The Economics of Criminal Enforcement of Copyright

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Domestic laws and states' legal obligations under regional and international treaties and conventions are increasingly transforming copyright infringements from civil to criminal acts and necessitating greater governmental costs to enforce copyright law. These changes have economic implications for governments that involve balancing issues of domestic costs, international compliance requirements, effects on the domestic economy, and political considerations in the decisions to expend funds on enforcement of copyright and the levels of that spending.

The rationale for criminalization of copyright infringement is that appropriation is a form of theft that creates social harm in addition to individual harm to the copyright owner. This occurs because society is denied the economic benefits of copyright by illicit uses. Policy makers require clear understanding of the economic value of copyright works and their contribution to national economies to create policies that adequately protect works so that the economic benefits to society are maximized (Picard & Toivonen, 2004; WIPO Guide, 2003). However, it is recognized that lowering illicit uses does not necessarily raise sales correspondingly because consumers of unauthorized products may not be willing to pay market price (Maffoletti & Ramello, 2004).

It has also been shown that infringement does not create uniform economic harm to producers and the effects vary depending upon the characteristics of the copyrighted product involved (Picard, 2004). Some have argued that producers and copyright owners receive some benefits from appropriation, but the instances and extent to which these occur are limited (Liebowitz, 2005).

This paper focuses on the implications of the criminalization of copyright violations, the economics of law enforcement, and the incentives and disincentives for national criminal enforcement of copyrights purely from the economic point of view. It provides a model of optimal criminal enforcement of copyright based on those factors and an assessment of how effective criminalization will be. It does not focus on the general issues of the contributions of copyright to producer and national economies or whether and how harm occurs from appropriation.

The emphasis is thus on choices made by governments that must decide how to implement the criminal laws. These decisions involve choices such as making expenditures for copyright enforcement or investments in social programs and between allocating police time and effort against copyright appropriation or to "traditional" crimes such as robberies and burglaries. It is recognized that nations can not enforce any laws so stringently that a zero level of crime is achieved. However,

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they can allocate resources to enforce to a level that is socially and politically acceptable.

Changing Legal Approaches to Copyright Appropriation

The use of criminal sanctions for copyright infringements is principally influenced by multilateral copyright treaties administered by the World Intellectual Property Organization (WIPO), the Agreement on Trade-Related Aspects of Intellectual Property (TRIPS) administered by the World Trade Organization (WTO), and within Europe by European Community legislation. Together, these treaties and laws show an increased use of criminalization in respect of copyright infringement over the last decade, in particular as a response to the (perceived) threat to rights-owners of digital copying and what tends to be referred to, at least by the draftsmen, as piracy.

International Treaties and Conventions

Prior to 1994, no international standard for the enforcement of copyright had been the subject of a treaty regime; these matters, including therefore criminal penalties, had largely been left to national law (D'Amato & Long, 1997; Bently & Sherman, 2004). The two principal WIPO-administered copyright-related treaties – the Berne Convention for the Protection of Literary and Artistic Works (1886), and the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations (1961) – only indirectly require appropriate enforcement measures, by requiring, for example, that member states make appropriate provisions in their national law to "give effect" to the Conventions (Articles 36 and 26, respectively). Although the Berne Convention also contains some specific references to seizure of infringing works (Articles 13(3) and 16(1)&(2)), WIPO acknowledges that these Conventions "cannot be respected without appropriate measures for the enforcement of rights provided under the national laws of their member States" and that "infringements committed willfully and for profit-making purposes should be punished by criminal sanctions" (WIPO, 2004).

Fuelled partly by apparent US frustration that, despite its position as a net producer of intellectual property-based goods, the traditional WIPO treaties and methods of negotiation were not achieving a high enough level of international intellectual property protection, in 1986 this subject was brought into the latest round of negotiations under the General Agreement on Tariffs and Trade system (GATT). By 1994, these had concluded in an Agreement on Trade-Related Aspects of Intellectual Property Rights, part of the WTO Agreement signed that year in Marrakesh. In relation to copyright, TRIPS requires members of the WTO to recognize the protection standards of the Berne Convention. Where it goes significantly further than the then-existing treaties on copyright is in its detailed provisions on enforcement in Part III, the last section of which (5) deals specifically with criminal sanctions. (Bently & Sherman, 2004; Ricketson & Ginsburg, 2006).

Among the aims stated in the preamble of TRIPS are: to deal with international trade in counterfeit goods, and to provide "effective and appropriate means" for enforcement of rights. Article 61 consequently requires WTO members to "provide for criminal procedures and penalties to be applied at least in cases of willful…copyright piracy on a commercial scale" and further says that they *may*

provide for such criminal sanctions in other cases of intellectual property law infringement, "in particular where they are committed willfully and on a commercial scale". The sorts of remedies required include "imprisonment and/or monetary fines sufficient to provide a deterrent, consistently with the level of penalties applied for crimes of a corresponding gravity". It can be noted, however, that in contrast to the detailed civil enforcement provisions of TRIPS, nothing was concluded regarding the actual criminal enforcement procedures that member states should use, leaving the scope and nature of these procedures open to debate (D'Amato & Long, 1997).

Despite the significance of TRIPS – which Bently & Sherman (2004) describe as "the single most important development in intellectual property law of the last thirty years" – WIPO's role in international copyright law has continued to feature highly, and 1996 saw the agreement of WIPO Treaties on, respectively, Copyright (the WCT), and Performers and Phonograms (the WPPT). A major motivation behind and focus of these treaties was to address the challenges to copyright from new digital communication technologies (see, for example, the Preambles). In this connection, each contains provisions requiring member states to provide adequate legal protection against the circumvention of "effective technological measures used by authors to protect their rights", and adequate remedies against those who remove or alter electronic rights management information (Articles 11 and 12 WCT, and 18 and 19 WPPT). Although the word "criminal" does not appear, the wording of the Articles on rights management information makes a deliberate distinction by limiting one particular clause with the words, "with respect to civil remedies": implying that the general references to remedies should mean both civil and criminal.

