

An Institutional Perspective on Two-sided Networks

Completed Research Paper

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Abstract

In the early 2000s, the term ‘two-sided network’ has been coined to describe a form of organizing economic activities related to novel uses of information technology. While it is evident that two-sided networks make use of the novel possibilities of information technologies to organize economic activities, they have not yet been studied from an institutional perspective to shed light on the nature of this phenomenon. We suggest a way to remedy this situation by developing a novel classification scheme to systematically describe institutionally distinct forms of two-sided networks. We find that the phenomenon of two-sided networks may herald an entirely new way of organizing economic activities, possibly replacing, or evolving from, traditional forms. Moreover, within certain limits, there may be substitutive relationships between forms of two-sided networks which suggests that there are alternatives to forms which currently dominate the public and academic attention and which may be more desirable.

Keywords: Two-sided networks, transaction cost economics, institutional theory

Introduction

With the penetration of the Internet new forms of economic organization have evolved that do not easily fit into traditional categories such as firms and markets. For example, online platforms such as Amazon, Taobao, and Uber can be viewed as firms whose product is the organization of a market. From a neoclassical economic perspective, such platforms are conceptualized as ‘two-sided markets’ (Rochet and Tirole, 2006) or ‘two-sided networks’ (Parker and Alstyne, 2005). While this literature has created important theoretical insights and practical advice for entrepreneurs, there is a curious absence of efforts to conceptualize the phenomenon from an institutional perspective. The phenomenon has implications in several fields such as economics and organization studies; it is also clearly relevant for the IS field. However, to better address IS-relevant questions, such as what role IT plays in enabling and shaping two-sided networks, one needs to explain the phenomenon rather than just define it. Institutional approaches, specifically Williamson’s Transaction Cost Economics, have proved to be very useful for understanding IT-relevant aspects of organizations, e.g. with regard to such topics as IT-outsourcing and IT effects on the boundary of firms (Aubert et al., 2004; Malone et al., 1987). We therefore in this paper ask: How to conceptualize the phenomenon of two-sided networks from an institutional perspective?

Williamson has adapted older institutional thinking, including that of John R. Commons, to a specific problem, namely the ‘make or buy decision’ (Williamson, 1975 and 1987). However, the scope of his analysis is limited to institutional forms that can be mapped onto a continuum with markets and hierarchies at its end points (Hodgson, 2002). Online trading platforms cannot be mapped onto this continuum since this continuum implies that, as one moves towards the market pole one also moves away from the hierarchy pole. However, online trading platforms seem to have strong elements of both markets and hierarchies. We therefore propose to draw on Commons’ original ideas, especially on his distinction between three types of transactions called bargaining, rationing, and managerial transactions (Commons, 1931 and 1990), which Williamson neglected in his analysis, to bring the phenomenon of IT-enabled two-sided networks within the conceptual reach of an institutional approach.

Our aim is to stimulate and encourage a novel perspective on the phenomenon of two-sided networks which, so far, has been studied primarily through a neo-classical lens. The ‘platformization’ of one industry after another (Bresnahan and Greenstein, 1999; Shapiro and Varian, 1999; Gawer and Cusumano, 2002) seems to indicate that new forms of organizing economic activities are announcing themselves that raise important practical and theoretical challenges. The largely instrumental approach inherent in the neo-classical treatment of two-sided networks is not adequate to make visible the full breadth and depth of this phenomenon. By juxtaposing a neo-classical and an institutional perspective, perspectives that otherwise rarely get into contact with one another except as mutually exclusive approaches to economic phenomena, we contribute to the literature by offering a novel, theory-based approach to explore the boundaries of this phenomenon and to shine a light on possibly promising and urgent questions that so far have largely remained in the dark.

From an IS perspective, probably one of the most urgent questions in this regard is what role IT plays in the emergence of the new phenomenon that is currently being referred to as two-sided networks. While the transformative power of IT in general and of the Internet in particular is often mentioned, few efforts have been made to get close to the phenomenon in order to understand exactly how IT is transforming the organization of economic activities and what new forms of economic organization are thus enabled. Alfred Chandler (1980) has convincingly argued that, in the 19th century, novel technologies – the railroad and the telegraph – have played a decisive role in the transformation of first the North American and later the global economy in that they made possible and called for a new form of economic organization, the giant, vertically integrated industrial firm, which pushed aside the long dominant forms of merchant-run markets and family-owned businesses. Are we currently in the midst of a transformation of similar magnitude and thrust? Which institutional form, or rather forms, are currently shaping up? Will they replace currently dominant forms such as ‘markets and hierarchies’? And what exactly and concretely is the role of IT in this possible transformation? While answering these questions is certainly beyond the possibilities of a single paper and a single research team, in this paper we intend to prepare the ground for addressing such questions by extending the conceptual apparatus of institutional theory to capture the phenomenon of two-sided networks and make it thus amenable to a comparative institutional analysis in view of the affordances of information technologies.

We begin by examining the relevant literature on two-sided networks to demonstrate that, indeed, this phenomenon has not yet been evaluated from an institutional perspective. We then introduce our theoretical framework which extends a set of simple but powerful conceptual tools introduced by Commons that, however, were left largely unused by his successors and show how this framework can be used to systematically classify forms of economic organization described by modern institutional approaches. Having secured our claim that our extended classification scheme successfully copes with current institutional forms of economic organization we then apply this framework to the phenomenon of IT-enabled two-sided networks to explore the boundaries of this phenomenon and to identify the novel theoretical and practical challenges that it implies.

The Focus of the Literature on Two-sided Networks

Originating in the early literature on network effects in the context of information technology standardization (Katz and Shapiro, 1985; Farrell and Saloner, 1985), the concept of two-sided markets (Rochet and Tirole, 2006) or two-sided networks (Parker and Alystine, 2005) can be traced to pioneering works by Rochet and Tirole (2001) and Parker and Alystine (2000). Their intuition was that, for the case of so-called indirect network effects, there must be two or more ‘user groups’ which provide each other with

network benefits. For example, users of software to *create* PDF documents depend upon users who use software that can *read* PDF documents. The more users there are that own software capable of reading PDF documents, the more worthwhile it becomes to own software that can create PDF documents and vice versa. In addition, often a third party is involved that brings these two user groups together, in this case this was, of course, the company Adobe which developed the PDF format and was an early producer of both types of software, PDF writing and PDF reading products. Accordingly, two-sided markets (or networks) are defined as consisting of two user groups that provide each other with network benefits and which are brought into contact with each other through a platform (Galaugher and Wang, 2002).

The early Adobe example also illustrates the main topic that the literature has explored subsequently, namely the question whether, and if so how, the platform provider should charge differential access and usage fees to participating user groups. As is commonly known, Adobe chose to provide its PDF reading software for free while charging relatively high prices for its PDF writing software, a choice which turned out to be very effective for Adobe. In their foundational paper, Rochet and Tirole (2001) have already mentioned a number of further applications of the basic idea such as operating systems as platforms (with application software users and developers as user groups), computer games (ditto), telecommunication services, and media streaming networks. Early formal applications referred to credit card systems as platforms (Rochet and Tirole, 2002) and web server and web client (browser) software (equivalent to the Adobe case) (Galaugher and Wang, 2002).

