## JOINT COPYRIGHTS MANAGEMENT BY COLLECTING SOCIETIES AND ONLINE PLATFORMS:

### AN ECONOMIC ANALYSIS

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Abstract. This paper discusses the effects of technological change on joint (copy)rights management (JRM). The economic literature discusses JRM as a response to relatively high transaction costs in complex markets for copyright works. Based on a formal analysis, we show that JRM reduces the average transaction costs per transaction and the total number of transactions under a broad range of conditions. Throughout the 20<sup>th</sup> Century, JRM was mostly conducted by copyrights holder collectives. Recently, private for-profit online platforms are taking on core functions of JRM. Our formal analysis yields two essential results: (1) the efficient scale and scope of JRM will increase as copyright works are increasingly traded via digital ICT networks; (2) a change from collective JRM on behalf of rights holders to commercial intermediation weakens the position of rights holders, and will aggravate problems with the private provision of copyright works with public good attributes.

**Keywords.** Collecting societies; copyright collectives; copyright; online intermediaries; digitization.

**JEL codes.** D23, K23, L33, L82, L86, O33.

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#### 1. Introduction

Markets for copyright works have exhibited swift and far-reaching change with digitization, the diffusion of digital information and communication technology (ICT). This affects the elaborate trading infrastructure for licenses to reproduce, disseminate and for making available copyright works (and creations protected by related rights). One aspect of the copyright industries affected by digitization is joint rights management (JRM). In virtually all highly developed economies, copyrights holders commission other organizations to jointly administer some of their rights. In the European Union, for instance, non-profit collective management organizations (CMO; also known as collecting societies) under formal control of rights holders collected €6.1 billion in 2009 (ECom 2012), and legal framework for many CMO is changing substantially in European Union Member States with the directive on collective management of copyright (2014/26/EU). In some countries like the USA, participation of copyrights holders in collective licensing of some rights is even compulsory.<sup>1</sup> CMO act as intermediary platforms in markets for copyrights and set standard terms of use (including the price) for a broad range of differentiated copyright works. JRM is usually seen as a means to reduce average transaction costs in markets for copyrights and copyright works by exploiting increasing returns to scale in the administration of rights.

Based on a formal model of JRM, this paper discusses under what market circumstances JRM is efficient, and how technological change affects the efficient scale and scope of JRM. We consider several aspects of digitization: falling costs of supplying JRM services; falling costs of creating and disseminating works, including facilitated unauthorized copying; integration of markets; and JRM services being supplied by for-profit firms rather than collectives of rights holders. We find that many consequences of digitization increase the efficient scale and scope of JRM. A case in point are online streaming or download services for copyright works, such as Spotify or Netflix, which have begun supplying core services of JRM among end-consumers as for-profit, joint rights management organizations (PMO). We also discuss the basic differences between CMO and PMO, and the implications for the fundamental aim of copyright systems: to promote the private provision of goods with public good attributes.

<sup>&</sup>lt;sup>1</sup> In the USA for example, collective licensing for digital audio transmission is compulsory (United States Copyright Office 2011).

#### 2. Definitive aspects of joint rights management

The essence of JRM is a *standard* regarding the terms of use (including a standard pricing scheme) for a large bundle of copyright works from a great number of different rights holders. Licenses that are close to comprehensive across a type of copyright works are referred to as blanket licenses. Where participation is voluntary, standard terms need to be designed so that a sufficient number of rights holders and users benefit from JRM. Terms and prices usually contain contingent elements (group pricing or metered pricing) to better cater for different characteristics of rights holders, works and users. Standards tend to be privately sponsored, but often with extensive public oversight and regulation in the case of CMO.

As we will discuss more formally below, standardization of contracts *reduces average transaction costs* in markets for copyright licenses. JRM reduces average transaction costs per transaction (including search costs, as well as bargaining and contracting costs). Holding other things equal, bundling with JRM also reduces the number of transactions in complex markets with differentiated products, multiple rights holders supplying several works and multiple users with a preference for variety. Simplifying somewhat, JRM means that a number of transactions between individual rights holders and users are replaced by a single interaction between each rights holders and each user with a JMO.

At the heart of JRM are *information services*: helping potential market participants to get information on whom to trade with, on mutually acceptable terms of trade, and on how to conduct the exchange. (This should not be confused with the characteristic of copyright works as information services.) Another way to put this is that transaction costs arise from incomplete information, and copyright collectives provide services that help mitigate some problems due to incomplete information of market participants.

Information services tend to have substantial fixed costs and low, non-increasing marginal costs over any practically relevant size of output. The theoretical literature, such as Besen, Kirby and Salop (BKS 1992) and Watt (2000), suggest that the services provided by JMO have the cost structure of a *natural monopoly*, with strictly increasing returns to scale. With very few exceptions, CMO are organized as national monopolies (Handke 2014). Among PMO there also tends to be a single firm that accounts for the bulk of the market (>50% market share) at any point in time, even though exact figures are rarely available and a quick succession of innovative market entry is associated with less stability in the industry structure.<sup>2</sup>

<sup>&</sup>lt;sup>2</sup> For instance the iTunes store had an estimated US market share of 63% in paid music downloads during the fourth quarter of 2012, followed by AmazonMP3 with 22% (NPD 2012). Market leaders in other areas catered for by PMO

Another universal aspect of JRM is that JMO do not make advance payments to rights holders but conduct ex post profit sharing. That is JMO operate not as conventional traders but as *platforms* in two-sided markets, supplying intermediary services to rights holders and users of copyright works (Armstrong 2006; Rochet and Tirole 2006; Rysman 2009; Ehrlich and Greiner 2013). There are indirect network effects in the provision of such services, where broad participation by rights holders (users) makes the JMO more attractive to users (rights holders). Together with economies of scale emphasized in preceding analyses of CMO and in this paper, network effects give rise to increasing returns to scale.

An obvious benchmark to evaluate JRM is individual rights management (IRM), also referred to as private ordering or separate selling. IRM has the advantage that suppliers and buyers negotiate tailored agreements to their specific circumstances. However, an otherwise unrestricted market mechanism is not advantageous if the transaction costs exceed the value of a mutually beneficial deal. Section 4 develops a systematic comparison between IRM and JRM, focusing on transaction costs.

#### 3. Literature and functions of JMO

#### 3.1 The literature on collective rights management and the contribution of this paper

A handful of papers have discussed the economics of CRM, starting with Hollander (1984) and Besen and Kirby (1989a). For recent literature reviews see Handke and Towse (2007) and Handke (2014). There are two formal analyses of collective copyright management to date, BKS (1992) and Watt (2000). Main features and insights are presented in section 3. We extend on the literature in three ways: first, we develop a more explicit comparison between IRM, CRM and PRM; second, we draw on the recent microeconomic literature on bundling, standards as well as two-sided markets; third, we apply the formal analysis to assess the implications of digitization for the efficient scale, scope and type of JRM.

are Youtube for online streams of videos, Amazon for online trading of books. Spotify has a very large market share for either advertising-financed or paid subscription-based music streaming services in Scandinavia (Findahl 2011). Pandora, which applies greater restrictions to the types of works being accessed than music subscription services, accounted for the bulk of the market for music streams in the USA until 2014, according to a proprietary study by Edison research, quoted by Elmer-De-Witt (2014). Arguably, markets for new online music services exhibit typical features of competition for the market (rather than in the market), with most firms incurring high losses and exponential growth in the market shares of successful new services.

