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Abstract

This paper aims to explore the impact of *ex-ante* legal status of creator on *ex-post* open license choice. It first describes the emergents *Creative Commons* licenses in *Open Cultural Contents* production and distribution. It introduces the two *open models* of diffusion and production, followed by creators. It orders the licenses according with their degree of openness in production as well as in diffusion. Then the paper presents an empirical analysis of the impact of legal status of creators on open license choice using an original database of video under *Creative Commons* licenses, created from the Internet Archive. The results show the existence of two models, *Open Diffusion* model and *Open Production*, that the creator has to balance when he/she decides the license. The results also show that in order to obtain benefit from the community, the *For-Profit* actors are more likely to adopt a high degree of openness in license.

Keywords: Open Production, Open Diffusion, Creative Commons, Open Licenses, Extrinsic, Intrinsic, Monetary, Non-Monetary, Motivations, Institutional Analysis and Development Framework, Common Goods, Digital Goods, For-Profit, Non-Profit.

JEL Numbers: D20, L82

1 Introduction

For more than 150 years the dominant model to produce cultural contents was the so-called *industrial model*. It was structured around high costs and high volumes of physical goods and diffusion through mechanical instruments such as telegraph, radio, television, cable, cinema and satellite systems.

Due to the *technological shock* induced by new technologies and the Internet, inexpensive instruments, such as computers, digital videos and audio systems, are currently able to perform most physical capital functions without substantial investments. Therefore users nowadays are able to overcome the economic barriers and create new and innovative contents.

The economic literature suggests that users start to invest skills, money and time to produce new contents in order to satisfy their needs, when physical capital cost for fixation and communication is low and widely distributed and then possible information is treated as a common good (Benkler, 2002; von Hippel, 1988, 2005). Under these conditions new production and diffusion models start to emerge and allow new creators, with different needs and motivations, to create and diffuse contents with characteristics similar to common goods. Indeed digital contents are technically non-rivals and non-excludables.

When using *Open Licenses* (like *General Public Licence* for software and *Creative Commons* licences for cultural contents) digital contents became legally similar to commons goods, indeed it became possible to share and modify the content.

The use of *Open Licenses* is usually related to the use of an “Open Model” to produce and diffuse the contents. The most known and studied “Open Model” is the *Free/Libre Open Source Software* (FLOSS). The main characteristic of “Open Model” is the unpaid volunteering cooperation and funding to the project.

Having unpaid volunteers, sponsors and for-profit firms involved to create a common good freely available is a big puzzle for economists.

Fershtman and Gandal (2007) collect several possible explanations concerning the incentives that drive developers to invest time and effort in a FLOSS project: to acquire reputation in the job market (Lerner and Tirole, 2002), to benefit from sharing innovation (Harhoff et al., 2003), the use of the final product (Johnson, 2002) and intrinsic motivations (Lakhani and Wolf, 2005).

The common cultural, legal and digital environment among FLOSS and cultural contents (video, music, texts, etc) under *Creative Commons* (CC) licenses suggest that the motivation to participate in a project under CC license can be similar in both “Open Models”.

The aim of this paper is to investigate the determinants of openness licenses choice to create a digital “common” good. Particularly I want to investigate the determinants of those licenses from the point of view of both production and diffusion.

2 The Creative Commons licenses

According to the *Creative Commons* website¹, *Creative Commons* licenses are several copyright licenses released on December 16, 2002 by *Creative Commons Corporation*, a U.S. non-profit corporation founded in 2001 by Lawrence Lessig. *Creative Commons Corporation* is headquartered in San Francisco, California, United States and is devoted to expanding the range of creative works available for others to build upon legally and to share.

Particularly by using *Creative Commons* licences the creator can use different combinations of the following clauses to declare which rights he/she wants to grant to users:

1. *Attribution* (by): Users may copy, distribute, display and perform the work and make derivative works based on it only if they give the creator the credits in the manner specified by these.
2. *Non-Commercial* (nc): Users may copy, distribute, display, and perform

¹<http://creativecommons.org/>

the work and make derivative works based on it only for non-commercial purposes.

3. *No Derivative Works* (nd): Users may copy, distribute, display and perform only verbatim copies of the work, not derivative works based on it.
4. *Share Alike* (sa): Users may distribute derivative works only under a license identical to the license that governs the original work.

I notice that not all the combinations are allowed, indeed the “nd” and “sa” clauses are mutually exclusive.

By using the different combinations of clauses of *Creative Commons* license, the creator could decide to grant to users the right to copy, to modify and to make money.

Following the six most used *Creative Commons* licenses:

1. *Creative Commons Attribution alone* (CC-by): This license allows users to redistribute, modify, using as input and contribute to the content. This license does not oblige derivative works under the same license, but forces a declaration of the original author.
2. *Creative Commons Attribution + Non-Commercial* (CC by-nc): This license allows users to redistribute, modify, using as input and contribute to the content, but only for non-commercial purposes. This license does not oblige derivative works under the same license, but forces a declaration of the original author.
3. *Creative Commons Attribution + No-Derivative-works* (CC by-nd): This license allows users to redistribute the content, but does not allow modification, using as input and contribute to the content.
4. *Creative Commons Attribution + Share-Alike* (CC by-sa): This license allows users to redistribute, modify using as input and contribute to the content. This license obliges derivative works under the same license and force a declaration of the original author.

