. In order to capture this idea, I define a totally competitively fair state of a market as a transaction cost equilibrium that holds in the ideal state in which the three fundamental rules prevails completely. In that case, I may assume that the human-controllable transaction costs are reduced to zero, i.e., $C_H = 0$. In the real world, in general, it is difficult to eliminate all the human-controllable transaction costs. Although a totally competitively fair equilibrium depicts a fictitious and ideal state of a market, it provides an important bench mark for analysis.

It is desirable that the competitive fairness loss is zero in a totally competitively fair equilibrium, capturing an ideal state of a market. (As is shown below, this is in fact the case.) In order to demonstrate this, let $C = (C_H, C_T)$ be the existing transaction costs. Since $C_H = 0$ in a totally competitively fair equilibrium, it holds that $C = (0, C_T)$. Moreover, if $C_H = 0$, the human-controllable part cannot change, which implies $C' = C = (0, C_T)$. Thus, under the assumption of $K(C, C) = 0$ (i.e., that no

costs are incurred if transaction costs are not to be changed), (4.9) implies that $L(s, C) = 0$.

Theoretically, it is possible to measure the competitive fairness of an equilibrium market state s under the existing transaction costs $C = (C_H, C_T)$ by comparing it with the totally competitively fair equilibrium. Since a totally competitively fair equilibrium holds under transaction costs $C_0 = (0, C_T)$, the competitive fairness of an equilibrium s can be captured by $-l(s, (C_H, C_T), (0, C_T))$. Under this measure, as is shown above, the fairness of a totally competitively fair market state is set equal to zero.

4.5. Competitive Fairness Loss: Example 1

Because the above definition of competitive fairness loss is rather abstract, it may be desirable to see how the concept can be applied to a simple, and concrete, model. For that purpose, I use the example developed in Yano (2008). For the sake of explanation, think of a pair of a buyer B_1 and a seller S_1, who owns one unit of good X. The buyer's maximum willingness to pay for this good is w_1 whereas the seller's minimum compensation for giving up what he owns is c_1. If no other individuals can get involved in a transaction between them, the buyer and the seller trade the good if and only if $w_1 > c_1$. If the ownership of the good transfers from the seller to the buyer, a gain will be created as much as $w_1 - c_1 > 0$, which implies that a more efficient allocation of the good will be achieved. This does not matter whether or not the transfer is forced or voluntary.

In order to achieve an efficient allocation in a decentralized manner, the voluntary action rule (Rule 2) is indispensable. Under this no one is forced to accept a transaction from which he/she is to be harmed. In other words, every party in a transaction will receive a gain from trade. In my model, if p is the price, the buyer and the seller would not agree to trade the good unless the price p satisfies condition

$$c_1 < p < w_1 \ . \tag{4.11}$$

In this case, the buyer receives a positive surplus equal to $w_1 - p > 0$, and the seller $p - c_1 > 0$.

Condition (4.11) captures the condition in which an exchange is made between a buyer and a seller and the range of a price in that exchange. In this condition, no competitive force is at work. In order to explain the role of competitive forces, think of a second buyer B_2 and a second seller S_2, who owns one unit of good X. The buyer's maximum willingness to pay for this good is w_2 whereas the seller's minimum compensation to ask for giving it up is c_2. Assume $w_2 < c_2$.

In this case, buyer B_2 and seller S_2 have no incentive to trade between them. Despite this, as is shown below, they play an important role in leading a price at a competitive (or competitively reasonable) level.

Suppose that, in these circumstances, B_1 buys from S_1 at a price, p, below w_2, $c_1 < p < w_2$. Would this price be competitively fair for the seller?

The answer is: No. If this price is to be held, buyer B_2 must be barred from participation in the transaction. Under Rule 3.2, anyone can trade in any terms. If buyer B_2 would offer a price $q = w_2 - \varepsilon > p$, seller S_1 would prefer to trade with B_2. Thus, under Rule 3.2, the initial price, p, is not sustainable. For the same reason, it is not sustainable for S_1 to set a price, p, above c_2, $c_2 < p < w_1$. Thus, in summary, the range of a competitively reasonable price is given by

$$w_2 < p < c_2 \ . \tag{4.12}$$

A comparison between (411) and (4.12) shows that if the no-discrimination rule is observed, the range of an equilibrium price gets narrowed down if $w_2 > c_1$ and $c_2 < w_1$. If multiple agents participate in both sides of a market, there is the range of reasonable prices, i.e., prices that are to be formed in observation of the rule of non-discriminatory transactions; in the case of two-on-two transactions, the range of reasonable prices is given by (4.12). If a potential market participant is barred from participation in a transaction, a price might be set outside of the range of reasonable prices. Such a price is competitively unreasonable and, thus, competitively unfair.

In order to explain a competitive fairness loss, think of an entry barrier that excludes buyer B_2 and S_2 from participating in the market; call this entry barrier C. Think of a market state as a collection of standing offers; a standing offer is a vector of a quantity offer and a price offer; $(n, -p)$is a buy offer whereas $(-n, p)$ is a sell offer, given $n > 0$ and $p > 0$. Think of the following market state:

$$s = ((1, -p), (0,0), (-1, p), (0,0)), \tag{4.13}$$

which describes the following: The first vector represents buyer B_1's purchase of the good (1 unit) and payment for that (p); the third seller S_1's sale of the good (1 unit) and revenue (p); here I adopt the convention to denote an acquirement of goods (or money) by a positive number and the release by a negative number. The second and the forth vectors are those of buyer B_2 and seller S_2, who are excluded from the market. Let $w_2 < c_2 < p$. This market state, s, is an equilibrium since there is no one in the market who can conduct an arbitrage.

Now, think of the case in which the entry barrier is removed completely (C'), and take an alternative market state

$$a = ((1, -q), (0,0), (0,0), (-1, q)). \tag{4.14}$$

In order for market state a to be an arbitrage on s, it must be beneficial for each participant in arbitrage. In the present case, if $c_2 < q < p$, the alternative market state, a, presents an arbitrage opportunity for the group of buyer B_1 and seller S_2, since

$$U_{B_1}(a) - U_{B_1}(s) = w_1 - q - [w_1 - p] > 0; \quad (4.15)$$

$$U_{S_2}(a) - U_{S_2}(s) = q - c_2 - 0 > 0. \quad (4.16)$$

Since $w_2 < c_2 < q$, buyer B_2 is not willing to offer seller S_1 at a price higher than w_2. Thus, there is no arbitrage opportunity for the group of B_2 and seller S_1. Thus, the alternative market state, a, is a feasible arbitrage opportunity for the group of buyer B_1 and seller S_2, which may be written as $a = a_{\{B_2, S_1\}}(s)$. Since there is no other group that can create an arbitrage opportunity in the above setting, the competitive fairness loss is equal to

$$\begin{aligned} L &= U_{B_1}(a) - U_{B_1}(s) + U_{S_2}(a) - U_{S_2}(s) - K(C, C') \\ &= p - c_2 - K(C, C'). \end{aligned} \quad (4.17)$$

The existence of transaction costs C may be attributable to various factors. They may be created by market participants themselves. In that case, the cost of reducing transaction costs may be small, and the associated competitive fairness loss would be almost equal to $p - c_2$.