#### 3.2 Standards

Standards are about managing a diverse range of situations with a small amount of rules. For instance, copyright law and related public regulation are formal, mandatory standards set by governments in markets for the relevant creative works. Copyright law defines what constitutes a work, and what constitutes reproduction, dissemination, use and modification of these works. It defines who enjoys exclusive rights, and how they can be sold. On this basis, private stakeholders generate subsidiary standards' such as conventional contracts and routines.

The economic literature suggests that standards can mitigate a number of market failures by: (1) reducing transaction costs and thus facilitating trade; (2) correcting for asymmetric information and adverse selection; (3) ensuring that rational agents consider external effects (internalization); and (4) enabling creators and intermediaries to focus on the quality of their core goods and services (specialization) rather than on searching and bargaining with trading partners and policy makers, or on monitoring and enforcing terms of trade (Blind 2004; Meeks and Swann 2006).<sup>3</sup>

On the other hand, there is the potential for extensive market power of the sponsor/owner of a standard and inefficient lock-in (David 1985). Furthermore, standards reduce the range of choices and thus the flexibility of economic agents and markets to instigate change and to adapt to changing conditions beyond the framework set by a standard. The literature further suggests that standards can be used to reduce competition among users of those standards (by favouring specific products and suppliers). Standards thus tend to have ambiguous effects regarding the diversity and quality of goods and services supplied. Standardization relates a trade-off between reducing uncertainty and transaction costs, and the inevitable mismatch when a diverse range of cases receive a 'one-size-fits-all' treatment.<sup>4</sup> Among CMO, extensive price discrimination (group pricing and metered pricing) on the user and the rights holder side mitigates the shortcomings of standardization (Towse and Handke 2007; Handke 2014).

#### 3.3 Bundling

Bundling of repertoires into comprehensive, blanket licenses is an important aspect of many JRM systems. The effects of bundling are well familiar in microeconomics (McAfee et al. 1989; Bakos

<sup>&</sup>lt;sup>3</sup> Our analysis is not focused on compatibility standards between rival technologies as widely discussed in microeconomics (e.g. Farrell and Saloner 1985; Katz and Shapiro 1985) but on the benefits of standards for suppliers of differentiated goods and services of trading under a joint standard.

<sup>&</sup>lt;sup>4</sup> Handke et al. (2013) use the term simplicity-flexibility trade-off in their discussion of standards in markets for copyright works.

and Brynjolfsson 1999): in markets for imperfect substitutes with low marginal costs and weak correlation of individual preferences, pure bundling enables suppliers to capture more of the surplus where price discrimination and personalized pricing is too costly. As we will discuss below, bundling of copyright works can increase social welfare where it encourages greater investments in the provision of quasi-public goods, or where it reduces total transaction costs compared to IRM.

Furthermore, the position of JMO as quasi-monopolies, who gather detailed information on users, means that a number of issues typically raised in conjunction with bundling are irrelevant. First, with a small number of JMO offering blanket licenses, sorting plays no substantial role.<sup>5</sup> Second, bundling is a primitive form of price discrimination, and this function of bundling is largely replaced where JMO apply more sophisticated means of price discrimination such as group pricing and metered pricing.

#### 3.3 Collective bargaining

An important aspect of CRM systems is collective bargaining on behalf of rights holders. On average, quasi-monopolistic CMO should be able to strike more beneficial deals with users on behalf of rights holders than rights holders are able to achieve individually. Collective administration inhibits price competition between copyright holders. In this sense, collective administration increases the intended effect of copyright to endow rights holders with some market power. This may be a social benefit if without collective bargaining, rights holders cannot secure sufficient revenues to encourage socially optimal levels of investments in the creation of new works. Among other things, this is contingent on the state of copying technology and market power on the user side.

<sup>&</sup>lt;sup>5</sup> Bundling may have a sorting function, where selective inclusion of a number of differentiated goods or services purveys signals of quality to imperfectly informed users, for instance in shopping centres for up-market brands. JRM tends to develop a single, quite comprehensive bundle with little apparent attempts for JMO to market their services as selective and focused on quality selection (even though recommendation systems can provide some customized pointers to works similar to those customers have previously used). This is consistent with Caves' (2000) stylized facts that in creative industries, users and suppliers are ignorant about intrinsic product quality and that demand for specific works changes rapidly over time. With uncertainty about quality, largely unpredictable demand, low inventory costs and increasing returns, JMO compete more on bulk of the repertoire than quality and curatorship. With a small number of largely comprehensive JMO operating, the quality signal from inclusion of works is that the rights holder expects some use so that any fixed cost of JRM participation is worthwhile and that the market share of the rights holder is not high enough to make IRM worthwhile under the cost conditions of a natural monopoly. This range is broad and says little about the specific value of an individual work.

#### 3.4. An overview of JMO types and their functions

The first proper CMO was set up in France in the middle of the 19<sup>th</sup> Century and in most highly developed economies, CMO have operated throughout the 20<sup>th</sup> Century. CMO generally operate as non-profit organizations, often under direct control of rights holders. Over recent years, other organizations have also begun supplying very similar functions to CMO: online platforms, which facilitate authorized trading and use of copyright works online such as the iTunes store, Rhapsody, Spotify, Amazon or Netflix. We refer to these private firms as joint for-profit management organizations (PMO), and to all organizations setting standards over a range of copyright works from a large number of independent rights holders as joint management organizations (JMO). The services that these organizations conduct are referred to as joint rights management (JRM), with the sub-types of collective rights management (CRM), joint for-profit rights management (PRM). Section 5 discusses outstanding differences between CRM and PRM.

Another type of JRM is a copyright compensation system (CCS), which relies less on copyright enforcement or voluntary payments. With CCS the liability to pay copyright royalties is established by acquisition or use of some more excludable good or service related to unauthorized copying (such as copying hardware or Internet subscription) or even through general taxation. CCS are a means to reduce total monitoring and enforcement costs in markets for copyrights. Its drawback is that CCS royalties based on related goods and services will correspond less precisely with users' valuation of copyright works than with IRM or JRM based on assessments of use, distorting the market mechanism. So far, CCS have been applied as compulsory levies on ICT hardware in most major economies, including the USA and many EU member states (WIPO 2013). In practice, CCS revenues are distributed among rights holders through CMO.<sup>6</sup>

TABLE 1 provides an overview of types of JMO, the license takers they predominantly cater for at present and the particular services supplied by them. The boundaries between the three types of JMO are not perfect, and it is probable that they will become blurrier as stakeholders experiment with novel solutions in the course of digitization.

<sup>&</sup>lt;sup>6</sup> See Handke, Bodó and Vallbé (2015) for a concise literature review and empirical evidence regarding the willingness to pay for CCS licenses among Dutch households. This paper also discusses CCS that are voluntary on the user side, whereas existing CCS (copyright levies) are generally mandatory.

	СМО	РМО	CCS
License takers	Mostly commercial users or organizations	Mostly private end-users	Mostly private end-users <sup>(2)</sup>
Services			
Directories and payment services	Yes	Yes	Yes
Standard terms and prices	Yes	Yes	Yes
Monitoring of use			
a) for efficient pricing	Yes	Yes	Yes
b) to support enforcement	Yes	No <sup>(1)</sup>	Less relevant
Enforcement of copyrights	Yes	Only DRM <sup>(1)</sup>	Less relevant
Collective bargaining for rights holders	Yes	No	Depends on set- up

TABLE 1: License takers and services supplied by different types of JMO

<sup>(1)</sup> JMO occasionally arrange for DRM aimed at inhibiting unauthorized use rather than identifying unauthorized use and instigating penal measures after unauthorized has occurred.