5. *Creative Commons Attribution + Non-Commercial + No-Derivative-works* (CC by-nd): This license allows users to redistribute the content, but only for non-commercial purposes. This license does not allow users to modify, using as input and contribute to the content.
6. *Creative Commons Attribution + Non-Commercial + Share-Alike* (CC by-nc-sa): This license allows users to redistribute, modify, using as input and contribute to the content, but only for non-commercial purposes. This license obliges derivative works under the same license and forces a declaration of the original author.

Using the Public Domain tool called *CC0*, available on *Creative Commons* website², copyright owners are able to dedicate their works to the worldwide Public Domain. Public Domain allows users to redistribute, modify, using as input and contribute to the content.

3 Research Framework

The paper focuses on the link among the formalized institutions, the attributes of the community and the creators of digital goods similar to public goods.

To do that the paper adopts the *Institutional Analysis and Development* (IAD) framework (Ostrom, 1994) originally created for analyses of common-pool resources. IAD framework is already used to analyze the various dynamics of collective-action initiative to create digital “common” goods under *Creative Commons* and *Open Source* licenses (Hess and Ostrom, 2005; Schweik, 2007).

In *Open Cultural Contents* (OCC) production and diffusion, *Creative Commons* licenses represent the formal institution. I argue that as in case of FLOSS production and distribution, also in case of OCC, creators that use these formal institutions could not only cooperate, but also encourage and reinforce cooperative behaviour (Lerner and Tirole, 2005; Lyubareva, 2010) and obtain *ex-ante*

²<https://creativecommons.org/publicdomain/>

and/or *ex-post* production funding and contributions from the related community (Stewart et al., 2006; Belleflamme et al., 2011).

Figure 1 shows the IAD applied to the production of videos under *Creative Commons* and stored on Internet Archive. As Hess and Ostrom (2005) suggest there are three ways to enter the framework (from the middle, from the right-hand side or from the left-hand side). According to Hess and Ostrom (2005), I enter the analysis with the technical and institutional characteristics by discussing the left-hand side, because it is more appropriate when you decide to focus on knowledge common and the creation of a new form of commons such as a digital repository video under *Creative Commons* licenses.

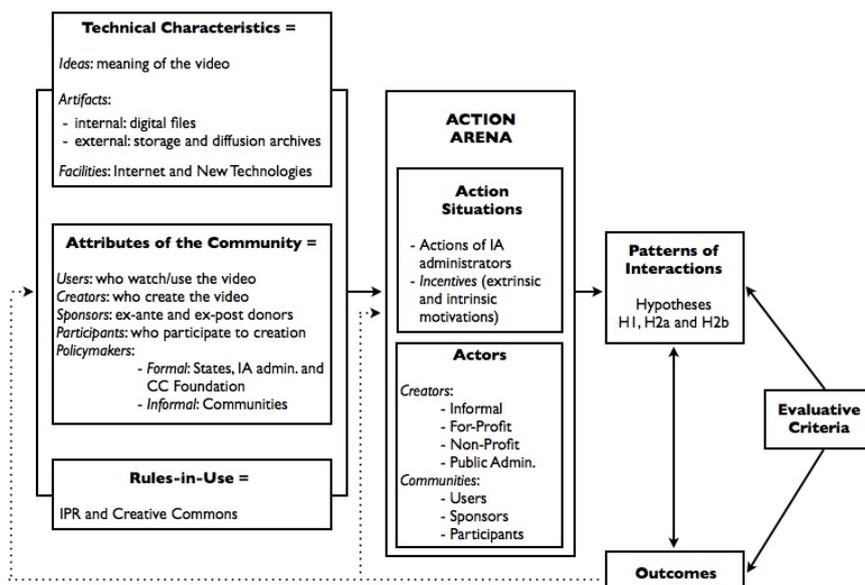


Figure 1: Institutional Analysis and Development

4 Ressource Characteristics

4.1 Technical Characteristics

As already stated in the introduction the Internet and more in general new technologies dematerialize contents and then these contents seem to have the same characteristics of public goods. Indeed they are non-rivals and non-excludables. Moreover the Internet and new technologies allow new actors to cross the barriers and produce new digital goods (online videos in these case) according to their business model, goals and knowledge that they want to share (see figure 1).

According with (Hess and Ostrom, 2005) *ideas* are the intangible content contained in artifacts. In case of *Open Video* (video under *Open License*) production and distribution there are two types of artifacts. I define *internal artifact* the video as it is and *external artifact* the storage and diffusion archives (like Facebook, YouTube and Internet Archive).

4.2 Attributes of the Community

I distinguish five different actors that define the attributes of the *Open Video Community* within the Internet Archive (see figure 1):

1. *Users*: The users are those who watch/use the video
2. *Creators*: The creators are those who create and publish the video
3. *Sponsors*: The sponsors are those who finance *ex-ante* and/or *ex-post* (i.e. by buying DVDs) the production (involving the *crowdfunding*).
4. *Participants*: The participants are those who contribute to the creation as directly (i.e. they contribute with music, writing part of the scenario or recording scenes) as indirectly (i.e. they contribute with feedback within the forum).
5. *Policymakers*:

- *Formal*: States, Internet Archive administrator and the Creative Commons Foundation, make Formal Policymakers.
- *Informal*: the different actors within the Open Community, like Users, Creators, Sponsors and Participants, make Informal Policymakers.

