The Intellectual Commons: A Rationale for Regulation*

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ABSTRACT *This article characterises the 'intellectual commons', and the relationship between it, commoners and the state. It is argued that in a democracy the State should adopt a steward-type role over the intellectual commons. This role dictates that regulation should be in the best interests of the commoners, without undue interference with their inherent rights and will only be justified if it is based upon a coherent rationale. Economic theory can provide such a rationale when the costs of open entry to the commons exceed the benefits. Innovative, cooperative direct regulation has the best potential for success.*

Keywords: externalities, government regulation, intellectual commons, Internet.

As the Information Age progresses, it has become increasingly clear that knowledge is an important economic resource and a significant source of wealth.[1] At the same time, there is a global movement towards placing ownership of knowledge in private hands.[2] This movement sees the 'intellectual commons', which has subsisted for centuries as an important independent resource, being gradually dismantled and regulated. It is in this context that an understanding of the intellectual commons is important.

What is the Intellectual Commons?

The idea of 'the commons' is familiar to both law and economics. English law has long recognised common rights held by a group of persons in relation to another's land.[3] Similarly, there has been extensive economic analysis of common property resources. In both disciplines, the commons has traditionally been associated with physical property resources such as lakes, pastures or forests. Recently, the idea of the commons has been extended to abstract objects through the concept of the 'intellectual commons'.[4]

Drahos has characterised the intellectual commons as:

> ...that part of the objective world of knowledge which is not subject to any of the following: property rights or some other conventional bar (contract for instance); technological bars (for example, encryption) or a physical bar (hidden manuscripts).[5]

This definition suggests that the intellectual commons is an 'independently existing resource which is open to use'.[6] To illustrate this point an analogy may be drawn with a lake used as a fishery. The resource associated with the lake is the stock of fish which

*This is an abridged version of a paper which was awarded the Blackburn Medal in 1997 by the Faculty of Law, The Australian National University. The author is indebted to Mark Donoghue and Peter Drahos for their comments on earlier versions of this article.

0810-9028/98/030275-15

are caught by the commoners whilst the resource associated with the intellectual commons is the stock of abstract objects open to use by the commoners.

In characterising the intellectual commons, Drahos distinguishes between the concepts of 'open to use' and 'accessibility'. Knowledge within the intellectual commons may not be accessible. Only those with 'the relevant capability and competence' can access the commons even though it is open to use.[7] Returning to the fishery analogy, any commoner can enter the fishery but only those with the relevant capability and competence (that is boats, nets and 'know how') will catch fish. Similarly, complex mathematical concepts within the intellectual commons are accessible only to those who understand theoretical mathematics.

The intellectual commons is not necessarily global in nature. Analogous to the commons in English law, right of entry to the intellectual commons can be limited to 'groups smaller than all of humanity'.[8] For example, nations may lay claim to a cultural or scientific heritage which is distinctly territorial in nature, and will only be open to use to those within the territory. Similarly, cultural heritage within the intellectual commons may be group specific. For instance, Aboriginal 'sacred knowledge', an oral tradition, is only open to use to those within the group.

The intellectual commons, whether open to all of humanity or not, may also be divided according to content. Ideas published in academic and technical journals are not subject to copyright, and provided they are not protected by patent, fall within the compass of the intellectual commons.[9] Information in academic journals on economics is clearly distinct from that of chemistry, even though there may be scope for interdisciplinary pollination.

The intellectual commons, then, may be divided according to group as defined by territory, culture or both, and within those divisions, by content. The best way to illustrate this division is by returning to the fishery analogy. In the absence of international agreements, fisheries within international waters are a global commons open to use by the fishing fleets of the world. Fisheries within a nation's territorial waters are open to use only to people living in that country. Within territorial waters, there are distinct coastal fishing grounds open to the local population. Within each common fishery, there are different types of fish. Similarly, there is some knowledge within the global intellectual commons (for example, the Theory of Relativity, or information open to use on the Internet), some that is territorial specific and some that is group specific (for instance, Aboriginal sacred knowledge). These divisions can be thought of as distinct yet overlapping common pools of abstract objects. Each common pool is open to use to the relevant commoners (for instance, Aboriginal people, the people of Australia, or the people of the world) and within each common pool there are different types of knowledge (such as: tribal law or dreamtime mythology; economics or biochemistry).

It should be noted that the primary manner in which abstract objects will enter the intellectual commons is through the absence of intellectual property rights.[10] Intellectual property rights will not subsist and abstract objects will enter the commons if the relevant intellectual property rights have expired or another criterion of the operation of the right is not met.[11]

Ownership of the Commons

The intellectual commons is 'open to use', which implies that each commoner has the right to use it, however, it need not be open to all humanity. Indeed, some commoners may have the right to exclude others from entry. From these characteristics it may be tentatively concluded that the intellectual commons is amenable to ownership [12]

The traditional English commons was often owned by the 'freeholder of the manor' and was 'only "common" because those living in the manor had rights over it—usually rights to graze animals'.[13] With respect to the intellectual commons, an analogous relationship may exist, that is, title may be vested in the State and commoners merely have right of access to abstract objects in the commons.[14] However, the suggestion that Aboriginal oral tradition, which is potentially thousands of years old, is owned by a political system, which has been in existence for a little over 200 years, is tenuous to say the least.

Having recognised the possibility of State ownership, it will be assumed for the purposes of this article, that the abstract objects within the intellectual commons are jointly owned by the commoners.

The State, the Intellectual Commons and the Commoners

The State, through intellectual property legislation, can significantly affect the size and content of the intellectual commons because the principal way abstract objects enter the intellectual commons is through the absence of statutory property rights. The higher the threshold requirements for intellectual property protection the larger and richer the intellectual commons.[15] Clearly, how one characterises the relationship between the State, the intellectual commons and the commoners may have a significant impact on how the State exercises its legislative power over intellectual property rights. It will be argued here, that the State should be seen as a steward whose duty is to maintain and protect the intellectual commons for the benefit of the commoners.