<sup>(2)</sup> Copying levies usually do not provide users with a license to use, so that unauthorized is not legalized.

#### 4. A basic economic model of JRM

#### 4.1 Assumptions on market conditions

We follow the preceding literature by addressing JRM as a means to exploit increasing returns to scale and scope in the administration of rights. For much of the analysis, it is inconsequential whether increasing returns derive from decreasing average costs or from positive network effects.

Throughout, we make the common assumptions of continuous and differentiable demand and supply functions for all relevant goods and services, which implies there being multitudes of rights holders, works and users with a positive willingness to pay.<sup>7</sup> We also assume that as a rule, copyright works are imperfect substitutes for each other. There are differentiated preferences in the sense that the choices users make are not perfectly correlated (Caves 2000). Over a given time period (the accounting period) users have a positive probability of using more than one work, that is there is a taste for variety. Only such works are supplied that have a positive probability of generating greater income to rights holders than the costs of supplying them. No market

<sup>&</sup>lt;sup>7</sup> Rewards to stakeholders may not necessarily be denominated in money. For creators in particular, there is extensive evidence for non-pecuniary incentives (Lakhani and von Hippel 2003; Towse 2006).

participant enjoys perfect information on what exact works will be (not) preferred by what users over the relevant time horizon. There is thus strictly increasing utility to increasing supply of copyright works. For simplicity, we refer to this constellation as a *complex market* in the following.<sup>8</sup>

We follow BKS (1992) and Watt (2000) in two further assumptions. First, the management of copyright entails non-negligible fixed costs and non-increasing marginal costs in adding works, rights holders and/or users, so that pure marginal cost pricing will not cover costs. Second, a repertoire of works is subject to diminishing marginal utility.

#### 4.2 The value of the repertoire

A JRM service has no value in itself. It is strictly a means to allow for a transaction of rights from creators/rights holders to users, who have a positive willingness to pay for non-exclusive usage rights. That is, licensing concerns the costs of market exchanges, or transaction costs in the traditional use of the term, not the costs of producing final goods and services.

For simplicity, we assume that each song has identical intrinsic value and each creator holds rights to an equivalent repertoire of works normalized to one. That is the number of individual rights holders' repertoires n also denominates the number of songs and the number of rights holders, r.

Furthermore, we assume works are imperfect substitutes for each other, so that a bundle of works is subject to strictly positive but diminishing marginal utility over n.<sup>9</sup> The value of the repertory u for a mass of users – normalized to one – is strictly increasing with the number of works n in the repertoire.

<sup>&</sup>lt;sup>8</sup> One reasoning behind these assumptions is that taste for specific works may be sustained over several instances of consumption but that specific copyright works either (a) lose some of their utility with (repeat) consumption, say after listening to the same musical recording a certain number of times, and/or (b) copyright works have experience good attributes so that imperfectly informed users learn and develop new preferences through consumption. Furthermore, costs of creation and supplying works are low enough for many works to be supplied. This is consistent with extensive product differentiation, demand for many different copyright works at any given point in time and the same users acquiring different works over time, all of which is all well-documented (e.g. Abramowicz 2004).

<sup>&</sup>lt;sup>9</sup> Another reasoning behind assuming positive but diminishing marginal utility is that consumption has opportunity costs, say because consumption takes time and consuming several works at the same time does not increase marginal utility.

A simple way to model this is as an exponential function by which the utility of the repertoire u to a population of homogenous users set to 1 increases over n with a constant exponent  $1 - \rho$ , which ranges between 0 and 1:

$$u(n) = n^{1-\rho} \mid \rho \in (0, ..., 1), n \in \mathbb{N}$$

To be sure that is just one subset of functions that fulfil the basic conditions of a strictly increasing utility and diminishing marginal utility over n.<sup>10</sup> The first derivative function, calculating the elasticity of utility at a specific n is

$$u'(n) = \frac{1-\rho}{n^{\rho}}$$

In our example, n is restricted to natural numbers, assuming that fragments of songs are not marketed. The marginal utility of an additional work added to the repertoire is given by

$$\Delta u(n_i \to n_i + 1) = (n_i + 1)^{1-\rho} - n_i^{1-\rho}$$

With a sufficiently large number of works, this converges on a concave utility schedule over n, where there is no utility without works and the utility of a single work is defined as 1.<sup>11</sup> Utility is strictly increasing but with diminishing marginal utility and converging on a theoretical maximum of utility as n approaches infinity that is a multiple of u(n = 1) defined entirely by  $\rho$ .

As noted by Watt (2000), copyright works are non-rival in consumption. For non-exclusive licenses, individual utility curves are summed up vertically rather than horizontally, as would be the case for rival goods. We discuss non-exclusive licensing throughout.<sup>12</sup>

None of this excludes the possibility of network effects in the sense that some types of use of copyright works, for instance by radio stations or in clubs, increases demand for other ways of marketing music. Neither is this model incompatible with a positive supply of copyright works for licensing without positive pecuniary revenues due to non-pecuniary rewards to create and supply copyright works. We simply assume that the value function as defined above reflects all benefits.

<sup>&</sup>lt;sup>10</sup> See Watt (2000) for a more general treatment, making the minimal assumptions that the first derivative of the utility function is strictly positive and the second derivative is strictly negative, which holds in our specification.

<sup>&</sup>lt;sup>11</sup> The specific change in utility  $\Delta u$  of an increase from a number of works  $n_i$  by a number of works  $n_x$  can be calculated by  $\Delta u(n_i \rightarrow n_x) = (n_i + n_x)^{1-\rho} - n_i^{1-\rho}$ .

<sup>&</sup>lt;sup>12</sup> Exclusive licenses of specific works by just one user – for instance for synchronization rights in advertising – are usually established in a direct transaction between a rights holder and the exclusive user.

#### 4.3 Costs of rights management

Like BKS (1992), we assume there are fixed costs in administering copyrights. The collective first needs to acquire the permission to sell licenses from rights holders and develop adequate terms for rights and users. Trading requires some means for rights holders and potential users to find each other and to communicate with one another. Efficient pricing requires the collection and processing information on users willingness to pay and general demand conditions. What is more, to inhibit unauthorized use and foster demand, rights holders may wish to maintain some system of monitoring and enforcing copyrights among users. All of these functions require some minimum investment in capital, training of specialized staff and the blanket license standard terms of trade, which are independent of the number of works administered. Some of these costs cannot be fully recovered and are thus sunk.<sup>13</sup>

We assume constant marginal costs of administering rights. Each work and rights holder needs to be registered correctly and some communication and transfer of payments needs to be conducted. Allowing for differentiated works with different demand conditions, the use of works needs also to be accounted for, to arrange for an efficient distribution of revenues among rights holders. As BKS (1992) show, a JMO would be swamped by low-value rights holders with equal distribution of licensing revenues among all participating rights holders.