4.3 Rules-in-Use

According with Hess and Ostrom (2005) *Rules-in-Use* are shared normative instructions written in administrative procedures, legislation, contracts and licenses. They define what the interacting actors should, should not or could do in different situations. The rules-in-use are enforced and known by the interacting actors. They generate opportunities and constraints.

In this paper the rules-in-use are the *Intellectual Property Rights* and *Creative Commons* licenses, which are national and international formal rules regarding the creation of *Open Video* repository (see figure 1).

To illustrate the characteristic of *property rights* in *Open Cultural Content* production and diffusion I use the literature on management of commons in natural environment (Ostrom, 1990; Ostrom et al., 1999; Schlager and Ostrom, 1992) applied to digital environment (Hess and Ostrom, 2005). This representation was already used in FLOSS environment (Lyubareva, 2010) and *Creative Commons* licenses (Hess and Ostrom, 2005).

Hess and Ostrom (2005) identify seven major types of property rights, which are particularly relevant in the case of digital knowledge commons. These are:

1. *Access: The right to enter a defined physical area and enjoy nonsubtractive benefits*
2. *Contribution: The right to contribute to the content*
3. *Extraction: The right to obtain resource units or products of a resource system*
4. *Removal: The right to remove one's artifacts from the resource system*

5. *Management/Participation: The right to regulate internal use patterns and transform the resource by making improvements*
6. *Exclusion: The right to determine who will have access, contribution, extraction, and removal rights and how those rights may be transferred*
7. *Alienation: The right to sell or lease management/participation and exclusion rights*

By licensing cultural contents under a *Creative Commons* license, the creator can decide the part of copyright that he wants to grant to users.

5 Action Arena

The Action Arena (see figure 1) is made by the interacting actors who take decisions in situations that are affected by the technical, community and institutional characteristics (Hess and Ostrom, 2005).

5.1 Action Situation and Actors

The Action Situation (see figure 1) focuses on how people cooperate or do not cooperate with each other in various circumstances (Hess and Ostrom, 2005). To build a repository of *Open Video* there are different levels of actions and decisions. To analyze the action situation it is important to understand the different *incentives* of interacting actors.

The standard property right theorist approach claims that only the regime of private property rights provide sufficient motivation for creators to produce contents and to innovate. This implies that the attenuation of property rights causes economic inefficiency. An alternative approach considers “*that creators’ property rights can be well protected in the absence of intellectual property, and that the latter does not increase either innovation or creation. They are an unnecessary evil*” (Boldrin and Levine, 2008).

Some authors consider the existence of alternative incentives to extrinsic monetary motivations. Indeed, in case of attenuation of property rights and of *extrinsic* motivations, *extrinsic non-monetary* and *intrinsic* motivations incentivise people to participate to the creation of contents (Lerner and Tirole, 2002; Lakhani and Wolf, 2005; Valentinov, 2007). According to this approach it is possible to organise the motivations in three main groups:

1. *Extrinsic Monetary Motivations*

- *administrative commands* (Valentinov, 2007): the orders of the management of a firm
- *monetary* (Valentinov, 2007): to earn money

2. *Extrinsic Non-Monetary Motivations*

- *reputation* (Lerner and Tirole, 2002): to show one's capability so that others can admire you
- *career concerning* (Lerner and Tirole, 2002): to show one's capability to firms, hoping in a future job
- *peer recognition* (Lerner and Tirole, 2002): to show one's capability or interest, to be accepted in a group

3. *Intrinsic Motivations*

- *activity itself* (Valentinov, 2007): the mere enjoyment of an activity
- *ego gratification* (Lerner and Tirole, 2002): personal achievement
- *need* (von Hippel, 1988, 2005): users create solutions to their particular needs

For the purpose of this analysis I group creators in four different categories, according to their organizational status, by checking the declared legal status.

1. *For-Profit*: a for-profit creator is a creator that operates primarily to earn money. He/she is more able to benefit from the *extrinsic monetary* motivations.

2. *Non-Profit*: In contrast, a non-profit creator is a creator who focuses primarily on social, cultural, or political goals rather than on making profits. He/she is more able to benefits from the *extrinsic non-monetary* and *intrinsic* motivations.
3. *Informal*: They do not declare any legal status. They cannot collect money from the government or community or stay in the market.
4. *Public Administrations*: They are usually forced by law to use Public Domain or high degree of openness in licenses.

The *extrinsic non-monetary* and *intrinsic* motivation compensate for a lower salary and incentivise volunteering and donations. In the case of *For-Profit* the main motivational instruments are the *extrinsic monetary* motivations (Valentinov, 2007). By contrast, they are not able to benefit from *extrinsic non-monetary* and *intrinsic* motivation of the community members.

6 Patterns of Interaction

The technical characteristics, the incentives, the actions and the actors, all contribute to the patterns of interaction (see figure 1) (Hess and Ostrom, 2005).

By using *Open licenses* like *Creative Commons* licenses, creators decide to keep different degrees of property rights. Therefore two different new property-rights regimes/models seem to emerge and co-exist: *Open Production* and *Open Diffusion*.

With *Open Production* (OP) I identify the characteristic of the content to be produced in a cooperative model, independently from the control of the initial creator. This means that, concerning the production of the content, the creator decide to reduce or completely lose the *contribution, management/participation, exclusion* and *extraction* rights.