In addition to the specific issues of technological measures and rights management information, the WCT and WPPT also contain more general provisions on copyright and related rights. They each therefore also contain a general enforcement provision (Articles 14 WCT, and 23 WPPT), requiring enforcement procedures which "permit effective action against any act of infringement of rights [under the respective Treaty]…, including…remedies which constitute a deterrent to further infringements." This wording reflects that found in Article 41.1 of TRIPS under the heading 'General Obligations', prior to the specific sections on civil and criminal procedures. It is arguable that this reference to "deterrent" extends to criminal sanctions (Ricketson & Ginsburg, 2006).

As a further step in WIPO's 'Digital Agenda', a sub-committee is currently negotiating a proposed new treaty to update the protection of broadcasting organizations, aiming to reach agreement by the end of 2007. Its focus is to address a "growing signal piracy problem", and it seems likely that a similar approach to remedies as found in the WCT and WPPT will be adopted. (WIPO 2007a and 2007b.)

The European Union

As far as the European Union is concerned, in order to implement the two 1996 WIPO treaties (which the European Community and a majority of its Member States had signed), Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights in the information society was adopted (the so-called 'Information Society Directive'). Articles 6 and 7 require "adequate legal protection" against the circumvention of effective technological measures and the removal or alteration of

electronic rights management information, in terms which mirror the wording of the WCT and WPPT. A general provision on sanctions and remedies for copyright infringement also appears in Article 8, requiring in particular that these be "effective, proportionate and dissuasive". As with the WIPO treaties, there is no express reference to criminalization, although Tritton (2002) notes that the reference to "dissuasive" sanctions would appear to be aiming at punitive or deterrent remedies – which would suggest that they encompass criminal penalties. The UK certainly seemed to think so: the amendments made to its existing copyright law to implement the provisions of the Information Society Directive bring in specific criminal remedies, as we mention below.

When it comes to the enforcement of intellectual property rights more generally, there appears to be a clear policy focus on criminalization. Although Directive 2004/48/EC, aimed at harmonizing the remedies available to intellectual property rights owners across the EU, did not ultimately include the criminal provisions that had originally been drafted, the European Commission has stated that it still believes that they are required in addition to civil sanctions for "an effective fight against counterfeiting and piracy". That directive was accompanied by a declaration that the Commission would revisit this issue (European Commission, 2004), something which it wasted little time acting on. In July 2005 it produced a proposal for a directive specifically on criminal measures aimed at ensuring the enforcement of intellectual property rights, accompanied by a proposal for a Council framework decision to strengthen the criminal law framework to combat intellectual property offenses. The European Parliament approved the draft directive in April 2007; it has then passed to the Council (European Parliament, 2007).

National Implementation – the Examples of the United States and the United Kingdom

In order to illustrate how international commitments have been transposed into national law, we also provide an overview of the position in, first, the United States and, secondly, the United Kingdom.

The North American Trade Agreement, NAFTA, concluded between Canada, Mexico and the United States in 1994, provides in Article 1717 for criminal procedures and penalties for willful copyright piracy on a commercial scale, in terms similar to those found in TRIPS. In addition to imprisonment and monetary fines, sanctions include the seizure, forfeiture and destruction of either infringing goods or any materials and implements which have been predominantly used in the commission of the offense (Foster & Alexander, 1994).

Corresponding provisions can be found in US copyright law. The 1976 Copyright Act (Title 17 of the US Code – 'U.S.C.', §§ 101-810; 1001-1101), as amended from time to time, provides for the granting and regulation of copyright (Halpern, Nard, & Port, 2007). This states that it is a criminal offense to infringe copyright "willfully either (1) for purposes of commercial advantage or private financial gain, or (2) by the reproduction or distribution, including by electronic means, during any 180-day period, of 1 or more copies or phonorecords of 1 or more copyrighted works, which have a total retail value of more than $1,000" (17 U.S.C § 506(a)). The types and severity of criminal penalties are contained in Title 18 U.S.C. § 2319.

It is also a criminal offense, punishable by smaller fines, fraudulently to place a false copyright notice onto a good or to remove a copyright notice, or knowingly to make a false representation of a material fact in an application for copyright registration (17 U.S.C. § 506(c)-(e)).

As regards technological protection measures and electronic rights management information, the Digital Millennium Copyright Act was enacted in October 1998, to implement the 1996 WIPO treaties discussed above by adding a new chapter 12 to the Copyright Act – "Copyright Protection and Management Systems" (17 U.S.C. §§ 1201-1205; Halpern, Nard & Port, 2007). It is a criminal offense, punishable by up to 10 years' imprisonment and a $1million fine, to circumvent (or assist others to circumvent) copyright protection systems, and to remove or alter copyright management information, "willfully and for purposes of commercial advantage or private financial gain" (17 U.S.C. §§ 1201-2; 1204).

The trend of criminalization of copyright infringements appears to be continuing in the United States. In the Family Entertainment and Copyright Act of 2005, Congress criminalized the acts of recording a motion picture in a movie theater, and distributing a work not then otherwise distributed but "being prepared for commercial distribution" (Halpern, Nard, & Port, 2007). And an Intellectual Property Rights Enforcement Act (IPREA) was introduced in the Senate in February 2007, its aim being to strengthen the management, coordination and effectiveness of domestic and international intellectual property rights enforcement by adopting an approach comparable to that of the USA's Financial Crimes Enforcement Network in relation to money laundering.

