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ICT from a Commons Perspective

Introduction; the problem with markets

Markets cannot explain the full range of exchange, and “market failure” and its consequent policy responses, is inadequate for the analysis of the economics of ICT, of infrastructure, and indeed for much else. Furthermore, normal approaches to the analysis of exchanges leave us with distinct problems for two areas that are central to our present concerns: the dynamics of changing industrial structures and incentives for innovation (Arrow, 1992). In this paper we will show how markets can best be seen as a part of the commons and how their efficiency is dependent on the wider systems of governance that characterize commons. This paper should be read in conjunction with Hogendorn & de Fontenay (2005), which applies this thinking to the modeling of entry and vertical disintegration, and de Fontenay (2005) which applies this thinking to the theory of vertical integration, and de Fontenay, de Fontenay & Pupillo (2005) which applies it to the economics of peer-to-peer.

It is not that digital goods or networks of networks has changed the character of exchange, rather they have forced us to reconsider the accumulated anomalies that appear as we attempt to accommodate all forms of property rights exchange into a single coherent model (see Arrow 1974a, b). When we normally speak of “markets” we have a wide range of concepts in mind that rest on a set of relationships among exchanges of property rights for things that are variously rival and excludable. Markets analysis

applies to transactions for congestible excludable goods, but many more goods are partially congestible than is normally considered and the institutional mechanisms of such exchange can vary tremendously. Indeed, there are many categories of exchange that are simply neglected (such as gift relations), excluded (such as public property) and regarded as non-market forms of exchange (such as irrigation systems in many countries). To account for dynamic characteristics of the sort we see in ICT, we need a form of analysis that takes into account the full range of situations of exchange. This we find in an extension of the analysis of common-pool resources.

This form of explanation will allow us to do many things that concepts of markets do not address well, and it provides a coherent model of transactions ranging from retail markets to derivatives markets to firms and their hierarchies to infrastructures and state-owned property to un-owned common resources. To begin with, it provides us with the tools to understand much better the rival and excludable characteristics of a wider range of property rights, their contexts and change over time. More significantly, perhaps, it allows us to apply a consistent form of analysis to the broad range of means of exchange. Most significantly, it allows us to understand how transformations take place dynamically from one form of exchange to another.

We will overcome the limitations of static forms of analysis by showing how to adopt a dynamic view of the commons, evolving through influences that come from changing contexts as much as through processes of learning and accommodating. We will also explore how the key elements of context, in particular the role of governments, provide the infrastructure for exchanges that are best viewed as aspects of governance. This is best seen in the case of infrastructure, including the legal, procedural, and fiscal practices that affect the conduct of transactions and provide the incentives for innovation.

This ability to understand the characteristics of a wider range of exchange conditions gives us the analytical ability to see how differing, and potentially improved, forms of governance might be applied. This would afford us the consistency needed in the application of our analysis of transformations to allow us to compare different market

forms and determine which might operate best under certain conditions. We see the utility of this in the analysis of policies towards goals such as telecommunication network unbundling and strategies such as those applied to peer-to-peer technologies. The goal, which is beyond the scope of our current concerns, is to model the infrastructure of exchange and governance (and to steer a course between extreme eclecticism and narrow causal models of interdependencies, as Fligstein, 2001, points out).

“Commons”

There is a basic misconception in the literature on the commons that arises out of the assumption that it is an extremely limited concept. What characterizes exchange is fundamentally the transference of property rights and it is our intention to establish the general case and to identify the benefits of such a view. Property rights can be moved in a large variety of ways, and there are many kinds of property, from portable goods that can be owned, to land and that which is kept (livestock) grows (flora) or is built there (or even that which flies over or walks across it, as with game). These concepts change in response to factors such as government legislation, regulations, customs, and technological changes. But property rights also include a variety of opportunities to use assets in others ways, such as harvesting a renewable resource (as with fisheries) and acquiring a legitimate means to have access to resources normally controlled by states (as with the use of radio spectrum) or rights to use land, air and water in a variety of ways (for example with rights-of-way for passage, or the discharge of effluent or heat (considering the constraints on polluting air and waterways, and on the utilization of power sources where wind and waterfall (dams and weirs) may be exploited. These are all forms of exchange and they all have in common a set of characteristics that are fundamental to what is normally regarded as both “commons” and “markets”—characteristics that can generally be called governance within a jurisdiction and the norms (and associated rules) of the transference of property.