The idea that the State should exercise its power in the public interest is not original.[16] Locke argued that the power of the legislative is 'but the joint power of every member of society'.[17] Therefore, the power of the legislature:

> *...is limited to the public good of the Society.* It is a Power that hath no other end but preservation, and therefore can never have a right to destroy enslave, or designedly to impoverish the Subjects (my emphasis).[18]

Following Locke, democratic governments can be seen as fiduciaries under a duty to exercise their power for 'the public good of the Society' without unduly interfering with society's inherent rights. Parliaments, then, should exercise their power to legislate for copyrights, patents of inventions, designs, and trademarks, consistently with this duty.[19]

Drahos argues that intellectual commons is 'crucial to creativity' [20] and, as will be seen below, this is arguably an important ingredient for growth. Therefore, 'the public good of the Society' with respect to the intellectual commons may be served if the state adopts two goals in constructing its intellectual commons:

> First, the intellectual commons should not be depleted. More rather than less abstract objects should remain open to use.
>
> Second, the intellectual commons should be continued to be enlarged. More rather than less abstract objects should be added to it.[21]

Adopting these goals and applying the idea of democratic government as fiduciary, the State can be seen as a steward over the commons, bound by a duty to exercise its legislative powers to enhance, protect and enlarge the intellectual commons.

The idea of the government as a fiduciary-type steward is particularly amenable to the intellectual commons. Intellectual property legislation affects what may be open to use by commoners thereby arguably altering the rights of commoners. These rights are therefore vulnerable to, and dependent on, government legislation. Governments have

been found to owe fiduciary duties to the members of groups which have been in analogous positions of vulnerability and dependence.[22]

It should be noted that by exercising their legislative powers to maintain the commons *alone*, governments may breach their fiduciary duties. There is a strong economic argument that intellectual property rights ensure the optimal allocation of resources to inventive activity.[23] These property rights effectively remove abstract objects from the intellectual commons.[24] Therefore, in exercising their fiduciary duties, governments must balance the need to protect and maintain the intellectual commons against the need to stimulate inventive activity.

What inherent rights do commoners have over the intellectual commons? Information is important in shaping an individual's life plans and the accumulation of knowledge increases an individual's human capital.[25] Given these important roles, it is arguable that each commoner has some inherent right over the abstract objects in the commons.[26] Depending upon who owns the commons, these rights may reflect at most joint ownership, or at worst the right to unencumbered entry to the commons akin to an easement. Democratic governments as fiduciary-type stewards should exercise their power to avoid undue interference with these rights. Legislation assigning property rights over abstract objects in the commons, and legislation under the general law restricting access to the commons, would interfere with such inherent rights. Whether such legislation amounts to an undue interference will in part depend upon the rationale behind it. In the following sections, an economic rationale for regulation will be developed. It is submitted that regulation based upon this rationale would not unduly interfere with commoners' inherent rights.

Economics, the Physical Commons and Externalities

Traditional economic theory suggests that the pursuit of individual self-interest will lead to a 'tragedy of the commons.'[27] In this drama, commoners who have no private property rights in the physical commons have no incentive to preserve it. Therefore, the commons is exhausted as a resource. At the centre of the tragedy theory lies externalities.

The definition of externalities has been a matter of controversy among economists.[28] The most significant divergence in opinion is whether the definition of externalities should include pecuniary externalities. The externalities to be considered in this article cannot be described as pecuniary externalities, therefore it is unnecessary for present purposes to identify which approach is preferable. For simplicity, a negative externality will be defined as costs arising from an activity which the conductor of the activity is not required to pay, and a positive externality as the benefit arising from an activity where the conferring party is unable to charge.[29]

Externalities can arise from consumption or production. A classic example of a negative externality in production is a smoke-belching factory that pollutes neighbouring houses.[30] Positive externalities in production may arise from the creation of information. Negative externalities in consumption include the inconvenience of loud music suffered by neighbours.[31] These examples illustrate that externalities may be difficult to measure absolutely and relatively. A remotely accurate estimation of the irritation from pollution or loud music would require extensive empirical research and subjective value judgements. Despite difficulties in their measurement, economics does provide a theoretical framework for identifying externalities and explaining their consequences without requiring precise measurements.[32]

Considering a lake used for fishing, externalities give rise to a tragedy of the commons in the following manner. Under open entry, commoners will continue to fish

as long as the benefits of using the commons exceed the costs. Although entry is free, each commoner will incur costs through use of the commons. These costs include the cost of equipment and the effort associated with fishing but represent a fraction of the total costs their activity creates. An individual fisher does not experience the increased effort expended by other fishers as it becomes more difficult to fill their nets with dwindling stocks of fish.

The pursuit of individual gain without considering the total costs of the activity causes rents to be dissipated and the resource to be degraded. This tragedy is not limited to scarce physical commons. 'Chaos' and 'wave jumping'[33] occurred when the scarce broadcasting spectrum was subject to open entry in the United States.[34]

Economics, the Intellectual Commons and Externalities

The economics of information creation has centred on ensuring the optimal allocation of resources to information producing activity.[35] The most widely advocated method to achieve this is through assignment of intellectual property rights.[36] This article does not seek to challenge the traditional economic analysis of the role of intellectual property rights. Therefore, positive externalities arising out of information creation will not be examined.[37] Nor will the effectiveness of intellectual property rights as an incentive for information production.[38] Rather, in this section the focus will be on information which has already been created and has entered the intellectual commons.