Finally in this section we mention the increasing use of criminal penalties in an EU member state, the UK. A general strengthening of the Copyright, Designs and Patents Act 1988 (the CDPA) with further and stronger criminal remedies was effected by the Copyright, Etc. and Trade Marks (Offences and Enforcement) Act 2002, principally to help combat piracy, bootlegging and counterfeiting (Bently & Sherman, 2004). These measures in fact go beyond the commercial copyright piracy requirements of TRIPS, and apply to most acts of copyright infringement, subject to the standards of knowledge required in criminal cases. Furthermore, the 'anti-circumvention' provisions of the 1996 WIPO treaties and the EU Information Society Directive have been implemented so as to make it a specific criminal offense to provide goods or services designed to circumvent effective technological measures (s.296ZB, CDPA).

As in the US, the national focus on criminalization continues. The Gowers Review of Intellectual Property (HM Treasury, 2006), an independent review of intellectual property law jointly commissioned by three departments of the UK government, concluded in December 2006 that "[c]ounterfeit goods and piracy are damaging the UK's creative industries, as well as threatening jobs". Among the Review's recommendations were an increase in criminal penalties for online copyright infringements, to match those in the physical world; and the bringing into force of an amendment to the CDPA to make criminal enforcement of copyright infringement the responsibility of Trading Standards (local administrative authorities). The latter measure takes effect from 6 April 2007, backed up with £5million of new funding and 4,500 Trading Standards officers, and forms part of the strategy of the UK's Intellectual Property Crime Group, set up in 2004 (DTI, 2007).

National debates about what acts should be criminalized and the penalties for violation are now taking place around the globe as states seek to comply with WIPO, TRIPS, and regional obligations. This paper seeks to add economic understanding to those debates by exploring incentives and disincentives for enforcement of criminal laws on copyright when they are enacted.

The Economics of Law Enforcement

The theory of optimal law enforcement explores issues of rationality in using enforcement as a deterrent to criminal behavior (Polinsky & Shavell, 2000). Strength of penalties and the credibility of the enforcement threats are central to compliance with law (Becker, 1968; Boadway, Marceau & Marchand, 1996). Governments must credibly commit to enforcement or potential criminals will take it into account when choosing whether or not to engage in crime (Baker & Miceli, 2005), despite the fact that enforcement involves both fixed and variable costs to the state (Polinsky & Shavell, 1992). The strength of enforcement and commitment to continue enforcement thus affect the willingness of individuals to breach legal prohibitions.

This research explores issues of optimal expenditures of public funds and effort into enforcement. Public finance economists have contributed some models for optimal enforcement agency expenditures (Slemrod & Yitzhaki, 1987) and public policy decisions on projects and expenditures are increasingly made on the bases of cost-benefit analyses that balance total expected costs of a project or activity against total expected cost (Freidman, 2002; Boardman, Greenberg, Vining, & Weimer, 2005). These analyses are a form of economic accounting that expresses costs and benefit in monetary terms and thus adds more rationality to decisions on public expenditures.

Even when formal analyses are not conducted prior to decisions, policy makers typically make a mental assessment of the perceived benefits and costs before making expenditure decisions. This rationality is based on incentives and disincentives to make any or specific levels of expenditures.

Also playing roles in decisions to expend funds on enforcement of copyright are domestic political considerations, particularly pressures resulting from tradeoffs of expenditures for other criminal enforcement or other public expenditures. This is a significant factor because as Stigler has noted, the goal of enforcement "is to achieve that degree of compliance with the rule of prescribed (or proscribed) behavior that the society believes it can afford" (Stigler, 1970:526).

Apprehension, prosecution, and punishment are costly so there are some incentives for governments to avoid enforcement costs or, at least, the costs of over-enforcement that achieve no significant increase in compliance.

Incentives and Disincentives for Copyright Enforcement

For nations a major incentive for enforcement is to ensure they receive the economic benefits of copyrights. As a result, nations in which copyrights make important contributions to their economies have incentives to enforce in order to preserve or improve those contributions through domestic enforcement. Further, nations that are

the primary beneficiaries of foreign rights payments have incentives to seek strict enforcement in foreign jurisdictions

It is efficient for a nation's enforcement costs not to exceed the lost value from infringement. The total lost value includes lost domestic value plus lost value of foreign rights payments. Domestic policy makers in various jurisdictions, however, only have strong incentives to enforce up to the level of the domestic value lost because this is where the social costs of copyright infringement end for the specific nation. There are thus fewer incentives for enforcement when lost value added to the national economy is low because the bulk of the lost value is accounted for by license payments that were not made to firms in other countries.

For nations that have a negative balance of trade in copyright payments (i.e., most copyrights are foreign owned), the domestic incentives are thus limited. It has been shown that the incentives to enforce rise when foreign IP rightsholders make provision for sharing profits from licenses, engage in foreign direct investments, and use other arrangements that promote domestic economic growth (Vishwasrao, 1991[2]).

Domestic policy makers have some incentives to enforce to minimal levels required by international agreements so as to be seen as in compliance with international obligations. Enforcement compliance can be sought through the World Trade Organization (WTO) when inadequate enforcement exists. However, the cost of that effort is high in temporal and monetary and would be sought in only in the most egregious cases. If a country has basic enforcement efforts in place and its performance is average, there is almost no threat of concerted action against it. Thus the international threat is not particularly strong for most nations.

Although many copyrights and related rights can be infringed, governments have incentives to primarily enforce rights that most effect national GDP. In the short-term they may conduct activities aimed at bringing compliance with other rights, but most enforcement will be directed against activities that bring the greatest harm of the national economy.

Many nations face a particularly thorny problem. Although countries do not reap an economic benefit from murder, tax evasion, and other crimes, they may receive benefits in terms of value added to the economy and employment through illicit production and sale of copyrighted materials. This value may or may not be higher than the value added and employment achieved through strict enforcement. Similarly some countries benefit significantly in terms of information and knowledge development through the illicit use of informational and scientific materials. There is thus a social gain from the use.