As is shown above, the transaction costs may be attributable to rules and technologies. In that case, the competitive fairness loss depends on the cost of controlling transaction costs. If the transaction cost preventing the entry of outside players, B_2 and S_2, is, say, of a technologically-fixed factor such as geographical conditions, and if the associated cost of changing the existing transaction costs is large, $L < 0$. In that case, the equilibrium characterized by condition (4.11) is competitively fair. In contrast, the same equilibrium is competitively unfair if the entry barrier is due to an institutional factor such as deficient antitrust laws tolerating anticompetitive activities, which can be fixed by a small cost, K.

5. Function-based Transaction Cost

In order to examine the formation of a new market from the viewpoint of transaction costs, the standard function-based classification of transaction costs is useful. While the standard literature focuses on the types of transaction costs that are relevant to the existing market (Dahlman (1979)), this study introduce two additional types of transaction costs that are important in the process in which a new market is formed. Together, they may be listed as follows:

(i) participation and concentration costs;
(ii) awareness and compliance building costs.
(iii) search and information costs;
(iv) bargaining and decision costs;
(v) policing and enforcement costs;

Of the above types, (iii), (iv) and (v) are discussed by Dahlman (1979). The first and the second are those introduced here.

"Participation and concentration costs" represent costs for people to gather in one place to trade and costs for building a network through which they can trade. As the process in which Amazon established itself as a popular marketplace shows, it takes a long costly process to organize a marketplace and to build its reputation as offering ample trading opportunities. It also includes the cost to build an equal footing place for transaction; the more concentrated market power is into a small number of agents, the higher those types of costs, hampering fair pricing. In many cases, it is difficult to ensure that all people who gather are on an equal footing, which is the most important factor to maintain a high quality market.

"Awareness and compliance building costs" represent costs for having economic agents understand the purpose and function of a rule imposed on a market, for raising their ability to distinguish good rules from bad rules for the market (as this study shows, rules could be either beneficial for or detrimental), and for raising their willingness to comply with good rules and their awareness on these facts.[14] While Dahlman (1979) points out that policing and enforcement are important, equally important is participants' willingness to comply with the rules, in particular in the process in which new markets are developed. There are various obstacles that hamper compliances. Compliance is a private activity, which few market participants would be willing to conduct unless it gives rise to economic gains. Because costs are associated with adopting compliance procedures, it is hard for market participants willingly to observe a rule on competition unless they understand the positive role played by a rule. To build such understanding, not only education but also learning by doing is important. The willingness to comply with a rule on a particular market may not be enhanced unless rules and laws are all aligned in many other markets. If only a few market participants are aware of the importance of a rule, their gains from compliance may be exceeded by compliance costs. In such circumstances, a Nash equilibrium may emerge in which no market participant complies with a rule even though everyone is aware of its importance. Unless all these types of obstacles are cleared, it may be difficult to enhance awareness and compliance. As is shown in Section 6, a properly designed rule may align the awareness of market participants, thereby reducing "awareness and compliance building cost."

6. Transaction-Cost Increasing Rules

In this section, I demonstrate that if ownership of, and other basic rules on transaction for, new resources are not properly set, in the world filled with transaction costs, it may raise transaction costs, which have a long-lasting negative impact on the quality of a market that will develop subsequently. Because, as is noted above, this study is motivated by the recent development of data monopolies, it focuses on the abuse of monopoly power.

[14] See Akiyama, Furukawa, and Yano (2011) and Furukawa and Yano (2014) study this issue in relation to the quality of the market for intellectual properties, Dei (2011) and Ngienthi (2013) for the application to labor markets and Yano and Komatsubara (2014) to stock markets.

6.1. "Sunshine Right" - the Creation of Dual Ownership and Local Monopolies

I will first examine the Japanese "sunshine law," which has held that an existing house owner can claim a damage from a new neighboring building that blocks sunshine (sunshine right). The sunshine right was initially recognized in the 1972 Japanese Supreme Court decision (see *Minshu* 26/5/1067). As is explained below, the sunshine law raised "participation and concentration costs" by preventing the formation of a uniform marketplace in which potential buyers and sellers of housing lots participate on an equal footing. Instead it turned existing housing owners into independent local monopolies over neighboring housing lots. By creating dual ownership of housing lots, the law also raised "bargaining and decision costs" because the owner of a housing lot and the sunshine right owners of neighboring lots normally have different incentives over the use of the lot; if a property is co-owned by multiple agents, and if the co-owners have different motivations on the use of property, it would be highly difficult to put the property on a market. The sunshine law was adopted at the timing at which the demand for housing lots was just about to grow and has grown constantly ever since. The increase of those transaction costs has lowered the quality of urban housing markets, contributing not only to the inefficient use of Japanese real estates but also to the creation of an unfair disadvantage on the large number of young people who moved to large cities under the post-war industrialization policy.

6.1.1. Sunshine Law

From the viewpoint of resource allocation, the Japanese real estate industry at the beginning of the 1970s, before the "sunshine law" was adopted by the Japanese Supreme Court, was in a very similar state to the current ICT industry; as is pointed out in Section 2, data collected through the Internet now is recognized as a new type of economic resources. The latter half of the 1960s and the first half of the 1970s was in the middle of the Japanese rapid growth period, during which the urban population expanded rapidly, in particular in Tokyo. This turned Tokyo into a really crowded city. Housing lots became scarce and got divided into smaller pieces. Apartment compounds started to be built. Under those circumstances, expanding a house size and building a new house would deprive neighboring houses of sunshine, which had turned sunshine into new scarce resources at that time.

It is under these circumstances that the "sunshine right" was adopted by the Japanese supreme court; the court states:

> "We believe that sunshine and ventilation are amenities that are necessary for a comfortable and healthy home life. Even if sunshine and fresh air are brought into one's home by crossing the space above another person's land, they can be a subject for legal protection. In cases where the perpetrator abuses his/her rights and obstructs sunshine and ventilation, it is appropriate to

allow the victim to make a claim for a damage based on tort." [15]

This deals with a classic case of externalities; a home owner may suffer if a house is built on a neighboring property. Put in the Coasian framework, the question before the court is: Which of the following two options should the court adopt? (Option 1) A home owner has a right freely to enjoy sunshine. (Option 2) A neighbor has a right freely to build a house on the property that he/she owns. The Coase Theorem implies that if no transaction costs are involved, an efficient allocation will be established no matter which of the options the court chooses. In the sunshine right case, transaction costs were, and are, not at all ignorable.

The sunshine law has created "dual ownership" of housing lots: the original owner of a housing lot and the next neighbors who claim the ownership of sunshine passing through the lot, which has enlarged "bargaining and decision costs." This is because many of the sunshine right owners have different motivations for the use of housing lots from the original owners; if, for example, the original owner of a lot would desire to sell the lot, there would be no reason why the owners of sunshine desire the same. The general unwillingness of sunshine right owners to give up their existing living environments has created many local monopolies of housing lots combined with sunshine rights. This has enlarged "participation and concentration costs," i.e., costs of creating a trading place in which everyone can participate on an equal footing. These factors made the trade of housing lots extremely difficult, thereby lowing the quality of real estate market as a whole.

6.1.2. Unfair Trade under the Sunshine Law

At the same time that the sunshine law developed, the building regulations were tightened. This altogether created a market that has been rather unfair to young people who moved to large cities under the post-war industrialization policy. Between 1956 and 1968, for example, the population of Tokyo grew from 8 million to 11 million. During this period, the government encouraged middle school graduates born in poor rural areas to move to large cities to take factory jobs in cities. At the end of every academic year, special trains by the name of "new recruits train" ran from country-side to Tokyo and other major cities. Year 1972, in which the sunshine law was adopted, was the time at which the first group of people who moved to urban areas were about to start having families.