With *Open Diffusion* (OD) I identify the characteristic of the contents to be freely diffused. The creator decides to reduce or completely lose the *access,*

alienation and *exclusion* rights in the diffusion content.

Moreover, it is possible to have different degrees of restrictiveness of both *Open Production* and *Open Diffusion*.

To be able to adopt the OP or OD model, OCC creators use a particular set of licenses, the so-called *Creative Commons* licenses, that allow them to define the degree of openness in both production and diffusion processes.

Hence it is possible to distinguish two different models:

1. *Open Production* (OP): the creator renounces *contribution, management/participation, exclusion* and *extraction* rights. The creator grants the possibility to re-use his/her contents as input to create new contents. The creator could decide to grant or not to grant the *Alienation* right. He/she could decide to grant the previously mentioned rights only for non-commercial purposes by other users.
2. *Open Diffusion* (OD): the creator renounces *access, alienation* and *exclusion* rights. In other words the creator grants the diffusion of the content to other users also for commercial purposes.

Table 1 shows the six commonly used licenses plus the Public Domain. It shows also if they allow openness (+) or not (-) in OP and/or OD:

Table 1: Open Models

License	Model
<i>Public Domain</i>	+OP ; +OD
<i>CC Attribution alone</i>	+OP ; +OD
<i>CC Attribution + Non-commercial</i>	+OP ; -OD
<i>CC Attribution + NoDerivs</i>	-OP ; +OD
<i>CC Attribution + ShareAlike</i>	+OP ; +OD
<i>CC Attribution + Non-commercial + NoDerivs</i>	-OP ; -OD
<i>CC Attribution + Non-commercial + ShareAlike</i>	+OP ; -OD

According with to the degree of openness I ordered the CC licenses (plus PD) in three groups from the point of view of the production and of the distribution. “CC by” and PD do not impose any restriction. I consider them as the *Maximum* level of openness in both production and diffusion.

From the point of view of the production, I consider that the use of No-Derivative-works clause indicates the *Minimum* level of openness. The clauses Non-Commercial and/or Share-Alike, reduce the level of openness, but less than the clause of No-Derivative-works. I label it *Medium* level of openness in production.

On the other hand, from the point of view of the diffusion, the using of Non-Commercial clause indicates the *Minimum* level of openness. The clauses Non-Derivative-works and/or Share-Alike, reduce the level of openness, but less than the clause Non-Commercial. I label it *Medium* level of openness in diffusion.

Table 2 shows the degree of openness as well as in production as in diffusion.

Table 2: Degree of openness

Degree of openness	Production	Diffusion
Maximum	PD	PD
	CC by	CC by
Medium	CC by-sa	CC by-sa
	CC by-nc	CC by-nd
	CC by-nc-sa	
Minimum	CC by-nd	CC by-nc
	CC by-nd-nc	CC by-nc-sa
		CC by-nc-nd

The goal of this study is to explore the impact of the legal status of creators on the license choice. The paper argues that the license choice affects production and diffusion process.

6.1 Hypotheses

The FLOSS literature shows the importance of organizational structure and license choice to entice developers and users (Lerner and Tirole, 2005; Stewart et al., 2006; Singh and Phelps, 2009; Colazo and Fang, 2009).

Creators that show limited monetary incentives attract more easily contributions by users, then *Non-Profit* actors tend to be more successful in attracting community interest and contribution, such as in the case of crowdfunding, crowdsourcing, volunteering, etc (Belleflamme et al., 2011; Lambert and Schvienbacher, 2010; Stewart et al., 2006).

Moreover, a high degree of openness in license tends to be more successful in attracting community interest and contribution. Therefore it is not surprising that *Non-Profit* status combined with a high degree of openness in license tends to be even more successful in attracting community interest and contribution (Stewart et al., 2006).

It follows that, to show limited monetary incentives, and attracting community, *For-Profit* actors need to use a high degree of openness in license and then increase the attractiveness to benefit from crowdfunding, crowdsourcing, volunteering, etc.

My hypotheses are:

- Creators that use open in production model (OP) will compensate by using less open diffusion model (OD) and vice-versa (H1).
- To entice community and benefit from them, the creator with *For-Profit* legal status will use a more high degree of openness in *Creative Commons* license in both aspects, production (H2a) and diffusion (H2b).

Then I focus on the impact of the different *ex-ante* organizational structures, described by the legal status, on the *ex-post* choice of the different degree of openness in both an *Open Production* and an *Open Diffusion* models.

The objective is to hypothesise the existence of both *Open Production* and *Open Diffusion* models (H1) and to test whether the legal status of the creator

affects the choice of openness of *Creative Commons* license and the *Open Production* and *Open Diffusion* models. Indeed I argue that *For Profit* creators use the highest degree of openness in both the OP and OD models to attract interest and contributions from community (H2a and H2b).

6.2 Data Collection

To explore the impact of *ex-ante* organizational structure on *ex-post* choice of openness in *Open Production* and *Open Diffusion* models, I have assembled an original database of videos under Public Domain and CC licenses, using the subsection “Community Video”³ hosted on Internet Archive.