Another aspect of national policy is the perception of its efficacy by its own citizens. If there is only weak support for enforcement, strong enforcement will generate little political support. At times there is strong outright opposition to enforcement and strong enforcement can create a domestic political backlash against policymakers and

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[2] This study involved patents, but the same incentive logic applies to copyrights.

law enforcement officials.[3] Thus, officials must balance international and national political pressures regarding enforcement.

A Model of Optimal Copyright Enforcement

For modeling optimal enforcement, three "actors" are relevant: the international community, the country (nation), and the citizens of that country.

The international community can affect the size of the punishment, θ, if the international treaty is not upheld in an individual country

The country can affect its citizens through the choice of public policy, σ, where σ is the proportion of resources spent on reducing the profitability of illegal activities while $\lambda = 1 - \sigma$ is the proportion spent on increasing the profitability of legal activities. The nations are assumed to be benevolent and trying to maximize the GDP which is equal to the output of legal activities y_L. This formalization makes it possible to see σ as a tax levied on legal production and consumption used for the enforcement of copyright laws.

The citizens (consumers and producers of illicit copies) want to maximize their utility, U, and can decide upon the time they spend on illegal activities, ι, and the time they spend on legal activities, L, where $\iota + L = 1$.

If the model is deterministic the threat to punish will be sufficient to ensure compliance under homogeneity of nations and certain parameter restrictions. The problem in question is of course due to the heterogeneity of the nations. Their decision on whether or not to act in accordance with the treaty or not is based on three factors: An exogenous and constant cost of complying with the international treaty, C, punishment if abstaining from complying with the international treaty, θ, a gain from complying with the international treaty, B, and the net effect of the home economy, π, due to changes in the public policy . If $B - C + \pi > 0$ then there is no need to threaten the nation with punishment since they will comply. So the interesting case is when $B - C + \pi < 0$. If $B - C + \pi < 0$ then the nation will only comply if $B - C + \pi < \theta$,i.e. if they lose more by not enforcing the treaty. Assume for simplicity that C and θ are constant for all nations and that only that B and π differ. Further assume that it is not possible for the international community to monitor the effort, σ, of the nations but only the level of illegal activities, ι, in the nation. If $\iota \leq \bar{\iota}$ then $\theta = 0$; if $\iota > \bar{\iota}$ then $\theta > 0$. If θ can be set at any level it will always be possible to force compliance so we need to set an upper limit on θ called $\bar{\theta}$. This seems reasonable given the limited possibilities to punish nations.

Let us assume a linear utility function, $U = c_\iota + c_L$, where consumption is equal to the amount produced, $c_\iota = y_\iota$ and $c_L = y_L$ but with decreasing marginal returns to

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[3] Governments' main objective function is maximising welfare in the country or staying in power. For this paper we assume (naive as it may be) the former but there can be debate on the issue. One could perhaps argue that one of the best ways for a government to stay in power is by assuring a high level of welfare in the country, thus a maximising GDP would then also maximize their possibility to stay in power.

illegal activity, y_ι , for increasing ι , and legal activity, y_L for increasing L . The production functions for legal and illegal goods are as follows

$$y_\iota = f(\iota, \sigma), \quad f'(\iota) > 0 , \quad f''(\iota) < 0 , \quad f'(\sigma) < 0 , \quad f''(\sigma) \le 0 \qquad (1)$$

$$y_L = g(L, \sigma, I) , \quad g'(L) > 0 , \quad g''(L) < 0, g'(\sigma) < 0 , \quad g''(\sigma) \le 0 \qquad (2)$$

The return on the illegal activity is negatively related to the amount of resources spent on enforcing the international treaty, while the production of legal activities is positively related to the amount of resources spent on increasing the profitability of legal activities, and thus it is negatively related to σ since $\lambda = 1 - \sigma$. We further assume that the total amount of illegal activity, $I = \sum_{i=1}^{N} \iota_i$, has a negative impact on the production of the legal good. People consume less of the legal good if more of the illegal good is produced. Since the negative effect on legal production is due to the total amount of illegal activity there will be an over production of the illegal good in the economy. The individuals are not internalising the total negative effect that their illegal action has on society. The level effect of this negative externality will probably differ between countries where the effect will be greater if the illegal good is a close substitute for the legal good. The individuals will allocate their time so that the marginal return per time unit spent is equal between the two activities.

$$\frac{\partial f(\iota, \sigma)}{\partial \iota} = \frac{\partial g(L, \sigma, I)}{\partial L} \qquad (3)$$

where $\dfrac{\partial f(\iota, \sigma)}{\partial \iota}$ is the marginal return on time spent on illegal activities, MR_ι and

$\dfrac{\partial g(L, \sigma, I)}{\partial L}$ is the marginal return on time spent on legal activities, MR_L.

It has been assumed that the negative externality is not taken into account at all by the individuals, this is reasonable unless the economy contains very few individuals (see footnote 4 for a short discussion). This utility function together with the production functions thus incorporates the fact that individuals spend both time and money on illicit uses of copyright material.

Illustrative example

Assume the following production function specification

$$y_{\iota i} = \sqrt{(1-\sigma)}\sqrt{\iota_i} \qquad (4)$$

$$y_{Li} = \sqrt{L_i - \alpha \sum_{i=1}^{n} \iota_i} + \sqrt{(1-\sigma)}\sqrt{L_i - \alpha \sum_{i=1}^{n} \iota_i} \qquad (5)$$

then the utility function becomes

$$U_i = \underbrace{\sqrt{(1-\sigma)}\sqrt{\iota_i}}_{1} + \underbrace{\sqrt{L_i - \alpha \sum_{i=1}^{n} \iota_i}}_{2} + \underbrace{\sqrt{(1-\sigma)}\sqrt{L_i - \alpha \sum_{i=1}^{n} \iota_i}}_{3} \qquad (6)$$

We get the following properties:
First term RHS (6): The value $(1-\sigma)$ represents the public policy's impact on the return of production of the illegal good; it could be seen as the value of production

discounted by risk of getting punished. As the public policy gets tougher on criminal activity, the discounted value of illegal production decreases.