In the 1970s, many city workers sought for their own homes in the Tokyo area, which created a huge housing demand. In order to satisfy this demand, given the limited sizes of Tokyo, it was crucial to build tall housing complexes rather than individual houses with low stories (see Iwata, Yamazaki, and Fukui, 1997). Under those circumstances, the "sunshine" decision has created a number of property owners who monopolistically own the right to limit the use of their neighboring housing properties. Market quality theory suggests that the creation of such monopolies contributes to both the inefficient

[15] Translated by the author; see *Minshu* 26/5/1067.

use of housing properties and their unfair pricing.

Iwata, Yamazaki and Fukui (1997) point out that the use of urban land was highly inefficient through the end of the 20th century. Back then, housing facilities were very poor, and many one or two story houses were packed even in the Tokyo area. As a result, the fraction of housing lots (with small houses) in the total area was much higher than other major cities in the world, [16] which implies that the public space such as park was smaller. There were not enough housing supplies in the middle of Tokyo, where work places were concentrated; as a result, many city workers had to commute long distance to work.

The "sunshine law" gave each small home owner the status of a strong local monopoly over space surrounding his/her lot. In order to build a housing complex, it is necessary to combine many small lots. A builder must purchase all the lots from their respective owners. The Japanese sunshine law has created very complicated ownership rights over neighboring lots. Every small house owner owns not only his/her own lot but also "sunshine rights" over neighboring lots. Call this a combined property. The value of a combined property (lot + sunshine rights), therefore, exceeds the value of the lot itself. This implies that, because of double counting, the total value of combined properties over the lot on which the builder is to build a housing complex exceeds the lot itself. This makes the transaction of housing lots highly difficult or, in other words, creates prohibitive transaction costs.

The creation of local monopolies gave rise to another type of transaction costs in the form of holdups. If the owner of one housing lot decides not to sell, it will create a serious holdup problem, raising the price of the lot for a housing complex. The stronger the local monopoly power, the higher the holdup price that the owner could charge. In the late 1980s, this resulted in the creation of a business, violently kicking out holding-up owners. This business is called "*jiage*." During that period, a bubble was created in the real estate market, and there were many small lot owners who refused to sell their houses. The generic meaning of *jiage* is a business that buys out a large lot of real estate for industrial and other use. In order to cope with this hold-up problem, many large construction companies employed gangsters to carry out *jiage*.

These transaction costs that have emerged with the "sunshine right" would not have arisen if the "sunshine right" had not been assigned to owners of existing small houses. If, instead, builders had been permitted to build new housing complexes, they would not have acquired monopoly power over land; an efficient use of land would have been achieved. As is well known, the Coase Theorem asks the society to choose a particular wealth distribution. If the "sunshine right" is established, new wealth is allocated to the existing land owners. If builders are permitted to build housing complex, the final beneficiaries would have been city workers many of whom moved out of poor country-side regions into large cities under the post-WWII economic policy of rapidly

[16] Iwata, Yamazaki and Fukui (1997) point out that it was 66 % in Tokyo, 51 % in London, 44 % in New York, and 42 % in Paris (Tokyo City Government, 1991).

industrializing Japan and, ten or twenty years later, having families in cities.

A common sense is that the holdups, and resulting *jiage*, in the Japanese real estate market are all highly "unfair." In the existing economic framework, however, there has not been any normative criterion to evaluate this sort of unfairness that may take place in a market. Market quality theory is designed to deal with this issue from the economic viewpoint. These problems have been eased by deregulations since some twenty years ago.

6.2. Contract of Adhesion and Monopolistic Bundling

Monopolistic bundling is another example showing that an improper rule has a long-lasting detrimental effect on market quality. It is typical contract of adhesion (contract of take-it-or-leave-it type), by which multiple units of a good are bundled together and sold (or bought) without allowing customers to break the bundle up. Bundling itself is a standard marketing device in a normal market. In a rapidly expanding market in which new goods and/or services are introduced, in general, "participation and concentration costs" are high; that is, it is difficult to keep participants on an equal footing by preventing the emergence of agents who have strong monopoly power. History shows that if bundling is permitted in such circumstances, it will permit monopolists to extract large gains from trade from their customers.

In this section, I will first show what is wrong with monopolistic bundling by examining old indentured servitude and, then, explain various real world cases. I will then demonstrate that for successful bundling, strong monopolistic power is necessary to exclude middlemen from the market. At the end, I will develop a model to evaluate the competitive fairness loss associated with bundling.

6.2.1. Evil of Monopolistic Bundling

In order to understand the evil of monopolistic bundling, it may be useful first to see a couple of old cases of bundling. In early days, contracts of adhesion were often treated as legally binding and/or given institutional protection, which is still the case for some incidents. The exploitation of contract of adhesion has a long history. The indentured servitude contract mainly during American pre-revolution days is one example. In those days, many poor European workers gained passage to American colonies by signing a contract by which a worker promised to repay the shipping company once he/she would arrive at the destination. Once workers arrived at the destination port, they entered into employments contracts with their respective employers. (Instead of signing, a worker who could not write marked a contract by indenting reduplicated copies.)

On the one hand, it may be assumed that indentured servitude provided poor Europeans with ample opportunities to travel to settle in the new world. At the same time, on the other hand, what those workers paid in exchange were extreme living environments. According the report by Mittelberger (1756), who travelled on a ship with those workers, the condition of travel was extremely poor and unhealthy; a number

of people, including children, died on ship. Once workers arrived at the destination port, they entered into employments contracts with their respective employers (usually plantation owners) that were strongly of the take-it-or-leave-it nature. Workers were not allowed to disembark the ship until they would find their respective employers (usually plantation owners), who travelled to the ship to purchase workers. Once a worker and an employer agreed on the length of service the worker provided to receive the money necessary to repay the shipping company, they signed an indentured service contract; the length of service was on average five years, although it was much longer for a child and a woman. Indentured servitude contracts were treated to legally binding; severe legal punishments were imposed on workers who escaped from employers.

The Japanese sumo wrestling is another example. It is founded on the stable system since the 19th century, in which the stable master (a retired established sumo wrestler) and a young sumo hopeful sign up a contract that is a similar exclusive contract to the old American major league baseball contract. Under this contract, sumo wrestlers are not permitted to move out of the stable (without the master's consent, which hardly comes by) that he/her joins at first. Just like the major league baseball contract, wrestlers only have a choice between continuing to wrestle or quit. Moreover, the sumo association (a federation of stable masters) has power to oust wrestlers who do not conform to the traditional rule that the association sets up.

Both indentured servitude contracts and the Japanese sumo system are based on transaction in bundle (bundling transaction). In the case of indentured servitude, workers are asked to sell years of their labor services in bundle at the arrival port on take-it-or-leave-it basis. In the case of sumo wrestling, young hopefuls are asked to sell their entire sumo careers on take-it-or-leave-it basis usually when they graduate from middle schools.

It would not be possible to have workers sign up such a contract of adhesion unless those who offer the contract has strong monopoly power. Such monopolistic power can be acquired often for new commodities, of which the potential use is not yet known to all potential market participants. Under such circumstances, it is infeasible for all potential market participants to gather at one place and to form a well-connected network, in which case one side of market participants may subdivide markets so as to hold the monopolistic status. This gives the strong monopoly power to those who start the business.

