

**A SOCIAL UTILITY MODEL OF INTELLECTUAL
PROPERTY ENFORCEMENT**

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1. Introduction: A Historical Perspective

There are two ways to consider the economic nature of information: information as a commodity, and information as a service. The information can be considered as a good in itself, a thing which one can buy and sell like groceries, or as a service, in which one is paid time for the labor rather than for the information as a good itself.

Historically, the practical difference between these two views has been negligible. There has never been a clean separation between information and medium. Anything which could be considered in the abstract was always tied to a particular medium: books were printed on pages, paintings were stuck to canvases, and music was imprinted on vinyl records.

What this means for our models of information is that the pricing structures which would arise from them coincided. The price which the producer (the publishers, painters, and record labels) commanded was reckoned by him to be the sale of the information itself which he has produced – separate from and in addition to the price of the medium. The consumer, however, reckoned the price as a certain markup on the medium for the service of imbuing it with the qualities for which he was buying it.¹ What the producer considered his due for the product, the consumer considered his duty for the process.

The peculiar feature of our modern age however, living in the information era, is that digital technology has allowed us to deal with information perfectly abstractly: information without a medium. In doing this, it has caused our two concepts of information to radically diverge in their prescriptions. The producer, in the commodity model, always commands a price because the information is the product itself and has not fundamentally changed its character.

¹ Paul Graham, *Post-Medium Publishing* (2009).

However, without a medium to mark up, there is no way to charge for pure information under the service model.

These newly divergent views are the underlying philosophies behind all debates on intellectual property. It is a debate which flares up every time technology drives down the marginal cost of the reproduction of information: The Western world got what is widely considered to be the first modern copyright law, the Statute of Anne, in response to the invention of the printing press. Musicians and record labels advocated for a series of draconian measures when the impact of the phonograph began to be felt, and movie studios were openly hostile to the mass adoption of the VCR. Yet these were only foreshocks, portending the appearance of an irreconcilable chasm formed by the introduction of digital technology: the clean separation of information from medium; the consummation of the technological trend driving the marginal cost of information reproduction to zero.

It is the effects of such laws on total social utility which this paper will explore. Though the conceptual character of information is binary – either service or commodity - its legal character allows a gradient – from total lenience, in which the market forces information to be dealt with as functionally a service, to total stringency, in which governments force people to deal with information strictly as a commodity, with the same permanent and excludable property rights afforded to physical property. With this in mind, we can look at total social utility as a function of this gradient, which we will call stringency.

By dealing with utility, we move away from pure ideologies of the nature of information and deal instead with legal realities. Our discussion becomes purely consequentialist with regard to total utility, irrespective of which particular concept is more ideologically meritorious.

2. A Model of Intellectual Property Stringency

The Market for Reproduction of Information

Let us first consider the nature of the market for information. Due to key differences in the economic nature of information at various points in its development which will be soon expounded upon, it must be separated into two markets: the market for original production, and the market for reproduction. Many of the economic fallacies on both sides of the issue arise from considering one of these markets as the entire market.

Let us first look at the reproductive market - the market for information as a commodity. The marginal cost curve in particular has a peculiar shape, for it is not a curve at all. Since this market is that for a single piece of information (an MP3 or a recipe, for example), the original cost of production is included in the production function: It takes a certain fixed cost f to produce

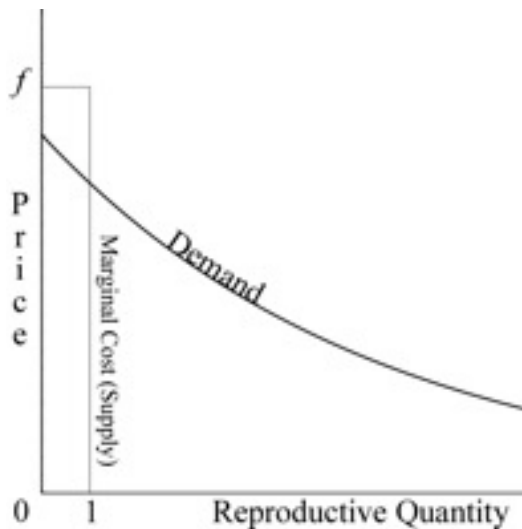


Fig. 1: *The market for information as a commodity*

the information. But because of the abstract nature of information, after the first unit is fully produced, the cost to reproduce that information drops to zero and continues at zero until $Q=\infty$. Because the production function is aggregate for that piece of information, it is immaterial whether after $q=1$ the information continues to be distributed by the original producer or by pirates.