Then the costs of administering copyrights of a repertoire containing a number of equivalent works c(n) with a fixed population of users set to 1 are c(n) = f + nv, where f is the fixed costs of administering rights, n is the number of works in the repertoire, and v is the constant, marginal cost of administering a work. The first derivative of the cost function with constant marginal costs is c'(n) = v and all further derivatives of the costs function are equal to zero. Average costs per work are  $\bar{c}(n) = \frac{f}{n} + v$ .

That is average costs are strictly decreasing over n and greater than marginal costs for any f > 0. We thus have a natural monopoly in the sense that average costs of administering rights fall with any expansion of the repertoire, even though at large n, the absolute change in average costs with an expansion of n may be very small.

Total costs of administering a repertory of works C also depend on the number of rights holders and users. Some costs of administering copyrights depend on the number of works and rights

<sup>&</sup>lt;sup>13</sup> We assume any reproduction, distribution or retailing costs of final products not covered by the JMO are entirely covered by users, who acquire copyright licenses. They are thus reflected in the value function (inverse demand function) specified above.

holders (running a directory of works and rights holders), some depend on the number of users (monitoring use and enforcement costs), and others depend on both (contracting and bargaining costs). For convenience, we assume users have uncorrelated preferences and a taste for variety, but are homogenous regarding their demand for works from the repertoire, and set the population of users to 1.

#### 4.4 Appropriability

Copyright works are not perfectly excludable. Rights holder cannot appropriate the entire value of the repertoire of works, and some of it is appropriated by users, either due to imperfect price discrimination or due to unauthorized use that results in some value spilling-over to those not compensating rights holders. One function of JRM is to increase rights holders' appropriability of the value of the works they supply. On the one hand, with lower average monitoring costs of users due to JRM, a JMO can process more precise information on users and conduct more extensive price discrimination than individual rights holders would find profitable. On the other hand, CMO tend to fight copyright infringements on behalf of their members, which is also subject to increasing returns.

A simple way to model this is that rights holders and/or JMO appropriate a constant share of the marginal utility u of  $\lambda \in \{0, ..., 1\}$ . With a constant appropriation factor  $\lambda$  for rights holders the revenue function of rights holders is  $\Pi_R = \lambda n^{1-\rho} | \lambda \in \{0, ..., 1\}$  and the remaining share of total surplus appropriated by users is  $\Pi_M = (1 - \lambda)n^{1-\rho}$ . JRM increases  $\lambda$ .<sup>14</sup> In the following, we mostly assume for simplicity that  $\lambda$  is exogenously given and constant, and normalize it to one.<sup>15</sup>

#### 5. A comparison of individual and joint rights administration

Our point of reference for assessing the implications of JRM are not perfect, frictionless markets for copyright works. Instead, we compare IRM with non-negligible fixed and marginal costs of trading rights with JRM.

<sup>&</sup>lt;sup>14</sup> For simplicity, we do not distinguish between authorized users and unauthorized users here.

<sup>&</sup>lt;sup>15</sup> Our analysis is analogous in this point to Watt (2000) and Besen et al. (1992), who assume perfect appropriability throughout.

With IRM, rights to works are traded ad hoc. There is one transaction between a user and a rights holder per work being used and user accessing it, or one transaction per instance of use under a pay-per-use-system. We make three simplifying assumptions: first, suppliers only supply repertoires that are used;<sup>16</sup> second, each user uses at least one work over the relevant period of time; third, with IRM users acquire licenses to use the works in question as frequently as they wish over the relevant period of time with a single transaction. Then the maximum number of transactions with IRM in a market for copyright works is the number of users *M* times the number of works *N* (with  $M, N \in \mathbb{N}$ ). Of course, individual users may not use all works so that total demand D < MN (with  $D \in \mathbb{N}$ ). The number of IRM-transactions  $T_{IRM}$  within a period of time is then simply the demand for repertoires

$$T_{IRM} = D = Md_m$$

Given the first two assumptions,  $D \ge M, N$ . For some subsequent analysis, it is useful to define  $\overline{d}_m$  as the average number of different works acquired by a specific user over an accounting period, that is  $\overline{d}_m = \frac{D}{M}$ , and  $\overline{d}_m \in \{1, ..., N\}$  assuming that each work is only licensed once over the accounting period.<sup>17</sup> With repertoires normalized to a size of 1, we are looking at the minimum number of transactions feasible with IRM when rights holders market only bundles to their entire repertoire.

With JRM, users acquire rights to use works ex ante and each rights holder and each user only has one transaction partner – the JMO. We focus on one accounting period, the period of time

<sup>&</sup>lt;sup>16</sup> In practice, this condition is easily met since existing CMO typically do not distribute royalties to rights holder whose work have been used infrequently (Handke, 2014). Otherwise, unused repertoire could inflate the number of transactions for JRM, since we assume that a JMO will transact with each rights holder at least once per accounting period, regardless of whether the relevant work has been used, whereas with IRM, there is no transaction if there is no demand. We discuss the implications below. If rights holders have even a miniscule cost from participating in a JRM, there must be some positive expected use of the repertoire.

<sup>&</sup>lt;sup>17</sup> The number of different works used per user,  $\overline{d}_m$ , decreases in the price, p, and in the transaction costs suffered by the user,  $t_m$ . It increases in the duration of the time period covered by a license (which is minimal under a pay per instance of use system), and in the utility function of works, u. It is clear that  $\overline{d}_m \leq N$ , since users cannot use more different works than are available. Assuming that users are distributed over a continuum in their willingness to pay over a positive and continuous probability function, the number of users M also decreases in p and  $t_m$ , and increase in t and u. However, for simplicity we assume that M and N are constant.

over which there is one transaction between the collective and each rights holder and user. Then the number of transactions with JRM,  $T_{JRM}$  is

$$T_{IRM} = M + N$$

For illustration, FIGURE 1 depicts a situation with six users, m, each using two repertoires over the accounting period ( $\bar{d}_m = 2$  and  $D = M\bar{d}_m = 12$ ) and with usage spread randomly over all works but each work used at least once. There are six rights holders, n. In this set-up, there are as many transactions with IRM as with JRM ( $T_{IRM} = M\bar{d}_m = 6 \times 2 = 12$  and  $T_{JRM} = M + N =$ 6 + 6 = 12). With JRM, the number of transactions is independent of  $\bar{d}_m$  and is always twelve if each user buys a license for at least one repertoire and the JMO interacts with each rights holder once over the accounting period. With IRM, the number of transactions varies in  $\bar{d}_m$ , between six where  $\bar{d}_m = 1$  and thirty-six where  $\bar{d}_m = 6 = N$ . The number of transactions with private ordering exceeds that with joint administration for any  $\bar{d}_m > 2$ .

#### FIGURE 1: The number of transactions with private ordering and joint administration



A. Individual rights management B. Joint rights management

If there is just one repertoire or one user, a JMO adds at least one transaction. If there are only two works or two users, JRM does not reduce the number of transactions. Generally, JRM reduces the number of transactions compared to IRM if M > 2 and  $\bar{d}_m > 2$  and  $\bar{d}_m > 2$  and

D - M - N > 0. The latter condition holds if either all individual repertoires are being used or if the JMO does not interact with rights holders of unused repertoire.<sup>18</sup>

These are hardly restrictive conditions. In markets for copyright works, there are often many works, many users and many rights holders. Not only professional users like radio stations or bars and restaurants but also individual end-consumers tend to use several different works over reasonably long accounting periods.<sup>19</sup>

#### 4.2 Fixed costs and product differentiation

Assuming that fixed costs of IRM and JRM are identical, it is easy to see that JRM avoids the multiplication of fixed costs in rights management. Compared to IRM, total fixed costs with JRM fall by (N - 1)f, which reduces costs for any N > 1. Then even where JRM does not reduce the number of transactions (say because many works are not used and JMO are obliged to conduct costly interactions with participating rights holders with zero demand over the accounting period) JRM may reduce total transaction costs with f exceeding v.

