**Intellectual Property rights, assets specificity and strong uncertainty: an approach in terms of "institutional form".**

**(Theme 2: The dynamics of socio-economic models of development: understanding the recent past to foresee the future)**

**Abstract**

*This paper aims to show how, from the post-Keynesian concept of uncertainty, the system of intellectual property rights cannot be conceived as a simple tool which permits to select the mode of governance that minimizes the level of transaction costs. Through a comparison between Coase´s and Williamson´s analysis, I will demonstrate (a) why Coase´s approach is intrinsically linked with the absence of strong uncertainty and (b) why, in regards to the concept of asset specificity, the analysis of Williamson is compatible with the existence of such strong uncertainty. In this case the system of Property Rights, and more specifically of Intellectual Property Rights, is an institutional form, in the way defined by the French Regulation School.*

*In a nutshell, this paper highlights the theoretical and empirical limits of the New Law and Economics, and propose an alternative explanation in the "old institutional" sense. This analysis may be applied to different objects such as pollution, cultural industries and technological innovation, for example.*

**Key-words**: Intellectual Property Rights – Transaction Costs- Governance- Institutions

**JEL Classification**: D230 - Organizational Behavior; Transaction Costs; Property Rights

# Intellectual Property rights, asset specificity and strong uncertainty: an approach in terms of "institutional form".

## Introduction

This study aims at showing how, from the post-Keynesian concept of uncertainty, the system of intellectual property rights cannot be conceived as a simple tool which permits to select the mode of governance that minimizes the level of transaction costs. Through a comparison between Coasian and Williamsonian analyses, I will demonstrate (a) why Coasian approach is intrinsically linked to the absence of strong uncertainty and (b) why, in regards to the concept of *asset specificity*, the Williamson's analysis is compatible with the existence of such a strong uncertainty. In this case, the system of Property Rights, and more specifically of Intellectual Property Rights, is an *institutional form* as defined by the French Regulation School.

In a nutshell, this paper highlights the theoretical and empirical limits of the New Law and Economics, and proposes an alternative explanation in the "Old Institutional" sense. For that purpose, I will study the analytical relationship between the economic nature of Intellectual Property Rights (IPR) and the concrete governance used to manage these IPR. These problematics may be extended to the economic analysis of Property Rights (PR) in general. Also, they are related to various social fields: environmental components, cultural goods and services, knowledge production and digital economy, to name a few.

In this study, I will demonstrate why, in regard to the IPR definition, private governance (i.e. the market) is not systematically the most efficient one. I will show why Coasian hypotheses do not correspond to the economic nature of IPR and why they are incompatible with strong uncertainty. I will utilize Williamson´s analysis, more specifically the relationship between the specificity assets, the nature of the contract and the transaction cost level. I will show why this methodological choice is pertinent when it comes to studying all the immaterial capital forms. Finally, from an Institutional perspective, in the sense of Veblen and Common, I will demonstrate what kinds of modes of governance are most efficient.

In the Economic Literature, the economic nature of IPR is not analyzed with these conceptual instruments: the New Law and Economics School does not consider asset specificities and the existence of uncertainty, nor does the literature on pollution rights. On the contrary, the problematics I constructed incorporates the existence of uncertainty and asset specificity. Consequently, this study stresses the importance of institutional components in the coordination mechanisms, the fact that the agent's rationality is bounded, and that the market is not systematically a self-regulatory instance and an efficient mode of governance.

In the first part, from stylized facts, I will show how the market's private logic translates high transaction costs. Then, from the opposition between Pigou and Coase, I will study the different conceptions of the economic nature of IPR and of the recommended market regulations. In the second part, I will point out, in regard to the *complexity* of the goods and services, the private negotiation limits, i.e. the Coasian approach limit. For this purpose, I will make full use of Williamsonian theoretical framework to demonstrate that the market logic translates high level transaction costs, and I will formalize some of these economic relations: I will show why private negotiation may be inefficient concerning the traditional maximization process, technological costs, and free-rider behaviors.

**I) Some stylized facts: the different interpretations**

**1)** *The economic nature of IPR*

**1.1** *Some tendencies*

Since the 1980s, we have seen that there is no positive correlation between the deposited quantity patents and R&D expenditure (Lebas, 2002, p. 252). Consequently, it can be said that the extension of IPR does not correspond to an incitement to develop technological innovation. So, there are, in contemporary capitalism, important modifications related to the economic nature of the IPR.

A number of firms have a patent portfolio strategy, which can be characterized by the following elements:

i) The patent is no longer conceived as a way of appropriating temporary rents related to technological innovation (ibid, p. 254), and secrecy is preferable to going public.

ii) The patent function consists of preventing the entrance of potential outsiders: it does not mean constituting a means of divulging innovation in the cheapest way, but rather a means to increase the market power of firms that achieve a critical size. Raising barriers to entry results in a drop in competition, to the extent that IPRs are related to *process and not to products*.

The outsiders are the object of a hold-up strategy by the insiders: these insiders constitute a closed network in which they exchange their respective IPR. Moreover, such market structures imply in *increased uncertainty regarding the valorization of patents:* company A's patent depends on the patents of B and C, and of the possibilities that B and C have of preventing A's patent registration. This situation is characterized by an oligopoly or games theory mechanism.

The patent value depends on the anticipated product that the innovation may produce for the rights holder. Until the 80s, when patents were related to specific products, it was quite easy to anticipate patent revenues. Patent utility depended on its industrial and commercial applications, which were identifiable.

Today, patents are related to discoveries, not only inventions[1]. In fact, they are related to processes and not only to identifiable inventions: property rights are conceded to the virtual applications of *generic processes.* By nature, it is impossible to anticipate these future applications. This must be interpreted as an important market power extension: the new

---

[1] Contrary to Posner's affirmation (2005), today the IPR are not applied only to processes, but also to "ideas".

systems of property rights allow more important monopoly power as this power relates to scientific and/or technological generic principles whose concrete applications are not identifiable.