Second term: The production of legal goods, where there is a negative effect on legal productions due to the nation aggregate of illegal activity. The α is a state variable that is greater in countries where the illegal activity is more damaging on the production of legal activities. It would probably be greater in countries with a high level of production of copyright protected material than in countries with less production. The extreme case is with a $a = 0$ meaning that there are no negative effects on legal production.

Third term: This is the added return on legal production that is due to the public policy.

We can rewrite () in the following way
$$U_i = \sqrt{(1-\sigma)\iota_i} + \sqrt{(2-\sigma)(1-\iota_i) - \alpha I} \tag{7}$$
where $I = \sum_{i=1}^{n} \iota_i$ and use has been made of the fact that $L_i = 1 - \iota_i$. This term would be seen as exogenous[4] by the consumers although it is actually determined endogenously by the consumers' decision (as any negative externality).

The Analytical "Results"

If the there are more resources used to enforce the international treaty the return on illegal activities will decrease. But the amount of time spent on i depends also on the marginal return of the alternative, namely the legal activity. If the marginal return of one activity increases relative to the other the amount of the other will decrease. If the scarce resources of the government must be reallocated from areas which make the inhabitants more productive in the legal activity to fight the illegal activity then, even though the marginal return of illegal activity decreases, this reallocation of resources also reduces the marginal return of legal activities. If the reduction in MR_L is greater than the reduction in MR_ι, then the amount of time spent on the illegal activity will increase even though the return has gone down. This is due to the fact that it is the relative relation between the two marginal return that is important. This would mean that even if the government wants to decrease the amount of illegal activities it can not do so and thus they will be punished by the international community although they actually invested money in stricter enforcement. It is of course also possible that the government does not engage in reallocation of available resources but chooses to collect the resources needed for the increased monitoring through higher tax rates. The effect discussed above will still remain possible, since the tax will lower the return of legal activities.

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[4]To be precise they incorporate the negative effect α, when in reality the effect is $N\alpha$. $\dfrac{\alpha}{N\alpha}$ is thus part of the total effect that the individual actually takes into account. As N becomes large we can say that the individual does not take into account the negative effect of an increase in illegal production.

So if

$$-\frac{\partial^2 g(L,\sigma,\iota)}{\partial L \partial \sigma} > -\frac{\partial^2 f(\iota,\sigma)}{\partial \iota \partial \sigma} \qquad (8)$$

then attempts to lower ι through stricter enforcement will have the opposite effect: people will actually spend more time on illegal activities. Further the economy will see a slump in the GDP if government chooses to enact stricter enforcement measures due to less legal production. While if

$$-\frac{\partial^2 g(L,\sigma,\iota)}{\partial L \partial \sigma} < -\frac{\partial^2 f(\iota,\sigma)}{\partial \iota \partial \sigma} \qquad (9)$$

there will be a decrease of illegal activities but the effect on GDP is still ambiguous. It depends on whether the increase in the amount of time spent on legal activities, L, is enough to cancel the decrease in production due to the lower marginal return, $g'(L)$. If the government's allocation from the start was optimal given the goal to maximize GDP, it will by definition not be possible for the government to increase GDP through any changes in the public policy. Thus there is a decrease in illegal activity but at the cost of a decrease in GDP. If the net negative effect of the decrease in GDP and positive benefit of complying with the international treaty is greater than the punishment θ, the government will choose to violate the international treaty. This may occur because they benefit from value added to the economy and employment created through appropriation of copyrighted materials. This value may or may not be higher than the value added and employment achieved through strict enforcement. $\sum_{i=1}^{N} U_i$ could be seen as the "real" GDP of a country including both the formal and informal sector. For a country with a small negative externality of illegal production on legal production (countries with a small media sector) this means that there are positive effects from producing illegal goods. For a greater externality (a large α) the negative effect of illegal production may be so large that there is a need of government intervention. If this is the case $\pi > 0$ and there will be no need for any international treaty since it is in the best interest of the nation to enact its own laws.

Summary

There are four possible scenarios (1, 2i, 2iia, 2iib):

Scenario 1) If $B - C + \pi > 0$ the country will comply and gain from it

Scenario 2) If $B - C + \pi < 0$ there are two subcases of 2)

Scenario 2i) $-\frac{\partial^2 g(L,\sigma,\iota)}{\partial L \partial \sigma} > -\frac{\partial^2 f(\iota,\sigma)^2}{\partial \iota \partial \sigma}$, the country can not lower the ι by stricter enforcement and will thus choose to change nothing and violate the international treaty

Scenario 2ii) $-\dfrac{\partial^2 g(L,\sigma)}{\partial L \partial \sigma} < -\dfrac{\partial^2 f(i,\sigma)^2}{\partial i \partial \sigma}$, the country can lower ι by stricter enforcement but will experience a slump in GDP; there are then two further subcases of ii) a and b

a) The negative effect of the slump in GDP and the net external effect of complying with the treaty $(B-C)$ is greater than the punishment so the government violates the treaty $(|\pi + B - C| > \theta)$.

b) The net negative effect of the slump in GDP and the net external effect of complying with the treaty is smaller than the punishment so the government complies with the treaty $(|\pi + B - C| \leq \theta)$.

Example

Please note that the chosen specification of the production function implies that case 2i is non existent, i.e. it is possible to lower the level of illegal activity in the country to zero. As usual with these type of problems we use backward induction to solve the problem. We first find the optimal choice of ι and L for the citizens given the public policy σ. Then, given the response functions of the citizens, we maximize the objective function of the nation given the constraints imposed by the international community.