This is the first type of transaction cost that this study introduces in Section 2. Once a particular form of contract of adhesion becomes established, the transaction cost will be enlarged, which will be hard to be fixed. Monopolistic power is often augmented by legal and institutional arrangements; or, in other words, if such legal and institutional arrangements are weakened, a monopolistic bundling problem will become less severe, and market quality will rise.

In what follows, I will build a basic model by which a monopolistic bundling equilibrium can be supported in a game theoretic manner. It has been known that by

bundling, just like the first-degree of price discrimination, a monopolist can extract the entire surplus that would otherwise belong to its trading partner (Oi (1971)). Despite this, it has not been known if that state can be supported as an equilibrium in a game theoretic framework.

Think of the case in which a buyer of a commodity B is willing to pay $w(n)$ for n units of the commodity; that is, the marginal willingness to pay for the n-th unit is $w(n) - w(n-1) > 0$. Thus, the maximum possible price that the seller S can charge for selling n units of the commodity is $w(n)$. Suppose that the seller desires to be compensated by payment $c(n)$ for giving up n units of the commodity; let $c(n) - c(n-1) > 0$. If $w(3) - w(2) < c(3) - c(2)$, the seller has no incentive to sell more than two units. The seller's best pricing is to bundle two units and to sell the two pack without allowing a buyer to break it. For such a bundling practice, the best price is just below the buyer's willingness to pay,

$$p = w(2) - \varepsilon, \tag{6.1}$$

where $\varepsilon > 0$ is a very small positive number.

It has been known that this price, p, can be achieved by setting different prices for each unit, i.e., the first unit at $p(1) = w(1)$ and $p(2) = w(2) - w(1)$,which is called a first-degree price discrimination. Following this terminology, I call the bundling price equal to the buyer's willingness to pay a first-degree (monopolistic) bundling.

While the above pricing, (6.1), captures that of a monopolistic seller, monopolistic bundling can be conducted by a monopolistic buyer (monopsonist) as well. In that case, the monopolistic buyer sets the price just above the seller's minimum desire to be compensated, i.e.,

$$q = c(2) + \varepsilon. \tag{6.2}$$

Although I have presented monopolistic bundling in a simple case of bilateral monopoly, a monopolist with many price taking customers can conduct similar bundling.

6.2.2. Old Hollywood Blockbooking: Seller's Bundling

The most notorious bundling case occurred in relation to block booking conducted in the early 20th by the film industry. It was a standard business model by which a movie studio bundled up its movies and sold their screen rights by a bunch to movie theaters on the take-it-or-leave-it basis. Block booking and other Hollywood business practices constituted an unusual case that were brought before the U.S. Supreme Court twice, and, each time, the Court ruled it in violation of the antitrust law.

This practice was developed by the then leading movie producer Adolph Zukor, who started the movie studio that would later been developed into the Universal Studio.

He began by packaging his company's A movie of the year with a bunch of "B movies" when selling the screening rights to theaters. The studio had an exclusive contract with Mary Pickford, one of the day's superstars, and films starring Pickford were the centerpieces for packages containing many other B movies, which started block booking. There was strong opposition to block booking from the very beginning. Pickford herself was among the most vocal and only extended her contract with Paramount on condition that films in which she appeared not be used in block booking. Nor was she alone in this. Many independent filmmakers and theaters protested that they were being forced to show films of little or no value.[17]

The first time that the Supreme Court considered block booking was in the *Paramount Famous Lasky v. U.S.* (1930). The case was brought by the Federal Trade Commission against ten film production and distribution companies, including Famous Players-Lasky. Between them, the companies controlled 60% of motion picture exhibition in United States, and the case concerned the illegality of the standard contract all of them used in selling screening rights.

The standard contract was widely used by other producers and distributors besides the ten. All totaled, companies using it controlled 98% of the film market at the time. Territories within the film market had been carved up among the distributors, each distributing exhibition rights to movies in their geographical domains.

Each spring, distributors decided the films to be produced during the year and published distribution plans for the next twelve months. To secure exhibition rights, exhibition companies (movie theaters) were required to sign block booking contracts promising to show films according to the annual plans of the distributors. No annual plan from any single distributor was enough to fill a theater's entire schedule for the year, so exhibitors had to purchase films from a number of different distributors.

In *Paramount Famous Lasky*, the Supreme Court concluded that the contracting and arbitration methods made possible the exercise of the distributors' monopoly power and therefore constituted violations of the antitrust law. The ruling says, "The record discloses that ten competitors in interstate commerce, controlling 60 per cent. of the entire film business, have agreed to restrict their liberty of action by refusing to contract for display of pictures except upon a standard form, which provides for compulsory joint action by them in respect of dealings with one who fails to observe such a contract with any distributor, all with the manifest purpose to coerce the exhibitor and limit the freedom of trade."

The film companies' side argued (1) the common contract was just a normal contract established through six years of discussion and experimentation, and (2) the lack of significant complaints from exhibitors demonstrated that the agreement was reasonable. The Court rejected this argument, finding, "The fact that the standard exhibition contract

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[17] See J. A. Aberdeen "The Root of All Evil in the Motion Picture Industry," Society of Independent Motion Picture Producers.https://www.cobbles.com/simpp_archive/blockbook_intro.htm (accessed June 2, 2019).

and rules of arbitration were evolved after six years of discussion and experimentation does not show that they were either normal or reasonable regulations. The arrangement existing between the parties cannot be classed among "those normal and usual agreements in aid of trade and commerce."

Paramount Famous Lasky did not have any real impact; right before the ruling, in October 1929, America entered the Great Depression. The Depression severely damage the film industry, and when the Roosevelt administration took power in 1932, it passed a National Industrial Recovery Act as part of efforts to deal with the Great Depression, under which the government and the film industry settled. In exchange for allowing labor unions to actively organize in the film industry, the government nullified the *Paramount Famous Lasky* decision and allowed block booking to continue.

With *Paramount Famous Lasky* nullified and a green light from the government to continue on with business as usual, Hollywood developed into a monopoly run with the tacit cooperation of several powerful companies that vertically integrated production, distribution and exhibition. In 1935, the Supreme Court found the National Industrial Recovery Act unconstitutional, but the tacit monopoly continued.

The government finally struck back in 1938 with a Justice Department suit alleging violations of the antitrust law by six leading Hollywood film companies, the famous *U.S. v. Paramount Pictures* Case (1948). The case took issue not only with block booking but with a wide range of Hollywood business practices. When the Supreme Court issued its "Paramount" verdict in 1948, it found illegality in basically everything.

Of particular note is the finding that the block booking system impeded producers from competing on the merits of their films. Films are protected by copyright and film companies are allowed exclusive ownership. However, the practice of selling one film as a package with another was found to be illegal under the antitrust law as an expansion of monopoly power. The Court wrote, "The sole interest of the United States and the primary object in conferring the monopoly lie in the general benefits derived by the public from the labors of authors. It is said that reward to the author or artist serves to induce release to the public of the products of his creative genius. But the reward does not serve its public purpose if it is not related to the quality of the copyright. Where a greatly desired, high quality film is licensed only if an inferior one is taken, the latter borrows quality from the former and strengthens its monopoly by drawing on the other. The practice tends to equalize rather than differentiate the reward for the individual copyrights," and is therefore undesirable.