The topic of platform access and usage pricing became so dominant in the literature that Rochet and Tirole (2006) have proposed to adopt a narrower technical definition of the concept of two-sided markets. Specifically, they suggest that only those markets should count as two-sided markets in which the choice of the platform provider regarding charging differential access and usage prices to the involved user groups affects economic outputs such as transaction volumes. If such choices do not affect economic outcome variables, for example because user groups can reverse such choices through bilateral negotiation, then a “one-sided” market exists and it would be a “waste of time” for public and private decision makers to concern themselves with matters of platform access and usage pricing (Rochet and Tirole, 2006, p. 648).

In their “progress report” on the literature on two-sided markets, Rochet and Tirole (2006) also come closest to addressing issues relevant to institutional economists when they discuss the question whether traditional firms can also be viewed as instances of two-sided markets, thus potentially collapsing the distinction between hierarchical firms and markets. However, they conclude that such an application, while possible in principle, is unlikely to provide an accurate description of firms since, at least in competitive labor and product markets, they have little “wriggle room” to adjust access and use fees (wages and product prices) to and of the firm viewed as a platform. Yet, far from moving towards studying institutional aspects of two-sided markets, this idea rather shows that the concept is increasingly being turned into a methodological tool through which a variety of phenomena can be viewed and analyzed. Guo et al., (2010) therefore conclude that “... [a]lmost all economic analyses [of two-sided markets] assume that price is the dominant factor that determines all platform users’ rational choices ...” (p. 4). We therefore want to retrieve an understanding of two-sided markets as an economic phenomenon (rather than as an analytical tool) by applying an institutional lens to bring forth hidden and possibly interesting and relevant aspects which have not yet been discussed – nor observed – in the literature.

Theoretical Framework: Extending Commons’ Distinction Between Types of Transactions

In this section, we present a novel analytical framework to classify institutional forms of organizing economic activities which builds on and extends an analytical distinction introduced by John R. Commons. In the subsequent section we will then demonstrate how the institutional forms described by Williamson can be mapped onto our classification scheme. This mapping will also show that the phenomenon of two-sided markets constitutes an institutionally distinct form not considered by Williamson. This then prepares the ground for using our classification framework to characterize institutionally distinct forms of two-sided networks.

Commons builds his monumental but also hard to penetrate “Institutional Economics” on the hypothesis that classical and neo-classical economics have largely failed to account for the institutional nature of economic relationships. Specifically, classical economists have conceptualized economic relationships as

relations between man and nature which appears either in the form of physical productive resources or in the form of physical consumable commodities. His main claim is that, while these relationships are obviously important, they are controlled by various forms of collective action, subsumed under the concepts of *going concerns* and *custom*, which limit and, at the same time, liberate and extend individual action. An institution, therefore, is defined "... as collective action in control, liberation and expansion of individual action" (Commons, 1931, p. 648). *Going concerns* are purposefully organized forms of collective action while *custom* refers to emergent forms of collective action.¹

Institutions thus refer to economic relations among actors. Such relations are characterized simultaneously by conflict of interest, interdependence, and order. Conflict of interest refers to the "principle of scarcity" in the sense that actors compete for scarce resources (wealth); interdependence refers to the "principle of efficiency" in that actors depend on each other for the creation of resources (wealth); and order refers to the "principle of futurity" in that actors engage in relationships with other actors in the expectation of orderly conduct of transactions in the future. Institutions thus concern relationships between humans characterized simultaneously by scarcity, interdependence, and order. There are many other forms of human relationships, of course, so that any analysis derived from Commons' definition of institutions must be limited to relationships involving the three named principles. For example, Internet forums, where people meet to discuss issues of shared concern, may be characterized by interdependence – people depend on each other for meaningful contribution – and order – people participate in the anticipation of continued and fruitful future exchange – but there is no scarcity of resources that would have to be somehow 'shared' among members. Thus, Internet forums fall outside the scope of Commons' analysis unless they also address problems of sharing scarce resources. Our analysis, therefore, cannot capture all organizational phenomena emerging from the Internet. However, in our elaboration of the classification scheme we will indicate that such broader phenomena, including Internet forums, may form a substrate on which new forms of economic organization can grow, ones that are contained within the scope of our analysis.

Since Commons' point of departure is the relationship between human actors, defined through and limited by the three principles of scarcity, efficiency, and futurity, his basic unit of analysis concerns the relationship between humans, not individual actions directed towards non-human objects such as exploitable productive resources and pleasure-giving commodities. Specifically, he defines as his basic unit of analysis a transaction which involves at least two human actors and distinguishes between three types of transactions, namely bargaining, rationing, and managerial transactions. A bargaining transaction describes the relationships between at least two prospective buyers and sellers respectively, who are all legal equals. A rationing transaction describes the relationship between a collective body as the superior and its members as inferiors where the collective body apportions benefits and burdens among its members. Finally, a managerial transaction describes the relationship between a superior, the manager, and her subordinates. The purpose of a managerial transaction is the creation of wealth whereas the purpose of a bargaining transaction is its distribution. Commons is less clear about the purpose of a rationing transaction but we argue that, properly interpreted in the context of his overall approach, it also refers to the problem of distributing wealth.² Typical examples for each type of transaction are: a two-sided auction on a stock

¹ In this paper, we draw mostly on Commons' book "Institutional Economics" (1990, first published in 1934) but occasionally also refer to an earlier short article by Commons (1931) which outlines his main ideas. While the short article is a useful guide to and summary of chapter II of the book, which sets out his main ideas and concepts, an intensive reading of chapter II of the book is still necessary to reveal their internal connections and true meaning. As shown in the introduction by Malcolm Rutherford to the reissue of Commons' book (1990) as well as by more recent efforts by Kaufman (2003 and 2007) to introduce the partly opaque work of Commons to a contemporary audience, there are a number of inconsistencies in Commons' use of some of his concepts which makes reliance on a summarized version problematic. Unless otherwise indicated, we therefore refer to Commons' book in our presentation of his main ideas.

² "Rationing transactions apportion the burdens and benefits of wealth creation by the dictation of legal superiors." (Commons, 1990, p. 68). However, on the one hand Commons explicitly states, shortly before defining it, that a rationing transaction refers to the "rationing of wealth or purchasing power" (ibid.); on the other hand, one of his main examples for rationing transactions, taxation policy, does not necessarily imply a relation with wealth creation whereas other examples, such as allocation of financial resources in a corporation, are related to wealth creation. Moreover, he later concludes that "... there may be all degrees

exchange (bargaining transaction), the allocation of a budget in a multi-divisional firm (rationing transaction), and production planning (managerial transaction).