Specification of Production Function

$$y_{i\iota} = \sqrt{(1-\sigma)\iota_i} \tag{10}$$

$$y_{iL} = \sqrt{(2-\sigma)L_i - \alpha \sum_{\iota=1}^{n} \iota_i} \tag{11}$$

Start with Consumer's Problem

$$\underset{\iota, L}{Max} \quad U_i = c_{i\iota} + c_{iL}$$

Using the fact that $L = 1 - \iota$ we can rewrite the utility function in the following way

$$U_i = \sqrt{(1-\sigma)\iota_i} + \sqrt{(2-\sigma)(1-\iota_i) - \alpha \sum_{\iota=1}^{n} \iota_i} \tag{12}$$

the first order condition yield

$$\iota^* = -\dfrac{1-\sigma}{-5\alpha + 2\sigma + 3\alpha\sigma - 2\alpha^2 + \alpha^2\sigma - 3}, \quad 0 \geq \iota^* > 1 \text{ if } 1 \geq \sigma \geq 0$$

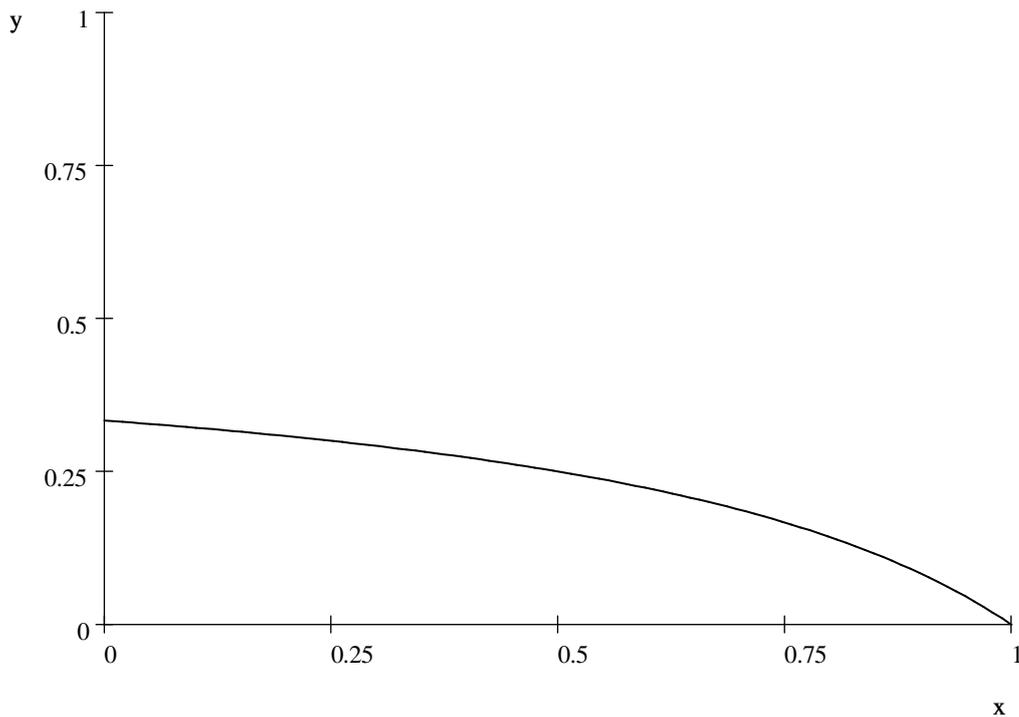Given the discussion in footnote 4 we can approximate ι^* with $-\dfrac{1-\sigma}{2\sigma - 3}$.

Figure 1

The Nation's Problem

$$\underset{\sigma}{Max} \quad y_L$$

$$s.t.$$
$$\iota = -\frac{1-\sigma}{2\sigma - 3}$$
$$\iota \leq \bar{\iota}$$
$$\sigma \geq 0$$
$$\sigma \leq 1$$

Where the first constraint is the response function of the citizens given the nation's choice of policy and the second is the international community's maximum level of allowed illegal activity. The solution to this problem does not necessarily have an interior solution nor is the optimal solution necessarily continuous in sigma. What is obvious here as stated earlier if course that if a public policy focused on reducing piracy is actually better for the nation's economy then it will be implemented with or without an international community. The discontinuity means that the nation gets the following reaction correspondence

$$R(\vec{\imath}) = \begin{cases} \sigma = 0 & \text{if } (\imath^* \leq \bar{\imath}) \vee (y_L \mid \sigma = 0 > y_L \mid \sigma = 1) \\ \sigma = 1 & \text{if } (\imath^* \leq \bar{\imath}) \vee (y_L \mid \sigma = 0 \leq y_L \mid \sigma = 1) \\ \sigma = \sigma_R & \text{if } (\imath^* > \bar{\imath}) \vee (y_L \mid \sigma = \sigma_R > y_L \mid \sigma = 1) \\ \sigma = 1 & \text{if } (\imath^* > \bar{\imath}) \vee (y_L \mid \sigma = \sigma_R < y_L \mid \sigma = 1) \end{cases}$$