The problem is that for some kinds of property rights exchange we imagine the existence of markets (and a wide range of analytically incommensurate kinds of markets), and for others we imagine the existence of a similarly wide range of analytically incommensurate

kinds of commons. In doing so we abandon much of what is useful in the analytically commonality, and by differentiating into incommensurate kinds we render impossible a coherent concept of dynamism that is needed when we speak of the transformation of, for example, commons into markets or the other way around. Given that property rights usually involve many parties (including the surrounding society, dispute resolution mechanisms, etc.) and involve restrictions on the liberty of some to the benefit of others, they are never optimal (Demsetz 1969, Arrow 1974, Coase 1960).

Our goals in this analysis include:

1. Taking into account characteristics of property rights that are typically neglected (Sidak & Spulber 1997), misunderstood, treated unevenly and/or imposing unrealistic restrictions (Coase 1960, Arrow 1986).
2. Articulating the most important characteristics of governance that affect the balance between innovation and stability.
3. Incorporating an understanding of dynamic capabilities to operationalize rights management.
4. Dealing coherently with transformations from one form of exchange to another, as with the “marketizing” or “liberalizing” of monopolies or state controlled property rights—and indeed the other way around when property rights are taken out of markets and brought under state control or monopolized.

Those of us of a certain age will remember the discussions around Garrett Hardin’s galvanizing paper of 1968, “The tragedy of the commons”. In that presidential speech to the Association of Mathematical Biology, Hardin described how population pressure could disrupt an ecological balance that had sustained productive use of English grazing lands for many hundreds of years. Demographics, he warned, can and would undermine sustainable resources. There were a number of problems with the argument as he presented it, not least, from our perspective here, his misconstrual of the basic property rights situation of the English common and village green. The fact that lands in a feudal society are the right of feudal lords (either local, absent, or Royal) is not irrelevant to the unfolding of the argument about property rights to follow. Nonetheless, in a follow-up

article in *Science* thirty years later, Hardin did re-cast the argument as a particular form of the failure of governance, pointed out that not all commons lead to tragedies, and specified some managerial principles that sustain ecological and other forms of balance.

Hardin's arguments have spanned many applications, some yielding extremely interesting results by the application of game theory to cases such as fisheries and guiding the management principles of national parks and forestlands. What Hardin understood from the outset is that incentives to act are at the heart of the transformation of norms of behavior within the commons, either personally motivated by greed or ambition or institutionally shaped or pressured by ecological conditions. This soon became transformed into a program for the application of game theory to this and kindred problems. What others perceived, and Hardin recognized in his paper thirty years later, is that governance is the determining feature. He also saw that not all commons, even those under population pressures, lead to tragic results.

The currently accepted general view of the commons is well expressed by the legal scholar, Yochai Benkler:

“Commons are a particular type of institutional arrangement for governing the use and disposition of resources. Their salient characteristic, which defines them in contradistinction to property, is that no single person has exclusive control over the use and disposition of any particular resource. Instead, resources governed by commons may be used or disposed of by anyone among some (more or less well defined) number of persons, under rules that may range from ‘anything goes’ to quite crisply articulated formal rules that are effectively enforced.” (“The Political Economy of Commons”, *Upgrade*, Vol. IV., No.3, June 2003)

This position is appropriate for the most part, and indeed Benkler's comment on the limitations of access and the application of rules is the key to further institutional analysis. Certainly we see the possibilities of limitation to persons with economic stake in a commons, and a set of rules that includes a wide range of property rights conditions and exchange regimes.