One of the companies in the suit, Columbia Pictures, argued strongly that a healthy film industry would be impossible without block booking. The Court ruled that the "policy of the antitrust laws is not qualified or conditioned by the convenience of those whose conduct is regulated. Nor can a vested interest, in a practice which contravenes the policy of the antitrust laws, receive judicial sanction."

6.2.3. Various Labor Contracts: Buyer's Bundling

There have been many monopolistic bundling cases on labor contracts. Two notable examples are: The major league baseball's standard contract that can date back to the latter half of the 19th century and existed until the 1970s and the personal services contract for actors and actresses that was abolished in the 1950s.

Major League Baseball's Standard Contract and Curt Flood Act

Old days, all professional baseball players were required to sign up the common contract that included a "reserve clause." Under this clause, a player was prohibited from moving to another team unless the first team consented. Teams were able to trade the players they owned to other teams and to discharge players regardless of the player's own desires. This contract continued to be effective even after the player retired. In other words, baseball team owners were able to bundle up a player's life-time service as a baseball player.

This common contract system started in the 1800s. Although players started question the validity of this contract as early as the 1920s (*Federal Baseball Club v. National League*, 1922), in which the U.S. Supreme Court gave immunity from antitrust laws by treating baseball as state affairs. Since then, the Supreme Court considered the issue several occasions (*Toolson v. New York Yankees*, 1953, and *Flood v. Kuhn*, 1972), it never reversed the 1922 decision. In 1998, the Curt Flood Act amended the Clayton Act to "declare that the antitrust laws apply to the conduct, acts, practices, or agreements (conduct) of persons in the business of organized professional major league based relating to or affecting employment of major league baseball players." In this course, the free agent system was adopted in the 1970s.

De Haviland Law

In 1937, the State of California enacted a new law that prevents a court from enforcing performance of personal services over seven years (Section 2855 of the California Labor Code). This section was originally enacted in 1872, during the Civil War, which mandated a maximum period of service of two years. California amended this section in 1931 to extend the period from two to seven years. That law was abolished in 1937 and the new Labor Code Section 2855 was enacted.

As is discussed in Section 5.2.2, the film companies of the time had extremely strong monopolistic positions. They interpreted the "seven year clause" of the 1937 Labor Code as net seven years, meaning the total of length of time during which performers actually worked. De Havilland was a movie star who was active in the Hollywood of the 1930s and 1940s. As she became popular, she refused several roles and, as a result, was suspended for about six months. At the conclusion of the seven-year contract period, Warner Bros. sought to have de Havilland make up the six-month suspension on the interpretation that Labor Code 2855 prohibited binding employees from actual labor in excess of seven years. De Havilland objected to this and brought suit (see Rosenberg, 2015). In 1944, the California Court of Appeals upheld de

Havilland's claim by interpreting the seven year clause to mean seven calendar years. This decision, reversing the common practice in the moving industry at that time, has been regarded so important that it has been called the De Havilland law.

Recording Artist's Contract

The recording industry was adamantly opposed to the de Havilland Law and in 1985 sought to extend the maximum contract period under Labor Code 2855 to 10 years. The proposed amendment did not pass the Legislature, but the next amendment submitted in 1987 was passed, allowing the signing of contracts binding musicians for more than seven years. The recording industry explained its reasons for seeking the amendment as follows: The recording industry invests in the future work of the artist according to the number of albums promised at the time the contract is signed. It is therefore unfair to the recording company if the law allows an artist to sign a contract for seven albums in seven years and then not fulfill that contract. In addition, the recording company only begins to make a profit on the fourth album, and then only if the artist is successful. Therefore, the recording company incurs material damage if the artist fails to produce the remaining three albums.

The California Legislature accepted this argument and attached 2855b to Labor Code 2855 with the following (Section 2855b(3)): "If a party to a contract described in paragraph (1) is, or could contractually be, required to render personal service in the production of a specified quantity of the phonorecords and fails to render all of the required service prior to the date specified in the notice provided in paragraph (1), the party damaged by the failure shall have the right to recover damages for each phonorecord . . ."[18]

Since then, this law was challenged by a number of occasions. However, the issue is not yet settled, although a strong opinion exists in favor of its repeal (see Rosenberg, 2015).

6.2.4. Bundling and Monopolistic Power

A necessary condition for bundling is that an agent who conducts bundling has monopoly power strong enough to prevent a middleman from entering the market. A bundling equilibrium, therefore, violates the rule of non-discrimination on terms of trade (Rule 3.2) and, thus, competitively unreasonable as well as competitively unfair.

For the sake of explanation, suppose that a middleman M can be involved in the market with one seller and two buyers by extending the model in Section 5.2.1. The above equilibrium, in which the monopolistic seller sells one two-pack to each of the buyers at price $p = w_i(2)$ for the ith buyer, is unreasonable in the sense of this study or does not satisfy the rule of non-discriminatory transactions (Rule 3.2). For the sake of simplicity, assume that both buyers have the same willingness to pay, $w_i(n) = w(n)$ for

[18] See https://codes.findlaw.com/ca/labor-code/lab-sect-2855.html

all i and that the seller owns only four units. Think of the state in which the seller can sell one two-pack to each of the two buyer at

$$p = w(2). \tag{6.3}$$

Suppose that the middleman buys one two-pack, divides it into two separate units, and sells each unit to each of the buyers. It is optimal for the middleman to set the same price for two units; if he/she can sell two units at different prices, he/she can sell them at the higher price, since the buyers are identical. Let q be the price the middleman set for one unit. Since $p = w(2)$, middleman M can profit if $2q - p \geq 0$. Each buyer is now presented two options: To buy one two-pack from the seller and to buy one unit from the middleman. If a buyer buys from the seller, his/her surplus is $w(2) - p = 0$; if he/she buys from the middleman, the surplus is $w(1) - q$. Thus, so long as $q < w(1)$, the middleman can sell two units. In summary, the middleman can profit by choosing q satisfying

$$w(2)/2 < q < w(1). \tag{6.4}$$

The seller can avoid this activity of the middleman by setting a sufficiently low price. As is shown above, the reselling is profitable if the middleman can choose its price, q, in such a way that

$$2q \geq p \text{ and } w(1) - q > w(2) - p \tag{6.5}$$

is satisfied. In order for the seller to sell both of the two two packs, he/she needs to choose the price, p, such that no q exists satisfying (6.5). The highest of such prices is

$$p = 2(w(2) - w(1)) \ . \tag{6.6}$$

This state may be called a competitive non-bundling equilibrium because the unit price $p/2$ is equal to the marginal willingness to pay for the second unit, $w(2) - w(1)$ and because the total supply (4 units) is equated to the total demand.

This state, in which the monopolistic seller two two-packs at the price p satisfying (6.6) is reasonable under Rule 3.2. In order to see if it can be supported as an equilibrium, it is necessary to check if the seller chooses the best option. The seller can choose to sell only two units. In that case, the seller can choose the unit price equal to

$$p = w(1). \tag{6.7}$$

In this case, the revenue is $2w(1)$. The seller will choose to sell two units only if this revenue, $2w(1)$, is larger than that by selling two two-packs at $2(w(2) - w(1))$, i.e., if

$$w(1)/2 > w(2) - w(1) \ . \tag{5.8}$$

6.2.5. Competitive Fairness Loss: Example 2

In order to derive the competitive fairness loss in that model, a somewhat more elaborate model setting is necessary than for the model of Section 4. Denote as C the existing transaction costs by which middlemen are prevented from entering the market.

In the above model, a market state may described by a collection of what may be standing offers. I define a standing offer of an agent as what the agent presents to the market, which I describe by the pair of an amount that an agent desires to trade and its price, $(n, p; A)$, with an agent A making the offer. Two offers are said to be balanced if they add up to zero; that is, $(n, p; A)$ and $(n', p'; A')$ are balanced if $(n, p) + (n', p') = 0$.

An agent can make multiple standing offers. In the above model, given that middlemen do not participate, the set of seller S's standing sell offers can be described by

$$O_S = \{(-2, w(2); S(1)), (-2, w(2); S(2))\}, \tag{6.9}$$

where $S(n)$ stands for seller S's nth offer. In contrast, the set of standing buy offers of buyer $i = 1,2$ is a singleton

$$O_{B_i} = \{(2, -w(2); B_i(1))\}, \tag{6.10}$$

whereas that of middleman, M, is

$$O_M = \emptyset, \tag{6.11}$$

for he/she cannot participate in the market under C. With this preparation, a market state is described by the sell and buy offers of all market participants,

$$s = O_{B_1} \cup O_{B_2} \cup O_S. \tag{6.12}$$

The feasibility of a market state, s, is defined by the short-side rule; that is, all the matching pairs of sell and buy offers are executed out whereas those left unmatched are just standing and not executed. A market state is said to be balanced if every sell offer is matched with a buy offer and if every buy offer is matched with a sell offer. Since each of the two sell offers in (6.9) matches with the buy offer of a buyer, market state s is feasible under transaction costs C.

Suppose now that of the transaction costs C, which have prevented middlemen from entering the market are removed. Denote as C' the remaining transaction costs. An arbitrage on market state s may be described by an alternative market state that contains an offer matching with an offer in the first market s; this implies that an arbitrage is conducted on the first market state. In the above setting, the arbitrage in the case in

which the transaction cost preventing middlemen from entering the market, C, is removed can be described by

$$a(s) = O'_{B_1} \cup O'_{B_2} \cup O'_S \cup O'_M \tag{6.13}$$

where O'_S, O'_{B_i} and O'_M are defined as follows.

$$O'_S = \{(-2, w(2); S(1))\}, \tag{6.14}$$

$$O'_{B_i} = \{(1, -q; B_i(1))\}, \tag{6.15}$$

$$O'_M = \{\big(-1, q; M(1)\big), \big(-1, q; M(2)\big), (2, -w(2); M(3))\}. \tag{6.16}$$

If the rule of non-discrimination is at work, neither the agent, A, nor the order, j, do not matter in actual transaction. However, this is necessary to denote a market state as a collection of many offers, some of which are identical.

An arbitrage is feasible if it is a feasible market state and if the offers of each middleman is feasible, i.e., if $\big(n, q; M(1)\big)$, $\big(n', q'; M(2)\big)$, and$(n'', q''; M(3))$ satisify $n + n' + n'' \geq 0$ and $q + q' + q'' \geq 0$. Finally, in the present setting, an arbitrage opportunity exists for the two buyers and the middleman if, by $w(2) = p$ from (6.3),

$$U_{B_i}(a) - U_{B_i}(s) = w(1) - q - [w(2) - p] = w(1) - q > 0; \tag{6.17}$$

$$U_M(a) - U_M(s) = 2q - p > 0. \tag{6.18}$$

Because there is no other arbitrage opportunities, the competitive fairness loss is

$$L = 2w(1) - p - K(C, C'). \tag{6.19}$$

By (6.3), $2w(1) - p > w(2) - p = 0$ under the assumption of decreasing marginal willingness to pay. Thus, the first term on the right-hand side of (6.19) is positive.

As (6.19) shows, whether or not the competitive fairness loss is positive depends on the cost of controlling transaction costs. Historically, bundling has been permitted in many markets. In the present context, this may be justified by the prohibitive controlling costs. A typical example is bags of candies sold in supermarkets; it would be unmanageable to sell all pieces of candies separately in a supermarket. In the cases of monopolistic bundling discussed in this section, in contrast, courts have found bundling practices to be illegal except for the cases of recording artists and Japanese sumo. My analysis shows that whether or not these cases can be thought of as fair depends on the relative size of the existing arbitrage opportunities and the cost of controlling the existing transaction costs.

5.2.6. Summary

There are three types of equilibria in the monopolistic bundling model above.

Equilibrium 1. The first is the first-degree bundling equilibrium in which the seller bars middlemen from the market. In that equilibrium, the monopolistic seller sells all of his goods and acquires all the gains from trade. The allocation is efficient.

Equilibrium 2. The second is the competitive non-bundling equilibrium in which the seller sets a unit price equal to the marginal willingness to pay of the buyers. This equilibrium holds if condition (5.8) is not satisfied and is efficient and competitively fair.

Equilibrium 3. The third is the monopolistic non-bundling equilibrium in which the seller sets the unit price equal to the buyer's willingness to pay for the first unit. This equilibrium holds if condition (5.8) is satisfied and is inefficient but competitively fair.

These results show that efficiency and competitive fairness are different normative criteria on market. Just ensuring efficiency could lead to an equilibrium that is competitively unfair (equilibrium 1). In contrast, just ensuring competitive fairness could lead to an equilibrium that is inefficient (equilibrium 3). This shows that monopolistic bundling (equilibrium 1) is not only competitively unfair but also competitive unreasonable in the sense that it cannot be conducted unless a monopolist can bar middlemen from the market.

7. Transaction-Cost Reducing Rules

A well-designed rule on competition would reduce transaction costs, thereby raising market quality. In this section, I will show two such cases in which a well-designed rule on competition for new resources enhanced the level of compliance (or reduced "awareness and compliance building costs"). For this purpose, I examine the development of the entire fairness test on the fiduciary duty of corporate executives and the FRAND clause in the standard setting organization. These cases show that the development of a well-designed rule leads to the development of private procedures on the side of market participants, i.e., enhances the compliance level.

7.1. Development of the Entire Fairness Test

As is shown above, it was recognized in a 19th century court that a reasonable price is determined outside of those who are directly involved in a transaction (*Acebal v. Levy*, 1831, and *Hoadly v. M'Laine*, 1831). In the Delaware Court of Chancery, Chancellor William Allen (1948-2019) adopted a similar view that was more in line with modern economics. Dealing with a case (*Cinerama, Inc. v. Technicolor* (1995)) in which a stock holder (Cinerama) sued a CEO who sold his company (Technicolor), Allen introduced what is now called the entire fairness test. Under the test, among others, corporate executives are asked to put the best effort to shop around. In the terminology of the model in Section 4.2, the stock holders of the company will receive a price p at least as high as the second best offer that exists in the market (or the second highest

willingness to pay), which is $w_2(\leq p)$ in our model. Allen's finding is that not the highest price that the actual buyer can afford to pay (w_1) but the price found through shopping (w_2) is reasonable for stock holders. Corporate executives are obligated to put the best effort for the benefit of stockholders. Subsequently, the criteria that Allen developed has been regarded an important test for determining if corporate executives fulfil their fiduciary duties to stockholders.

In *Cinerama v. Technicolor* (1995), it was found that the Technicolor CEO had shopped around offers extensively in consultation with reputable investment bankers and lawyers before actually selling the company. This shows that even before the entire fairness test was introduced, the Technicolor CEO had voluntarily complied with what was subsequently regarded as constituting corporate executives' fiduciary duties. This shows that proper rules on market may develop through business activities and is reinforced by the legal process, which contributes to market quality.

The *Cinerama v. Technicolor* (1995) decision follows the Delaware Court's decision on the *Revlon, Inc. v. MacAndrews & Forbes Holdings, Inc* (1986). In this case, the executives of Revlon fought against a hostile takeover and, in the end, accepted a friendly but much lower bid from a white knight. This was found to be a violation of the fiduciary duty of the directors of a company to stock holders. In this finding, the Court pointed out that in the case of selling a company, "[the role of the board of directors transforms] from defenders of the corporate bastion to auctioneers charged with getting the best price for the stockholders at a sale of the company" and is "to sell [the company] to the highest bidder." This criterion has subsequently been referred to as the Revlon rule.

In the *Cinerama v. Technicolor* case, the Technicolor executives' actions were in line with the Revlon rule; in this respect, the economic contribution of the *Cinerama v. Technicolor* decision may be regarded as an economically sound interpretation for what the *Revlon* decision referred to as the highest price.

This shows that the Revlon rule has enhanced compliance levels of corporate executives (or reduced "awareness and compliance building costs"). This has contributed to raise the quality of the market for corporate mergers and acquisitions, the importance of which has been renewed since the 1980s.[19] As this history shows, the establishment of a proper rule on market competition (the Revlon rule, for example) tends to enhance compliances by market participants, which may subsequently improve rules themselves (for example, the entire fairness test, which has defined a broader fiduciary duty of corporate executives). This process is important for healthy market quality dynamics modelled by (3.2).

7.2. Reasonable and Non-discriminatory (FRAND) Contract

[19] This is evidenced by the fact that the conventional business judgement rule (putting the burden of proof on stockholders rather than corporate directors in a dispute between them) was revised during that period (see the *Unocal v. Mesa Petroleum Co*. (1985) as well as the *Revlon v. MacAndrews* (1986) and the *Cinerama v. Technicolor* (1995).

Reasonable and non-discriminatory (FRAND) terms refer to an agreement between an organization putting together technical standards and the owner of technologies in a technical standard that the owner treats users of its technologies in a FRAND manner in licensing its technologies. Sometimes, they are referred to as fair, reasonable, and non-discriminatory (FRAND) terms.

A technical standard combines many patented and unpatented technologies into a common standard that many different manufactures may adopt to ensure their products to be interconnected with other makers' devices. It is usually a formal protocol stipulating uniform engineering or technical criteria, methods, processes, and practices. While it can be adopted by an individual technology manufacture, more and more technical standards are agreed on by a group of manufacturers. It differs from de fact standards, which are naturally developed over time.

Recently, many technical standards are adopted by standard setting organizations (SSOs), which are voluntary membership organizations whose participants engage in the development of industry standards. Such a standard embodies many patented technologies as well as non-patented technologies. Some of those technologies are essential for the function of a standard whereas others are not. Some standard involves thousands of essential patents, which are often called standard essential patents (SEPs).[20]

As is explained in *Microsoft v. Motorola* (2013, Order 10), "SSOs play a significant role in the technology market by allowing companies to agree on common technological standards so that all compliant products will work together." "Standards lower costs by increasing products manufacturing volume, and they increase price competition by eliminating switching costs for consumers who want to switch from products manufactured by one firm to those manufactured by another." "SSOs seek to promote widespread adoption of their standards because the interoperability benefits of standards depend on broad implementation." "They also seek to develop standards that incorporates technology that will make the standard attractive to implementers, while at the same time ensuring a feasible price to those same implementers to promote broad implementation." Industry participants in the standard-setting process enjoy significant potential benefit to having their technology incorporated into a standard independent of potential royalty income from licensing patents they own."

A technical standard often combines hundreds of patented and non-patented technologies and provides a basis for new standards. For example, MP4 is a well-known standard for a digital file format for motion pictures; xxxx.MP4 file is created when a motion picture is taken by a digital camera adopting this standard. Another example is a standard for compressing video signals, called the International Telecommunication Union (ITU) H.264; ITU is a standard setting organization. This standard combines 2500

[20] One of the technology standards examined in the *Microsoft v. Motorola* case involves more than 2400 essential patents (see Order 13).

patents.[21] These two standards belong to a broader class of standards, called MPEG-4.

In putting a standard together, the SSO evaluates the importance of, and selects, various technologies to form the standard it is aiming at. A firm that is to manufacture a product compatible with a standard pays royalty fees to the holders of standard essential patents (SEPs). Once a standard is widely accepted by the market, more consumers demand products compatible with the standard, which enhances the bargaining power of an SEP holder in fee negotiation. In order to limit this bargaining power, the holders of SEPs for a standard is required to agree FRAND terms.

7.2.1. Competitively Reasonable Pricing in Microsoft v. Motorola

As is shown below, the recent U.S. court decision on *Microsoft v. Motorola* (2103) is in line with Rule 3.2 (rule of non-discrimination on terms of trade). As is explained above, a technical standard combines many different patents. If a standard for a particular type of devices (say, MPEG4 for a camera) is widely accepted by consumers, it becomes difficult for a consumer device manufacture to sell that type of devices (camera) without using the standard. In such a case, a holdup problem may emerge.

This holdup problem may be explained in a simple model with two technologies. One of the technologies is patented whereas the other is not; as the *Microsoft v. Motorola* (2013) explains, it is not unusual for a technology company to leave its technology unpatented to promote the use of its technology. In that case, a user's willingness to pay for the standard reflects three factors, the use of the patented technology, which creates $w(1)$, that of the non-patented technology, which creates $w(2)$, and the extra use generated by designing a proper combining of technologies to come up with a useful standard, which creates $w(3)$. This could make it possible for the owner of the patent in the standard to behave as if he/she were the owner of the entire standard. If that happens, the patent owner can engage in bundling just like that discussed above; that is, the patent owner could set a price equal to $\sum_{n=1}^{3} w(n)$.

This illustrates the holdup problem that could arise from creating a technology standard. The FRAND terms are developed to avoid this sort of holdup problems. When the holder of a particular patent joins a technology standard, the SSO asks the patent holder to sign a contract including the FRAND clause.

Microsoft v. Motorola (2013) deals with such a case. In that case, for its Xbox device, Microsoft adopted video and wifi standards, in which it does not take part. Motorola owned a number of patents that were considered to be essential to those technical standards. Although Motorola and the standard setting organizations holding those standards have FRAND contracts, Motorola's interpretation was that the FRAND clause did not extend to companies outside of technical standards. When negotiating licensing terms, Motorola set too high prices for Microsoft to accept. Without licenses,

[21] Microsoft v. Motorola (2013).

Microsoft could not incorporate the video and wifi standards into its products; Motorola sued Microsoft for patent infringement. The German court, considering this case, gave Motorola an injunction.

Considering this case, the United States District Court, Western District of Washington at Seattle, concluded that the FRAND contract extends to any user of the technical standard regardless of whether or not the user is a member of the standard. The court then assessed a range of reasonable prices for Motorola's patents in those standards. It found that if the other patent holders were to adopt Motorola's asking method, the total price of a standard would become unreasonable high for Microsoft to put the Xbox on market. In evaluating a reasonable price, the Court developed the "hypothetical negotiation." In doing so, it assessed the price of each patent that would be agreed on outside of the actual transaction between Microsoft and Motorola.