Where $\imath^*$ signifies the level of illegal activity chosen by the citizens when a nation maximizes with respect to only the first, third and fourth restriction and σ_R signifies the lowest level of σ that makes the second restriction bind with strict equality. Thus the two top most case are valid when the second restriction is non binding, i.e. the optimal choice of public policy so as to maximize GDP also implies that the international treaty is honored. If all countries were in this group there would be no need for the creation of any international treaty. The third and fourth line arise when all restrictions bind i.e. the optimal choice of policy so as to maximize GDP would imply that the international treaty is broken. The third line represents the case when the choice of public policy is chosen such that the amount of illegal activity is just taken down to the international accepted level and the fourth line represent the case where it is better for the country to have the strictest type of policy $(\sigma = 1)$ if they have to interfere in the market. The convexity of y_L implies that the optimal choice of σ will be one of two extreme values. For the first two lines the extreme values are 0 and 1 and for the third and fourth lines they are σ_R and 1.
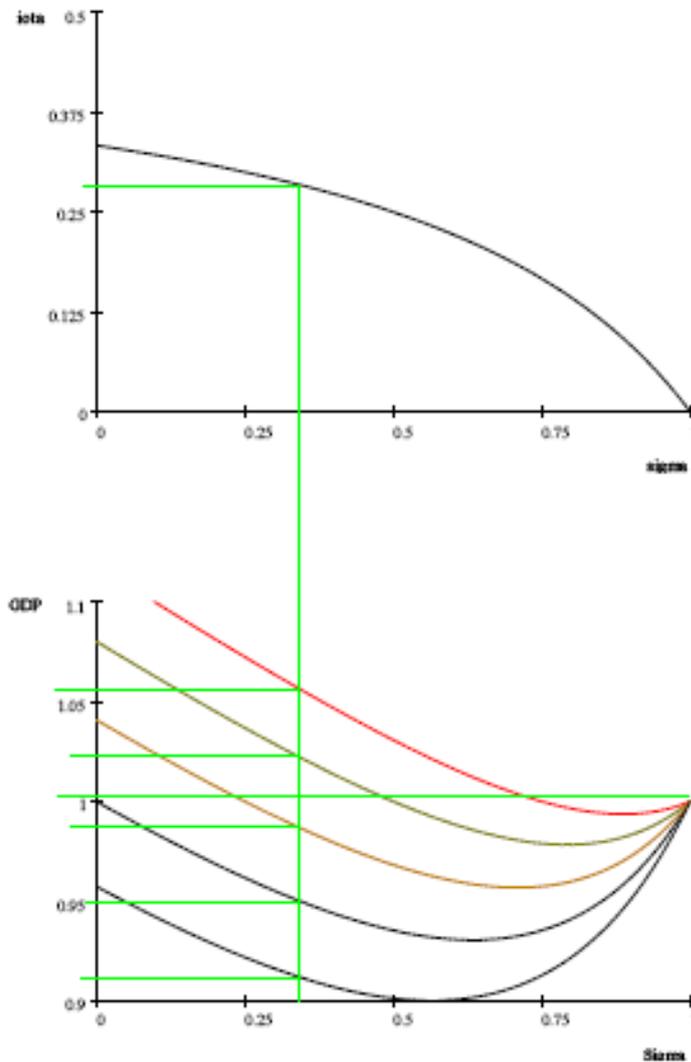
Figure 2

In figure 2 we can see a graphical illustration of how to create the response correspondence. The top most part shows the response function of the citizens while the bottom part shows the relationship between the public policy and level of GDP. The different curves correspond to different levels of α with the upper curve having the lowest level of negative externality from illegal production. If $\bar{\iota} = 0.3$ then even if the nation chooses $\sigma = 0$ it will never be punished so the second constraint is not needed. The nation will maximize the objective function with respect to the first constraint, for the three top curves that correspond to choosing $\sigma = 0$ while for the two bottom curves it is $\sigma = 0$ Assume now that $\bar{\iota} = 0.3$. To achieve that level $\sigma \geq 0.35$, this can be found by looking at the response function of the citizens. With the new lower $\bar{\iota}$ the second constraint is no longer slack and $\sigma_R = 0.35$. The two top most curves will yield the choice $\sigma = \sigma_R$ so as to maximize GDP while the three bottom curves will yield the choice $\sigma = 1$. Using this information we can construct the best response correspondence. Figure 3 below shows the response correspondence for a nation with an externality level equal to the lowest of those presented above i.e. the top most curve in the bottom graph in figure 2.
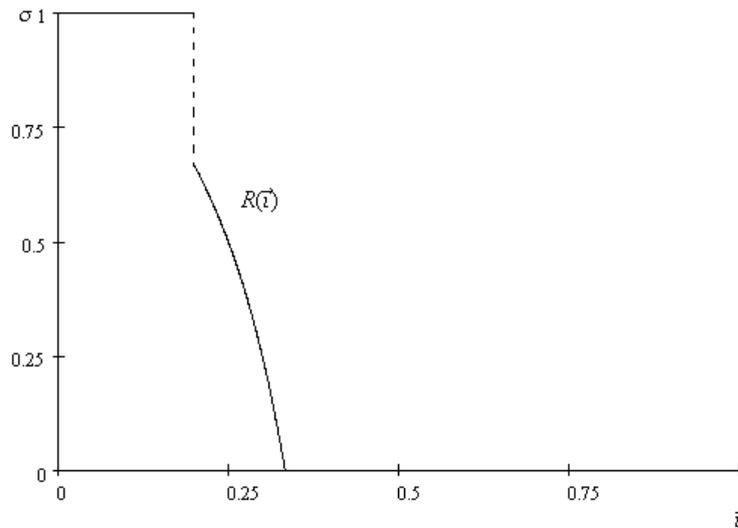
Figure 3

Discussion

This paper has explored the effectiveness of use of state power to protect copyrights through criminalization of acts harmful to copyright owners. It has shown that compliance incentives vary among nations and will produce different levels of enforcement. The deterrent and dissuasive effects of criminalization asserted as the rationales for the creation of international and regional treaties and national law will thus be unequal depending upon nation and region of the world.

The strongest enforcement will be seen in nations that are leading creators of copyrightable material. In these nations domestic economic benefits rather than international obligations will be the driver of enforcement and they will enforce up to a level that costs of enforcement plus any penalties extracted match domestic economic losses or lower than that level if additional enforcement does not produce greater compliance. Thus one can expect the most significant enforcement in countries such as the United States, United Kingdom, Denmark, Finland, and Sweden, where larger portions of the GDP result from copyright industries.

Moderate enforcement will come in nations creating some copyrightable material. These nations have incentives to protect their domestically created value and to meet international obligations. They will enforce up to a level that costs of enforcement plus any penalties extracted match domestic losses or below that level if additional enforcement does not produce greater compliance. Nations in this category include members of the EU, OECD nations, and most developed nations of Asia and Latin America.