Another legal scholar, Brett Frishmann in extending Lessig's notions of a "Creative Commons" writes:

"I am intentionally abstracting from the institutional form (property right, regulation, norm, etc.) in order to focus on a particular institutional function (opening or restricting access), the management principle itself. Tying form and function together obscures the fact that the management principle can be implemented through a variety of institutional forms, which are often mixed (property and regulation, private and communal property, etc.), and not necessarily through particular forms of property rights. For example, as we will see . . . , environmental, information and Internet commons are sustained through very different sets of institutional arrangements. Ultimately, the optimal degree of openness/restrictiveness depends on a number of functional economic considerations related to the nature of the resource in question, the manner in which the resource is utilized to create value, institutional structures, and the community setting." ("An economic theory of infrastructure and sustainable infrastructure commons" Frischmann , Brett M., "An Economic Theory of Infrastructure and Sustainable Infrastructure Commons" *Minnesota Law Review*, Vol. 89, April 2005

The important feature of our approach is that it goes beyond the designation of commons as common pool resources of the type associated with state-owned properties or un-owned resources such as the air and oceans.

The key elements of commons are not that access is free or that the resources are available to everybody. Indeed, the more carefully we look at commons the more we see how rare and partial those characteristics are. What characterizes commons at the root are attributes of transactions that are more efficiently dealt with through norms than by full economic costs, and that are governed by social conventions, sometimes formalized and sometimes not, but in all cases determining of the economic behavior in such a way as to accommodate much more than the incurred costs.

For some classes of goods and services, infrastructures and resources these characteristics are easier to describe than for others.

As we are working within the scope of evolutionary and institutional economics, we agree with Frischmann that infrastructure should be modeled as a commons. We can also show that applying this commons thinking brings us a number of useful tools of analysis that go beyond concepts of commonly held property and explains behaviors and strategies for corporate actions, too.

Of particular importance is the insight that a notion of the boundaries of economic factors that shape actions. Whereas neoclassical economics stresses the utility of separating out all factors that complicate a model that shows static balance, our approach stresses the broader significance of endogenous factors and the complex of relations that together constitute the dynamic character of property and decisions about property rights. One good example of the specific aspects of telecommunications infrastructure seen from the commons perspective is where market failure is concerned.

Market failure is a central concept for regulation, indeed it could be said that regulation is solely intended to compensate for or preempt market failure. But if we recast our image of markets to include the actions that firms take by, for example, investing resources to influence governments and the society at large, then lobbying can be viewed as part of the inherently dynamic nature of strategic choice in the use of property rights. Our argument takes a strong form: markets are subsets of commons. That means that markets can be compared within a unified analytic structure, and dynamic characteristics can be taken into consideration.

This argument may be most easily applied to familiar instances of the common-sense notion of the commons, grazing lands and fisheries. We can also see why the works of Ostrom and others has addressed national parks and forestry lands (sometimes privately owned, sometimes leased, sometimes licensed for logging). Frischmann's application to infrastructure is a measured extension of the notion, and we can take his approach

considerably further to apply the analysis to utilities, government sanctioned monopolies (or pseudo-monopolies such as the arms industry), and business associations. But the notion of the commons as a model for exchange of all types can be applied to more unfamiliar cases, including bazaars and shopping malls and the stock exchange. The most common forms of exchange, wholesale and retail sales not only benefit from this form of analysis, again we can learn more about the transformations possible from one form to another as a matter of business strategy. When we get more used to the application of these ideas they provide new insight into the firm, extending the theory of the firm from transaction analysis to broader questions of institution building and governance.