In these markets, the externalities produced by technical progress are internalized within closed or semi-closed networks: these barriers to entry limit the social appropriation of these externalities and the cumulative technical progress. This kind of strategy and the Property Right fragmentation may be interpreted as market failures (see the formalization of this mechanism in the last section).

**1.2** *Tragedy of commons, tragedy of anti-commons and IPR*

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 such 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 the exhaustion of the system. Hardin analyzes the enclosures of the 17th century from such perspective.

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

i) There is another means to regulate the social appropriation of the common. This social appropriation takes place with social convention and rules and it can't be assimilated with open access regimes (Orstom, 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 opportunist behaviors. These rules and conventions allow limiting the level of transaction costs necessary to control opportunist behaviors. In regard to the enclosures, in the 18 and 19th century in England, the failure of this collective system comes from the actions of richer farmers (Cox, 1986, p. 60), i.e. from the private appropriation of the common good.

ii) We must differentiate the situations in which the goods are private and divisible from situations where the goods are public. The mechanism described by Hardin is only related with private goods, totally divisible: "the benefits consumed by one individual subtract from the benefits available to others" (Orstom, 2000, p. 337).

On the contrary, when the goods are public, they produce externalities, generally positive, that depend on the number of 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 produce important "market failures" for the following reasons: on the one hand, 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 such effects. On other hand, the level of transaction costs necessary to prevent and control the opportunist 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.

Applied to scientific and technological production, a predatory behavior may lead to a decrease in production innovation growth, in which the privatization of the Scientific and Technological knowledge may produce such a result[2]. Concerning the cumulative character of production, the privatization will translate into a decrease in total production growth.

The anti-commons (Heller & Eisenberger, 1998) appear when knowledge is fragmented between various IPR holders. We can consider a technological process constituted by two complementary segments *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 does not lower its price. So, the IPR price necessary to use the technological process will be higher in this case, compared to the situation in which there is only one PR holder. This *externality of demand* [3] will produce coordination failures and will result in a decrease in welfare corresponding to the higher price, regarding competitive price. This situation is characterized by *subadditive costs.*

*My interpretation will explain these failures based on the incompatibility between individual appropriations related to a private PR system and the production of non-rival and non-exclusive public goods.* The tragedy of the commons may be explained from contradiction between communal right and private rights. As there is no private appropriation of the common good, there are no opportunist behaviors (Alchian, Demsetz, 1973, p. 23). This other interpretation of the tragedy of commons highlights the fact that the *private appropriation creates opportunist behaviors*, and that the solution to eliminate these opportunist behaviors is not the systematic privatization of the rights, but on the contrary, a specific form of "social or communal" PR.

Barzel (1997, p.4 e 5) defines transaction costs as "(…) the costs associated with the transfer, capture and protection of rights". This means that the PR system must be compatible with a particular level of transaction that enables the effective production and distribution of such goods.

The tragedy of the commons and the tragedy of the anti-commons are explained by the incompatibility between the economic nature of the good and the PR system: in the first situation, the divergence 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.

However, PR and IPR must be conceived as a *bundle of rights*: access, contribution, extraction, detraction, management/ participation, exclusion, and alienation (Ostrom and Hesse, 2007,. p. 17 and 18). The different forms of commons property result in ceding some

---

[2] In this sense, Nelson (2003) underlines the danger of such a system, in regard to the Bayle Dole Act, in the United States.
[3] They are close to the externalities of demand defined by the New Keynesians.

of these rights to create a common social space and to produce a social capital (Bowles and Gintis, 2000), i.e. a public good:

i) Regarding the different forms of digital communities, the construction of such commons imply abandoning  the components related to access and to alienation and, generally, to developing the activities related to the contribution of the different participants.

ii) The scientific communities present the same characteristics: the development of private IPR increases the exclusion process, limits the positive externalities, and decreases the growth of the production of Knowledge (Nelson, 2003).

**1.3** *IPR and new property forms*

Digital economy is representative of the efficiency of the commons. 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 upon a private 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. But today, the modalities of social appropriation have changed and become collective. As the mode of appropriation changed, the IPR system and the funding arrangements have to change (Herscovici, 2009, 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 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 such 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 differentiate the public regarding the different groups' propensity to pay (ibid).

On the other hand, these goods are *experience goods* (Varian, 2003): therefore, the price system cannot transmit all the necessary qualitative information to the consumer. Other social mechanisms must do this in order to compensate the system price failure: institutions, online communities concerning the digital economy, etc.

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 divulging 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.

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).

## 2) *Externalities and Intellectual Property Rights: the economic nature of externalities*

**2.1** *IPR economic specificities and the Pigouvian approach*

IPRs are a mechanism that endogeneize the externalities produced by some types of commodities such as Knowledge and Information. In the case of industrial commodities, because of their economic characteristics, it is relatively easy to implement a property right mechanism, price exclusion mechanisms, and divisibility. For instance, regarding Knowledge and Information, the problem is quite different: these commodities are characterized by no rivalry, by non-exclusion and by their cumulative character.

i) Non-rivalry may be explained by the consumption *indivisibility*: the good does not "disappear" in the consumption process. It may be consumed in its entirety, in a simultaneous way, by other consumers.

ii) The non-exclusion means that it is impossible to control the appropriation of the service provided by the commodity. In other words, the commodity intrinsically produces *externalities* which benefit the agents who do not contribute to its production.

iii) Finally, the production is cumulative in the sense that the actual production depends on the initial stock of knowledge available today. This dimension outlines the interdependency between the different producers, as well as the dangers of a "closed" IPR system (Nelson, 2003).