Weak enforcement can be expected in nations creating limited copyrightable material. These nations will enforce to the level at which they minimally comply with international standards and up to the level that the costs of enforcement plus any penalties extracted match domestic losses from legitimate and illegitimate sales or before that level is reached if additional enforcement does not produce greater compliances.

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Given the distribution of production and ownership of copyright works and their contributions to national economies around the world, the majority of nations can be expected to undertake only weak or moderate enforcement.

The study has shown that incentives for aggressive enforcement are thus absent in many nations and that criminalizing copyright appropriation is not a panacea that will bring uniform enforcement. This occurs because the incentives for governments to enforce differ from the incentives of copyright owners to enforce using civil law.

It must be noted that criminal enforcement can be a cost reducing mechanism for copyright owners. Greater state investments reduce the incentives for copyright owners to invest in civil enforcement and joint industry-state apprehension of those who appropriate copyright. This will reduce costs to firms and increase their wealth, but the transfer of costs in itself will not increase national wealth.

Governments, of course, may deal with the costs of enforcement by higher taxation or collecting by penalties from illicit users that pay for the enforcement costs. The taxation route—which is often used—can negatively affect the national economy by suppressing entrepreneurship if the collective weight of government in the economy is strong.

From a legal policy point of view, therefore, it can be questioned whether the international treaties and conventions we have looked at, and – in particular – the ongoing legislative development at EU level, are taking too broad-brush an approach to the question of criminal enforcement of copyright infringements. We have already noted that one of the driving forces behind the 1994 TRIPS Agreement was the United States; it is perhaps not surprising that a model of (criminal) enforcement that we have shown as being suitable to that nation as a leading creator of copyright material has been afforded international treaty status. However, for those nations that do not fall within the category of leading creators (in other words, a majority), is the investment of state funds in anti-piracy measures really apt to achieve these ends?

The question seems particularly apt in the current context of the EU Commission's apparent conviction that a raising of standards of criminal procedures and penalties across the EU member states (in the name of harmonization) is required in order to combat counterfeiting and piracy effectively. Indeed, in the Explanatory Memorandum to the 2005 proposal for a directive on criminal enforcement measures, the Commission cites as a major justification Article 17(2) of the EU's Charter of Fundamental Rights which states that "Intellectual property shall be protected". Regardless of wider policy and legal concerns being raised about this proposed directive, our results alone show that the means of achieving such protection will vary significantly from country to country, and that criminalization can not necessarily be equated with protection. With its nations occupying 27 different positions along the scale of 'creation of copyright material', it seems hard to suggest that a one-size-fits-all approach is necessarily the most appropriate within the EU, despite the European Parliament's approval of the draft criminalization of intellectual property rights directive.

Even in the case of a nation we have discussed that *does* fall within the leading creator category (the UK) it is not entirely clear what motivations are behind the trend of criminalization that we have observed, and, especially, whether the sort of reasoning inherent in our findings forms part of policy decision-making. We have noted that the criminal provisions of that country's Copyright Designs and Patents Act 1988 go beyond that which is strictly required by any of TRIPS, the WIPO treaties or the EU Infosoc directive – intimating that compliance with international law for its own sake is not the main motivation. Yet since our economic models show that the UK legislator's activities are to a large extent justified in the case of copyright goods, why do equivalent provisions not appear in the exact same piece of legislation in respect of products protected by industrial design right? In other words there seems to be scope for rather more explicit acknowledgment and use of economic analysis in order to formulate clearer and more consistent intellectual property policy in general.

This study raises some interesting implications such as whether differential enforcement would lead producers to choose to move their content production to countries with greater enforcement. Such a decision would deny their country of origin the greater economic benefits that would accrue if it were produced domestically.

One would also expect that private enforcement through civil procedures would tend to decline in nations with the strongest public enforcement. Because these nations also tend to be the largest consuming nations for copyrighted goods, the transfer of enforcement costs to government should reduce the firms' costs of enforcement and thus increase their profits in those nations.

The results also suggest a more constructive approach to copyright compliance. Because incentives are lacking for significant limits to enforcement in most nations, better protection for copyright can be achieved by encouraging production of domestic copyrightable material and thus raising the domestic incentive to enforce. In some nations it can be expected to be more effective in the long run to invest national resources in production funding rather than weak enforcement. Nations with firms that are leading producers of copyrighted works, as well as companies that produce of copyrighted works, might also fund such mechanisms through aid programs to increase levels of protection and enforcement.

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Legislation

International

Berne Convention for the Protection of Literary and Artistic Works of 9 September 1886 (latest version, Paris 1971)

Universal Copyright Convention (UCC) 1952 (latest version, Paris 1971)

Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations 1961

Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) 1994

North American Free Trade Agreement (NAFTA) 1994

World Intellectual Property Organization Copyright Treaty (WCT) 1996

World Intellectual Property Organization Performances and Phonograms Treaty (WPPT) 1996

European Union

Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright in the information society [2001] OJ L 167/10

Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights [2004] OJ L 195

Commission Proposal (COM (2005) 276 final) for a European Parliament and Council Directive on criminal measures aimed at ensuring the enforcement of intellectual property rights, and for a Council Framework Decision to strengthen the criminal law framework to combat intellectual property offences (Brussels, July 12, 2005)

United States

Titles 17 and 18 of the United States Code

Digital Millennium Copyright Act of 1998

Family Entertainment and Copyright Act of 2005

Intellectual Property Rights Enforcement Act (Introduced in Senate February 7, 2007)

United Kingdom

Copyright, Designs and Patents Act 1988

Copyright and Trade Marks (Offences and Enforcement) Act 2002

The Copyright and Related Rights Regulations 2003, SI 2003/2498