However, with product differentiation it may be misleading to speak of a single market for repertoires. For instance, a classical music supplier might have to monitor and transact with a different set of music venues than an electronic dance music supplier, and each would only need to deal with a sub-section of the venues that a JRM with membership from all genres would. Consider a circular model of product-differentiation among suppliers of copyright works, with the simplest case of two rights holders supplying differentiated repertoires illustrated in FIGURE 2. Repertoires of rights holders are placed equidistantly on a circle. Users are also positioned equidistantly on the circle. The entire potential demand for each repertoire's position. Only information from users in its segment will be of value to individual rights holders. With a taste for variety, these areas can overlap with neighbouring repertoires, and they do on the right of FIGURE 2. With some overlap, the full circle makes up a market for a range of related goods but each supplier exclusively serves a sub-market, and some specific sub-markets may have no overlap with each other.

<sup>&</sup>lt;sup>18</sup> If the JMO is required to transact with rights holders of unused repertoire, JRM reduces the total number of transactions compared to IRM if  $(M - 1)\overline{d}_m > n_0$ , with  $n_0$  denominating the number of unused repertoires and the left side of the inequality giving the reduction in the number of transactions on the user side due to JRM.

<sup>&</sup>lt;sup>19</sup> In existing collecting society, the accounting period is one year. Even many end consumers see more than two movies or listen to more than two songs over a month or year, for example.



FIGURE 2: Two perfectly separated and two overlapping markets for copyright works

It is then necessary to distinguish between two types of fixed costs in rights management: the fixed costs of the general technology of rights management  $f_g$ , which are spread across all rights holders participating in a JMO as discussed above; and the fixed costs  $f_r$  of running a database with information on users in a sub-market served by a specific rights holder. Then total fixed costs suffered by a rights holder with IRM are  $f_g + f_r$  and lower than the fixed costs of a JMO serving many rights holders,  $f_J$ . We stick to the simplifying assumption of equivalent repertoires normalized to one, so that N=R. Then  $f_J = f_g + Nf_r\omega$ , with  $\omega \in \{0, ..., 1\}$  denominating the separation of markets for repertoires, which is zero if there is complete overlap between potential markets for repertoires (full integration) and 1 if potential demand for each repertoire comes from completely distinct sets of users. On the left in FIGURE 2,  $\omega$  is 1; on the right,  $\omega$  is 0.5. It follows that  $f_J \ge f_r$  and the difference between  $f_J$  and  $f_r$  decreases in the integration of markets,  $1 - \omega$ . The average fixed costs per user are lower with JRM if either  $f_g > 0$  or there is any overlap between sub-markets for repertoires ( $\omega < 1$ ).

#### 4.3 The effects of JRM holding all other things equal

To assess the effects of JRM on total costs, we assume that: (1) marginal costs of transacting are identical with IRM and JRM and constant; and (2) with JRM, the fixed transaction costs for rights holders are negligible since the JMO offers a standardized, non-negotiable contract that is easily acquired, say through online registration. Furthermore, to illustrate the essential result in simple terms, we initially assume that: (3) M, N and thus R are stable; and (4) the JMO maximizes total profits from licensing rights. Section 6 discusses that assumption (4) is not a given for CMO.

It follows from the preceding two sections that total transactions costs of managing a given repertoire to a given set of users with IRM are

$$C_{Ts} = Dv + Nf_r + Nf_g$$

Total transaction costs in the same set-up with JRM are

$$C_{Ti} = (M+N)\nu + f_q + Nf_r\omega$$

The returns of JRM in the sense of the change in the total transactions costs T when moving from IRM to JRM and holding other things equal (including the size of the licensed repertoire) are

$$\Pi_{I \to J} = Dv + (1 - \omega)Nf_r + (N - 1)f_g - (M + N)v$$

This simplified analysis illustrates that holding all other things equal, JRM reduces total transaction costs where this equation produces a positive result. It is easily seen that the returns of JRM strictly increase in the size of demand D (and the average number of works used per users  $\bar{d}_m$ ), in the number of users M with  $\bar{d}_m > 1$ , in the general fixed cost  $f_g$  and the fixed costs per sub-market  $f_r$ , and in the integration of markets for repertoires  $1 - \omega$ . Average fixed costs per user are generally lower with any  $f_g > 0$  or  $\omega < 1$ . Variable costs are also lower with JRM if D > M + N, which is certain if all works are used and  $\bar{d}_m > 1$ .

#### 5.4 Overall effects including the supply of works and social welfare

FIGURE 3 facilitates a comparison between IRM and JRM. The curved grey line plots the market value of a copyright license over the number of works included. The lower grey-dashed line marks the costs of creation. The black line plots the total costs of supplying such a license with JRM, including the costs of creation and transaction costs in the market for licenses. In this illustration, there are no positive returns to supply licenses with a low number of works, to the right of the first intersection between the value curve and the cost schedule. With JRM, there is a range in the number of works between the first and the second intersection of the value curve

and the JRM cost schedule over which suppliers incur profits. Given the first order condition and assuming perfect appropriability for the JMO, the greatest social value of supplying works through JRM,  $u_I^*$ , is found where marginal value equals marginal costs,

$$u^*_{JRM}(n) \equiv \frac{1-\rho}{n^\rho} = v$$

Solving for n we get the socially optimal number of equivalent works managed by a JMO at

$$n_{JRM}^* = \left\| \left( \frac{1-\rho}{v} \right)^{\frac{1}{\rho}} \right\|$$

Of course, this optimal size of the repertoire could be at a fractional value, so that the best feasible size will be at the closest integer.<sup>20</sup>

FIGURE 3: The utility of licenses and the costs of rights administration



SOURCE: This figure is based on Besen, Kirby and Salop (1992) and Watt (2000), extended by the author.

 $<sup>^{20}</sup>$  Note that we must have  $1 - \rho > v$  for  $n^* > 0$ . We assume throughout that this holds.

The two upper dashed lines in FIGURE 3 plot total costs with IRM, assuming either that IRM is associated with greater variable costs (a steeper slope than with JRM) or higher fixed costs (a higher intercept with the vertical axis). In this illustration, IRM is never profitable. If a cost curve with IRM had an intercept with the utility schedule, it is clear that surplus with higher transaction costs would be lower than with JRM. With higher fixed costs, the area between the value curve and the cost schedule would be smaller, while the optimal number of works remains unaffected. With higher marginal costs, the optimal number of works would also be lower than with JRM. Allowing for differentiated and continuous demand schedules for specific repertoires or works, with IRM only the works with greatest expected demand would be available for a license and some transactions would not take place that would become mutually beneficial with JRM lowering average costs of trading. Of course, a rational JRM may expand the size of the repertoire licensed compared to a situation with IRM. We present a formal treatment of important aspects in the appendix.