The IPR mechanism applied to these kinds of goods will be specific, because of these economic specificities. In this regard, Arrow (2000) outlines the retro-engineering process which characterizes this kind of commodity. The private efficiency of the IPR system depends on the possibilities it offers to make these externalities endogenous.

In fact, it is possible to distinguish two externality concepts: the first one can be called Pigouvian because it derives from Pigou's analyses. In this perspective, the externalities are not transferable from one agent to another; the endogenization is implemented out of the market, based on an "administrative" and/or institutional mechanism.

This institutional mechanism consists in taxing the agent who produced the negative externality to compensate for the disutility of the agent's victims of this externality. It is possible to establish rules to end the cause of externality. In this perspective, externalities are conceived as *market failures*, which result from divergence between private and social

interests. The optimal pollution level is that which equalizes the marginal profit of the polluter with its marginal cost plus the Pigouvian tax.

This approach is based upon the collective interest primacy: the existence of pure public goods translates the fact that private appropriation of these public goods produces negative externalities. These public goods are patrimonial goods (Herscovici, 1997), and the social interest consists in limiting their private modes of appropriation: the urban laws, the environmental regulations or the arts laws on exportation regulation are based on such principles. The internalization modes lead to public or institutional interventions to neutralize the effects of private appropriation.

The Pareto criterion is used to guide these interventions: one state can be called Pareto superior ($S_1$) when no agent prefers the previous state S, and at least one agent prefers $S_1$. This criterion corresponds to distributive goals, in regard to utility and to income distribution. Finally, the transaction costs related to the public or institutional administration are ignored. The Coasian approach will focus on this point to elaborate its critique.

**2.2** *The Coasian Social Cost Theory: the main results*

The Coasian analysis uses another hypothesis and another axiomatization. The externality is no longer viewed as a market failure, but on the contrary, as the result of the absence of a market mechanism, i.e. the absence of private negotiation. Unlike Pigou's analysis, the externality is the result of PR failure. The solution lies in extending the market logic to social activities which can be negotiated in a private way, and which can be patented (Berg 2003, Brousseau 2003, Guerrien 1999).

I do not agree with Liebowitz and Margolis (1994) when they define technological externalities as situations in which "*the benefits or the costs are imposed outside of market mechanisms. Resolution of such problems may occur through property rights, private negotiation or government interventions that allow the externalities to be internalized*". My argument is that (a) the dynamics of the markets have changed: the benefits and costs are indirect (Herscovici, 2008), and the competition does not occur within the direct prices system; (b) we can see the development of markets to administer property rights (for example, pollution rights); and (c) private negotiation is a mechanism which can be assimilated to a market. In fact, the internalization is implemented within an indirect mechanism and not within direct prices.

The Coasian analysis implies that (a) the PR are transferable; (b) the PR system can be clearly defined; and (c) the agents may implement a substantive rationality. The first criterion implies that the PR are negotiable on a market, and that it is possible to quantify them. The second criterion is that the object of PR can be defined without any ambiguity. The third criterion means that there is no uncertainty about the asset value and about the other agents' behavior. Concerning agents' behavior, all types of information asymmetries constitute a limit to the concrete realization of a substantive rationality (Saussier Yvrandre Brillon, 2007, Williamson, 2002). In other words, *in Coasian approach, the contracts are complete in relation to the hypothesis of substantive rationality.*

The PR are conceived as the possibility to use one specific production factor, and to produce the negative externalities which result from this use (Coase, 1960, p. 22). The PR are defined

in terms of availability and no longer in terms of property (Kirat, 1999, p. 65) in the traditional sense.

The efficiency criterion is different from that used by Pigouvian economy: it incorporates the production or utility maximization, and ignores the income distribution implications.

In this regard, Coase affirms that "« Pigou is, of course, quite right to describe such actions as « uncharged disservices ». But he is wrong when he describes these actions as « anti-social » » (1960, p. 18)". This means that Welfare is conceived only in function of total production and/or utility. The criterion used is that of Kaldor-Hicks.

If A makes a profit equal to 100, but this activity produces a disutility equal to 30, and if A pays 30 to B, this situation is a Pareto optimal one. On the one hand, neither agent prefers the previous state. On the other hand, the total utility net growth is equal to 70. However, in this situation, there are no transaction costs.

The problem is different when we introduce transaction costs: if the transaction costs in the previous example were equal to 80, for instance, there would be two solutions:

i) If the compensation is achieved, the total utility (or production) reduction is equal to 10.

ii) If the compensation is not achieved, the utility increase is equal to 70. However, the inequalities are more important between polluters and pollutees. Then, the situation is no longer a Pareto's optimum.The Kaldor-Hicks criterion *only considers the PR allocation efficiency and its impact on production level*.

This kind of allocation of PR is possible only if the different opportunistic behaviors are controlled and do not result in high transaction costs. Naturally, the market solution is considered to be the most efficient one. This means that the transaction costs are less high than they would be in an "institutional" or a bureaucratic situation, and that the situation is efficient, in regard to the criterion chosen.

**2.3** *Stigler's interpretation*

Despite its limits, the Coasian Theorem, in the way it was formulated by Stigler (1966), may be considered as a first the presentation of Coasian problematics in the way it was developed in his paper "The problem of Social Cost" (1960). It highlights the fact that the private negotiation between private actors is the most efficient governance mechanism.

We can illustrate this theorem with the following example (Pejovich, 1995): two agents, X and Y, have a house. Y's activity consists in testing alarm sirens. This activity translates into an increasing utility evaluated at 500, for Y, and a decrease in X's utility of 200.