The Internet Archive (IA) is a non-profit digital library, founded in 1996, operating in the United States with the stated mission: “*universal access to all knowledge*”. It offers permanent storage and access to collections of digitized materials, including websites, music, videos, and books. IA is a member of the American Library Association and is officially recognized by the State of California as a library. The IA began to archive the World Wide Web from 1996, but it did not make this collection available until 2001. To use IA as storage is also suggested by CC tools and website, particularly when using CC license tools.

IA collects more than 100.000 videos under the subsection “Community Video”, but only 27.939 provide detailed information of the CC license⁴. Some observations were dropped for the purpose of this study, as they do not provide detailed information on creator, publisher or year of creation or year of publication. Because the first set of CC licenses were created in December 2002, I dropped the observations about videos created and/or published before 2003.

This selection has resulted in a sample of 999 observations.

³http://www.archive.org/details/opensource_movies

⁴last check on February 2010

6.3 Variables

The contents in the sample were published under some CC license or under Public Domain by different creators with different legal status. I distinguish among four groups of creators, the *For-Profit* creators (1), that tend to attract interest of contributors more influenced by *extrinsic monetary* motivations; the *Non-Profit* creators (2), that tend to attract interest of contributors more influenced by *intrinsic* and *extrinsic non-monetary* motivations; the *Informal* creators (3) that are not organized to benefit from contributions of *extrinsic monetary* motivated actors; and the *Public Administrations* (4), that tend to attract interest of contributors more influenced by *intrinsic* and *extrinsic non-monetary* motivations. I checked the legal status of each creator. I also checked the different clauses of CC licenses. The variables are:

Open Production. This variable indicates if the creator allows others to modify his product or not. This variable indicates whether there is the *no-derivative-work* clause or not. I distinguish between licenses that allow modification (PD, CC by, CC by-sa, CC by-nc and CC by-nc-sa) and licenses that do not allow modification (CC by-nc-nd, CC by-nd). This dummy variable takes the value “1” if the users can modify and re-use the contents as input and “0” otherwise.

Open Diffusion. This variable indicates if the creator allows others to sell his product or not. This variable indicates whether there is the *non-commercial* clause or not. I distinguish between licenses that allow commercial purposes (PD, CC by, CC by-sa and CC by-nd) and licenses that do not allow commercial purposes (CC by-nc, CC by-nc-nd and CC by-nc-sa). This dummy variable takes the value “1” if users can re-use and diffuse the contents for commercial purposes.

OpenProdDeg. This variable represents the degree of openness of the license from the point of view of the production process. I distinguish among three degrees of openness.

1. The first category indicates the *Maximum* degree of openness (PD and CC-by).
2. The second category indicates the *Medium* degree of openness (CC by-sa, CC by-nc and CC by-nc-sa).
3. The third category indicates the *Minimum* degree of openness (CC by-nd, CC by-nd-nc).

OpenDiffDeg. This variable represents the degree of openness of the license from the point of view of the diffusion process. I distinguish among three degrees of openness.

1. The first category indicates the *Maximum* degree of openness (PD and CC-by).
2. The second category indicates the *Medium* degree of openness (CC by-sa and CC by-nd).
3. The third category indicates the *Minimum* degree of openness (CC by-nc, CC by-nc-sa and CC by-nc-nd).

Informal. This dummy variable takes the value of “1” in the absence of any legal status.

For-profit. This dummy variable takes the value of “1” in the presence of the for-profit legal status (i.e. firms)

Non-profit. This dummy variable takes the value of “1” in the presence of the non-profit legal status (i.e. foundations)

Public. This dummy variable takes the value of “1” in the presence of a Public Administration.

The objective of this study is to show that the *ex-ante* organizational structure, has a significant impact on the *ex-post* choice of the degree of openness of license, in both production and diffusion.

7 Outcomes

7.1 Descriptive Results

833 contents (83.38 %) were published under a permissive *Open Production* (OP) model, and so without No-Derivative-Works (ND) clause. This means that it is possible to modify and re-use the original material as input to create new contents. 166 contents (16.62 %) were published under restrictive OP model, and so with ND clause, meaning that is not possible to re-use the material and create derivative works.

841 contents (84.18 %) were published under the permissive *Open Diffusion* (OD) model, which imply that it is possible to freely re-distribute and commercialise these contents. 158 contents (15.82 %) were published under the restrictive OD model, meaning that it is possible to re-distribute the contents for non-commercial purposes only.

284 contents (28.43 %) were created by *Informal* actors, 252 (25.23 %) by *For-Profit* actors, 141 (14.11 %) by non-profit actors and 322 (32.23 %) by Public Administrations.

Table 3 shows the percentage of different Status among the contents under restrictive (0) or permissive (1) both OP and OD models:

Table 3: Percentage of different Legal Status

Status	OpenProduction				OpenDiffusion				Total	%
	(0)	%	(1)	%	(0)	%	(1)	%		
Informal	78	27.46 %	206	72.54 %	89	31.34 %	195	68.66 %	284	28.43 %
For_Profit	27	10.71 %	225	89.29 %	41	16.27 %	211	83.73 %	252	25.23 %
Non_Profit	54	38.30 %	87	61.70 %	25	17.73 %	116	82.27 %	141	14.11 %
Public	7	2.17 %	315	97.83 %	3	0.93 %	319	99.07 %	322	32.23 %
									999	100 %

Because Public Administrations are usually obliged by law to share the pro-

perty rights with citizens⁵, it is not surprising that the majority of the contents produced by the Public Administration was published under permissive CC licenses or PD using open OP (97.83%) and open OD (99.07%) models.