Because of this feature, supply and demand do not have a finite intersection. It is a perfectly competitive market with no barriers to entry and zero marginal cost: anyone can reproduce this information virtually without cost. Thus, under

natural market conditions, the price of information as a commodity (which we will call its *rent price*) is 0, the quantity is infinite, and all surplus goes to the consumer.

However, it is in the producers' interests to fix a price p for the reproduction of their information such that total revenue (the integral of p with respect to q) exceeds f at equilibrium q . In Fig. 2, it does so by quite a hefty margin. But, as a result of this model, we can also see that to fix the price at any level produces deadweight loss equal to the integral of demand with respect to quantity from equilibrium q to ∞ (In reality consuming information involves nonmonetary costs

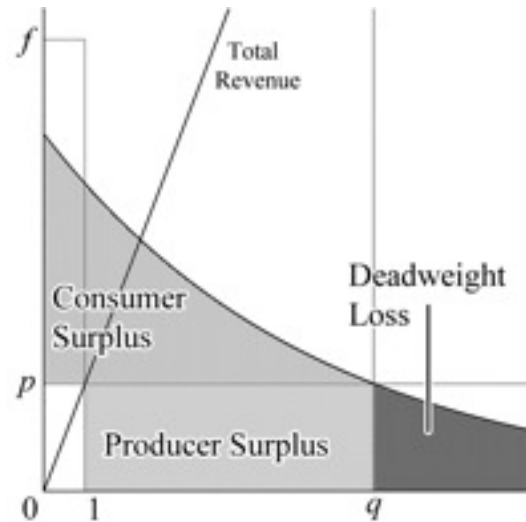


Fig. 2: A price-fixed commodity market for information, showing surpluses and deadweight loss.

like time, so it would eventually intersect the x axis. However for simplicity's sake, we will assume demand to simply be a convergent function). However, it increases the producer surplus from $-f$ to $p \cdot q - f$ as well (Note that this means the above figure overrepresents the producer surplus, for the value of $f - p$ could not have been easily represented as missing from the area representing producer surplus).

What does stringency mean in the commodity market then? If producers organize well enough to convince the government to enforce intellectual property rights - to crack down on piracy, and to force consumers to act as if information were an excludable good - then the market will be split between legal consumers and pirates. Stringency, then, is how well the government is able to enforce the monopoly position of the producer and quash the pirate market. It is a coefficient ω such that ω proportion of people pays p price, where $(1-\omega)$ still operates as if there were

no fixed price. Total demand is split between the two of them. Thus, as stringency increases, demand in the price-fixed legal market increases. Facing less competition from the pirate market and exploiting their fiat monopoly position over the reproduction of that piece of information, producers may then increase their price, which in turn increases the deadweight loss of utility.

The Market for Original Intellectual Production

Why then do we make room for producer surplus, when there is clearly a loss involved when we do? The answer lies in the market for original production - the service market for information - which is related to, but distinct from the commodity market for information.

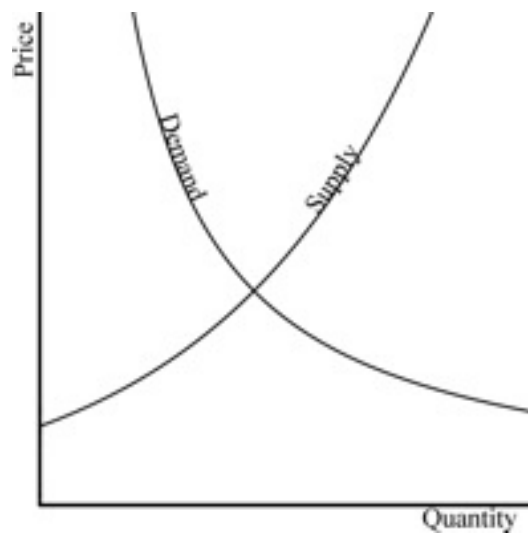


Fig. 3: The market for information as a service.

The demand curve for original production goes higher because there will always be a need for commissioned intellectual labor at any price. Though this labor may be pirated, the benefits of having the produced information will nevertheless in some (though fewer than under a more stringent regime) cases outweigh the cost which must be borne alone.