Implied in this distinction between the three types of transactions is thus a further distinction between two purposes of transactions, the creation of wealth on the one hand and its distribution or sharing on the other hand. While Commons does not make this explicit – probably because this is obvious to the careful reader and thus does not need to be specifically pointed out – these two purposes are directly related to two of the three principles that he uses to define an institution, namely the principle of efficiency, which concerns the creation of wealth, and the principle of scarcity, which concerns the distribution or sharing of wealth. For our analysis it is doubly useful to highlight this connection. On the one hand, in what follows we will limit our analysis to phenomena which can be described by Commons' notion of transactions – which we will extend by a fourth type – and thus must leave open the question how the principle of futurity, which is not worked into Commons' notion of transaction, is involved in the emergence of new forms of economic organization. We will briefly address this issue in our 'limitations' section. Secondly, the distinction between the two purposes of transactions and, along with this distinction, that between the principles of scarcity and efficiency will turn out to be quite useful for extending Williamson's analytical framework.

While Williamson has not explicitly mapped his markets-hierarchy continuum onto Commons' three forms of transactions, it is illustrative to attempt to do so. A straightforward mapping might be: hierarchy: managerial transaction; market: bargaining transaction; and hybrid (which combines elements of hierarchies and markets): rationing transaction. However, such a mapping would ignore the distinction between the purpose of creating wealth vs. its distribution which is implied in Commons' definition of the three types of transactions, as we have just pointed out. Moreover, it would also negate the possibility that specific institutional forms of organizing economic activities, which Commons would refer to as forms of going concerns, may combine various types of transactions, a possibility explicitly mentioned by Commons (1990, p. 93, see Footnote 2).

The question thus arises how else the classification systems of Williamson and Commons can be combined. Being able to show that such a combination is feasible would add to the conceptual consistency of institutional approaches and might reveal phenomena which have, so far, been overlooked by modern institutional theorists, including those that interest IS researchers. To arrive at such an integrated classification system, we first inspect Commons' three types of transactions for completeness.

Williamson encountered a problem with his original two-way classification of firms vs. markets (Williamson, 1975) when considering long-term supply relationships between firms because these could neither be classified as pure hierarchies nor as pure markets. He resolved this problem by allowing for a hybrid form which combines both elements of markets and firms (Williamson, 1987 and 2002). On first glance, it appears that Commons' would classify such instances, i.e. hybrids, as forms of rationing transactions, as indicated above. However, rationing transactions refer to the problem of distributing wealth or, in modern language, of sharing resources, whereas long-term supply relationships between firms concern the problem of how to efficiently combine productive resources of suppliers and customers to create wealth (value) (Williamson, 2002). By contrast, Commons lacks a concept to describe such relations while his notion of a rationing transaction can, indeed, be used to describe the long-term relations between firms with regard to the problem of sharing resources. For example, an instance of a rationing transaction can be seen in the case of trade associations. Trade associations often impose certain behaviors on their members which is an instance of allocating benefits and burdens through rationing (Commons, 1990).

We therefore extend Commons' framework by formally introducing a fourth type of transaction which we call a *mutual adjustment transaction*. This is defined as describing the relationship between two or more legal equals and as addressing the problem of combining resources for the purpose of wealth (value) creation.³ In a mutual adjustment transaction, the several parties continually observe each other's actions

of combinations, for the three kinds of transactions are interdependent and variable in a world of collective action and perpetual change ..." (p. 93). (Below, we will expand the idea that various types of transactions are usually combined in particular forms of collective action.) Here, we conclude that rationing transactions primarily refer to the purpose of distributing wealth, whether for productive or for consumptive purposes.

³ The name for this type of transaction is borrowed from organization theory which distinguishes between various types of coordination mechanisms, including 'mutual adjustment' (Mintzberg, 1979). Our definition

and, if necessary, adjust their actions to ensure that their actions, or rather their actions' output, fit together in a productive manner. The difference with a managerial transaction consists of the nature of the involved parties. In a managerial transaction, they are a superior and a subordinate, in a mutual adjustment transaction, they are legal equals. It thus turns out that extending Commons' framework is quite straightforward since we can easily define this new form of transaction in terms of his own definitional terminology and arrive at a type of transaction that accurately characterizes important aspects of long-term supply relationships between firms as described by Williamson through his concept of a hybrid. This also shows that a one-on-one mapping of Williamson's institutional forms onto Commons' types of transactions is no longer feasible – since the now four types of transactions would have to be mapped onto Williamson's three institutional forms – and may have been misguided in the first place.

This becomes clear when one recognizes that an institutional form of organizing economic activities ('going concerns' in Commons' and 'governance structures' in Williamson's terminology) may combine two or more types of transactions, a possibility explicitly indicated by Commons, as we have observed above. Moreover, it is reasonable to assume that institutional forms always address both types of problems, namely that of sharing resources and that of combining them for value creation. We therefore propose a two-dimensional rather than a one-dimensional classification system which takes these two fundamental problems of organizing economic activities, and, along with this distinction, the distinction between the two principles of scarcity and efficiency as its dimensions. According to the extended list of types of transactions, there are then two types of transactions available for addressing each problem, as shown in Figure 1.⁴

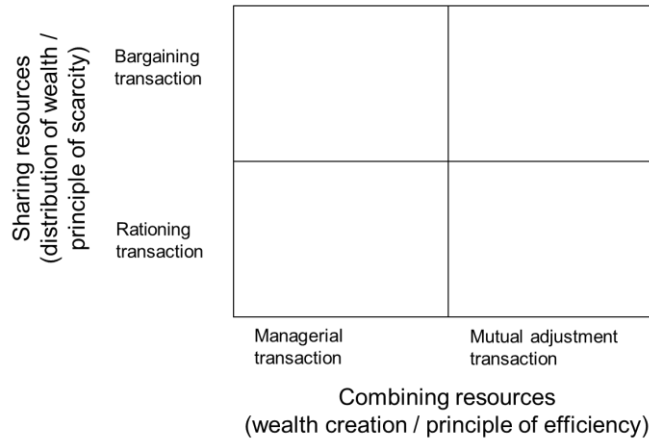


Figure 1: Extended scheme for classifying institutional forms

of a 'mutual adjustment transaction' is consistent with the use of the term 'mutual adjustment' in organization theory, namely as referring to coordination actions among equals who need to ensure that their several activities fit together. However, in organization theory the term is usually used in a context of intra-organizational coordination whereas we want to use the term in a more general sense. This is indicated by our addition of the term 'transaction' which, in Commons' system who considers the 'transaction' to be the basic unit of analysis, allows for intra- as well as for inter-organizational application.

⁴ Kaufman (2003 and 2007) has more recently offered a new reading of Commons in an attempt to make known Commons to a wider audience and also to demonstrate a way in which Commons' analysis can be readily applied to contemporary phenomena. However, while he offers a rich description of various other concepts proposed by Commons, he gives only fleeting reference to Commons' distinction between the three types of transactions. Moreover, he tends to collapse them into yet another dichotomy (or continuum) characterized by centralized vs. decentralized decision making.

Mapping Williamson’s Institutional Forms onto the Extended Classification Scheme

Above, we have argued that it would strengthen institutional approaches if the classification systems of Williamson and Commons could be combined to produce a consistent and comprehensive system. While a direct mapping of Williamson’s institutional forms onto Commons’ three types of transactions was only possible if one ignored Commons’ distinction between the problems of distributing and creating wealth (sharing and combining resources), mapping Williamson’s institutional forms onto the extended classification scheme avoids this problem. Figure 2 shows the result of our mapping.