Transformations and innovation

Transformations and the analysis of dynamic capability are the most important and challenging problems for the application of the commons. This in particular is important in explaining the ways in which exchanges are shifted from the legacy of monopoly or state control to various forms of competition, and gives us better guidelines for the application of regulation in conditions of market failure. One of the most intractable problems has been to guide monopolistic suppliers into more open systems of exchange. This is all the more clear where technology makes competition feasible where previously it might not have been. That is at the heart of many arguments about the changing nature of digital property rights.

Transformations arise at every stage in the analysis of economic development, most starkly in the transition economies of the former Soviet Bloc. They arise in the processes of changing economic activities in China and India and other economies that are undergoing rapid alteration. They also arise whenever policies are applied to transform markets from highly regulated to lightly regulated or to liberalized governmental controls. They also arise when national goals such as the improvement of infrastructure are translated into market-based activities. And they arise when monopolies are broken up with the intent to liberalize trade in a particular sector. We see them at force when

new forms of exchange challenge assumptions about property rights and mechanisms of exchange, as with peer-to-peer business models and community WiFi.

To be able to go further in our analysis of the commons, we need to clarify, at least in general terms the concept of market. Milgrom and Roberts (1992) define the “neoclassical market model” in terms of an organization of the economy where “consumers/resource suppliers, whose needs and wants the organization tries to satisfy, and productive units (firms) that purchase resources (including labor services) from consumers, make products consumers desire, and are owned by consumers (either directly or indirectly).” For them, markets include situations where one of the parties has imperfect knowledge about the commodity that is traded, i.e., where there is adverse selection even though, in those situations, markets cannot be shown to be efficient. Therein lies an inherent contradiction with the principle that markets embody economic efficiency.

The economic literature has defined markets as the alternative to a socialist, centrally planned economy. However, within the neoclassical model, both models give the same results. It is only when one deviates from the conventional hypotheses that differences emerge. This is the case of Hayek for whom markets are able to generate information that is not available to central planning (Milgrom and Roberts, 1992). Yet, Hayek’s solution is inadequate since there is nothing more than a blind faith in the spontaneous order to eliminate the possibility that, in a market economy, concentration and market power would result, at the limit in central planning (Bowles 2004). In addition, Hayek’s market is ill-defined since it is not clear what information a “perfectly competitive market” generates beyond what would be available to a central planner.

The new institutional economics since the pathbreaking work of Coase (1937) addresses the trade-off between centralized decision-making and decentralized, market-based decision-making. This deviates in many ways from the neoclassical model. It presumes that different firms that compete may select different organizational forms, some integrating vertically and others using intermediate markets. The approach also assumed

that the vertical organization of those firms that choose to be vertically integrated does not weaken intermediate markets that are used by those firms who choose to use them. Those models, however, do not explain how different organizations would emerge nor what happens when such competitive assumptions are relaxed. In other words, the new industrial economics is not better positioned than neoclassical analysis in dealing with market failures.¹

From the neoclassical economic analysis of markets, Hardin's model is the result of a market failure due to free-riding (Milgrom and Roberts 1992)² because it is a situation where a single resource is shared among consumers. Such a situation is perceived as creating an incentive for parties to overuse the resource, hence, Hardin's title.³ From conventional economics (as well as conventional political science) one concludes is that no rational, self-interested person would accept to contribute to a public good of their own free will (Olson 1965).

We can look beyond the conventional economic analysis of markets and see an alternative analytical model capable of reconciling the apparent paradox between the free-riding result and everyday observations. Ostrom (2000) uses that literature to challenge the conventional economic models that are built exclusively upon self-interested, rational people, what she calls the "rational egoist." Empirical results from experimental approaches support the conclusion that markets based upon "rational egoists" à la Adam Smith work well in some situations such as auctions and where the market is highly differentiated and competitive. Outside that scope, those models fail to address what happens empirically in the context of collective actions, confirming everyday observations.

¹ There is at least one exception. Williamson (1985) show how a licensed monopoly would generally be able to gain a significant competitive advantage where the license is periodically placed back for competitive bids.