To complete the comparison between IRM and JRM, consider the number of works supplied for licensing in both constellations, which maximizes surplus. This socially optimal supply with IRM is found where  $n_{IRM}^* \equiv \frac{1-\rho}{n^{\rho}} = f + \nu$ . Solving for *n* produces

$$n_{IRM}^* = \left\| \left( \frac{1-\rho}{f+\nu} \right)^{\frac{1}{\rho}} \right\|$$

Recall that the optimal size of the repertoire with JRM is  $n_{JRM}^* = \left\| \left( \frac{1-\rho}{\nu} \right)^{\frac{1}{\rho}} \right\|$ . Both expressions have the same exponents and numerators. For  $n_{IRM}^*$  there is a larger denominator for any f > 0. We thus have proof that  $n_{IRM}^* < n_{JRM}^*$ . Furthermore, with strictly increasing utility over n, it is clear that the value of the repertoire with JRM is greater than with IRM.

Overall, JRM reduces average rights management costs per market participant over a very broad range of constellations. With lower average transaction costs, welfare increases and the market approximates the social optimum in a frictionless market more closely.

# 6. A comparison of collective and joint rights management by a profit-maximizing independent supplier

As discussed in BKS (1992) and Watt (2000), the objective of the JMO is not straightforward. These two papers study cases where the administration of rights is conducted by a CMO (the agent) that is perfectly controlled by the principals (the rights holders who are members), and the members can agree on the equal distribution of profits. Then the objective of the collective is to maximize average profits per rights holder  $\bar{\pi} = \frac{u-c}{n}$ .

Average utility of works in the repertoire  $\overline{u} = \frac{n^{1-\rho}}{n}$ , which simplifies to  $1/n^{\rho}$ . The first derivative over n is  $\overline{u}' = \rho \frac{1}{-n^{1+\rho}}$ , so that  $\overline{u}$  is strictly decreasing for all n > 0. Average costs are  $\overline{c} = \frac{f}{n} + v$ , and the first derivative of this function is  $\overline{c}' = \frac{-f}{n^2}$ . For simplicity, we ignore the complication associated with partially overlapping markets discussed in section 4.2, assuming that there are the same fixed costs for administering rights in all sub-markets. According to the first order condition, maximum average profits are found where  $\overline{n}^* \equiv \overline{u}' = \overline{c}'$ . Expanding produces  $\overline{n}^* \equiv \rho \frac{1}{-n^{1+\rho}} = \frac{-f}{n^2}$ . Solving for n, we get the number of works that maximize average profits, which is  $n_{CRM}^* \equiv \|^{1-\rho} \sqrt{f/\rho}\| = \left(\frac{f}{\rho}\right)^{\frac{1}{1-\rho}}$  assuming  $\rho$  is a fractional number. This is the size of the repertoire a CMO will accept if it maximizes average profits per participating rights holder and if unrestricted by regulation.

To illustrate a comparison between CRM and PRM, see FIGURE 4. The figure also contains the value function of a copyright license subject to the number of (equivalent) works included in grey and the cost function of supplying copyright works in black. Three points are marked. First, the size of the repertoire maximizing average utility per rights holder,  $n_{CRM}^*$ , chosen by a rational CMO on behalf of its existing members; second, the size of the repertoire maximizing total utility with transaction costs,  $n_{PRM}^*$ ; third, the theoretical size of the repertoire maximizing total social utility without transaction costs in a frictionless market,  $n^*$ . It is easy to see that the situation with JRM is socially superior to CRM. This is a main result in BKS (2002) and Watt (2000).

#### FIGURE 4: Utility and costs of joint rights administration



A monopolistic, rational CMO unrestricted by regulation will limit membership and thus the supply of works available under JRM, or discriminate against new members (BKS 1992; Watt 2000). The welfare implications of this parsimonious analysis are obvious: an independent, profit-maximizing PMO will perform better, by including the socially optimal number of works into its license.<sup>21</sup>

A rational CMO maximizing participating rights holders' profits will license a repertoire of the size of  $n_{CRM}^* = \left(\frac{f}{\rho}\right)^{\frac{1}{1-\rho}}$ . The rational repertoire size of a PMO is  $n_{PRM}^* = \left(\frac{1-\rho}{\nu}\right)^{\frac{1}{\rho}}$ . It follows that  $n_{CRM}^* = n_{PRM}^* \equiv \left(\frac{f}{\rho}\right)^{\frac{1}{1-\rho}} = \left(\frac{1-\rho}{\nu}\right)^{\frac{1}{\rho}}$ . The size of the repertoire licensed by a CMO may exceed or fall below the socially desirable size. Solving for f gives the critical value for this parameter where

<sup>&</sup>lt;sup>21</sup> This result holds for any stable proportion of total surplus appropriated by the rights management organization on the user side. In theory, it is possible that other JMO form, offering licenses for other works. Two JMO operating simultaneously will not be cost efficient, however, since economies of scale in the administration of rights are the point of JMO to begin with. What is more, CMO bargaining collectively on behalf of rights holders or investing copyright enforcement may increase the appropriability of copyright works for rights holders, fostering the supply of works.

 $n_{CRM}^* = n_{PRM}^*$ , which is  $f = \rho \left[ \left( \frac{1-\rho}{\nu} \right)^{\frac{1}{\rho}} \right]^{1-\rho}$  and decreases exponentially in  $\rho$  and  $\nu$ . The repertoire size with CRM,  $n_{CRM}^*$ , is greater (smaller) than the socially optimal  $n_{PRM}^*$  if f exceeds (falls below) this critical value.

However, in our analysis the administration of rights is a natural monopoly so that a for-profit administrator may appropriate the returns of administering rights. That is, neither rights holders nor users are necessarily better off with PRM compared to CRM. This depends on the bargaining position of rights holders with the PMO. Preconditions for productively efficient JRM are complex markets for copyright works with numerous suppliers, as well as extensive economies of scale in rights administration. In other words, JRM is restricted to situations where the market share of individual rights holders is low, whereas JMO will be highly concentrated. Therefore, the bargaining position of rights holders is likely to be weak.

Regarding social welfare, the short-run impact of PMO market power (with a fixed supply of copyright works) depends on the PMO's ability to price discriminate on the user and the rights holder side. As the gathering and processing of information on demand and use of copyright works is the core function of JMO, these central intermediaries should be able to price discriminate effectively, which mitigates the adverse consequences of market power on social welfare. In the long run, social welfare depends on the approximation of socially optimal investment in content creation/innovation. It is improbable that centralized decision-making by a monopolistic PMO would approximate a social optimum in this respect. The core function of PMO is not creating new content, so that a PMO will lack first-hand information on innovation opportunities in this area. Generally, with imperfect information the optimal allocation of resources through the market mechanism in the long run depends on experimentation by a diversity of agents, imitation and selection. Centralized decision-making by a PMO will not replace this market mechanism, even if the PMO invests in content creation. The market power of a PMO on the rights holder side will thus be associated with misallocation of resources regarding product innovation in markets for copyright works.

#### 6.1 Imperfect member control of collectives

What is more, one of the criticisms of CMO organized in de facto or de jure national monopolies is that there are principal agent problems. A first implication of our analysis is that a CMO under incomplete control by its rights holder/members will act more similarly to an independent PMO: it will tend to maximize total profits of rights administration rather than average profits of its members, setting the size of the repertoire closer to the social optimum. This may be against existing members' interests but welfare increasing. A second implication is that both CMO with incomplete member control and PMO enjoy some market power in their dealings with rights holders (in addition to their market power on the user side with imperfect contestability).