**Table 1: The Coasian theorem**

|                      | X Utility | Y utility | Total utility |
|----------------------|-----------|-----------|---------------|
| With alarm sirens    | 1000      | 1500      | 2500          |
| Without alarm sirens | 1200      | 1000      | 2200          |

**Case 1** Y wins the case and is allowed to test the alarm sirens. This means a disutility of 200 for X, and a utility increase of 500 for Y. The value that X can buy Y's "silence" cannot be higher than 200. There is no possibility of negotiation, and the total utility is 2500.

**Case 2** X wins and Y can buy the right to silence for up to 500. If this right is evaluated at 300, the final situation is the following one: X's utility is equal to 1300, Y's utility to 1200, and total utility is 2500.

*Proposition 1* Social Efficiency does not depend on the attribution of initial rights.

*Proposition 2* The economic activity is implemented, regardless of attribution of rights, and the social product is maximized.

Coase concludes that the private negotiation is the most efficient way to internalize externalities and that social utility, evaluated from the total product, is maximized (Kirat, 1999, p. 61).

We can formulate the following observations:

i) This mechanism does not include a social justice criterion. In the first situation, the deviation between pollutee and polluter increased.

ii) This mechanism is valid only when there are no transaction costs, which implies that there are no opportunistic behaviors. On the contrary, the control of these opportunistic behaviors means that the transaction costs are positive and high.

iii) When the transaction costs are positive, we have to compare the transaction costs relative to the private negotiation and those relative to other modes of governance. In other words, the private solution does not systematically constitute the solution which minimizes transaction costs.

We can observe that this approach implies an *instrumental* conception of institutions, quite different from the Old Institutional one: the institution is conceived as a tool which allows agents to choose the mode of governance that corresponds to the lowest transaction costs. The reality and the recent controversial debates about IPR do not correspond to these results: this debate shows explicitly that the definition of an IPR system is important in terms of

economic interests of the different agents. The economic activity, the dominant positions and the funding mechanisms depend on the IPR system[4].

This means that the IPR system must be conceived as an *institutional form,* as the product of divergent economic interests. Therefore, the economic activity is not independent from the initial IPR attribution. (Alchian, Demsetz,1973)

## II) The limits of the Coasian approach:  another institutional alternative

## 1) Another interpretation: the *Williamsonian problematic*

**1.1** *The comparison between Coasian and Williamsonian approach*

The comparison between Coasian and Williamsonian approaches is the following:

**Table 2** Coasian and Williamsonian approaches: a comparison

| Coasian approach: 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 | 1300 | 1200 | 2500 | 4 |
| Institutional regulation | 1200 | 1300 | 2500 | 5 |

*Proposition 1:* The comparison between 1, 2 and 3 shows that 1 and 2 are socially more efficient. In this respect, we must 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.

---

[4] The debate about IPR and peer to peer networks is particularly representative.  Concerning this subject, see Herscovici (2007).

*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.*

We will interpret 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 New Law and Economic School considers, a priori, that the bureaucratic costs are higher than the market costs (Buchanan and Tullock, 1962). Williamson, on the contrary, will demonstrate that the market is not systematically the solution that corresponds to the lowest level of transaction costs.

**1.2** *Williamsonian alternative*

The question is, for Williamson, to establish, within the market rules, a positive relation between asset specificities and the amount of transaction costs (Williamson, 2002). Contrary to the standard neoclassical analysis[5], Williamson claims that the market rules defined by Walras do not produce, *systematically* a *first best*, insofar as they do not result in Pareto efficiency. Williamson establishes that each type of asset, according to its own level of specificity, is related to a specific type of regulation that minimizes transaction costs: "*Transaction costs economizing is the unifying concept* (Williamson, 2000, p.180).

Specific assets present an irreversible feature: these costs are irreversible as they cannot be the object of multiple uses (Saussier, Yvrande-Billon, 2007, p. 18). Unlike the neoclassical market, whose main feature is dealing with anonymous supply and demand, when it comes to this type of transaction, the agents' relationships are strongly individualized (Williamson, 2002, p.176). A *bilateral dependence* arises between buyers and sellers, insofar as their relationships are defined in a contract compatible with the IPR system in force.

We must also consider the existing relationship between the nature of contracts, the asset's specificities and uncertainty. The more specific the asset, the more important the uncertainty related to its economic valorization. A way to reduce uncertainty may consist in rising transaction costs. However, we must consider, more deeply, in what way transaction costs would enable the reduction of this uncertainty.

In the framework of a neoclassical analysis, assets are not specific, transaction costs are nil and, thus, the market is efficient. On the contrary, when an asset is specific, transaction costs are increasing and the best way to minimize these costs is to develop an intra-firm integration, a public management or a hybrid form (Williamson, 2000, p.604). It is interesting to observe that, in the case of a competitive market, the more important the uncertainty, the higher the asset price. Thus, the asset offer-price incorporates a risk premium (ibid). Transaction *costs include safeguard clauses, penalties, asymmetries of information, control systems and costs related to conflict resolution by an external authority* (Williamson, 2002, p183).Therefore, choosing a mode of governance depends on the relation between the price rising due to strong uncertainty and the transaction costs necessary to reduce this uncertainty. While transactions costs are less important than the price rising, i.e. the loss of collective welfare, the competitive market is not the best governance solution.

---

[5] By standard neoclassical analysis, I mean the approaches which use substantive rationality hypothesis and optimal adjustment realized by markets. This conception is similar to that of Favereau. (1990) and of Hodgson (1998).

In regard to the specificity of the assets, regulations which are specific to digital economy are not those defined by the Walrasian framework. They require other modes of production and distribution for goods and services: networks, clubs or other types of *community governance* (Herscovici, 2008).