Table 4 shows the percentage of different legal status among the different degree of openness in production.

Table 4: Percentage of different legal Status on degree of openness in production

Status	OpenProdDeg			Total
	Minimum	Medium	Maximus	
Informal	78	115	91	284
	27.46%	40.49%	32.04%	100%
	46.99%	25.61%	23.70%	28.43%
ForProfit	27	138	87	252
	10.71%	54.76%	34.52%	100%
	16.27%	30.73%	22.66%	25.23%
Non_Profit	54	40	47	141
	38.30%	28.37%	33.33%	100%
	32.53%	8.91%	12.24%	14.11%
Public	7	156	159	322
	2.17%	48.45%	49.38%	100%
	4.22%	34.74%	41.41%	32.23%
Total	166	449	384	999
16.62%	44.94%	38.44%	100%	
100%	100%	100%	100%	

Table 5 shows the percentage of different legal status among the different degree of openness in diffusion.

⁵i.e. in U.S.A. according to Federal Copyright Act contents produced by the Federal Government can not be copyrighted

Table 5: Percentage of different legal Status on degree of openness in production

Status	OpenDiffDeg			Total
	Minimum	Medium	Maximus	
Informal	89	104	91	284
	31.34%	36.62%	32.04%	100%
	56.33%	22.76%	23.70%	28.43%
For_Profit	41	124	87	252
	16.27%	49.21%	34.52%	100%
	25.95%	27.13%	22.66%	25.23%
Non_Profit	25	69	47	141
	17.73%	48.94%	33.33%	100%
	15.82%	15.10%	12.24%	14.11%
Public	3	160	159	322
	0.93%	49.69%	49.38%	100%
	1.90%	35.01%	41.41%	32.23%
Total	158	457	384	999
	15.82%	45.75%	38.44%	100%
	100%	100%	100%	100%

Table 6 shows the correlation analysis of our variables.

Table 6: Correlation

Variables	OpenProduction	OpenDiffusion	OpenProdDeg	OpenDiffDeg
OpenProduction	1.000			
OpenDiffusion	-0.171 (0.000)	1.000		
OpenProdDeg	0.767 (0.000)	0.145 (0.000)	1.000	
OpenDiffDeg	0.156 (0.000)	0.758 (0.000)	0.680 (0.000)	1.000
Informal	-0.184 (0.000)	-0.268 (0.000)	-0.153 (0.000)	-0.197 (0.000)
For_Profit	0.092	-0.007	0.016	-0.036

Continued on next page...

... table 6 continued

	(0.004)	(0.820)	(0.607)	(0.253)
Non_Profit	-0.236	-0.021	-0.153	-0.041
	(0.000)	(0.502)	(0.000)	(0.200)
Public	0.268	0.281	0.247	0.254
	(0.000)	(0.000)	(0.000)	(0.000)

It is important to remark that the openness in production (*OpenProduction*) and the openness in diffusion (*OpenDiffusion*) are negatively correlated (-0.171). Therefore who uses more OD is more likely to use less OP and vice-versa. This supports the hypotheses H1.

The degree of openness in production (*OpenProdDeg*) is positively correlated (0.680) with the degree of openness in diffusion (*OpenDiffDeg*). This is not surprising because when creator increases the degree of openness in production he/she will automatically increase the degree of openness in diffusion.

Both *OpenProduction* and *OpenDiffusion* are positively correlated with the openness in production (*OpenProdDeg*) and diffusion (*OpenDiffDeg*). This can be explained by the fact that when creator decides to adopt openness in production (or in diffusion) he/she will automatically increases the degree of openness in diffusion (or in production).

OpenProduction is positively correlated with *Public* (0.268) and *For_Profit* (0.092), and is negatively correlated with *Informal* (-0.184) and *Non_Profit* (-0.236). This supports the hypothesis H2a.

The correlation between *OpenDiffusion* and *For_Profit* is not significant. The correlation between *OpenDiffusion* and *Non_Profit* is not significant either.

The correlation between the degree of openness in production *OpenProdDeg* and *For_Profit* is not significant, but the degree of openness in production *OpenProdDeg* is negatively correlated with *Non_Profit* (-0.153) and *Informal* (-0.153) and it is positively correlated with *Public* (0.247). This is coherent with hypotheses H2a.

The correlation between the degree of openness in diffusion *OpenDiffDeg* and *For_Profit* is not significant. The correlation between *OpenDiffDeg* and *Non_Profit* is not significant either.

7.2 Regression Results

7.2.1 Open Production and Open Diffusion

To further explore the impact of openness in production on openness in distribution, I estimated two ordered logistic regressions.

Table 7 shows the logistic regression and marginal effect results of the impact of *OpenDiffusion* on *OpenProduction* and table 8 shows the logistic regression and marginal effect results of the impact of *OpenProduction* on *OpenDiffusion*.

Table 7: Logistic Regression and Marginal Effect Results

	(Dep. Var.) OpenProduction	(Marginal Effects) mfx
OpenDiffusion (d)	-2.519*** (0.590)	-0.175*** (0.0174)
<i>N</i>	999	999
Log lik.	-428.4	-428.4
Chi-squared	18.25	18.25
p	0.0000193	0.0000193

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Logistic Regression and Marginal Effect Results

	(Dep. Var) OpenDiffusion	(Marginal Effects) mfx
OpenProduction (d)	-2.519*** (0.590)	-0.168*** (0.0170)
<i>N</i>	999	999
Log lik.	-415.3	-415.3
Chi-squared	18.25	18.25
p	0.0000193	0.0000193

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

OpenDiffusion has a negative impact (-0.175) on *OpenProduction* and *Open-*

Production has a negative impact (-0.168) on *OpenDiffusion*. It confirms the hypotheses H1 that two different “open” models OP and OD operate in case of OCC production and diffusion.

7.2.2 Impact of Legal Status on Openness in Production

To investigate the impact of the legal *Status* of creator on the degree of openness of license chosen, from the point of view of the production (*OpenProdDeg*), I estimated another ordered logistic regression. To avoid the multicollinearity problem I dropped one variable concerning the legal status of the creators. I decide to drop the *Public* variable because I know that Public Administrations are more likely to adopt a high degree of openness.

Table 9 shows the results of the regression and of the marginal effect.

Table 9: Ordered Logistic Regression and Marginal Effect Results

	(Dep. Var.)	(Marginal Effects)		
	OpenProdDeg	Maximum	Medium	Minimum
Informal (d)	-1.085*** (0.158)	-0.231*** (0.0292)	0.0611*** (0.0110)	0.170*** (0.0305)
For_Profit (d)	-0.609*** (0.138)	-0.135*** (0.0289)	0.0443*** (0.00884)	0.0904*** (0.0230)
Non_Profit (d)	-1.370*** (0.241)	-0.262*** (0.0334)	0.0159 (0.0259)	0.246*** (0.0551)
<i>N</i>	999	999	999	999
Log lik.	-989.3	-989.3	-989.3	-989.3
Chi-squared	67.28	67.28	67.28	67.28
p	1.64e-14	1.64e-14	1.64e-14	1.64e-14

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The values of Wald Chi-Square and the p-value indicate that our model is statistically significant. I also used the Brant test that has confirmed that our model is statistically significant.

Except for Medium degree of openness of *Non_Profit* all other results are statistically significant ($p < 0.001$).

It is not surprising that all independent variables (*Informal*, *Non_Profit* and *For_Profit*) have a negative impact on the dependent variable (*OpenProdDeg*). The negative effect of the included variables can be explained by the fact that the variable *Public* (the most likely to adopt the higher degree of openness) has been dropped.

For_Profit (-0.135) is more likely to adopt a high degree of openness of license than *Informal* (-0.231) and *Non_Profit* (-0.262).

Both *Non_Profit* (0.246) and *Informal* (0.170) are more likely to adopt a lower openness degree in production than *For_Profit* (0.0904).

These results confirm hypothesis H2a. Indeed concerning the production of a digital goods with characteristics similar to a public good (a video under *Creative Commons* license in this case), I argue that *For_Profit* actors, in order to attract interest of users, participants and sponsors (crowdfunding and crowdsourcing), need to use a high degree of openness than *Non_Profit* actors that are able to attract community interest and contributions because of its legal status.

7.2.3 Impact of Legal Status on Openness in Diffusion

To investigate the impact of the legal *Status* of creator on the degree of openness of license chosen, from the point of view of the diffusion(*OpenDiffDeg*), I estimated another ordered logistic regression. To avoid the multicollinearity problem the dummy variable *Public* is dropped. Indeed Public Administration is more likely to use a high degree of openness. The results of the regression and of the marginal effects are showed in the table 10.

The values of Wald Chi-Square and the p-value indicate that our model is statistically significant. I also used the Brant test that has confirmed that our model is statistically significant.

To avoid the multicollinearity problem I drop one variable concerning the legal status of the creators. Like in the previously regression I decide to drop the *Public* variable because I know that Public Administration are more likely to adopt the higher degree of openness.

Table 10: Ordered Logistic Regression and Marginal Effect Results

	(Dep. Var.)	(Marginal Effects)		
	OpenDiffDeg	Maximum	Medium	Minimum
Informal (d)	-1.233*** (0.166)	-0.259*** (0.0292)	0.0693*** (0.0126)	0.190*** (0.0329)
For_Profit (d)	-0.760*** (0.147)	-0.166*** (0.0296)	0.0548*** (0.00907)	0.111*** (0.0256)
Non_Profit (d)	-0.830*** (0.183)	-0.174*** (0.0334)	0.0441*** (0.00909)	0.130*** (0.0350)
N	999	999	999	999
Log lik.	-983.5	-983.5	-983.5	-983.5
Chi-squared	68.76	68.76	68.76	68.76
p	7.88e-15	7.88e-15	7.88e-15	7.88e-15
Standard Error	Robust	Robust	Robust	Robust

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

All results are statistically significant ($p < 0.001$). Like in previously regression, also in this case it is not surprising that all independent variables (*Informal*, *Non_Profit* and *For_Profit*) have a negative impact on dependent variable (*OpenDiffDeg*), because the fact that the variable *Public* has been dropped.

For_Profit (-0.166) is more likely to adopt a high degree of openness of license than *Non_Profit* (-0.174) and *Informal* (-0.259).