Sharing resources	Bargaining transaction	Managed market: Exchanges (not considered by Williamson)	Market before the 'fundamental transformation': Clusters
	Rationing transaction	Williamson's hierarchy	Market after the 'fundamental transformation': Hybrids
		Managerial transaction	Mutual adjustment transaction
Combining resources			

Figure 2: Mapping Williamson’s institutional forms onto the extended classification scheme

We will justify our classification of Williamson’s institutional forms by briefly showing how each of Williamson’s three forms (market, hybrid, hierarchy) can be seen as an instance of a particular pair of types of transactions as indicated in Figure 2. This also demonstrates how Commons’ idea of combining types of transactions into distinct and variable forms of collective action can be exemplified. Our analysis reveals that one possible form is not described by Williamson and we will show that a traditional form of two-sided markets, managed markets or exchanges, can be seen as an instance of this theoretical possibility.

Williamson’s Hierarchy

Williamson responded to critics who claimed that there is no principal difference between markets and firms by arguing that firms are fundamentally distinct from markets because courts generally reject to accept cases concerning internal conflicts about resource allocation, thus establishing management as a quasi-legal body in matters of internal resource allocation. This, he argues, creates a type of internal authority which, in markets, would be associated with courts but cannot be performed by the market participants themselves (Williamson, 1987 and 2002).⁵

Considering this argument in view of Commons’ distinction between types of transactions, the internal authority, which characterizes firms as opposed to markets, can be seen to perform two types of transactions regarding its internal relationships, namely rationing and managerial transactions.

Managerial transactions in firms are all managerial decisions that concern the combination of resources or assets according to the principle of efficiency, e.g. production planning and scheduling (combining

⁵ Hodgson uses the same argument to justify the principal difference between hierarchies and markets and then goes on to criticize Williamson for not taking seriously this (Williamson’s own) argument when introducing hybrids as an intermediate form (Hodgson, 2002).

materials and machine and worker capacities) and marketing (combining various design, communication, and research resources, among others, to produce a consistent marketing campaign).

Rationing transactions are all managerial decisions that concern the allocation of scarce resources among competing organizational activities, e.g. budget planning (allocating the firm's financial resources among divisions or functional departments) and promotion decisions (allocating positions to employees); the former are explicitly mentioned by Commons as instances of rationing transactions.

Market before the Fundamental Transformation: Clusters

Williamson distinguishes between two types of market relationships, namely whether at least one of the involved parties has made partner-specific investments (creating so-called asset specificity) or not; such investments cause a “fundamental transformation” of the market relationship (Williamson, 1987 and 2002).⁶

The market relationship before the fundamental transformation is characterized by the freedom of all involved parties to costlessly sever the relationship with a business partner. This allows for treating each transaction as independent from earlier or later transactions. A possibly negative impact of tough price negotiations on long-term relationships thus does not need to be considered.

While many forms of markets fit this description, a specific form turns out to be very interesting in view of our classification system, namely so-called clusters as described by Porter (1990 and 1998). While firms in such clusters have typically developed trust-based relationships as a result of recurring and ongoing transactions, they are not tied to one another through relationship-specific investments. Rather, firms are free to choose their business partner for each transaction anew, depending on availability of production capacity and specialization as well as on price. This freedom of choice is established through a high degree of specialization in the presence of intense competition within each group of specialized suppliers. Any firm in the cluster can therefore tap into a pool of highly specialized as well as extremely competitive suppliers and choose the supplier that offers the best deal on each occasion, i.e. to engage in bargaining transactions.

Clusters evolve over long periods of time to create such conditions. One crucial aspect is that firms chose their business focus in view of the choices made by all other firms in the cluster. In this sense, firms adjust their production capacities and focus to one another as the cluster continues to evolve. As pointed out by Porter (1990), a crucial aspect of the competitiveness of a cluster as a whole consists of the willingness of its member firms to continually update their production equipment. Each such updating decision can therefore be conceptualized as a mutual adjustment transaction because such investments are only viable in the context of the cluster as a whole but do not establish a dependence relation to any particular firm within the cluster.

Market after the Fundamental Transformation: Hybrids

Once partner-specific investments have been made, adjustments to changing market conditions can no longer be made costlessly by switching transaction parties or terminating contracts because this will significantly reduce the value of partner-specific investments. Since the involved parties will anticipate such problems, they will attempt to take precautionary measures, such as entering liquidated damages clauses into contracts or agreeing on arbitration mechanisms in cases of conflict. All such measures are also costly in terms of transaction costs.

Williamson refers to such precautionary measures as private ordering, i.e. the setting up of specific governance structures tailored to the transaction problem at hand, which gives rise to an intermediate form of economic organization between market and firm called “hybrid” (Williamson, 1987 and 2002). In view of Commons' distinction between types of transactions, a hybrid can be conceptualized as a collective body, composed of the transaction parties, which, in case of conflict, apportions benefits and costs of resolving

⁶ There is no inherent trend or necessity for a market to experience a fundamental transformation. Many markets, including our example of clusters to be described below, persist in a state which is characterized by the absence of partner-specific investments; indeed, some markets, including clusters, thrive on the ability of members to costlessly change transaction parties.

the conflict through a rationing transaction. Williamson, in his analysis of cases involving partner-specific investments, focuses on cases where parties to a business relationship characterized by partner-specific investments need to make quantity adjustments to changing market conditions *ex post*, i.e. after having already fixed supply quantities in purchasing contracts. Without the prior setting up of dedicated decision making bodies, one party may opportunistically exploit the dependence of the other party created through the partner-specific investment, e.g. by asking for higher (lower) prices than originally agreed in response to changing market conditions. Importantly, because parties anticipate the possibility of such opportunistic behavior, they will shy away from making partner-specific investments in the absence of protective governance structures even when such investments are relatively more efficient. Partner-specific investments, in turn, can be conceptualized as instances of a mutual adjustment transaction since the business parties adjust their production capacities and capabilities to one another according to the principle of efficiency.

Managed Market: Exchanges

The institutionalized combination of bargaining and managerial transactions has not been considered by Williamson, probably because bargaining transactions are generally associated with market coordination and managerial transactions with hierarchical coordination, two forms of organizing economic activities usually considered to be mutually exclusive.

However, stock or commodity exchanges are an obvious example of a managed market that supports bargaining transactions. To enable such auction-type price negotiation, exchanges need to operate a complex apparatus comprising organizational as well as technical elements. Market participants have to perform specific roles and a complex socio-technical machinery has to be orchestrated and maintained that facilitates the swift publication of prices or price quotes and, most importantly, the execution of contracts (Mulherin et al., 1991). All this requires the skillful and efficient combination of resources. On many organized markets, such decisions are made by a management hierarchy, i.e. through managerial transactions.

Other Proposals to Extend Williamson's Classification System

Other ways of extending Williamson's distinction between markets, hierarchies, and hybrids have been proposed in the literature. From a sociological or managerial perspective, a number of proposals have been made which share the same basic argument, namely that relationships among economic actors are not only based on a narrow economic or legal rationale but also on social mechanisms that recognize the social nature of human beings. These include Ouchi's (1980) concept of clans, Granovetter's (1994) concept of business groups, Ciborra's (1996) 'teams and markets approach', and various proposals which are collectively addressed as the 'Swedish Network Approach' (Johanson and Mattson, 1987). These proposals tend to juxtapose economic and social aspects of economic relationships. They can be characterized as efforts to offer a richer and more precise description of contemporary phenomena but lack the analytical capabilities of institutional approaches that link certain economic problems with particular institutional arrangements.