## 2) *Private mechanisms: limits and complexity*

### 2.1 *Complexity versus substantive rationality?*

We can point out various limits to the Coasian analysis regarding the hypotheses related to the commodity economic nature and the agents' behavior:

i) The goods cannot be specific, in the Williamsonian sense: if the goods are specific, the transaction cost level necessary to contain the uncertainty may be high (Williamson, 2000). When the assets are specific, the market does not constitute, systematically, the most efficient mechanism to internalize the externalities. For the same level of asset specificities, it is necessary to compare the transaction cost level which characterizes each kind of governance: the private one, the intra-firm integration, the public one, the hybrid ones, and all forms of community governance.

The specificity may be defined based on the following characteristics: (a) since the irreversibility asset cannot be the object of multiple uses, the investment represents irreversible costs and cannot be used to produce other types of goods; (b) the relationships between supply and demand are highly individualized, there is a bilateral dependency between buyers and sellers. In regard to IPR, owing to the cumulative production aspect, it is possible to speak of *multilateral dependency*. These specificities explain the *behavioral uncertainty* which characterizes these markets.

ii) Part of the goods is *experience goods*; the price system does not transmit their qualitative characteristics. The uncertainty related to these qualitative characteristics should be compensated by other mechanisms: a brand name strategy, shared information communities, and so on. This kind of mechanism, necessary to the market coordination, translates some type of transaction costs related to the differentiation strategies, to the formation and coordination of shared information communities, or to monitoring activities[6]**.** These markets are not Walrasian ones, since the transaction costs are positive and the prices system does not freely transmit all the information necessary to implement the transactions.

The agents' behavior is characterized by various types of information asymmetries: on the one hand, the relationships between producers and consumers do not allow the evaluation of the goods utility or the asset marginal product. The price system is *noisy* and can spread false information concerning quality (Akerlof, 1970). Consequently, it is not possible to maximize microeconomic utility or profit functions, nor is it possible to determine the precise extent of PR. On the other hand, these goods are, at least partially, non-exclusive and non-rival. Possibilities for opportunistic behavior appear. The club operating may be harmed by free rider behaviors[7]. This is a form of moral hazard.

---

[6] The communities' online development, for example.
[7] See Herscovici 2007.

Unlike the Walrasian approach (the central auctioneer), or the Rational Expectations Theory (continued market clearing hypothesis), for the New Institutional Economy, the central problem is market coordination mechanisms because the Walrasian natural adjustment does not work anymore.

We can observe two positions: Coase maintains the substantive rationality and the non-specificity goods hypothesis, and advocates the market mechanism to negotiate the PR. This means, in the last instance, that the contracts are complete and that, in this universe, there is no uncertainty. Then, *he maintains a relationship with the neoclassical framework.* Differently, Williamsonian analysis does not adopt the substantive rationality and the ergodic hypothesis: the agents' rationality is limited and the contracts are intrinsically incomplete.

How is it possible to define this *complexity*? This concept is a multidimensional one:
i) Concerning the cumulative characteristics of the production knowledge, the complexity may be defined by the uncertain economic valorization: hold-up strategies are common and result in uncertain valorization.
ii) The PR concept was extended to process and is no longer limited to inventions. It is nearly impossible to identify all the possible applications of a particular process. Consequently, it is impossible to anticipate the marginal product of this asset, and to identify all these possible applications, as shown by the legal conflicts in sectors intensive in knowledge (the software and pharmaceutical industries, for example).
iii) As far as consumption is concerned, the complexity and the quantity of information and knowledge embedded in theses goods are so important that it is no longer possible to evaluate the utility ex-ante. Moreover, this utility depends on the social consumers' differentiated tacit knowledge.

The theoretical and empirical consequences are the following: the agents' rationality is intrinsically bounded. These limits can be explained by the complexity of the product.

The universe is characterized by uncertainty. Some authors speak of behavioral uncertainty (Saussier Yvrandre Brillon, 2007), in function of the uncertainty which characterizes the impossibility to anticipate the agents' behaviors. In this sense, the Game Theory shows that the equilibrium is not a Pareto's equilibrium. This uncertainty is too epistemic and looks like strong uncertainty in the Post-Keynesian sense. This uncertainty is also related to the economic valorization asset and thus to its marginal product.

The contracts are incomplete, in regard to this complexity, as they cannot anticipate all the possible "states of the universe", whether it is in terms of agents' behavior, or in terms of capital marginal product.

In fact, it is possible to affirm that the complexity of goods and services is a permissive condition in regard to opportunist behavior development. Moreover, the impossibility of implementing an efficient IPR system broadens this trend. Finally, the coordination problem is fundamental, as shown by the economic studies of the online communities (Curien N., Fauchart E., Laffond G. and Moreau F., 2005).

**2.2** *From bounded rationality to uncertainty: the institutional solution*

It is necessary to study the nature of uncertainty. Williamson adopts the bounded rationality hypothesis. In this sense, the uncertainty may be accounted for by the agents' limitations concerning their cognitive capacity to organize and collect the available information. In other words, the uncertainty may be explained by the agents' cognitive limitations, but the universe is ergodic and the different states of the world are finite and knowable.

The uncertainty may be explained by the existence of bilateral relations and of free rider behaviors, i.e. behavioral uncertainty (Saussier, Yvrande-Billon, 2007, p. 21). The process of infinite regressions is incompatible with the absence of uncertainty.

What is the nature of this uncertainty? There are two possible answers:

i) In the first one, the uncertainty is entirely defined by the agents' cognitive limitations, and the universe is ergodic (Slater and Spencer, 2000). In this sense, there is not strong uncertainty in the Post-Keynesian sense (ibid, p. 61).

ii) On the other hand, the second interpretation shows that there is a relation between these two types of uncertainty: when there are opportunist behaviors, it is not possible to predict the different strategies of the agents. So, it is not possible to know all the states of the universe. The behavioral uncertainty implies strong uncertainty, and asset specificity is an endogenous variable (Saussier, Yvrande-Billon, 2007, p. 75). It allows the existence of strategies to benefit from monopoly or oligopoly rents in relation to the IPR system.