#### 6.2 Universal service obligations

Regulation of existing copyright collectives often stipulates that the CMO has to serve all rights holders, who wish to join. As discussed in BKS (1992), with universal service obligations, a sufficient number of works in existence and equal distribution of receipts among members, more rights holders will join a collective than is socially optimal. With linear costs and diminishing marginal utility of works, rights holders would join up to the second intercept of the value curve and cost schedule in FIGURE 4, leaving no social surplus.<sup>22</sup> Membership will expand up to this point, where the collectives' profits are zero and beyond which expanding the repertoire results in total losses. Under the assumptions of complete appropriability for a CMO and that revenues from collective administration are the only income to rights holders, motivating the supply of works, BKS (1992) conclude that the supply of works will exceed the socially optimal amount under universal service obligations.<sup>23</sup>

There are two caveats. First, existing JMO use the information they gather on use of copyright works to approximate a distribution of licensing income to rights holders that reflects the use of works. The better this is achieved, the better market incentives for rights holders are retained and the less probable it is that CRM would bring about any excessive supply of works or misallocation of resources to supply low-value works. Second, with incomplete appropriability ( $\lambda < 1$ ), which is typical in markets for copyrights, the social utility of copyright works exceeds their market value, so that the socially optimal size of repertoires licensed will be greater than the profit-maximizing size for suppliers. For these reasons, excessive supply of creative works with universal service obligations is probably not a great problem in practice. With effective universal service obligations and payments to rights holders proportional to use, the shortcomings of CRM compared to PRM described in BKS (1992) will not transpire.

<sup>&</sup>lt;sup>22</sup> In practice there would also be adverse selection, since with equal distribution of rights, rights holders would have no incentive to invest in supplying works of high quality to the JMO.

<sup>&</sup>lt;sup>23</sup> Furthermore, existing CMO members can discriminate against new members by setting the price of membership close to the reservation price of new members and appropriating any surplus for existing members (BKS 1992). To have a strong effect, universal service obligations thus need to be accompanied by non-discriminatory pricing on the rights holder side, in the sense that the distribution of revenues is proportional to use of rights holders' repertoires.

#### 7. The effects of digitization

One widely held expectation is that digital ICT applications will reduce transaction costs, especially in markets for information goods. Organizations such as CMO that are organizational means to reduce transaction costs through standardization and bundling could thus become obsolete. According to our analysis, this intuition may be misleading. This section discusses four stylized facts about digitization and how they affect the benefits of various types of JRM compared to IRM.

#### 7.1 Falling costs of creating and disseminating copyrights works

Digitization affects the costs of creating and disseminating copyright works. Holding other things equal, the *costs of creating copyright works* fall with more efficient ICT. In terms of our model, this implies that (a) the number of works supplied will increase, and/or (b) the number of rights holders supplying works will increase, and/or (c) the quality of works increases, and/or (d) prices for works fall. These developments foster demand. There is also some evidence that the variety of works supplied in many copyright industries has increased substantially with digitization, sometimes even with stagnating or decreasing rights holder revenues (Waldfogel, 2011; 2012; Handke 2012). In other words, markets are becoming more complex. As demonstrated in section 4, the benefits of JRM compared to IRM will thus increase.<sup>24</sup>

A peculiar aspect of falling costs of disseminating works is that unauthorized copying increases. In spite of enforcement measures such as blocking or shutting down websites associated with

<sup>&</sup>lt;sup>24</sup> The long-tail hypothesis expands on this analysis of immediate effects of digitization (Anderson 2006;

Brynjolfsson et al. 2006; 2011). There are three particularly important and mutually enforcing aspects. First, on the supply side lower inventory costs increases the variety of works supplied, now including repertoire in low demand that would not have been made available beforehand. Second, on the demand side and subject to differentiated preferences and taste for variety, users may find a better fit for their individual tastes and preferences with greater diversity supplied, increasing demand holding other things equal. Third, more efficient product searches in complex markets may have the same effect. However, better-informed users may also reduce experimental purchases of copyright works that have experience good attributes (Nelson 1971; for a theoretical discussion of free copying, sampling and rights holder profits, see Peitz and Waelbroeck 2006). Our analysis in section 4 implies that the benefits of JRM will increase with more works supplied and increasing demand. The scale and scope of long-tail effects and the direction of their net effect on demand remains uncertain. What is more, demand-side aspects of the long-tail hypothesis root in strong assumptions about highly differentiated preferences. Superstar-effects (Rosen 1981; Adler 1985; Towse 1999) and positive network effects could instead lead to more homogenous preferences with digitization.

unauthorized copying, unauthorized copying has become much more common with the diffusion of digital ICT among private households (e.g. Danaher and Smith 2014). Subject to the efficiency of countermeasures and increasing returns of monitoring and enforcement services, CMO or new JMO may have a greater role to play in copyright enforcement.

Other complications are user-generated content (UGC) and intrinsic motivation. It is unclear at this point, to what extent user-generated content substitutes or complements professional content, or whether UGC requires an ample supply of professional content to build on. Neither is it clear whether user innovation is maximized with low costs of developing derivative works or if amateurs supplying UGC are also incentivized by prospects of future commercial success. With strong intrinsic motivation unaffected by copyright protection and pecuniary income, the economic case for copyright would decrease. With copyright in place, JRM could become an effective way to reduce the legal risks and administrative burden on creative users/follow-up innovators. If the supply of valuable UGC is driven by pecuniary incentives or requires commercial works to draw on, an efficient trade-off is necessary between low costs of compliance for follow-up users and rewarding rights holders to existing, valuable creations. JRM may be an efficient way for fragmented, amateur suppliers of content to appropriate some of the value they create.

#### 7.2 Falling costs of rights management

Digitization will almost certainly reduce the *costs of rights management*, that is the costs of supplying the information services that are at the core of copyrights management. If either fixed costs or marginal costs fall, holding other things equal the cost disadvantage of IRM compared to JRM will decrease, reducing the absolute efficiency gain due to JRM. However, as shown in section 4, average costs of JRM will continue to be lower in complex markets, and thus provide a relative cost advantage.

If marginal costs fall, the benefits of JRM as a means to reduce the number of transactions will decrease. We believe that especially marginal bargaining costs will not fall to virtually zero. Marginal enforcement costs may even have increased with the diffusion of digital ICT.

Fixed costs are of particular interest due to their effect on competition. In this paper, we do not develop a thorough discussion of the contestability of markets for JRM and thus the market power of JMO.<sup>25</sup> As a rule, market power increases in the fixed costs of production. This holds for Cournot competition. It also holds for Bertrand competition allowing for asymmetric fixed

<sup>&</sup>lt;sup>25</sup> Watt (2000) pioneered the analysis of competition between CMO assuming Cournot competition.

costs (Marquez 1997; Chowdhury 2002). If so, the market power of JMO will decrease with falling fixed costs.

The costs and benefits of JRM are thus positively correlated. Paradoxically, any reduction in fixed costs of rights management will (a) reduce the absolute benefits of JRM compared to IRM in terms of productive efficiency, and (b) will increase the contestability of markets for JRM and thus improve the allocative efficiency of self-interested JMO. Holding other things equal, it is not clear whether the efficient scale and scope of JRM increases or decrease with falling costs due to digitization.