The *Microsoft v. Motorola* case is similar to *Aceball and Levy* (1834) and *Hoadly v. M'Laine* (1834) in that the price of what is traded is not specified in the contracts. Its approach to the determination of a reasonable price is particularly similar to *Hoadly v. M'Laine* (1834) in that the court assesses a reasonable price by means of the evaluations of outsiders who are not directly involved in transactions. Similar points are pointed out in the *Microsoft v. Motorola* decision, which suggests that the importance of outside trading opportunities in the determination of a reasonable price is generally accepted as a common sense.

7.2.2. Trade Associations and the Antitrust Law

SSOs are a type of trade association. A trade association provides its members, as well as non-members, with useful information on the state of business and sets up means, like technology standards, of promoting its business as a whole. There is a fine line that divides procompetitive activities of a trade association from anticompetitive activities; for example, the publication of industry-wide price information could help each member to understand business conditions over the entire market at the same time that it could serve as a device for horizontal restraint on competition. As a result, activities of trade associations have long been investigated under the antitrust law in many cases;[22] what the antitrust law permits trade associations can do is fairly clearly established.

It is apparent that FRAND terms on technology standard are influenced by the U.S. Supreme Court decision on blanket licensing (*Broadcast Music v. CBS* (1979)). Blanket licensing is a device developed by an association of musicians. The association bundled up many pieces of recorded music and sold the bundle to broadcasting companies. In this sense, blanket licensing is bundling of commodities similar to that discussed in the previous section. In this respect, it has an anticompetitive aspect.

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[22] American Column and Lumber Co. v. United States (257 U.S. 227, 1921); Federal Trade Commission v. Cement Institute (333 U.S. 683, 1948); Tag Manufacturers Institute v. Federal Trade Commission (174 F.2d. 452, 1st Cir. 1949); United States v. Automobile Mfrs. Assn., Inc.; General Motors Corp; Ford Motor Co.; Chrysler Corp.; and American Motors Corp (307 F. Supp. 617 (C.D. Cal. 1969); Broadcast Music v. CBS (1979).

At the same time, blanket licensing has a strong procompetitive aspect. Musicians have copyrights for their own music, the use of which should be paid for. If it is a record, collecting fees for the use of copyrights is easy; a proper portion of payments to a record will go to musician who is involved in its production. It is, however, a different story if music is broadcasted. If it is broadcasted through radio and TVs, it is extremely difficult for musicians to collect fees, on which the broadcasting company free rode for a long time. This makes a certain sense because it is extremely costly for a broadcaster to keep track of each of the music pieces that it broadcasts and to make an appropriate payment, which is expected to be very small. A blanket license is developed to overcome this problem. It bundles up a number of music pieces; a broadcaster buys a blanket license from a licensing organization, which pays to musicians. At an early stage of its development, broadcasting companies were not happy about this practice; CBS sued American Society of Composers, Authors and Publishers and Broadcast Music, Inc., which put together blanket licenses, for conducting a horizontal restraint on competition. In *Broadcast Music v. CBS* (1979), the Supreme Court considered this case and concluded that blanket licensing did not fall into the category of a horizontal restraint that is regarded as per se violation of the antitrust law.

FRAND terms are similar to blanket licensing in that commodities are bundled up by a trade association. They are different in that they permit each technology owner in a standard to sell its technology to the users; this opens up the possibility that technology owners abuse monopoly extracted from the bundle of technologies as a whole (Microsoft v. Motorola, 2013). SSOs administer FRAND terms carefully by following the established antitrust rules, in particular, those related to trade association.

As is noted above, FRAND terms are in line with not only the antitrust law but also the more fundamental rule against discrimination (Rules 3 and 3'). This demonstrates that, like the entire fairness test, a well-designed rule (the rule on blanket licensing) reduces "awareness and compliance building costs" sufficiently, getting rid of the existing obstacles to build compliance mechanism, as noted in Section 2. Once that is done, proper procedures on competition will develop voluntarily in a decentralized manner by private market participants.

8. Ownership of New Economic Resources and Market Quality

I have demonstrated that in the real world filled with transaction costs, the assignment of ownership and design of rules on competition for new economic resources should be determined in such a way that a high quality market will evolve once the ownership is established. In doing so, I have incorporated transaction costs into the analysis of market quality. Market quality is a normative concept to evaluate performance of a market in terms of efficiency and what I call competitive fairness. While various measures for efficiency are known in the existing literature, there has been no measure to quantify competitive fairness, which I have developed in this study (competitive fairness loss).

This study is motivated by the recent development of blockchain technology, which makes it possible to assign an owner to every piece of data collected though the Internet. Blockchain is a decentralized digital ledger. A ledger is a book of permanent record. A record that is absolutely accurate and unfalsifiable is valuable. For example, a county recorder's office keeps the vital records relating to ownership in real estate (land) and to debts or liens upon it. Without those records, it would be practically impossible to trade land and/or to lend and borrow money with land as security. Those records are economically valuable because everyone trusts that they are absolutely accurate and unfalsifiable. Rather than by a centrally controlled organization like a county recorder's office, blockchain creates trust in a ledger by developing an algorism by which many independent individuals contribute to building a digital ledger. Many applications of blockchain technology are created right now; IoT data are just about to be collected in a blockchain (Pu, 2019); digital assets can now be directly traded on blockchain without going through a crypto-currency exchange (Dai, 2019); various business applications are being developed on blockchain (Metcalfe, 2019). This study shows that in order to facilitate these new developments, proper rules and laws are necessary at the outset (Yano, Dai, Masuda, and Kishimoto, 2019a, 2019b).

Because the real world is filled with transaction costs, as Coase (1988) points out, it is necessary to come up with proper rules and laws to make use of digital data. In doing so, it is important to broaden the concepts of transaction costs by adding "participation and concentration costs" and "awareness and compliance building costs" to the standard list of transaction costs (encompassing search and information costs, bargaining and decision costs and policing and enforcement costs).

Currently the ownership of data and the basic rules on trading data have not yet been clearly established anywhere in the world. Large internet service companies are permitted to collect all data passing through them in data transactions, by which they are establishing the status of monopolistic positions. Many observers are concerned with the emergence of data monopolies. For example, a recent *Economist* (2018) article warns, "[B]ig tech platforms, particularly Facebook, Google and Amazon, do indeed raise a worry about fair competition (Economist (2018))." In order to cope with this problem, Khan (2016)) proposes to shift from the modern price theory based approach to predatory actions of monopolist back to the conventional structure-based approach. I disagree.

As Pu and Yano (2020) point out, there has been ample evidence showing that monopoly could cause serious problems in a market. This study, however, shows that in dealing with new resources that are rapidly growing their importance, the highest priority should be set on the design of proper ownership and other basic rules on transactions so as to ensure the development of a high quality market. Historically, as this study shows, a take-it-or-leave-it type of contact (contract of adhesion) have created various competitively unfair practices. In the internet industry, many standard online contracts are adopted; if strong monopolies would develop, those and other types of contracts could turn into contracts of adhesion, which could create seriously unfair markets. Before the organization of digital data markets is fixed, it is important to set ownership of digital data and other rules of transactions so as to prevent market

participants from acquiring unmanageably strong market power. This study shows that once proper rules are adopted, people's awareness on fair practices in the digital data market will develop and that proper compliance procedures will be created through private economic activities.

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