Based on Williamson's analysis concerning the second interpretation I understand that: it allows people to emphasize the oppositions between Williamson and Coase, as well as to justify the existence of incomplete contracts. The Coasian analysis adopts the hypotheses of substantial rationality and of assets non-specificity. The contracts are complete and there is no strong uncertainty. Despite the rupture with the neoclassical economy, Coasian analysis keeps a narrow relation with Walrasian economy, due to the fact that it adopts the same ontological hypothesis: the substantive rationality and the ergodicity. Differently, according to Williamson, the contracts are incomplete and the IPR system is intrinsically imperfect. This imperfection may be explained not only by information asymmetries and by opportunistic behaviors, but also by the nature of the economic universe.

Once the existence of uncertainty has been admitted, the contradiction takes this form: the general problematics developed by Williamson consists in choosing the mode of governance which *minimizes* the transaction costs for a particular specificity level (2002). However, this implies that the agents use substantive rationality in an ergodic universe. If rationality is limited, and the universe is not ergodic, the agents cannot implement this choice: *it is impossible, on the one hand, to make compatible bounded rationality and no ergodicity hypothesis and, on the other hand, the choice of a mode of governance which minimizes the transaction costs*. At least, if we consider that the universe is ergodic, in the long term, the

transaction costs are negligible, and the markets constitute the most efficient social mechanism (Slater & Spencer, 2000, p. 79, Langlois & Robertson, 1995).

From an Old Institutional perspective, I choose the strong uncertainty thesis:  the choice does not allow us to minimize the transaction costs, but it leads to an intermediated situation (*a satisficing approach*), between the lowest and the highest transaction cost level (Williamson, 2002, p. 174.). So, *it is possible to establish a comparison between the governance concept and the regulation one* in the sense defined by the French Regulation School. From this perspective, the governance is implemented far from maximization mechanisms and from the long term equilibrium that the system would reach. This interpretation focuses on the *historicity* and the role of institutions in the regulation process.

Finally, the IPR system is not conceived only as an instrument which allows us to minimize transaction costs, but as an *institution*, in which the historical and social dimensions are incorporated. The IPR system is a historical commitment between antagonistic social forces, a commitment that enables market regulation. The IPR system is the product of social and political forces which characterize a particular historical period, i.e. the "codification of one or of various social relations" (Boyer, 1987, p. 48). The IPR system is not a neutral instrument which permits achieving an optimal situation, but a complex institution which can be modified in terms of social, historical and economic evolutions.

As noted by Bowles and Gintis (2000), in some situations including "social capital", community governance is more suitable for managing opportunistic behaviors and for coordinating the activity of the whole community. When part of the capital is social, meaning common to a community, the markets and the State cannot obtain all the information necessary to coordinate all the individual activities. We can observe these mechanisms with the cooperative bank system in some emerging countries, for example.

Likewise, a number of heterodox analyses consider that the price is a social convention (Hodgson, 1998, p. 175) or the product of a collective belief (Orléan, 2006, p. 3). This means that the market is not conceived as a self-regulating and autonomous instance, determined in an exogenous way, that the substantive rationality is not a realistic premise and that the economic value cannot be determined in an "objective" mode, because it is the product of these beliefs and institutions[8].

## 3) Some *formalization*

### 3.1 *The choice of an efficiency criterion*

The choice of a maximization criterion may be expressed by the following relations:

MPr = Pigouvian tax (or institutional constaint) + Mc          (1)

Pigouvian tax = disutility          (2)

(With MPr as the marginal product and Mc as the marginal costs)

---

[8] Orléan (2006) speaks of self referential value (*valeur autoréférentielle*)

Relation (1) means that the polluter will increase their production until their marginal product is equal to the marginal cost plus the Pigouvian taxes; the capital marginal product is decreasing, and the capital marginal cost is increasing.

Relation (2) means that the pollutees will accept the Pigouvian tax as far as this tax is superior or equal to their disutility.

The Pareto criterion is related *simultaneously,* to (1) and (2): it means that the PR allocation maximizes the total welfare and the income distribution.

On the other hand, the Kaldor-Hicks criterion only considers that (1): the product will increase only if the MPr is superior to all the costs supported by the polluting company. For that reason, the Pigouvian tax will not be systematically implemented: in this way, the MPr will be superior to the costs. So, the total product will increase. The elimination of the redistribution problem by eliminating the Pigouvian tax is the only way to increase total product.

**3.2** *The private negotiation limits: the impossibility of implementing substantive rationality*

The necessary conditions to implement a private negotiation are the following: it must be possible to evaluate (a) the polluter's marginal product and (b) the pollutee's disutility.

I will show why it is impossible to concretely implement such a private negotiation:

i) In the way the goods and services are complex, in the sense I defined this concept, the speculative dimension does not permit us to evaluate the capital marginal product ex-ante. Consequently, it is impossible to evaluate the marginal product and thus to maximize the production function.

ii) In the same way, part of the cost the producer will have to pay eventually depends on the disutility of the pollutee. This disutility is intrinsically subjective, and cannot be evaluated ex-ante. So, part of the cost the polluter will have to pay is not predictable.

ii) From a more general perspective, if we consider that the rationality is bounded, in Simon's sense, it is not possible to evaluate all the negative and positive externalities related to this kind of capital. Consequently, it is not possible to evaluate the pollutee's disutility, nor the polluter's marginal product.

*The Coasian analysis focuses on the ex-ante level of cost of transaction, but ignores the ex-post costs of transa*ction: it enables to preserve the hypothesis of substantial rationality, but it is incompatible with the existence of a strong uncertainty (Zylbersztajn, 2003, p. 6).