#### 7.3 Integration of markets

Digitization is associated with integration of markets. Services available online, for example, are technically available to all Internet users. In a reversal of the situation offline, it costs more to restrict the dissemination of works across territories than to enable it. Market integration means that markets become more complex.<sup>26</sup> The effects are similar to hypothetical long-tail effects (Anderson 2006; Brynjolfsson et al. 2011). Holding other things equal, more works become available for any user. With different preferences and taste for variety, aggregate demand may increase. For rights holders, it becomes efficient to supply more works. The fixed costs of managing rights efficiently increase. Holding other things equal, all of these effects of market integration will increase the returns of JRM.<sup>27</sup>

<sup>&</sup>lt;sup>26</sup> Technological convergence also removes boundaries between different formats of creative works, which are increasingly available through the same technical infrastructure.

<sup>&</sup>lt;sup>27</sup> Market integration is rarely complete. As discussed in section 4.2, JRM provides greater relative benefits in more integrated markets, where the same technology needs to be applied to process the same information for suppliers of differentiated products to operate efficiently. Consider for instance boundaries between markets for copyrights by genre, say classical music and Rock. Given blurred boundaries between genres and the prevalence of eclectic tastes spanning over several genres, we expect a relatively continuous cost schedule as a JMO expands from classical music to Rock and other genres. This could explain why JRM according to genres of copyright works are rare. Another dimension of integration is by territory, for instance between countries. With substantial differences in copyright law, for instance, we would expect a more discontinuous cost schedule for JMO as they expand their operations across multiple territories, with regulation-specific fixed costs incurred over each distinct territory. Especially with high, sunk set-up costs and another JMO already in operation, there may be no incentives for market entry. On the other hand, with internationally harmonized copyright law and JMO regulation, it becomes more probable that a single JMO serves all territories.

#### 7.4 The emergence of independent, for-profit JMO

A specific aspect of digitization in the copyright industries is the emergence of independent PMO supplying mostly end-consumers. We argue that new intermediaries in digital markets for copyright works – such as the iTunes store, Pandora, Youtube or Spotify – supply definitive services of JRM. PMO expand JRM into the realm of retailing rather than licensing for commercial use. PMO may also replace traditional CMO based on technological innovation. This could come about due to re-intermediation where commercial users such as radio stations are replaced by services provided by PMO, such as Spotify or Pandora. PMO could also directly compete with traditional CMO. PMO have two important advantages that have little to do with their relative efficiency: first, without rights holder control PMO have greater prospects to exploit market power on the rights holder side; second, so far PMO seem less restricted by statutory regulation.

The very reason for JRM are increasing returns to scale. Market power of PMO could reduce the appropriability of rights holders, however, reducing incentives for content creating with imperfect sharing of profits (Handke 2015). Collective bargaining through CMO could mitigate the problem. This requires some duplication of efforts, with two intermediaries gathering market information. Otherwise, statutory regulation of PMO may be required to restrict the market power of PMO. What is more, where various JMO compete *for* the market, there are strong incentives for collusion between JMO and large incumbent rights holders and/or large users at the expense of other suppliers and fragmented end-users.

Importantly, JMO enjoy asymmetric information advantages when dealing with rights holders. Rights holders will find it hard to verify the reports on revenues and use because it is the very cost of effective data gathering and processing that rights holders outsource with JRM. One way to avoid that problem may be trusted CMO (or regulators) monitoring and bargaining on behalf of rights holders. If so, the only ways to avoid multiplication of efforts seems to be CMO or CCS, each with their own limitations and disadvantages.

#### 8. Conclusions

This paper advances the understanding of JRM. The analysis implies that important aspects of digitization are likely to expand the efficient scale and scope of joint, standardized management of differentiated information goods online. The reason is that online markets for copyright

licenses become more complex, with a greater number of differentiated works technically available. In markets for many differentiated information goods, the flexibility of direct trading is of relatively little value where either: (1) transaction costs are high relative to the value of transactions, or (2) rights holders are in a weak bargaining position and find it hard to recover fixed costs of creation so that the supply of works falls below its socially desirable level.

JRM is expanding with the emergence of independent PMO – Spotify and Pandora being typical examples – that conduct the core functions of JRM in new aspects of markets for copyright works. The previous literature suggests that PMO will be more efficient than conventional CMO in approximating a socially efficient supply of works under standard licensing. Our analysis challenges this notion.

The point of JRM is to exploit increasing returns to scale and scope, either due to falling average costs or increasing value due to network effects. PMO are thus likely to acquire extensive market power. Whereas CMO wield that market power mostly on behalf of participating rights holders, PMO will not. What is more, at this point PMO seem less restricted by regulation than CMO. A shift from IRM and CMO to PMO may thus undermine the main function of the copyright system: to endow rights holders with temporary market power to encourage the supply of quasipublic good. JRM of any type can reduce total transaction costs under typical market conditions in the Internet economy. Compared to CMO, PMO is a relatively ineffective means to foster the position of creators and mitigate market failure in the provision of non-excludable goods and services.

Further work is required on the contestability of markets for JRM services and the implications of JRM on competition and innovation by suppliers and users of copyright works. Developing efficient systems to trade and disseminate licenses to use copyright works is a central challenge for policy-makers occupied with online markets for information goods and the related telecommunications and ICT sectors. There are also many other differentiated goods and services traded through central intermediaries on the Internet, where standardization and other intermediation services may increase efficiency. Day (2009) for example draws parallels between copyright management and travel agencies. Our analysis suggests that joint, standardized management of differentiated services will play an increasing role in digital markets and that unregulated markets will not reliably bring about reasonably efficient outcomes.

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#### Appendix

#### Calculating the social returns of JRM compared to IRM

Sections 4.3 and 4.4 compare IRM and JRM, holding all other things equal, including the size of the repertoire licensed. A rational JRM will supply a larger repertoire and we present the basic implications here. For simplicity we consider the total costs of production, including the costs of creation and transaction costs. We assume that R, M and D are constant. The only adaptation is the price charged per user as the value of the repertoire increases with more works included. That corresponds to a situation with: (1) perfect price discrimination on the user side; (2) all transaction costs being suffered by rights holders or JMO; (3) any additional repertoire coming from the same suppliers; and (4) the population of users as well as the average number of repertoires used remaining constant. We thus focus on the benefits of JRM to existing rights holders and users.

Then the difference in social welfare within the market for relevant copyright licenses is

$$\Delta \Pi_{I \to J} = \int_{n_{IRM}^*}^{n_{JRM}^*} f(\pi_{JRM}) df(\pi_{IRM}) = n_{JRM}^* {}^{1-\rho} - n_{CRM}^* {}^{1-\rho} - \nu(M+N) + \nu D + (N-1)f$$

Expanding according to the specification of  $n_{JRM}^*$  and  $n_{CRM}^*$ , simplifying and reforming according to the rules of radicals and exponents yields

$$\Delta \Pi_{I \to J} = \left(\frac{1-\rho}{v}\right)^{\frac{1}{\rho}} - \left(\frac{1-\rho}{v}\right) - \frac{f}{\rho} - v(M+N) + vD + (N-1)f$$

For simplicity, we ignore that repertoire sizes are restricted to integers and the distinction between general fixed costs and fixed costs associated with operating in sub-markets (section 4.2). The effects on the number of rights holders, users and demand could be included but depend on arbitrary assumptions without empirical data.