From a legal perspective, Hodgson argues that Williamson's distinction between markets, hybrids, and hierarchies fails to take into account that there is a fundamental difference between "proper" or "pure" markets and long-term relationships between firms. He even argues that the latter do not involve market transactions at all and proposes to call such arrangements "relational exchanges" or "non-market exchanges" because their purpose is not the one-time exchange of a product or service, as in "proper" markets, but the maintenance of a business relationship (Hodgson, 2002). However, while his distinction between short-term relationships and relational exchange is clearly important and descriptively accurate, he also does not offer an analytical apparatus for linking forms of economic organization with fundamental problems of allocating resources. Instead, his categories are purely descriptive, like those of the above mentioned managerial and sociological approaches, albeit from a legal or institutional perspective.

We therefore propose that our rendering and extension of Commons' framework is novel and possibly fruitful for the analysis of IT-enabled phenomena, including two-sided networks, as it yields four distinct forms of economic organization characterized by the combination of two types of transactions which

address both fundamental problems of economic organization distinguished by Commons in institutionally distinct ways.

Mapping Two-sided Networks onto the Framework

After having demonstrated how ‘traditional’ forms of organizing economic activities, including hierarchical firms, clusters, hybrids, and exchanges, can be systematically classified by our extended scheme we will now show how the novel phenomenon of IT-enabled two-sided networks can be analyzed into distinct institutional forms by relating this phenomenon to the four generic forms identified by our framework. This mapping will also reveal that the concept of two-sided networks comprises phenomena that have not yet been related to one another in a systematic fashion. Figure 3 displays the result of our mapping which we will now describe and justify in detail.

Sharing resources	Bargaining transaction	Online trading platforms	Virtual clusters
	Rationing transaction	Online service delivery platforms	Industry-wide information infrastructures
		Managerial transaction	Mutual adjustment transaction
		Combining resources	

Figure 3: Forms of two-sided networks, seen from an institutional perspective

Online Trading Platforms

Online trading platforms, such as eBay or Taobao, combine managerial transactions and bargaining transactions. They are just the online version of traditional organized exchanges and thus our analysis regarding managed markets applies to online trading platforms without modification. Indeed, as traditional exchanges continue to automate their operations, they come to resemble their online-only siblings more and more. For example, so-called floor-trading on traditional exchanges is increasingly replaced by online trading, albeit on dedicated networks rather than over the public Internet (Heng, 2003).

Online Service Delivery Platforms

Online service delivery platforms, such as Uber, combine managerial transactions and rationing transactions, similar to Williamson’s hierarchy. In contrast to hierarchically organized firms, rationing and managerial transactions are made with regard to platform members, not employees. For example, Uber uses algorithms to decide which vehicle is being sent to which client, based on various factors such as current location of vehicles, traffic situation, and caller preferences. That means Uber uses managerial transactions to combine resources, in this case driver, vehicle, and client, to create a useful service, similar to production planning and control processes. In addition, Uber prescribes requirements for drivers, cars, and clients, and also sets prices, thus apportioning benefits and costs among its members, i.e. it also

conducts rationing transactions. For example, in 2014 Uber has lowered prices in Germany, responding to ongoing legal disputes with local taxi services, thus shifting benefits from drivers to clients.⁷

Indeed, the ongoing legal disputes between Uber and local taxi services show that taxi services traditionally operate (local) platforms for creating transportation services. These use different legal forms such as limited company and cooperative to operate their services and also employ IT-based platforms to combine vehicles, drivers, and clients into useful services. The main difference between these traditional taxi services and Uber consists in the global reach of the latter. One may therefore conceive of Uber as a globally standardized platform whereas traditional taxi services rarely reach beyond local boundaries such as a city.

Industry-wide Information Infrastructures

A further phenomenon, which now reveals itself as an instance of a two-sided network, regards industry-wide information infrastructures (III). Rooted in modest beginnings where companies began to connect their internal information systems to create so-called inter-organizational information systems (IOIS) (Cash, 1985), III increasingly facilitate cooperation across whole industries. Specifically, III involve mutual adjustment as well as rationing transactions. For example, supply chain members use III to engage in joint production planning processes (Johnston and Lee, 1997; VICS, 2010). As members of a supply chain cannot refer to a super-ordinate authority to coordinate their activities, they need to mutually adjust their production plans so as to optimize the material flow across the whole supply chain subject to various constraints. Regarding service industries, pharmaceutical distribution and dispensing offers an interesting example. Here, various actors such as physicians, pharmacists, hospitals, home care organizations etc. have to coordinate their several actions in order to offer a safe and effective medication therapy and also to adjust the initially determined medication therapy to the evolving condition of the patient (Kohn et al., 2000).

III also involve rationing transactions as industry members have to comply with certain procedures and interfacing requirements for the III to function. Such specifications are usually produced by industry standardization bodies, often specifically set up for the purpose of establishing and maintaining the III. For example, in the German pharmaceutical distribution industry the trade associations of manufacturers, wholesalers, and pharmacies have jointly set up an organization that administers a product code used to identify drugs which is an essential component of the industry's information infrastructure (Wagner, 2005). This body defines responsibilities and rights regarding the maintenance of the product code, e.g. who has to apply for the code, what information must be supplied, and who has the right to access the joint database containing the code as well as additional information, thus apportioning benefits and burdens among industry members.

Virtual Clusters

Social networks are one of the most interesting novel IT-enabled phenomena. However, they have rarely been related to problems of organizing economic activities, except in the context of facilitating communication and cooperation in traditional firms (Riemer and Johnston, 2012). However, we believe that social networks can also become the basis for a new form of economic organization which might be characterized as a virtual cluster. Similar to geographical clusters described above, virtual clusters combine mutual adjustment and bargaining transactions. Prototypes of such forms may be seen in simple forums where participants gather around some focal themes and may occasionally offer used items related to their common interest for sale. Not every type of item may be considered to be appropriate for such offerings and the understanding of what constitutes a suitable item for trading on a particular thematic social platform may evolve over time. Eventually, a 'self-regulated' marketplace may emerge where participants can tap into a large pool of specialized and highly competitive product or service offerings as is characteristic of a cluster. The equivalent of geographical proximity and its associated close personal ties can be seen in the shared interest and its associated trust-based relationships that may evolve on thematic social platforms.

Especially in emerging thematic fields such as novel forms of sports or gaming activities an 'ecosystem' of complementary services and products may arise in this manner. Participants who originally shared an equal interest in their hobby gradually take over specific roles such as provider and consumer. As with

⁷ Entry on Uber on the German Wikipedia site, last updated on April 26 2016, retrieved on May 8, 2016.

geographical clusters, providers' specializations co-evolve to eventually form a complementary, competitive and highly specialized pool of resources, resulting from ongoing mutual adjustment transactions. Tapping into this pool is then done through bargaining transactions that are regulated by emergent norms of behavior ("custom" in Commons' terminology) rather than through a central oversight body.