Finally, the maximization mechanism implies that the marginal product must be decreasing (relation (1)). On the contrary, the knowledge production is cumulative: so, its marginal product is increasing[9], and the traditional maximization mechanism is no longer valid.

It is possible to make the following observations: Coasian analysis limits may be explained regarding the intangible capital economic specificities, which are ignored in this approach.

---

[9] This result comes from the endogenous growth theories, or from knowledge economics.

**3.3** *Technological innovation and private mechanisms: the limits in terms of efficiency*

Concerning complexity and bilateral (and multilateral) dependency, it is possible to consider the following situation: there are two companies that offer the complementary technological processes to use a certain type of technology. For example, each company offers a specific algorithm, and the software production depends on these two different algorithms (it is possible to extend this reasoning to *n* companies).

Lets us write the following equations:

$$Pa = pa.qa + Ea/b \qquad\qquad (3)$$

$$Pb = pb.qb + Eb/a \qquad\qquad (4)$$

$$TC = pa.qa + pb.qb \qquad\qquad (5)$$

Where *p* is the price at which the company sells the technology, *q* is the amount sold and TC is the cost related to the technology acquisition. Eb/a represents the externality produced by A and endogeneized by B, Ea/b the externality produced by B and endogeneized by A.

We can suppose that, at first, A decreases its price. Regarding bilateral dependency, the company which will buy the complete technological process will have to buy one segment from A and the other one from B. If B maintains its prices constant, and if A decreases its price, Ea/b = 0, and Eb/a is positive, B will benefit from the externalities of demand produced by A, i.e. benefits of the demand increase produced by A. A produces a demand externality, which benefits B.

*Coordination failures appear*: the price decrease depends on A's anticipations concerning B's strategy (and vice-versa). The market is not systematically the most efficient mechanism: in 2, 3, and 4, TC is higher than it would be if there were only one technology producer. In this case, it is possible to speak of *technological costs sub-additively*. This situation can be explained by opportunistic behaviors from B, in this situation.

**Table 3** Coordination failures

|  | ↘pa | pa constant |
| --- | --- | --- |
| ↘ pb | 1 | 2 |
| pb constant | 3 | 4 |

Situation 1 corresponds to the market efficiency, in which CT is minimized. All the other situations are sub-optimal, in which CT is not minimized.

Concerning this sub-optimality, a Pigouvian tax implementation, or an institutional constrain, allows neutralizing the opportunistic behavior (Rosenkranz S., Schmitz P.W., 2006):

Pa = pa.qa                                                                                   (6)

Pb = pb.qb + Eb/a – Tx                                                         (7)

TC = pa.qa + pb.qb                                                               (8)


(with Tx as the Pigouvian tax, or the institutional constraint, and *p* as the price of the technology)

The Tx growth rate must be superior to the *qb* growth rate to neutralize the positive externality Eb/a. This mechanism will encourage B to lower its prices, and will be able to eliminate the behavior of free-riders. Any other institutional mechanism (rules, beliefs, conventions, community governance, clubs, and so on) may assume this control in the same way.

This theoretical result is paradoxical: *the private negotiation and the market efficiency cannot be implemented without governmental (and/or institutional) intervention*. In other words, the market cannot be efficient without institutional intervention. This is necessary to prevent opportunistic behaviors and to maintain the social efficiency conditions.


**Conclusion**


In conclusion, it is possible to affirm that the IPR (and the PR) private negotiation is not systematically the most efficient social instance: when it comes to the goods specificities and complexity and to asymmetries of information that characterize these markets, the private solution limits soon emerge.

The transaction cost level produced by a market regulation is, in various situations, higher than that produced by other kinds of governance. The limits of the "neoclassical" analysis can be explained by the fact that these analyses do not take into account the transaction costs produced by a private regulation. Regarding the complexity, in the way I defined this concept, the pertinent problematics are not the ones evaluated in terms of production costs and private costs. On the contrary, *the analysis also has to consider the transaction costs, including the collective costs related to coordination mechanisms*.

On the other hand, the PR and the IPR cannot be conceived as a neutral instrument that allows us to minimize transaction costs: (a) as institutions, they are the product of divergent interests, and they are historically determined; (b) if we adopt the non-ergodic hypothesis, it is not possible to concretely implement a minimization process.

Based on Coasian approach limits, this paper highlights the need for an institutional (or a bureaucratic) component to regulate the market activities and to chose a mode of governance which allows a reduction in transaction costs. From an institutional perspective, and more specifically from the "Old Institutional" approach, this means that the market, i.e. the IPR private forms of negotiation, cannot be conceived as an optimal mechanism and as an auto-regulatory instance. This also means that the institutional variables are necessary to implement this market governance.

**Bibliography**

Alchian Armen A., Demsetz Harold, 1973, The Property Rights Paradigm, *The Journal of Economic History*, Vol. 3,n No 1, pp. 16-27

Akerlof, G. , (1970), "The Market for "Lemons": Qualitative Uncertainty and the Market Mechanism", *Quartely Journal of Economics*, Aug.1970, 89.

Arrow K (2000), De la rationalité de soi et des autres dans un système économique, in *Théorie de l´Information et des organisations*, Edité et présenté par Thierry Granger, Dunod, Paris.

Barzel, Yoram., 1997, *Economic Analysis of Property Rights*, 2$^{nd}$ ed, Cambridge University Press.

Benard Jean, 1985, *Economie Publique*, Economica, Paris.

Berg, Roger van der, 2003, Property Rights and the Creation of Wealth, *American Law and Economics Review, V. 5 N1 2003*.

Boyer, Robert, 1987, *La théorie de la régulation: une analyse critique*, La Découverte, Paris.