Informal (0.0693) and *For_Profit* (0.0548) are more likely to adopt a medium degree of openness than *Non_Profit* (0.0441).

Both *Non_Profit* (0.130) and *Informal* (0.190) are more likely to adopt a lower openness degree in production than *For_Profit* (0.111).

These results confirm hypothesis H2b. Also in the case of diffusion I argue that *For_Profit* actors needed to adopt a higher degree of openness than *Non_Profit* actors to benefit from crowdfunding, crowdsourcing and to attract interest of community. Openness in diffusion is also helpful to increase the diffusion of the goods.

8 Conclusions and future research

In this paper I have analyzed the impact of the organizational structure on openness in production and distribution, by assessing the impact of the *ex-ante* legal status of creator on the *ex-post* choice of the emergent *Creative Commons* licenses.

I hypothesise the existence of two different emergent *open* models: the *Open Diffusion* and the *Open Production* model.

According to the standard property right approach, only the regime of private property rights provide sufficient motivation for creators to produce contents and to innovate. As a consequence *For-Profit* actors should be more likely to use restrictive licenses in both production and diffusion models. My results suggest the opposite. I show that when *For-Profit* actors decide to use the *Creative Commons* licenses, they are more likely to use a high degree of openness in license in both production and distribution point of view. This can be explained as the result of the intent of *For-Profit* creators to be more attractive to users, participants and sponsors in order to obtain advantages from community and people who are motivated by *extrinsic non-monetary* and *intrinsic* motivations.

The paper leaves a number of issues open. Therefore future investigations are necessary. Particularly it will be interesting to investigate the different business strategies of creators and the *evaluative criteria* (see figure 1), to explore and to assess current results as well as under alternative actions or institutional arrangements (Hess and Ostrom, 2005).

References

- Belleflamme, P., Lambert, T., and Schwienbacher, A. (2011). Crowdfunding: Tapping the right crowd. pages 1–39.
- Benkler, Y. (2002). Coase’s penguin, or, linux and the nature of the firm. *Yale Law Journal*, (112):446–369.
- Boldrin, M. and Levine, D. (2008). Against intellectual monopoly. *Cambridge University Press*, pages 1–325.

- Colazo, J. and Fang, Y. (2009). Impact of license choice on open source software development activity. *Journal of the American Society for Information Science and Technology*, 60(5):997–1011.
- Fershtman, C. and Gandal, N. (2007). Open source software: Motivation and restrictive licensing. *International Economics and Economic Policy*.
- Harhoff, D., Henkel, J., and von Hippel, E. (2003). Profiting from voluntary information spillovers: how users benefit by freely revealing their innovations. *Research policy*, 32(10):1753–1769.
- Hess, C. and Ostrom, E. (2005). A framework for analyzing the knowledge commons: a chapter from understanding knowledge as a commons: from theory to practice. *surface.syr.edu*.
- Johnson, J. (2002). Open source software: Private provision of a public good. *Journal of Economics & Management Strategy*.
- Lakhani, K. and Wolf, R. (2005). Why hackers do what they do: Understanding motivation and effort in free/open source software projects. *Perspectives on free and open source software*, pages 3–22.
- Lambert, T. and Schwienbacher, A. (2010). An empirical analysis of crowdfunding. *SSRN Working Paper Series*.
- Lerner, J. and Tirole, J. (2002). Some simple economics of open source. *The journal of industrial economics*, 50(2):197–234.
- Lerner, J. and Tirole, J. (2005). The scope of open source licensing. *Journal of Law, Economics, and Organization*, 21(1):20–56. 16853495650622974643.
- Lyubareva, I. (2010). Cooperation in network as an alternative for the knowledge creation. example of free and open source software. *University Paris Ouest, PhD Thesis*.
- Ostrom, E. (1990). Governing the commons – the evolution of institutions for collective action. *New York Cambridge University Press*, (2).
- Ostrom, E. (1994). Institutional analysis, design principles and threats to sustainable community governance and management of commons'. *Community management and common property of coastal fisheries in Asia and the Pacific: concepts, methods and experiences*.
- Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., and Policansky, D. (1999). Sustainability - revisiting the commons: Local lessons, global challenges. *Science*, 284(5412):278–282+.
- Schlager, E. and Ostrom, E. (1992). Property-rights regimes and natural resources: A conceptual analysis. *Land Economics*, 68(3):249–262.
- Schweik, C. (2007). Free/open source software as a framework for scientific collaboration. *works.bepress.com*, (in Hess, Charlotte and Elinor Ostrom, eds. *Understanding Knowledge as a Commons: From Theory to Practice*. Cambridge, Mass: MIT Press).

- Singh, P. and Phelps, C. (2009). Determinants of open source software license choice: A social influence perspective. *Available at SSRN: <http://ssrn.com/abstract=1436153>*.
- Stewart, K., Ammeter, A., and Maruping, L. (2006). Impacts of license choice and organizational sponsorship on success in open source software development projects. *Information Systems Research*, 17(2):126–144.
- Valentinov, V. (2007). The property rights approach to nonprofit organization: The role of intrinsic motivation. *Public Organization Review*, 7(1):41–55.
- von Hippel, E. (1988). The sources of innovation. *Oxford University Press, New York*, page 218. User Innovation Theory.
- von Hippel, E. (2005). Democratizing innovation. *The MIT Press*, page 224.