Discussion

In this section we will first discuss whether our examples in fact qualify as instances of two-sided networks. We will then turn to discussing theoretical and practical implications of our analysis. These concern three issues: (1) How do two-sided networks, as possibly novel forms of organizing economic activities, relate to currently dominant forms? (2) Are there substitutive relationships between forms of two-sided networks as there are between traditional forms of organizing economic activities such as between markets and hierarchies? (3) In view of all eight institutional forms of organizing economic activities identified through our classification scheme, can we derive more fundamental questions and hypotheses about how institutional forms combine types of transactions?

First, however, we must clarify whether all four forms classified above are, indeed, two-sided networks. As shown above, a two-sided network is defined as an arrangement where an intermediary brings together two distinct user groups who provide each other with network benefits. Well-known examples are credit card networks (card holders and retailers), computer operating systems (users and developers), recruitment sites (job seekers and employers), and online markets (buyers and sellers).

Online trading platforms and online service delivery networks are often quoted examples of two-sided markets. We therefore do not further discuss these two types. Industry-wide information infrastructures also clearly fall into the category of two-sided markets. For example, in the case of III for supply chain management the different user groups are supply chain members who, through complying with certain interfacing requirements, provide each other with network benefits related to coordinating production planning: The more companies comply with a particular interface specification the higher the value of participation in the network as a whole becomes. Standardization bodies can then be seen as the actor that brings together these user groups.

Regarding virtual clusters, the involvement of an intermediary is much less visible. Market rules emerge on a particular platform without managerial oversight. Likewise, trading on the platform is not monitored by a central authority. Yet, a virtual cluster, like its geographical sibling, requires a 'caring' body or group of bodies. In the case of geographical clusters, these are often local development agencies and local banks that attract suitable firms to the cluster and help by running complementary systems and basic infrastructures such as schooling, administration, financing, and transportation (Porter, 1990). On virtual networks, such services comprise the running of a social network platform, possibly involving 'virtual' counterparts to the just named services such as operation of arbitration and petition mechanisms and responsiveness to requests for extending the functionality of the platform. The several user groups brought together by such actions are the specialized groups of product and service providers. The more such specialized groups are attracted to the cluster, and the more competitive each group is internally, the higher the value for all participants in the cluster.

We therefore conclude that all four forms identified through our classification system are, indeed, instances of two-sided networks.

Relationship between Extant and Emerging Forms of Economic Organizing

A first noteworthy implication of analyzing forms of organizing economic activities based on our classification system is that all four forms of two-sided networks seem to have 'predecessors' in traditional forms of organizing economic activity. The clearest case concerns online trading platforms which are just online versions of traditional organized markets, as we have already observed. A very interesting case concerns online service delivery platforms which may become the modern heir to traditional hierarchical firms, as suggested by our classification system. Both combine managerial and rationing transactions to provide a service which may also comprise the design and delivery of a product. Malone and Laubacher (1998) have discussed this possibility in the context of their vision of the "e-lancer", a self-employed worker who replaces the traditional life-long employee of hierarchical firms, and suggested that modern guilds may

succeed firms in maintaining performance records and credentials of the e-lancer (Laubacher and Malone, 1997). However, another, less benign possibility is that online service delivery platforms such as Uber take over this role. Recently, the choice between firms (hierarchies) and two-sided networks has been modelled from an economic perspective (Haigu and Wright, 2015) which corroborates our claim that online service delivery platforms, as instances of two-sided networks, can be viewed as institutional alternatives to traditional firms.

Likewise, industry-wide information infrastructures may be seen as modern successors to traditional supply chain management approaches based on long-term bilateral relationships among adjacent supply chain members, described as hybrids by Williamson. Indeed, industry-wide information infrastructures may enable a much more integrated approach to complex problems of supply chain management. For example, in a scenario-based approach Reimers and Guo (2014) describe so-called supply chain resource planning systems (SCRPs) that replicate the logic of ERP systems at the supply chain level to identify the conditions under which such systems would be viable. Finally, the concept of virtual clusters is an extrapolation of traditional geographical clusters to the online world. Presently, only rudimentary forms are visible and it remains to be seen whether these forms evolve towards a viable new form of organizing economic activities.

The main difference between traditional and emerging forms of organizing economic activities, as indicated by our analysis, is that two-sided networks can be seen as higher-order forms of organizing economic activities. Seen from a classical or neo-classical perspective, they involve only traditional forms such as markets and firms. For example, an online service delivery platform can be seen as a nexus of contracts between the platform operator and independent, self-employed agents. However, the legal disputes regarding the business practices of Uber suggest that courts increasingly see a dependence relationship between these agents and the platform operator. For example, in 2015, several court rulings in the US have upheld a decision by the California Employment Development Department against Uber to treat Uber drivers as employees of Uber, not as independent contractors.⁸ Thus, the phenomenon of Uber cannot be accurately described as a combination of a hierarchy – Uber as a company – and a market – the relationship between Uber and its driver-members. Rather, Uber must be seen as a more comprehensive organization which organizes different types of relationships that are hard to describe in terms of extant legal concepts.

Likewise, industry-wide information infrastructures may create new forms of dependence among supply chain members that currently elude the extant legal and economic conceptual apparatus. For example, organizations such as RosettaNet may be interpreted as platforms that organize whole industries. The standards developed and maintained by this industry group go much further in terms of organizing productive processes than is usual for standards developing organizations (Reimers, 2001). Regarding online trading platforms, their offline siblings such as the London Insurance Market already comprise large firms as members as well as several trade associations, forming complex higher-order organizational structures (Barrett and Walsham, 1999). Their online versions are likely to follow suit. Likewise, geographical clusters are recognized as complex, higher-order forms of economic organization (Porter, 1990; Kumar et al., 1998). The emergence of virtual clusters, as we have described them, is currently a topic of speculation. However, it is not unlikely that, once in place, they also organize relationships among their members, which may be organizations themselves, in non-standard ways.

We therefore conclude that there is a distinct possibility that present-day two-sided networks are proto-forms of novel, higher-order forms of organizing economic activity that may be recognized by courts in the near future and even may give rise to the creation of new legal forms of organizing economic activity, similar to the creation of the modern corporation at the end of the nineteenth century in response to the rise of the giant, vertically integrated industrial firm (Chandler, 1980).

In fact, higher-order forms of economic organization are not a new phenomenon at all. For example, various forms of trade associations have existed for centuries and were as abundant in earlier times as they are nowadays. However, outside the field of political science they are rarely addressed as a relevant phenomenon of economic organization, with Olson's (1965) theory of collective action being a rare exception. More recently, Knoke (1990) has presented a systematic albeit rather descriptive study of North

⁸ "Uber Driver Declared Employee as the Company Loses another Ruling," *The Guardian*, September 11, 2015.