² They note that the problem is also called "the common-resource problem, the public-goods problem..., and the tragedy of the commons" (p. 294).

³ The problem is due to a commodity that is characterized by rivalry and non-excludability.

Bowles (2004) considers the generic efficiency problem economic organizations face by defining a broader framework that includes markets, state, and communities. In his model, institutions are the decisive force that determines the relative merits of those organizations, hence those that will generally be chosen. In this paper we use Bowles' framework as a generic structure within which we are able to define the commons. The commons in our analysis is the set of all possible economic exchanges that are "managed" (to use Hardin's 1998 terminology) within a given society. That is assumed to have a government with the coercive power to enforce laws and regulations. It follows from our definition that free markets as conventionally defined in economics are only a subset of commons.

Historically, it is easy to find examples where commons organization resulted in market failures (Bowles 2004). However, a more careful analysis of the commons reveals a very rich institutional arrangement that supports economic activities that generally tackle successfully the inherent flaws Hardin (1968) had identified: non-excludability and rivalry. It follows that it is an institutional setting that can have very attractive properties and achieve significant economic efficiency (Hardin 1998). It is an approach to the governance of resources that enlarges the scope of trade beyond the conventional free market organization and has the potential to resolve existing market failures through institutional arrangements.⁴ Our approach is consistent with Hardin (1998) who has revised his original treatment of the commons, noting that his original treatment deals with only "a subset of commons," namely those that are "unmanaged."⁵

Commons do not imply efficiency, nor do they imply optimization. However, commons include all efficient outcome, whether market-based, based upon central-planning allocations, or, still other arrangements that can be government and/or community-based.

⁴ We use the term "market" the way it is used in economic analysis (Besanko et al. 2000). The key dimension of markets is that two parties trade with one another, i.e., agree on a price for the transfer of some property rights between two parties.

⁵ As Hardin (1998), our definition does not require for the goods traded within a commons to be owned by the community.

Our definition of the commons incorporate the role of institutions and the inherent role of governments as a means to enforce private contract and resolve conflicts in a free market system. For instance, it recognizes that a market outcome that is efficient, within the realm of conventional economics, in New Zealand needs not be efficient in the U.S. for the simple reasons that institutions differ between the two countries.

As illustrated by Hardin (1968) commons can fail. It is also true that economists often underestimate the resourcefulness of societies in finding free market solutions as shown by Coase's lighthouse (1974) and Cheung's fable of the bees (1973). However both Hardin on the one hand and Coase and Cheung on the other hand restrict their analysis to a subset of solutions, free markets, within the set of commons solutions. In additions, just like the English commons may have failed in the late seventeenth century, there are market failures that economists have not considered such as the market failures that one observes in time of crisis (Leonard, 2004) and the existence of alternative solutions, namely, commons-based solutions as demonstrated, for instance, by Sengupta (2001) and Ostrom et al. (2002).

More significantly, we argue that free markets as they are defined in economics are generally deficient because they fail to consider a number of dimensions, for instance, where the cost of everyday commodities vary in more dimensions than those in terms of which they are commercialized. This can be illustrated by the following example. Consider a local telephone call. In New Zealand, residential service is based on a flat rate while, in Australia, local calls are charged by calls and, in Switzerland, they are charged by the call's duration measured in minutes. This means that, from the strict interpretation of a conventional economic analysis, a call is not priced at the margin. Such a call is a commodity that creates some costs, at the margin, in terms of a number of dimensions, say, peak hours and duration, a function that is not even linear with time.