Traditional analysis suggests open entry to the physical commons results in its degradation as a resource, that is, all the fish are caught. In contrast, open entry to the intellectual commons cannot degrade the intellectual commons. A piece of information in the commons can be used over and over again without being depleted. As Boulding states, 'It is only information and knowledge processes which get out from under the iron laws of conservation and decay'.[39] For instance, the Theory of Relativity can be applied countless times but remain available for others to apply. Analogous to solar energy, the intellectual commons is essentially an inexhaustible resource that is actually enhanced through use.[40]

A distinction needs to be drawn here between the market value of objects in the intellectual commons and the stock of the commons itself. Often there is an observable change in market value of abstract objects within the commons. An analysis of the factors which influence these changes in value is beyond the scope of this article.[41] It is sufficient to recognise that changing market valuations for abstract objects are not a reflection of the reduction in the available stock of abstract objects.

Because the intellectual commons is nondepletable, much of the economic literature examining the tragedy of the physical commons would appear to be of little application. On closer examination this is perhaps not the case. At the core of the tragedy of the commons dilemma lies externalities which are manifest in the degradation of the common property resource. If externalities arise under open entry to the intellectual commons, the economic analysis of the physical commons may be relevant.[42]

Any external effects arising from open entry to the intellectual commons should be interpreted as transmission externalities. That is, externalities whose costs or benefits arise out of the *use* to which information, already in existence and in the commons, is put. Unlike externalities arising from open entry to the physical commons, the external effect would not be manifest in the depletion of the intellectual commons. Rather, the external effect would be manifest in other costs or benefits borne by society.

To determine whether any *negative* externalities arise under open entry to the intellectual commons, it is first necessary to identify the price paid by an individual using

the intellectual commons. Because 'accessibility to the intellectual commons depends on a commoner having the relevant capability and competence' to take advantage of the 'objective world of knowledge',[43] it may be argued that the cost of using the commons is the cost of obtaining the 'relevant capability and competence'. At its most basic it is the cost of learning how to read. Similarly, it may include the cost of purchasing or hiring computers in order to access the intellectual commons on the Internet. In essence, these examples represent set-up costs which enable one to access the commons. Additional search costs are incurred through use of the commons. These include the time spent sifting the thousands of abstract objects in the commons for useful information.

One would assume that a rational utility-maximising individual under open entry would incur these costs up to the point at which they equal the benefits. The question that now arises is whether, under open entry, the individual utility maximiser incurs the total cost of using of the intellectual commons, and whether they are able to reap all of the benefits. If not, open entry to the intellectual commons may create externalities.

Open entry to different common pools within the intellectual commons may give rise to different externalities. For example, information about constructing nuclear devices can be seen as a distinct common pool within the commons. Tom Clancy, in his novel *The Sum of All Fears*,[44] illustrates a fictional extreme external effect arising out of open entry to such information. In that book, terrorists use information in the intellectual commons to construct a nuclear device that is then detonated at the Super Bowl in America.[45] Evidently in this example, open entry to the commons creates significant external costs not borne by the terrorists in obtaining the information. A similar though less extreme example may be home-made bomb-making information on the Internet.

Pornography, open to entry on the Internet, can also be seen as a common pool of abstract objects. Alongside moral costs and costs associated with degrading women[46], there is evidence which suggests that some violent forms of pornography promote aggressive behaviour.[47] Therefore, under open entry to such material, external costs in the form of behavioural disorders, sex-related crime and moral costs may be borne by society.

It is also possible that positive externalities may arise through open entry. These externalities have the potential to create public good problems. For example, databases are not currently protected by intellectual property rights.[48] However, they represent a valuable resource because they significantly reduce search costs. Despite encryption[49] and the laws of confidential information, some databases will lie within the intellectual commons. These databases may be copied at little cost, thereby creating the incentive to free ride. As a result, fewer databases than is socially optimal are compiled because compilers will be unable to capture all the benefits of their work.[50]

These examples illustrate difficulties in determining whether externalities arise out of open entry to the intellectual commons. Concentrating on *negative* externalities, the main problem is identifying an external cost caused by open entry before the information is used in a socially detrimental way. In the case of technical information on bomb construction, no external costs arise until the information is used in a socially detrimental manner, that is, until the bomb is detonated. The presence of an external cost, then, is dependent on how the information is used. A further difficulty relates to estimating the quantum—absolutely or relatively—of any external effect. However, as discussed above, these measurement difficulties do not preclude economic analysis.

These difficulties dictate that an examination of externalities arising out of usage of the intellectual commons must be *'a posteriori.'* Demsetz's classic article 'Toward a theory of property rights'[51] demonstrates that inductive reasoning is not a hurdle to economic analysis. Through a historical study of the Montagnes Indians' development of property

rights, Demsetz concluded that 'property rights develop to internalise externalities when the gains of internalization become larger than the cost of internalization'.[52] A similar approach may be undertaken by comparing the current regulatory position of the common pool of scientific and technical knowledge and that of the common pool of 'offensive material' on the Internet. From these examples it will be asserted that the intellectual commons should be regulated if the external costs of entry exceed the benefits.

An Economic Rationale for Regulation

The presence of externalities does not necessarily imply the need for regulation.[53] Coase states in relation to the issue of whether regulation is the appropriate course of action to address *negative* externality problems:

> When an economist is comparing alternative social arrangements the proper procedure is to compare the total social product yielded by these different arrangements.[54]

and further:

> It is all a matter of weighing up the gains that would accrue from eliminating these harmful effects against the gains that accrue from allowing them to continue.[55]

Therefore, the mere presence of negative externalities arising from open entry to the intellectual commons does not justify regulation, particularly if the external costs are outweighed by the benefits of free and unencumbered entry.

When considering negative externalities arising out of open entry to the *physical* commons there is generally an economic rationale for some level of regulation. The marginal social benefits of open entry to a physical commons will decline with increased entry, due to congestion and depletion of the commons. On the other hand, the marginal social costs of open entry will rise with increased entry. Therefore, at some point marginal benefits will equal marginal costs, and this point represents the optimal level of entry to the commons. [56]

Some knowledge will exhibit increasing returns with use.[57] For example, the continued application of Newton's theory of gravity has contributed to space exploration. Therefore, the marginal social benefit of open entry to some types of knowledge will increase over time. It is possible, then, that the marginal social benefit of open entry to some pools of information will always lie above marginal social cost of open entry. Boyle's Gas Law, the Theory of Relativity and Maxwell's Equation are examples of laws of science that are within the common pool of scientific and technical knowledge and are subject to open entry. The absence of regulation of entry to these laws of science may reflect the fact that social benefits from open entry at all times exceed social costs. If this is the case, there is no rationale for regulating open entry. An examination of the benefits of open entry to this common pool is necessary to test this proposition.