American trade associations as forms of collective action. Organizational scholars are traditionally more open to the study of various forms of trade associations as relevant economic phenomena. Pfeffer and Salancik's (1978) study of inter-firm relations clearly stands out as preparing the ground for analyzing higher-order forms of economic organization. Astley and Fombrun (1983) have built on their work to distinguish various forms of higher-order economic organization (agglomerate, confederate, conjugate, and organic). Much earlier, Emery and Trist (1965) have introduced the concept of the "referent organization", later elaborated by Trist (1983), to describe the phenomenon of higher-order economic organization. All these examples frame the phenomenon of higher-order economic organization as various forms of collective action, which seems to be a natural approach to such phenomena.⁹

When juxtaposing this literature with the two 'managed' forms of our classification scheme, online trading and service delivery platforms, it appears that one novel aspect brought about by these types of two-sided networks is that 'primary' forms of economic organization, i.e. forms that create useful and marketable products and services, are increasingly reaching a level that was traditionally analyzed as collective action of organizations, typically as a not-for-profit endeavor. Thus, the phenomena of online trading and service delivery platforms may indicate that this traditional two-level structure – profit-oriented firms at the first level and collective action of such firms at the second-level – is collapsing into a broader phenomenon, one where profit-oriented firms aim to organize economic activities in a much more comprehensive sense. The vast economic literature on standardization processes that emerged in the late 1980s and early 1990s in the wake of the foundational papers by Katz and Shapiro (1985) and Farrell and Saloner (1985) seems to corroborate this analysis in the sense that standardization, traditionally viewed as a field of collective action where firms come together to produce standards as a 'collective good', has been firmly brought into the realm of a strictly economic analysis where 'network externalities', as private cost and use increments, explain the emergence of standards rather than forms of collective action. Incidentally, the concept of two-sided networks grew out of this literature, as we have observed at the beginning of this paper.

The traditional distinction between these two levels, commercial activities of firms on the one hand and collective action of firms on the other hand, is also reflected in the IS literature where it has concerned itself with large, industry-level systems, e.g. in the form of EDI networks (Damsgaard and Lyytinen, 2001; Kurnia and Dare, 2005). The novel and interesting aspect that our paper brings to the fore is the question what role IT plays in this possible collapsing of the two levels traditionally viewed and analyzed as separate phenomena.

We do not intend to give a definite answer in this paper but would like to take the opportunity to hint at a promising and tantalizing hypothesis. Beyond the obvious enabling aspect of technology – such as IT's role in enabling virtual clusters – there seems to be hidden a deeper role. If technology's role was limited to just enabling easier (tele-)communication and faster information processing, why does it not just make extant forms of economic organization, such as markets and hierarchies, more efficient or lead to shifts between extant forms as a result of differentially increasing relative efficiencies of extant forms, as Malone et al. (1987) have famously argued? Early on, Ciborra (1996) has speculated that, instead, new forms may arise which he saw and described as combinations of team-based organizational forms and markets and which we here may describe as various forms of our extended classification scheme. More broadly, why is it that 'platforms' possibly collapse the two levels of economic activity as we have speculated above? We suspect that the answer lies in the essence of technology as something that turns everything into a resource and then relates resources in an instrumental, i.e. means-ends fashion to one another (Heidegger, 1977). Thus, the phenomena which traditionally are described as collective action are now being 'economized' in the sense that platform operators view market participants as resources that can be combined, and re-combined, in ever more efficient ways. In essence, phenomena which used to be analyzed as instances of collective action aimed at creating 'collective goods' are being turned into instances of entrepreneurial action aiming at creating 'private goods' through efficient resource combination. Thus, technology might be not just an enabling factor but a driving force in this processes of continued economizing of organizing

⁹ Use of the term 'collective action' in this tradition should not be equated with Commons' use of the term; for Commons, the term denotes all types of organized behavior whereas its modern use refers to forms of organized activity that aims at the production of collective or public goods as distinguished from private goods (Ostrom, 1990).

economic activities at ever higher levels. However, we must leave this idea for exploration in future research, well aware of the risk of being accused of resurrecting technological determinism.

Relationships between the Four Emergent Forms

A second noteworthy implication of our analysis is that the two forms in the right-hand column of Figure 3, virtual clusters and industry-wide information infrastructures, seem to offer institutional alternatives to the forms in the left-hand column, online trading and service-delivery platforms, at least to some extent. Specifically, services organized through an online service delivery platform may alternatively also be organized through an industry-wide information infrastructure. A case in point concerns networks of healthcare providers, such as physicians, pharmacists, and home care providers, who jointly ‘compose’ and adjust a medication therapy. Similarly, transactions on an online trading platform, which are managed by a central oversight body, may also be conducted within a virtual cluster according to norms that emerge in that cluster without central direction and oversight. Yet, there are significant differences between these two pairs of forms of organizing economic activity that need to be considered. Regarding service-delivery platforms and industry-wide information infrastructures, the latter tend to comprise firms whereas the former tend to comprise individuals as their constituent members. Regarding virtual clusters and online trading platforms, the former comprise highly specialized small production firms in a production network whereas the latter mostly comprise homogenous groups of buyers and sellers on consumer markets. Yet, in view of our discussion above where we suggested that online trading and service delivery platforms may eventually evolve into higher-order forms of economic organization knitting together various simpler forms of organization into a complex structure, it is possible that these differences turn out to be non-substantial so that we may be moving towards a future where there are open, or non-managed forms of organizing economic activity (virtual clusters and industry-wide information infrastructures) competing with managed forms (online trading and service delivery platforms).

Presently the IS field is enamored with success stories regarding entrepreneurs who successfully established online trading and service-delivery platforms. However, a much more interesting and socially relevant question might be how to develop virtual clusters and industry-wide information infrastructures. Above, we have argued that the phenomenon of two-sided networks may indicate a shift to higher-order forms of economic organization where network members become resources that can and need to be efficiently combined into useful services. However, industry-wide information infrastructures and virtual clusters do not aim at turning such economizing into private goods, albeit still aiming at efficient resource combination at the network level. Thus, to the extent that industry-wide information infrastructures and virtual clusters are institutional alternatives to online service delivery and trading platforms, they may be the socially more desirable forms. They may also be more difficult to develop since they cannot rely on profit as a motivational force at the network level. But they may also be the forms that are more interesting to study as they might turn out to be the ones that truly herald novel forms of organizing economic activities. The IS field has a long and strong track record of studying industry-wide information systems, albeit mostly at the level of inter-organizational networks rather than whole industries. Yet, since some time an interesting literature is shaping up around the concept of information infrastructures as infrastructuring that view information infrastructures not as socio-technical entities but as processes (Star and Ruhleder, 1996; Pipek and Wulf, 2009; Aanestad et al., 2014). This novel perspective seems to be well suited to the study of these phenomena.