Commons typically emerge to address market failures that arise, for example, in the context of public utilities. While Cheung, Coase, and others such as Williamson (1985) have stressed the role of transaction costs, they have treated situations where market-

specific transaction costs are so high as to foreclose the use of markets. Even where they may have emerged as in Coase's lighthouse example, their costs characteristics often suggests that they may not be particularly efficient outcomes. It is in those situations that commons have provided non-market-based solutions that achieve much lower transaction costs. Sengupta (2001) has studied a commons that is somewhat unique because of its size and because of its survival over 4,000 years, the irrigation system in xxx South of the Ganger river. In Sengupta's social system (a complex commons with private and public elements) as in Coase's private factory (a privately owned commons), it is typically the commons' ability to achieve low transaction costs that makes it so attractive.

The low transaction costs are achieved through a diversity of social and human idiosyncrasies such as the ability to develop routines, to adopt customs, to integrate within one's language and/or religion,... dimensions that may benefit the members of a community by such factors as creating trust and/or reducing the significance of incomplete contracts. Those are also the dimensions that make the analysis of the commons so important to the understanding of networks, infrastructure, and behaviors such as p2p. The limited experience we already have with p2p suggests that it will be our ability to lower transaction costs that will enable us to derive the full benefits of this new technology and it is the economics of the commons that points to new ways to look at the transaction cost problem that may help us work out those problems in a p2p environment.

The problem of the commons is not new to economics.⁶ Hardin defends Malthus and attacks both Bentham and Adam Smith. However, it contains an ambiguity as

⁶ Hardin considers a commons, i.e., a public place in the village where some of the people would be entitled to bring their cattle to graze and he makes the simple observation that, through time, as the population grows, the commons will eventually be unable to sustain that growth. Hardin's point is that, individually, those cattle ranchers do not have any incentive to save on the public resource since the commons is free for them individually.

Evidently, as illustrated by Bowles, there is no reason to assume that the cattle ranchers, both individually and as group, do not appreciate their predicament, i.e., the dilemma the commons create for them individually. They are likely to be able to observe first hand the damage their actions cause to the commons. They are also likely to know that they may even damage their long-term prospects. However, in the absence of a coordinating

demonstrated by those attacks. It is based on the presumption of a static world in which the ways resources are used is finite. He effectively assumes away the possibility that humans could develop new ways to use the earth's resources such that the depletion of the resources does not diminish the benefit humans can derive from those resources even though that quantity is continuously decreasing. But his formulation cannot be dismissed as a simple problem of free-riding.

Coase and Cheung start from real world situations that are or have been dealt with adequately at one time or another by a free market mechanism with independent individuals trading. Coase and Cheung acknowledge that, in some situations, the market system may not always be the most efficient and they recognize that a government solution may be, at times, more efficient. The point they are making is that one should not, a priori, dismiss the market mechanism.

We know a great deal about market failure; the threats, the role of regulators, the expectation that government can and should step in to mitigate the effects of distorted markets. However, as pointed out by Kenneth Arrow in *The Limits of Organization* (1974), there is a disjuncture between the normal analysis markets and market failure, and this reduces our ability to assess steps taken by regulators, fiscal policy, or other forms, to assist in transformations. In this paper we have set out the agenda for a more comprehensive form of analysis based on the concept of the commons.

mechanism, it may not be rational for any one of them to do something about it because those who take the initiative and try to correct the problem of the commons on their own may suffer damages for which they are not compensated. Bowles (2004) considers a number of commons-like situations in various settings around the world and shows how local societies have at times been able to solve through various means such as customs, routines, and other means. In other situations, societies have been unable to resolve the issue in a satisfactory manner.

Bibliography

Arrow 1972, 1974, 1995

Coase 1960, 1988

Densetz 1969

Dyer 1997

Fligstein 2001

de Fontenay, Liebenau and Savin (2004)

de Fontenay (2005)

de Fontenay, de Fontenay & Pupillo (2005)

Harind 1968, 1998

Hogendorn & de Fontenay (2005)

Krishnan 2003

Lessig 2002, 2005

Olsen 1965

Ostrom 2001

Sengupta 2001

Sidak & Spulber 1997

Spulber 1999

Stigler 1951

Tullock 1975

Williamson 1985