It has been argued that open entry to the common pool of scientific and technical knowledge drives economic growth. Gans has developed a macroeconomic model which asserts the only way to permanently raise per capita productivity is through the production and distribution of knowledge.[58]

The intellectual commons is fundamental to the production of knowledge.[59] This proposition can be illustrated as follows. Basic scientific research creates significant advances in knowledge[60] and existing scientific knowledge is an essential building block in making new scientific discoveries.[61] As Siegel states: 'Every discovery actually builds upon a foundation of 'old' knowledge that has become part of the cultural heritage.'[62]

Scientific knowledge which is 'part of the cultural heritage' is knowledge within the intellectual commons. Therefore, the intellectual commons can be seen as an essential resource for scientific research, which promotes the creation of new knowledge, which in turn, drives economic development.[63]

The more-established Solow–Swan growth model asserts that long-run growth is in part determined by technical change.[64] Scientific discoveries generally proceed innovation,[65] and innovation generally drives technical change.[66] Furthermore, creativity, which is central to innovation, depends on the intellectual commons.[67] Therefore, technological change, which drives growth, can depend on basic scientific research and innovation, both of which rely on open entry to the intellectual commons.[68]

Gans' second assertion is that distribution of knowledge is essential for increased productivity.[69] Open entry to scientific knowledge helps to achieve this goal by allowing diffusion of knowledge.[70]

Open entry to scientific and technical knowledge, then, aids the creation of new knowledge, stimulates creativity and helps diffuse existing knowledge. These effects arguably stimulate economic growth.

At present, the common pool of scientific and technical information is subject to open entry. Applying Coase's proposition, it may be concluded that the absence of regulation for this particular common pool reflects the fact that the benefits of open entry, discussed above, at all times outweigh the external costs arising from the knowledge being used in a socially detrimental manner.

The recent trend towards regulation of open entry to 'offensive material' on the Internet suggests that at some point the social benefits of open entry to 'offensive material' are outweighed by the social costs. This trend is evident in Australia[71] and overseas.[72] It represents a movement towards restricting children's access to offensive material available on the Internet and to imposing outright bans on child pornography.

The social costs that might arise from open entry to such material may include the moral aversion of some groups to such material which may be classified as moralisms. Moralisms do not preclude economic analysis.[73] Calabresi and Melamed argue that if a transaction gives rise to a moral cost which exceeds the benefits from the transaction, then economic efficiency justifies the prohibition of the transaction. For example, if the availability of offensive material on the Internet upsets a large proportion of society on moral grounds: 'The state must, ... either ignore the external costs ..., or if it judges them great enough, forbid the transaction that gave rise to them'. However: 'Obviously we will not always value the external harm of a moralism enough to prohibit the sale'.[74] The trend towards restricting open entry to offensive material to adults alone suggests that for minors the costs of open entry outweigh the benefits. Similarly, the movement towards outright bans on child pornography suggest that at all times the costs of open entry, to any member of society, exceed any benefits.

There are, of course, other explanations for the movement towards Internet regulation. It is arguable that the trend toward Internet censorship is for the protection of power, government or otherwise. As one Internet site states '... an uncensored Net connection can be as deadly to a 20th century government as the plague was three centuries ago'.[75] Abstract objects are a form of capital and capital is a source of power.[76] Calabresi and Melamed warn that:

> The danger may be that what is justified on, for example, paternalism grounds is really a hidden way of accruing distributional benefits for a group whom we would not otherwise wish to benefit.[77]

Therefore, the movement towards Internet regulation may reflect the lobbying of factions seeking to accumulate power.

In summary, an examination of the regulatory position of scientific knowledge and offensive material on the Internet suggests that if the external costs arising from open entry to the intellectual commons exceed the benefits there may be an economic rationale for regulation of entry. Whether government intervention is in fact necessary for this regulation and what in form that intervention should take are questions addressed below.

Self-regulation

In order to prevent the tragedy of the commons, economic theory argues entry to a common property resource should be restricted to a point where the social costs equal social benefits. The traditional methods prescribed for achieving this level of entry are the 'Leviathan'[78] and privatisation.[79] Recent research, however, asserts that the tragedy of the commons can be avoided through collective action in the absence of private property rights and government intervention.[80]

Is the intellectual commons amenable to self-regulation? Ostrom identifies eight characteristics shared by long-enduring self-regulatory common property resources, the most relevant of which is the need for clearly defined boundaries. That is, the 'individuals or households who have rights to withdraw resource units from the common property resource must be clearly defined, as must the boundaries of the common property resource'.[81] The success of self-regulation is therefore bound by territoriality and locality.[82] The global nature of some intellectual commons will make self-regulation inappropriate for this reason. For such commons, boundaries are difficult to map and the vast number of individuals who can enter are difficult to define.[83]

The intellectual commons, however, need not be global in nature. It may be limited to smaller groups which may be characterised by culture or territory. One potential model for analysing the self-regulation of such intellectual commons has been suggested by Sethi and Somanathan.[84] The model asserts that if the costs of breaking the rules, devised by the self-regulating community, exceed the benefits, self-regulation of a common property resource will successfully prevent a tragedy of the commons.[85]

Sanctions under self-regulation do not mean criminal penalties. Rather, they refer to penalties imposed by the community, such as exclusion from cultural activities, which are imposed locally.[86] It is unclear whether an intellectual commons community would have sanctions sufficiently strong enough to modify individual behaviour. If the intellectual commons were specific to a group defined by culture, such as Aboriginal sacred knowledge, strong community sanctions are likely to be imposed by the group itself as a means of regulating use of the intellectual commons. If, however, the intellectual commons is specific to a group defined by territory there may be less scope for such sanctions. For example, if the United States laid claim to an intellectual commons, it is unlikely there would be a community-based sanction that would have universal effect.

Even if sanctions did exist, the benefits from breaking the rules may outweigh the punitive effect of any sanctions. Abstract objects are linked to power, therefore, the benefits of using the intellectual commons in a manner inconsistent with self-regulating rules may involve the accumulation of power or wealth. Furthermore, the punitive value of community-based sanctions may be dissipated because once the self-regulating community becomes 'culturally integrated into a larger social entity, means of escaping local sanctions become available'.[87] Cultural integration may render self-regulation ineffective in culturally diverse nations such as the United States and Australia.

'[I]ncursions of outsiders immune to local sanctions' will also reduce the punitive effect of any social sanction.[88] For instance, satellite technology allows outsiders to broadcast into nations and remain immune from local sanctions. However, by definition, group-specific intellectual commons characterised by culture are not open to use by outsiders. The punitive value of sanctions of such a group would not be dissipated in this manner.

This analysis suggests that self-regulation of the intellectual commons will only be successful in the case of culturally unified groups immune from incursions by outsiders. That is, the commons must be group specific, defined by culture, and the members of the cultural group must be bound by strong sanctions. Clearly, self-regulation will only succeed in limited circumstances which suggests there is scope for government intervention.

Government Intervention

A traditional form of government intervention market to internalise external costs is through the imposition of Pigouvian taxes.[89] These are taxes which would force each individual commoner to take account of the external costs they impose on others, thereby achieving the level of entry where the social benefits equal the social costs.

It is unlikely such a solution could be effectively applied to the intellectual commons. Considering offensive material on the Internet, for a tax to be effective it would need to increase the costs faced by an individual, such as set-up costs and subsequent search costs, to a point at which they equal the social benefits of entry to that material. Several problems arise here. First, the external costs to society of open entry to offensive material are potentially unquantifiable, as are the benefits. As a result, it would be almost impossible to determine the optimal level of the tax. Second, it is unlikely to be possible to effectively levy such a tax because it would need to be levied whenever an individual entered an offensive web site. This is clearly a task of identification that would be difficult to achieve.

Another traditional form of government intervention to correct the tragedy of the commons is privatisation.[90] In this case, government intervention is confined to the assignment of private property rights in the co.nmons.[91] Private property rights in abstract objects will not correct any externalities arising out of open entry to the intellectual commons. Rather, by creating property rights in abstract objects not previously the subject of property rights, the intellectual commons is depleted. Clearly, this form of intervention is unlikely to succeed.[92]

Government intervention through the assignment of tradeable rights is a further option. Underlying this form of intervention is the logic of the Coase theorem.[93] Coase posits that the creation of tradeable proprietary rights will encourage trade which in turn helps to successfully internalize externalities. In theory, the government could apply the Coase theorem to the intellectual commons by assigning, for example, the right to the Internet free of any offensive material to a group who would then be free to trade with those wanting offensive material until an optimal solution was achieved. In practice, the millions of people who use the Internet would mean the transactions costs associated with any trade would prevent the Coase theorem operating.

Direct government intervention is the remaining option for the correction of the tragedy of the commons. Essentially, the government determines the optimal level of entry and regulates to restrict entry to that level. With regard to the intellectual commons, there are clearly large problems associated with determining where the

optimal level lies. However, as the alternative regulatory options are unlikely to succeed, direct intervention may be the next best alternative.

Ayres and Braithwaite's study of the regulation of firms suggests the possibility of a pyramid of regulatory strategies with minimal direct government intervention (in the form of self-regulation encouraged by sanctions) at its base and severe intervention (in the form of command control regulation with nondiscriminatory punishment) at its apex. In conjunction with a 'tit for tat' strategy, [94] a regulatory pyramid enables some degree of cooperative direct regulation which, in the context of the intellectual commons, may successfully achieve the optimal level of entry. Cooperation may also assist the government in collecting information from the commoners which points towards the optimal level of entry.

In order to achieve effective self-regulation at the base of the pyramid, there needs to be potent sanctions at the apex. One possible method of achieving this result is through the 'Benign Big Gun'.[95] This approach relates to the relevant regulatory agency holding an armoury of potent sanctions, the mere presence of which encourages people to regulate their own behaviour. A similar approach could be adopted in the context of the intellectual commons. For instance, the mere presence of stringent criminal sanctions for child pornography may dissuade commoners from using abstract objects in the intellectual commons for this purpose.

Another approach on the regulatory pyramid is enforced self-regulation.[96] Under this regime, firms create a set of rules sanctioned by a government regulatory agency. Any breach of these rules would be punishable by law. A similar system may be applied to the intellectual commons. A further option may be one analogous to partial industry intervention. Here, the government would regulate one identifiable group of commoners who would then be responsible for regulating all others.[97]

The present trend in Internet regulation displays a combination of enforced self-regulation and partial industry intervention. For example, reports published by the Australian Broadcasting Authority[98] and a Senate Select Committee[99] recommend the creation of codes of practice for Internet Service Providers (ISPs) to be approved and enforced by the Australian Broadcasting Authority. ISPs provide access to the Internet for both users and content providers by on-selling bandwidth purchased from telecommunications companies. ISPs are a clearly identifiable group which are arguably intellectual commoners. By enforcing self-regulation by ISPs, governments are seeking to regulate the activities of all commoners using the Internet.[100]

Conclusion

The government as a steward over the commons should intervene to restrict entry to the commons only if there is a coherent rationale for doing so. Such a rationale may exist in cases where the external costs arising from open entry exceed the benefits.

Of the policy options available for regulating the intellectual commons, creative direct government intervention has the most potential for success. It is, however, potentially constrained by jurisdiction and deficiencies in information concerning the optimal level of entry. For instance, in relation to the Internet, it has been argued that jurisdiction, property, identity and responsibility are extraordinarily difficult to establish.[101] This has led to the conclusion by some that cyberspace will remain immune form legal regulation.[102] Nonetheless difficulties may be partly overcome through international agreements, public consultation and research.

What is clear is that as a steward over the intellectual commons the government cannot simply allocate proprietary rights and leave the market to self-adjust. It must

work a little harder to develop creative regulation that works in the interests of the public.

Notes and References

1. T. A. Stewart, *Intellectual Capital: The New Wealth of Organisations*, Doubleday, New York, 1997, p. 6.
2. For example, Article 33 of the TRIPS agreement increases the patent term to 20 years.
3. *Halsbury's Laws of England*, vol. 6, 4th edn., Butterworths, London, 1974, para 505.
4. See Peter Drahos, *A Philosophy of Intellectual Property*, Aldershot, Dartmouth, 1996.
5. *Ibid.* at p. 54.
6. *Ibid.*
7. *Ibid.* at p. 55.
8. *Ibid.* at p. 56.
9. See generally E. Samuels, 'The idea expression dichotomy in copyright law', *Tennessee Law Review*, 56, 321, 1989.
10. Other explanations may include Demsetz's thesis of the development of property rights: H. Demsetz, 'Towards a theory of property rights', *American Economic Review*, 51, 347, 1967 at p. 350; or Barzel's assertion that property rights may be deliberately relinquished: Y. Barzel, *Economic Analysis of Property Rights*, Cambridge University Press, New York, 1989, pp. 66–68.
11. For example, copyright will not be granted if there is a lack of originality, *Feist Publications, Inc. v. Rural Telephone Service Co. Inc.* (1991) 111 S Ct 1282. Nor will patents be granted for scientific discoveries, See *Harwood v. Great Northern Railway Co.* (1865) 11 HLC 654; Lindley LJ. in *Lane Fox v. Knightsbridge Electric Lighting Co.* [1892] 3 Ch 424, 428. For a shift away from this position see *Diamond v. Chakrabarty* (1980) 447 US 303.
12. L. C. Becker, *Property Rights*, Routledge & Kegan Paul, London, 1977, p. 18. For discussion of ownership and political theory see A. Reeve, *Property*, Macmillan, London, 1986, pp. 9–37. Ownership in this context is probably not Honore's concept of 'Full ownership': A. M. Honore, 'Ownership' in A. G. Guest (ed.), *Oxford Essays in Jurisprudence*, Clarendon Press, Oxford, 1961, pp. 107–147.
13. Reeve, *ibid.* at p. 34.
14. The theory that the State has claim over property of individuals is perhaps a secular parallel to Locke's idea that God has claim over all property: see Reeve, *ibid.* at p. 31.
15. Drahos, *op. cit.*, Ref. 4 at pp. 64–68.
16. For an account of the widespread view of the 17th century that public power was fiduciary in nature see E.S. Morgan, *Inventing the People*, Norton & Co, New York, 1989, Ch. 5.
17. J. Locke, *Two Treatises of Government*, Special Edn, Legal Classics Library, New York, 1994, para. 135, p. 269.
18. *Ibid.*
19. Whether the government does in fact act as a fiduciary in a democracy is a question that cannot be adequately addressed in this article. It should be noted, however, that public choice theory challenges the idea that government will always act in the public interest. A good concise discussion of public choice theory is found in S. Bottomley & S. Parker, *Law in Context*, 2nd edn, Federation Press, 1997.
20. Drahos, *op. cit.*, Ref. 4 at p. 62.
21. *Ibid.*
22. See for example Toohey J.'s finding of a fiduciary duty owed by the government to the Meriam people in *Mabo v. Queensland (No. 2)* [1992] 175 CLR 1 at 334 and 356–357. A similar duty was imposed on the Canadian government by the Supreme Court of Canada in *Guerin v. R* [1984] 2 SCR 335. The same approach has been adopted in New Zealand, see *Te Runanga o Wharekauri v. Attorney-General* [1993] 2 NZLR 301.
23. See K. Arrow, 'Economic welfare and the allocation of resources for invention', in *The Rate and Direction of Inventive Activity: Economic and Social Factors*, National Bureau of Economic Research, Princeton University Press, Princeton, 1962, p. 609.
24. Drahos, *op. cit.*, Ref. 4 at p. 67.

25. *Ibid.* at pp. 173–181, 179–180.
26. For discussion of access to information as a right see P. C. Schuman, 'Information Justice', in D. Lamberton, (ed.), *The Economics of Communication and Information*, Edward Elgar, Cheltenham, 1996, p. 401.
27. G. Hardin, 'The tragedy of the commons,', *Science*, 162, 1243, 1968.
28. See for example: J. E. Meade, *The Theory of Economic Externalities: The Control of Environmental Pollution and Similar Costs*, Sijhoff, Geneva, 1973; W. J. Baumol & W. E. Oates, *The Theory of Environmental Policy*, Prentice-Hall, New Jersey, 1975; J. M. Buchanan & W. C. Stubblebine, 'Externality', *Economica*, 29, 371, 1962.
29. This is essentially the same as the definition adopted by A. E. Friedman, 'The economics of the common pool: property rights in exhaustible resources', UCLALR, 18, 855, 1971, p. 866.
30. See for example R. Coase, 'The problem of social cost', *The Journal of Law and Economics*, 3, 289, 1960; A. C. Pigou, *The Economics of Welfare*, 4th ed, Macmillan, London, 1962, p. 184.
31. R. Perman *et al.*, *Natural Resource and Environmental Economics*, Longman, New York, 1996 at p. 96.
32. Environmental economics is one such branch of economics. See Perman *Ibid.* at Ch. 10 for a discussion of innovative environmental valuation techniques.
33. *US v. Zenith Radio Corporation* 12 F2d 614 (ND Ill 1926).
34. One such chaotic incident was the clogging of the airwaves upon the sinking of the Titanic. See T. W. Hazlett, 'The rationality of US regulation of the broadcast spectrum', *Journal of Law and Economics*, 33, 133, 1990; H. J. Levin, *The Invisible Resource: Use and Regulation of the Radio Spectrum*, John's Hopkins University Press, Baltimore, MD, 1971.
35. Arrow, *op. cit.*, Ref. 23; See also Pigou, *op. cit.*, Ref. 30 at p. 185.
36. For a criticism of the need for intellectual property rights see F. Machlup & E. Penrose, 'The patent controversy in the nineteenth century', *Journal of Economic History*, 10, 1, 1950.
37. For a discussion of positive externalities and the free rider problem see J. McMillan, 'The free rider problem: a survey', *Economic Record*, 55, 95, 1979; see also A. De Jasay, *Social Contract, Free Ride*, Oxford University Press, New York, 1989.
38. For a discussion of the incentive effects of intellectual property rights see J. Hirshleifer, 'The private and social value of information and the reward for inventive activity', *American Economic Review*, 61, 561, 1971; Y. Barzel, 'The optimal timing of innovations', *Review of Economics and Statistics*, 50, 348, 1968.
39. K. E. Boulding, 'The economics of knowledge and the knowledge of economics', *American Economic Review*, 56(2), 1, 1966, p. 25.
40. Drahos, *op. cit.*, Ref. 4 at p. 62.
41. On the value of information to a decision maker see K. Arrow, 'The value of and demand for information', in C. B. Mcguire & R. Radner (eds), *Decision and Organisation*, North-Holland, Amsterdam, 1971, p. 131. On the supply value of information see T. Murota, 'Demand and supply values of information', *Information Economics and Policy*, 3, 25, 1988.
42. It is important to note that the global and local characteristics of the intellectual commons do not prevent economic analysis of these potential external effects because the economic analysis of common property resources applies equally to local and global problems. For a discussion of a microscopic commons see J. Kloppenburg, *First the Seed: The Political Economy of Plant Biotechnology*, Cambridge University Press, Cambridge, 1988. For a macroscopic commons see K. N. Cameron, *Atmospheric Destruction and Human Survival*, Centre for Political Ecology, Santa Cruz, 1992.
43. Drahos, *op. cit.*, Ref. 4 at pp. 54, 55.
44. Harper Collins, 1991.
45. Clancy points out in his afterword that all the information needed for construction of a nuclear device is freely available in technical journals. In fact, with the information in the public domain 'a sufficiently wealthy individual could ... produce a multi-stage thermonuclear device': *ibid.*, p. 801.
46. See for example M. A. Vivar, 'The new anti-female violent pornography', *Law and Psychology Review*, 7, 352, 1984; R. Dworkin & K. MacKinnon, *Pornography and Sexual Violence: Evidence of the Links*, Everywoman, London, 1988.
47. An excellent summary of the issues relating to pornography and sexual aggression is given by A. Fukui & B. Westmore, 'To see or not to see: the debate over pornography and its relationship to sexual aggression', *Australian and New Zealand Journal of Psychiatry*, 28(4), 600, 1994.

48. *Feist Publications Inc v. Rural Telephone Service Co.* (1991) 111 S Ct 2182.
49. Note that objects will only be 'public goods within a certain technological context': see D. E. Van Zandt, 'The lessons of the lighthouse', *Journal of Legal Studies*, 23, 47, 1993, p. 53.
50. This is the rationale behind the WIPO Draft Database Treaty: see the Preamble of the Treaty at www.loc.gov/copyright/wipo6.html
51. Demsetz, *op. cit.*, Ref. 10.
52. *Ibid.* at p. 350.
53. See Buchanan & Stubblebine, *op. cit.*, Ref. 28 at p. 381; see generally A. Samuelson, *Foundations of Economic Analysis*, Harvard University Press, Cambridge, MA, 1948.
54. Coase, *op. cit.*, Ref. 30 at p. 34.
55. *Ibid.* p. 26.
56. This discussion of marginal social benefits, marginal social costs is based on Perman *et al. op. cit.*, Ref. 31, Chs 8 and 9, in particular pp. 200–203.
57. See generally Arrow, *op. cit.*, Ref. 23; Boulding, *op. cit.*, Ref. 39.
58. J. Gans, 'Knowledge of growth and the growth of knowledge', *Information Economics and Policy*, 4, 201, 1991. This reflects Boulding's argument that economic development is essentially a knowledge process that depends on 'copying' old knowledge and the creation of new knowledge: Boulding, *op. cit.*, Ref. 39 at p. 25.
59. Drahos, *op. cit.*, Ref. 4, pp. 60–64.
60. R. R. Nelson, 'The simple economics of basic scientific research', *Journal of Political Economy*, 67, 297, 1959, p. 302.
61. I. H. Siegel, 'Scientific discovery and the rate of invention', in *The Rate and Direction of Inventive Activity: Economic and Social Factors*, National Bureau of Economic Research, Princeton University Press, Princeton, NJ, 1962 at p. 442.
62. *Ibid.* at p. 442.
63. Gans, *op. cit.*, Ref. 58.
64. R. Solow, 'A contribution to the theory of economic growth', *Quarterly Journal of Economics*, 70, 65, 1956; T. W. Swan, 'Economic growth and capital accumulation', *The Economic Record*, 32, 334, 1956.
65. Siegel, *op. cit.*, Ref. 61 at p. 442.
66. This 'linear theory' of technical change may not always hold. See generally N. Rosenberg, *Inside the Black Box: Technology and Economics*, Cambridge University Press, Cambridge, 1982.
67. Drahos, *op. cit.*, Ref. 4 at p. 63.
68. Basic scientific research may in some cases depend on technological knowledge in the intellectual commons rather than technological change depending on scientific research: see Rosenberg, *op. cit.*, Ref. 66, Ch. 7.
69. It should be noted here that Gans' requirements for economic growth tend to conflict. Intellectual property rights arguably create an incentive to produce information. These property rights grant the holder a temporary monopoly over knowledge which necessarily hampers its free distribution.
70. Drahos, *op. cit.*, Ref. 4 at p. 121; P. Stoneman & P. Dierderen, 'Technology diffusion and public policy', *The Economic Journal*, 104, 918, 1994.
71. For example, the Australian Broadcasting Authority's *Investigation into the Content of On-line Services: Report to the Minister for Communications and the Arts*, 30 June 1996, Australian Senate, Sydney; Select Committee on Community Standards Relevant to the Supply of Services Utilising Electronic Technologies, *Report on Regulation of Computer On-line Services Part 3*, June 1997.
72. For example, the British parliament has amended provisions of the *Obscene Publications Act 1959*, the *Criminal Justice and Public Order Act 1994*, the *Protection of Children Act 1978*, and the *Criminal Justice Act 1988* in order to deal with computer-generated child pornography. In a similar vein, the United States passed the *Communications Decency Act 1996*. This Act was struck down as unconstitutional in *Reno, Attorney-General of the United States of America et al. v. American Civil Liberties Union et al.* No. 96-511, 26 June 1997.
73. G. Calabresi & A. Melamed, 'Property rules, liability rules and inalienability: one view of the cathedral', *Harvard Law Review*, 85(6), 1089, 1972, pp. 1111–1112.
74. *Ibid.*

75. Declan McCullagh's *Plague of Freedom* net site at http://www.eff.org/"declan/global/
76. G. J. Stigler, 'The economics of information', *Journal of Political Economy*, 69, 213, 1961; see also Drahos, *op. cit.*, Ref. 4 at pp. 156, 157; Stewart, *op. cit.*, Ref. 1 at p. 6.
77. Calabresi & Melamed, *op. cit.*, Ref. 73 at p. 1115.
78. The term 'Leviathan' in this context means direct government intervention and stems from Ophuls who argued the tragedy of the commons could only be corrected by recourse to 'the tragic necessity of Leviathan'; W. Ophuls, 'Leviathan or oblivion', in H. E. Daly (ed.), *Toward a Steady State Economy*, W. H. Freeman, San Francisco, CA, 1973, 215 at p. 229.
79. Ostrom provides an excellent discussion of these policy prescriptions: E. Ostrom, *Governing the Commons*, Cambridge University Press, Cambridge, 1990 at pp. 8–13.
80. See for example *Ibid.*, and the articles contained in T. Anderson & R. Simmons, (eds), *The Political Economy of Custom and Culture*, Rowan and Littlefield, Lanham, MD, USA, 1993. For a comprehensive bibliography of work in this area see F. Martin, *Common Pool Resources and Collective Action: A Bibliography*, vols 1 and 2, Workshop in Political Theory and Policy Analysis, Indiana University Press, Bloomington, 1989 and 1992.
81. Ostrom, *op. cit.*, Ref. 79 at pp. 90–102.
82. M. Goldman, 'Customs in culture', *Theory and Society*, 26(1), 1, 1997 at p. 6.
83. This is consistent with Olson's view that the larger the group the further it will fall short of providing an optimal amount of a collective good: M. Olson, *The Logic of Collective Action*, Harvard University Press, Cambridge, MA, 1965, p. 48.
84. See R. Sethi & E. Somanathan, 'The evolution of social norms in common property resource use', *American Economic Review*, 86(4), 766, 1996.
85. This conclusion is consistent with Ayres and Braithwaite's proposition that self-regulation is unlikely to be achieved if strong punitive sanctions are removed. See I. Ayres & J. Braithwiate, *Responsive Regulation*, Oxford University Press, New York, 1992 at p. 39.
86. Sethi & Somanathan, *op. cit.*, Ref. 84 at pp. 769, 776.
87. *Ibid.* at p. 776.
88. *Ibid.* p. 781.
89. See Pigou, *op. cit.*, Ref. 30 at p. 192.
90. See Demsetz, *op. cit.*, Ref. 10 at p. 356. For an examination of enclosure of the commons see K. Polanyi, *The Great Transformation*, Beacon Press, Boston, MA, 1944.
91. Demsetz, *op. cit.*, Ref. 10 at p. 356. Ostrom discusses similar views: see Ref. 79 at p. 12.
92. There is currently an action before the Waitangi Tribunal in New Zealand for the assignment of intellectual property-type rights over Maori culture. This could be taken to be a depletion of the commons. Alternatively, it may represent a formal recognition of Maori ownership of their cultural commons: 'Maoris claim birds and bees', *The Australian*, 16 September 1997.
93. See Coase, *op. cit.*, Ref. 30.
94. A 'tit for tat' strategy refers to the use of persuasion with movement to punitive strategies for recalcitrants: Ayres & Braithwaite, *op. cit.*, Ref. 85 at p. 24.
95. *Ibid.* Ch. 2.
96. *Ibid.* Ch. 4.
97. *Ibid.* p. 135.
98. *Investigation into the Content of On-line Services*, *op. cit.*, Ref. 71 at pp. 105–117.
99. *Report on Regulation of Computer On-line Services: Part 3*, *op. cit.*, Ref. 71.
100. The European Community has also recommended enforced self-regulation of ISPs: *Communication to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions on Illegal and Harmful Content on the Internet* at www.europa.eu.int/en/record/legal/index.htm
101. H. Wright, 'The net: the beginning or the end of free speech?', *Computers and Law*, 29, 3, 1996.
102. *Ibid.* and J. T. Delacourt, 'The international impact of Internet regulation', *Harvard International Law Journal*, 38, 207, 1997. See also John Perry Barlow's Declaration of Independence of the Internet on 9 February 1996 at www.eff.org.au