Relationships between the Various Types of Transactions

Finally, on a more general level, our analysis so far has implied that new forms of organizing economic activities are limited to comprising only two types of transactions. Is it possible that these also comprise three or even all four types of transactions? In the 1990s, a lively debate has emerged in the IS literature in the wake of Malone et al.’s ‘electronic market hypothesis’ (Malone et al., 1987; Wigand, 2011), including a proposal known as the ‘mixed mode hypothesis’ by Holland and Lockett (1993), which posits that IT affords the possibility to freely combine ‘coordination mechanisms’, a term which roughly correspond to the notion of transaction types, into organizational forms. It seems worthwhile to explore whether there are systematic reasons for limiting the number of types of transactions or coordination mechanisms that can be combined in an organizational form. Closer inspection of all eight forms classified above suggests that, indeed, there might be such a systematic reason. Specifically, each pair of transaction types associated with an

institutional form is characterized by a one-directional constitutive relationship such that one transaction type creates the possibility for the other to operate:

- Hierarchy: rationing transactions (allocation of budgets) enable managerial transactions (combination of resources)
- Hybrid: rationing transactions (by the dedicated governance body) enable mutual adjustment transactions (investments in partner-specific assets)
- Cluster: Mutual adjustment transactions (specialization of all firms in view of the capabilities of the cluster as a whole) enable bargaining transactions (tapping into the pool of production capacities through short-term buying contracts)
- Exchanges: Managerial transactions (e.g. regarding the running of a price publication and clearing system) enable bargaining transactions (e.g. two-sided auctions)
- Online trading platforms: similar to exchanges
- Online service delivery platforms: Rationing transactions (e.g. imposition of requirements on drivers, cars, and clients, setting of prices) enable managerial transactions (e.g. allocation of resources to produce transportation services)
- Industry-wide information infrastructures: Rationing transactions (imposition of interfacing requirements) enable mutual adjustment transactions (e.g. alignment of production plans of supply chain members or of medication decisions of various healthcare providers)
- Virtual clusters: similar to geographical clusters

However, whether these relationships are coincidental or related to a deeper systematic reason needs to be explored in future research. This question may usefully be pushed forward by the IS field, even though it has implications in several related reference disciplines. The IS field has proven in the past that it is able to promote such a discussion and thus to also enrich its reference disciplines.

Limitations

Two limitations need to be mentioned. First, we have limited our analysis to cases that, in a broad sense, concern economic transactions. However, many interesting phenomena enabled by the Internet do not seem to be limited to or even concerned with economic transactions. To the extent that relevant emerging phenomena are not based on an economic logic they are indeed outside the scope of this analysis. Second, while we make use of the concept of ‘institutional forms’ (‘going concerns’ in Commons’ and ‘governance structures’ in Williamson’s terminology), our instantiations of various institutional forms are described through pairs of types of transactions. These make reference to how certain problems of coordination, in the presence of conflict and interdependence, are addressed but the concept of transaction cannot explain how institutional forms arise in the first place. As Ciborra (1996) has argued, Williamson’s analysis is incapable of describing how actors move from one institutional form to another since “transition costs” or, more broadly, organizational learning is not considered. The same limitation applies to our analysis. We suspect that this is related to the fact that the notion of transaction type does not consider Commons’ third principle, ‘futurity’, which refers to the expectation of continued and orderly exchange and cooperation. The IS field is replete with ‘visions’ that are often discarded as ‘hype’. However, this phenomenon seems to have a bearing on the ‘principle of futurity’ and, as such, be related to the question of how institutions emerge and, indeed, what makes an institution an institution. This question is also left unanswered by our analysis.

Conclusions

The concept of two-sided networks has, so far, primarily been used to derive prescriptive statements addressed at intermediaries who bring together the various user groups that constitute the phenomenon of two-sided networks. No effort has been made to study the phenomenon from an institutional perspective. In this paper, we have made a first step in this direction by extending the analytical apparatus developed by John R. Commons to describe and classify two-sided networks. As an intermediate step, we have also shown how the institutional forms of organizing economic activities proposed by Oliver Williamson, who himself drew on the works of Commons, can be mapped onto our classification scheme. In doing so, we have related a broad range of institutional forms to one another in a systematical manner which opens up interesting directions for research in two ways. On the one hand, our framework suggests that certain institutional forms can be considered as “discrete alternatives” (Williamson, 1996) which, so far, have not been related

to one other in this manner. On the other hand, our framework also suggests that the concept of two-sided networks foreshadows a new, higher-order form of organizing economic activities that may replace contemporary familiar forms such as hierarchical firms and long-term relationships between firms (hybrids). We will briefly highlight interesting and relevant questions that are suggested by these possible directions for future research.

The literature on two-sided markets has treated specific instances of two-sided markets as possible applications of a general optimization logic. However, it has not yet studied whether these instances are related to one another in a systematic fashion. Our discussion suggests that, indeed, such systematic relations may exist. Specifically, virtual clusters and industry-wide information infrastructures can be seen, within certain limits, as institutional alternatives to online trading and service delivery platforms respectively. The differences in both cases consist of using a non-managed type of transaction that we termed a ‘mutual adjustment transaction’ instead of a managed type. Specifically, online service delivery platforms use managerial transactions whereas industry-wide information infrastructures use mutual adjustment transactions to combine resources efficiently; likewise, online trading platforms use managerial transactions and virtual clusters mutual adjustment transactions to create the conditions of possibility for conducting bargaining transactions. It is worthwhile to study under which conditions these institutional forms are, indeed, functional substitutes. Moreover, from a normative perspective, it also seems desirable to explore how the non-managed forms can be strengthened vis-à-vis their managed siblings that, so far, capture most of the attention and imagination of the IS community. In short, our paper points to a phenomenon that has been neglected and that is both interesting and worthwhile to explore in more depth.

More generally, our paper suggests that two-sided networks are not just a new form of organizing economic activities that is now available to entrepreneurs in addition to established forms but that two-sided networks may indicate an imminent substitution of contemporary forms through new, higher-order forms of organizing economic activities. In fact, as observed above, Rochet and Tirole (2006) have suggested that the concept of two-sided networks can be used also to analyze economic relationships within traditional hierarchical firms, suggesting that the concept is broadly applicable. We suspect that the possibility of such application is rooted in an expanded perspective that the concept affords such that, with hindsight, it seems that hierarchical firms organize economic activities in a manner similar to a specific type of two-sided network which we call online service delivery platforms. Moreover, our analysis suggests that for each of the four ‘traditional’ forms identified by our framework there is a variant of a two-sided network that may eventually replace it, or evolve from it. These new forms cannot be reduced to traditional forms because they significantly expand the reach of purposefully organized economic activities; they are thus higher-order forms of organizing economic activities (i.e. of “going concerns” in Commons’ terminology). It seems worthwhile and urgent to explore this possibility from a number of disciplinary perspectives, including competition theory and law, industrial relations, organizational and management studies, and information systems. Regarding the latter, it is especially interesting to explore the extent to which these new forms are enabled by information technology and thus the extent by which IT can be seen as facilitating, if not determining, changes in organizational structures. The lively debate on how IT might affect the organization of economic activities that was characteristic of the IS literature in the 1990s may fruitfully be referred to and broadened, promising to contribute to the reference disciplines such as economics and organization studies. Since some time, the field of information infrastructure studies has become increasingly attractive to a number of IS scholars as this concept allows for transcending the boundaries of small-scale projects and narrow IT effects that calls for rigorous research have imposed on IS researchers. Phenomena such as virtual clusters or industry-wide information infrastructures, shown to be potentially important by our paper, call for a resolute broadening of traditional IS concerns in order to be able to continue to make relevant contributions to organizational practice and theory.

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