Bowles Samuel and Herbert Gintis, 2000, *Social Capital and Community Governance,* accessed on the  site www.santafe.edu/sfi/publications/ Working-Papers./03-04-027, 1 of July of 2004.

Brousseau Eric, *Property rights in the digital space,* 2003, without editor, ICER/Turin.

Buchanan James M. and Tullock Gordon, 1962, The Calculus of Consent, University of Michigan Press.

Coase, R. H.1960, The Problem of Social Cost, in *Journal of Law and Economics*, 3.

Coriat Benjamin (2002), Le nouveau régime américain de la propriété intellectuelle- Contours et caractéristiques clés, in *Revue d´Economie Industrielle n.99*, 2ème trimestre 2002, Paris.

Cox Susan Jane Buck, 1986, No Tragedy on the Commons, Discussion Papers, *Workshop in Political Theory and Policy Analysis, Indiana University*.

Curien N., Fauchart E., Laffond G. and Moreau F., 2005, *Online Consumers Communities: Escaping the Tragedy of the Digital Commons, C*, Conservaoire National des Arts et Métiers, Paris.

Demsetz Harold, 1964, The Exchange and Enforcement of Property Rights, *Journal of Law and Economics*, Vol. 7, pp. 11-26.

Favereau, Olivier (1990),   "L'économie des conventions: son objet, sa contribution à la science économique ", *Problèmes économiques n. 2167*, 21 Mars 1990,  La Documentation Française, Paris.

Guerrien B., 1999, *La théorie économique néoclassique 1. Microéconomie*, La Découverte, Paris.

Hardin Garret, 1968, The Tragedy of the Commons, *Science, Vol. 162*, pp. 1243-1248.

Heller M. and Eisenberg R, 1998, Can Patent Deter Inovation? The Anticommons Tragedy in Biomedical Resaerch, in *Science, Vol. 29.*

Herscovici, Alain**,** 1997, Economie des réseaux et structuration de l'espace: pour une Economie de la Culture et de la Communication, in *Sciences de La Société*, Toulouse, v. 40.
----------------------, 2007, Information, qualité et prix : une analyse économique de l´internet et des réseaux d´échange d´archives. Congrès International *Online services ADIS/Université de Paris Sud*, Paris, décembre 2007.
-----------------------, 2008, *Direitos de Propriedade intelectual, novas formas concorrenciais e externalidades de redes. Uma análise a partir da contribuição de Williamson*, Seminário de Pesquida, IE/UFRJ, Rio de Janeiro.

Hodgson, Geoffrey M., The Approach of Institucional Economics, *Journal of Economic Literature*, Volume 36, Issue 1, March 1998.

Katz M.L. and Shapiro C., 1985, "Network Externalities, Competition and Compatibility", in *American Economic Review,* Vol.75 n°3

Kirat, Thierry, 1999, *Économie du droit*, La Découverte, Paris.

Langlois R.N and Robertson P.L., 1995, *Firms, Markets and Economic Changes*, London, Routledge

Lebas Christian, 2002, Fonctionnement, transformation et tensions du système de brevet-Les implications du "cours pro-brevet" à la lumière des études empiriques récentes, in *Revue d´Economie Industrielle n.99*, 2ème trimestre 2002, Paris.

Liebowitch S.J. and Margolis S.E, 1994 Network Externality: An Uncommon Tragedy, *Journal of Economic Perspectives*, Volume 8, Number 2, Spring 1994.

Nelson R., 2003, *Markets and the Scientific Commons,* WP, Columbia University.

Ostrom Elinor, 2000, Private and Common Property Rights, *Workshop in Political Theory and Policy Analysis, and Center for the Study of Institutions, Population and Environment Change*, Indiana University.

Osrtom Elinor and Charlotte Hess, 2007, A framework for Analyzing the Knowledge Commons, in *Understanding Knowledge as a Commons*, Edited by Charlotte Hess and Elinor Ostrom, The Mit Press, Cambridge, Massachusetts, London, England.

Orléan André, *Connaissance et finances: de l´hypothèse du futur à l´hypothèse conventionnelle*, manuscript, 11.06. 2006.

Pejovich S., 1995, *Economic Analysis of Institutions and Systems*, Kluwer Academic Publishers, International Studies in Economics and Econometrics, vol. 33, Dordrecht-Boston, Londres.

Posner, Richard A., 2005, Intellectual Property : The Law and Economics Approach, *Journal of Economic Perspectives*-Volume 19, Number 2- Spring 2005- Pages 57-73.

Romer Paul, 2002, When Should We Use Intellectual Property Rights?, *The American Economic Review*, Vol. 92, N.2, May 2002, pp. 213-216.

Rosenkranz S., Schmitz P.W., 2006, *Can Coasean bargaining justify Pigouvian taxation?*, Bonn Econ Discussion Paper, Discussion Paper 7/2006, Bonn, February 2006.

Saussier Stéphane, Anne Yvrande-Billon, 2007, *Économie des coûts de transaction*, La Découverte, Paris.

Slater Gary and Spencer David, 2000, A., The Uncertain Foundations of Transaction Costs, *Journal of Economic Issues, vol. XXXIV, N.1, March 2000.*

Stigler George J., 1966, The Theory of Price, 3 [e]. éd., New York, Macmillan & CO.

Varian, H.R., *Economics of Information Technology*, March 2003, without date and without editor.

Williamson, Oliver E, 2000,  The New Institutional Economics: Taking Stock, Looking Ahead, *Journal of  Economic Literature, Vol. XXXVIII* (September 2000). ,
-------------------------, 2002, The Theory of the Firm as Governance Structure: From Choice to Contract, *Journal of Economic Prospectives* – Volume 16, Number 3 - Summer 2002.


Zylbersztajn Decio, 2003, Costs, Transactions and Transaction Costs: Are There Simple answers for Compex Questions, *Working Papers*, Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo.