

Commons, Social choice and Welfare: the limits of private Property Rights system.

This paper aims to demonstrate that the institutional approach, more specifically the seminal works of Williamson (2000, 2002) and Ostrom (2000, 2005), enables us to highlight the limits of private Property Rights (PR) systems. The former highlights the specificities of the assets and the fact that, intrinsically, the contracts are incomplete; the latter studies more specifically the different forms of social organization based on collective systems of PR. In this sense, this paper aims to propose an alternative to the analyses of the New Law and Economics, which advocate modalities of private negotiation.

The concepts developed in this study may be applied to different social activities: environment, information, knowledge, culture, scientific and technological production, microcredit banks and so on. However, the study will be focused on the digital economy: the economic nature of goods, the new forms of property, the impossibility of implementing a private system of PR, and the development of all kinds of communities online are elements that highlight the importance of the commons in such economy. This study will highlight the importance of these collective components in the way markets are concretely working.

The problematic are the following: identifying the different variables that determine a function of Social Welfare; and defining the *viability* of a mode of governance based on the compatibility between the PR system and the economic nature of goods, which will determine the level of transaction costs, the level of the stock available for the community and, consequently, the level of Welfare that characterizes the mode of governance. The Coasian analysis will be studied based on this approach.

In the first part, I will show how the economic literature conceives the problem of the commons and anticommons, and why this directly concerns the digital economy. In the second part, I will specify the different elements necessary to construct a collective function of Welfare. Then, I will define the viability of a mode of governance and show how this theoretical framework enables choosing a specific mode of governance.

I) Tragedy of commons, tragedy of anticommons and (Intellectual) Property Rights (IPR): a primary approach

1) *Commons versus anticommons?*

When there is a common good in a particular community (ecological components, natural resources, etc.), private appropriation may damage the whole collectivity: this process may result in a decrease in the stock available for the other agents.

Hardin (1968, p. 1243) explains the failure produced by a common property by the absence of an institutional system able to preserve the common good. For example, if a lake is this common good, every fisherman will maximize his gain, which will compromise fish reproduction. The solution consists in implementing a *coercion principle*: the private property of the common good will prevent stock depletion. Hardin analyzes the *enclosures* of the 18th century from such perspective.

The limitation of this thesis may be explained by the following elements:

i) There are other means to regulate the social appropriation of the commons. This social appropriation takes place through social convention and rules, and it cannot be associated to open access regimes (Ostrom, 2000, p. 335). This form of collective property results in establishing explicit or implicit rules and conventions that all the community members should respect so as to control and prevent opportunistic behaviors. These rules and conventions allow limiting the level of transaction costs necessary to control

opportunistic behaviors. Regarding the end of the systems based on common property of the land, in the 18 and 19th centuries in England, the failure of the collective system comes from the actions of richer farmers (Cox, 1986, p. 60), i.e. from the private appropriation of the common good, and not from the collective system of property rights.

ii) We should distinguish the situations in which the goods are private and divisible from those in which the goods are public. The mechanism described by Hardin only makes sense if the goods are private and totally divisible: “the benefits consumed by one individual subtract from the benefits available to others” (Ostrom, 2000, p. 337).

On the other hand, when the goods are public, the positive externalities depend directly on the number of users/participants. In the case of the communication networks, for example, these network externalities are characterized by the positive correlation between the number of participants and the utility of the service (Katz and Shapiro, 1985). We can observe the same mechanisms in regard to the software industry, more particularly in the free software industry, and in the peer to peer systems where digital archives are shared (Herscovici, 2007).

When the goods are public goods, private PR may cause significant “market failures” for the following reasons: the private appropriation introduces an exclusion process; decreases the number of participants and the indivisible “quality” of the service available for all participants of the community; and limits the positive externalities produced by this system: the privatization of Scientific Commons produces these effects (Nelson, 2003). On other hand, the level of transaction costs necessary to prevent and control the opportunistic behaviors linked to the non-rivalry of these goods is too high (Demsetz, 1964, p. 16). In order to decrease the transaction costs to a level compatible with the production of such good, the solution consists in modifying the nature of PR and, eventually, the mode of governance.

The anticommons (Heller & Eisenberger, 1998) take place when knowledge is fragmented among various IPR holders. We can consider that two complementary segments constitute the technological process: *a* and *b*. If, for example, there are two PR holders, A and B, and if A lowers its price, A and B’s demand will increase, even though B has not lowered its price. So, the IPR price necessary to use a particular technological innovation will be higher in this case compared to the situation in which there is only one PR holder. This *externality of demand*¹ will produce coordination failures and result in a decrease in welfare, regarding competitive price. This situation is characterized by *subadditive costs*.

My interpretation will explain these failures based on the incompatibility between individual appropriations linked to a private PR system and the production of non-rival and non-exclusive public goods. The tragedy of the commons may be explained by the contradiction between communal right and private rights.

Barzel (1997, pp. 4 and 5) defines transaction costs as “(...) the costs associated with the transfer, capture and protection of rights”. This means that the PR system should be compatible with a particular level of transaction that enables the effective production and distribution of these goods. Thus, the following contradiction can be seen: if the PR are totally delineated, the transaction costs are nil, and it is not possible to explain the existence of the firm (Coase, 1937). We are in a neoclassical situation, without firm.

¹ They are close to the externalities of demand defined by the New Keynesians.

This definition seems Williamson's: transaction cost may be defined "by safeguards, which include penalties, information disclosure and verification procedures, specialized dispute (such as arbitration) (....)" (Williamson, 2002, p. 183).

The tragedy of the commons and the tragedy of the anticommons are explained by the incompatibility between the economic nature of the good and the PR system: in the first situation, the discrepancy between social welfare and private interests is explained by the fact that the collective PR (or the absence of PR) are incompatible with the private economic nature of the goods. The second situation is explained by the fact that the private PR are incompatible with the public nature of the goods. Both situations are socially inefficient.

This approach highlights the fact that the economic dimension of the PR is defined as "socially recognized rights of action" (Alchian, Demsetz, 1973, p. 17) related to a particular asset and to the economic and social results of this action (Coase, 1960).

2) *Intellectual Property Rights and new forms of Intellectual Property*

It is in digital economy that the efficiency of the commons is most representative. The systems based upon sharing information and cultural goods may be socially and economically more efficient than the systems based upon private property and individualized supports. In regard to the music industry, for example, the traditional analysis of the cultural industries is based on a private Intellectual Property Rights (IPR) system, directly linked to private (or semi-private) forms of appropriation; to individualized material supports (books, CDs, and so on); and to individualized payments from the consumers. However, the modalities of social appropriation have changed and became collective. As the mode of appropriation has changed, the IPR system and the funding arrangements have to change (Romer, 2002). From a general point of view, digital economy development is characterized by a double movement: *the transformation of the nature of goods and services and the transformation of the IPR forms*.

On the one the hand, most of these goods and services are public goods, whose principal characteristics are their non-exclusion and non-rivalry. The economic dynamics consists in internalizing the network externalities that appear in these markets. In regard to these specificities, it is not possible to maximize microeconomic profit function equaling marginal cost and marginal product (Herscovici, 2008). These markets are not Walrasian, and their dynamics do not consist in selling private goods, but rather in negotiating the access to the networks in order to "capture" the consumers/users and to distinguish the public regarding the different groups' propensity to pay (ibid).

These new strategies consist in developing, at first, free or almost free services for consumers. This mechanism permits creating the network and the corresponding externalities, as well as disclosing the necessary information that the price system hides.

There are various examples that illustrate this kind of strategy:

- i) Several software producers make some particular software available for a limited period of time;
- ii) Some economic studies determine the piracy level in order to maximize the producer's profit;
- iii) All free software programs (such as Linux and Google) are other examples;
- iv) When it comes to the immateriality of the diffusion support, in the case of peer to peer networks, more particularly in the music sector, it is no longer possible to control and limit piracy (Herscovici, 2007).
- v) Finally, new collective IPR forms appear: the various kinds of Copyleft may be interpreted as *collective property forms*. In regard to open-source software, the GPL (General Public License) produces spill-over effects: if a software component protected by such a license is incorporated into another software program,

this new software program has to be protected by the same type of license. The creative commons represent another form of collective property. The authors cede some of their private rights to create a public good (Ostrom and Hess, 2007, p. 17).

II) The function of Social Welfare

1) *The construction of the Social Welfare function*

The aim of this formalization is to construct a Social Welfare function, i.e. to identify the main determinant variables and ultimately show to what extent the type of governance determines social welfare. According to the epistemological and methodological choices made in this paper, I will study the different social systems concerning the compatibility/incompatibility between institutional and economic variables, regardless of micro or macro maximization mechanisms.

This function depends on the following variables: the quantities consumed individually (q_i), the level of the stock available for the community (N_j), the level of transaction costs that correspond to the mode of governance (TC), and the exclusion mechanisms, Ex . These are determined based on the current PR system: a private PR system will implement the exclusion based on the prices conditioning individual consumption, i.e. access to the available stock.

$$U_{wt} = \Phi (q_i, N_{jt}, TC, Ex) \quad (1)$$

We can write the following relations:

$$dU_w/dq_i > 0 \quad (2)$$

$$dU_w/dN_j > 0 \quad (3)$$

The components linked to production activities are embedded in this function through the stock level. The relations (2) and (3) show that social welfare increases when the level of the stock and the individual consumption increase.

The effects of intensification in the exclusion mechanisms are more complex, and they depend on the nature of the goods that compose the stock.

The tragedy of the commons may be expressed by the following relation:

$$dU_w/dEx > 0, \text{ when the good is private.} \quad (4.1)$$

Here, the exclusion allows preserving the future consumption: it is an intertemporal choice of consumption of scarce goods.

When the good is public, in the sense defined by Samuelson (1954), the effects of the exclusion are differentiated. As consumption generated no congestion, we can say that:

$$dU_w/dEx < 0 \quad (4.2)$$

In regard to the indivisibility of the good, the exclusion decreases social welfare. This mechanism is broadened when there are network externalities (Katz and Shapiro, 1985): regardless of the consumption level, the exclusion decreases the indivisible quality of the good. The same can be observed in regard to activities showing cumulative features such as the scientific and technological production (Nelson, 2003). This is the case illustrated by the tragedy of the anticommons.

When it comes to experience goods, the relation (4.2) is also verified: as the price system does not transmit the information related to qualitative components, we must share the experience of all the users in order to increase the utility of consumption. Thus, the higher the number of users, the greater the utility of each user. This is a specificity of the electronics networks, both hard and software. In this regard, we can observe the fundamental economic role of the different communities online.

$$dU_w/dEx > 0 \quad (4.3)$$

When the consumption reaches a critical value, *congestion effects* arise: the indivisible quality decreases for each user. Here, the exclusion, which allows limiting consumption, can be implemented based on the price system or other institutional criteria: rules, coercion principles, and so on.

There is a negative correlation between transaction costs and welfare.

$$dU_w/dTC < 0 \quad (5).$$

2) *The different components of the Social Welfare Function*

2.1 The level of the common goods stock may be expressed by:

$$N_{jt} = \Omega (L_p, L_s, N_{jt-1}, Ex, q_i) \quad (6)$$

The first three components of this function are directly related to the amount of labor necessary to maintain this stock.

Part of this labor is paid (L_p), part is not (L_s). L_s may be explained by the mechanisms related to all forms of social or cooperative economy: the free software, peer to peer networks, among others. On the other hand, some of these activities are characterized by the cumulative nature of production: the input needed to produce knowledge is knowledge itself. So, (a) the production has a cumulative character, and consequently (b) part of the labor is not paid, which explains *the presence of positive externalities*.

The cumulative character of production can be described by the following equation:

$$N_{jt} - N_{j,t-1} / N_{j,t-1} > N_{j,t-1} - N_{j,t-2} / N_{j,t-2} \quad (7)$$

for the same quantity of labor applied in this sector

The problem of labor remuneration, and thus the PPR system that allows paying for this labor, is directly related to the economic nature of good. (a) In case of a divisible private good, the PR system has to be coupled to the value, i.e. the payment of the final consumer. (b) In case of an indivisible public good, as the creation of value is not created in the act of consumption, we must pay the labor from the value generated at the level of different intermediate markets, i.e. from the value created by selling space to different advertisers. Again, we must emphasize the necessary compatibility between the nature of assets and the PR system applied.

$$N_j = f_3 (q_i) \quad (8)$$

$$dN_j/dq_i < 0 \quad (8.1)$$

This is the specific case studied by Hardin.

$$dN_j/dq_i = 0 \quad (8.2)$$

When it is an indivisible public good, without congestion effects.

$$dN_j/dq_i > 0 \quad (8.3)$$

When there are network externalities, or when the process is cumulative.

For example, the problem of the peer to peer networks concerns the incompatibility between a stock of indivisible goods and logic of supply and demand linked to a private and individualized PR system (Romer, 2002). The transaction costs necessary to control the opportunistic behaviors are higher than the gains that this kind of mechanism tries to preserve (Herscovici, 2007).

2.2 The labor costs are related to production, realization and distribution of different goods and services. Technological developments have resulted in a significant decrease in these costs, notably this applies to storage costs.

Generally, the traditional analysis of cultural industries showed that this was characterized by increased costs from the law of Baumol (1967). However, in today's post-industrial era, there is a reversal of trend, i.e. a reduced set of these costs. In the analysis of Baumol, maintaining the stock of goods and services belonging to the sector with stagnant productivity is reflected by an increased transfer of value from the productive sector to the stagnant sector. In regard to the digital economy, we observe the opposite phenomenon: the decrease in production and maintenance costs of this sector, and some major changes concerning the value chain (Herscovici, 2010).

Finally, it is important to note that in this digital economy, there is no differentiation between demand and supply; the increase in consumption, i.e. in the number of users, is the element that can create value from the mechanism based on the demand externalities (Herscovici, 2008). Thus, an increase in exclusion translates into a decrease in the stock, while an increase in consumption translates into an increase in the stock and the value created.

2.3 *The choice of a modality of governance*

From table 1, we can deduce the following propositions:

Proposition 1: The comparison between 1, 2 and 3 shows that 1 and 2 are socially more efficient. In this respect, we should observe that the transaction costs are zero.

Proposition 2: The comparison between 1, 2, 4, and 5 shows that the four situations are equivalent in terms of total welfare, even though transactions costs are zero.

If, on the contrary, we consider that each solution is characterized by positive transaction costs, the total welfare depends on the level of transaction costs inherent in each mode of governance. Nothing indicates that the private mode of governance corresponds to the lowest level of transaction costs. The hypothesis of positive transaction costs is fully justified: they correspond to the costs that allow implementing and transferring the PR. Nil transaction costs imply that the PR are totally defined, that the implement of PR system works “naturally” without transaction costs, and that contracts are complete. This is a Walrasian situation, not an institutional one (Barzel, 1997, p. 11).

Table 1 Coasian and Williamsonian approaches: a comparison

The “Coasian Theorem”: the private mechanism				
	X utility	Y utility	Total utility	
With negotiation	1200	1300	2500	1
Without negotiation	1000	1500	2500	2
The Williamsonian approach: the institutional mechanism				
Pigouvian regulation	1200	1000	2200	3
Pigouvian tax	1200	1300	2500	4
Institutional regulation	1300	1200	2500	5

We understand Williamson’s analysis in this way: the choice of a mode of governance will be made regarding the total welfare. This total welfare depends on the level of transaction costs of each mode of governance. The Coasian analysis, or more precisely the Stigler’s interpretation, considers, a priori, that the bureaucratic (or public) costs are higher than the market costs. *Williamson, on the contrary, demonstrates that the market is not systematically the solution that corresponds to the lowest level of transaction costs.*

In other words, the welfare produced by each mode of governance depends on the specific level of transaction costs. Differently of Stigler’s interpretation, I show in this present study that the market, i.e. the private negotiation, is not systematically the most efficient mechanism. *When the transaction costs are positive, the choice of a modality of governance depends on its viability, i.e. (a) the implications in terms of preservation/enlargement of the stock; and (b) the increase in the Social Welfare that corresponds to each modality of governance.*

3) *The viability of governance*

The problem of viability appears when there are incompatibilities between the different elements of the system, and when the resolution of such antagonisms cannot be implemented without prohibitive transaction costs. The tragedy of the commons or the present copyright conflicts in the musical industry are consequences of this incompatibility.

It is possible to define the viability of the mode of governance in the following way: *a mode of governance is viable when the transaction costs are compatible with the level of production of goods and*

services, i.e., when the implementation of this activity does not imply a decrease in welfare. Regarding equation (1), we can say that a particular mode of governance is viable: (a) when there is not decrease in consumption or in the level of available stock and (b) when the increase in the TC required to implement this governance is not greater than the increase in production, i.e., the increase in stock level.

Table 2 - Governance, Social welfare and Viability

Stock (PR)	Economic nature	Individ. consumption (PR)	TC	Stock	Viability	
Common	divisible	private appropriation	+	-	-	1
Common	indivisible	collective appropriation	-	≥ 0	+	2
		Contribution	-	+	+	3
		Network extern.	-	+	+	4
		Congest.	+	0/-	+/-	5
private	divisible	direct private appropriation	+/-	+/-	+/-	6
semi commons	indivisible	indirect private appropriation (two sided markets)	-	+	+	7

The first situation in the table above corresponds to Hardin's analysis: the unfeasibility of the governance is expressed by the exhaustion of the available stock, and by prohibitive transaction costs to solve these problems.

On the other hand, situations (2), (3), and (4) correspond to viable modalities of governance: the institutional variables allow maintaining the transaction costs to a level that is compatible with the maintenance of welfare, and also allow maintaining or increasing the stock.

Situation (5) highlights the necessity of a control on the social consumption: these control activities imply an increase in transaction costs and, consequently, a decrease in welfare. The viability will be evaluated based on the comparison between the increase in TC and the decrease in welfare.

Situation (6) corresponds to the private logic. For the neoclassical school, this is the most efficient situation: the welfare is maximized by the Pareto optimum, and there are no transaction costs. This is verified in the pure and perfect competition situation, as defined by Walras, i.e. when the price system provides all the necessary information. Following Williamson's (2000, 2002) analysis, according to market logic, the more specific the assets, the higher the transaction costs and, consequently, the higher the decrease in the welfare.

Finally, situation (7) corresponds to the mechanisms operating in the digital economy: (a) the access to the stock is semi-private but the goods are indivisible; (b) the consumption is quasi-free, but the modalities of access to the network represent the new modalities of economic valorization of these activities (double-sided markets); the source of the value depends on the social utility created. The results

in terms of welfare and viability seem positive: the free access for the final consumer implies an increase in welfare. However, the viability of the governance depends on the PR system adopted: the current system is based on an individual consumption from individualized material supports (books, CDs, DVDs, and so on), while the creation of economic value comes from the social utility created within the network. We should then think about how to remunerate the creators in other ways that are compatible with the economic evolutions in this sector.

Conclusion

This analysis implies a redefinition of the object of Economic Science itself: this object is no longer defined as the way a competitive system of prices allows carrying out an efficient allocation of scarce resources:

i) The price system is a noisy signal in regard to the qualitative components of the goods and services (Stiglitz and Grossman, 1976, and Akerlof, 1970) and it does not convey the appropriate signal to carry out this efficient allocation of resources.

ii) Some technological advances produced abundance of goods and assets: (a) the increase in labor productivity, in the long run, means a decrease in the unitary value and price of each good. So, it is possible to talk about relative abundance; (b) the digitalization of Information and Knowledge creates an abundance of such goods and services.

Consequently, *the choice of a modality of governance has become a fundamental issue in Economic Science*: it directly concerns the concrete modalities of social appropriation of goods and services and the continuity of such governance, i.e. activity coordination problems, and social and economic viability.

From this perspective, the analysis of transaction costs is essential: it allows choosing a specific modality of governance and ensuring its viability. It is an institutional analysis, as the market is not understood as an autonomous mechanism; socially efficient and deprived of historical dimension. The institutional components play a fundamental role: They allow regulating the whole system based on the compatibility between the accumulation logic and the institutional elements, coordinating the actions of the agents, and keeping the transaction costs at a level that is compatible with the activity considered.

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