The supply curve, however, looks more like a traditional supply curve in that it slopes upward and is smooth.

This means that the market for original production clears at a finite equilibrium, or moves towards equilibrium with the alacrity of any other market. The service market for information has a unique supply curve and demand curve which clear regardless of protection. Rather than MP3s or trade patents, think of this as a company which hires a songwriter to record a jingle for

a commercial, or an architect to create blueprints for a new building. It is information created under commission for a particular purpose, not for its own sake. Thus, we will call the price for the service of information creation its *commission price*.

The distinguishing characteristic of the service market for information as distinct from its market as a commodity is that where the commodity market was perfectly competitive, the service market is perfectly monopolistic. One unit of intellectual labor is no substitute at all for another unit: it is a completely heterogeneous bunch. The market for black metal recordings is a totally separate market from the market for hip-hop recordings, which are both totally separate from the market for blueprint drawings. Reproductions of all of these are perfect substitutes for their originals, but the labor itself is completely distinguished from other labor and inconvertible.

In this way, the two markets can be thought of as perpendicular to one another, where the marginal cost bar of the reproduction market is a vertical slice of the original production market.

Relating the Markets

These markets, however, though separate, are not independent. If by government fiat (a copyright or a patent law, for example) the price of information is moved above zero, as in figure 2, the supply curve of the service market will move to the right (fig. 4).

This has several effects. First, as the rent price increases, the commission price decreases. We see phenomena like this all the time in the market: telecom companies, for example, heavily subsidize the sale of cellphones, for they would prefer to make a one-time outlay in order to secure a stream of income. In the same way, the more rent one can extract from a piece of information, the lower the initial commission price the producers will demand.

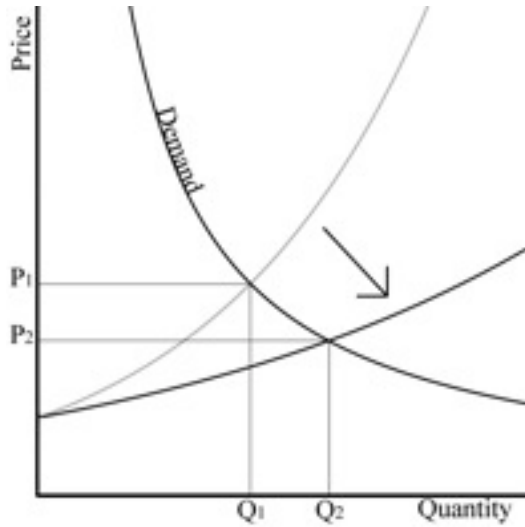


Fig. 4: An increase in the rent price of information shifts the supply curve of the service market rightward.

In addition, because the production of information has suddenly become more lucrative (The producer surplus in the service market may increase or decrease due to such a shift depending on the elasticity of demand at that point. Nevertheless, the surplus generated by $p \cdot q - f$ in the commodity market will exceed any potential losses in the service market), the supply of people producing information increases.

More information is produced (vis a vis the service market), but that production generates less total utility than before (vis a vis the commodity market).

There are thus two opposing forces at work when governments enact intellectual property protections: the supply of original information production, which increases with protection, and the utility derived from reproduction of that information, the positive externalities which decrease with protection. It must be the goal of any public policy regarding intellectual property to find the maximum total social utility with respect to these opposing forces.

A Model of Total Social Utility

Total utility - that is, the sum of producer and consumer surplus - in the reproductive/commodity market can be defined as the sum of the total surpluses of the legal and pirate reproduction markets, which are the integrals of the demand functions with respect to q from 0 to equilibrium price. We must also subtract the area under the marginal cost curve, which is the

fixed cost of production $1f = f$. Recall that we have defined stringency as the proportion of people who acquiesce to do business in the legal rather than the pirate market for reproduction. The utility function would then be of the form $U_C = \omega \int_0^{q^e} D_L(q) dq + (1-\omega) \int_0^{\infty} D_P(q) dq - f$ with each market weighted according to the demand afforded by stringency (a situation in which no price is fixed may be regarded as zero stringency). Because we treat the total demand function which appears in both the integrals as exogenous, the two integrals may be regarded as constants. This gives us a negatively sloping linear equation of the form $U_C(\omega) = \omega U_L + (1-\omega) U_P - f$, which simplifies to $\omega(U_L - U_P) + U_P - f$, where U_L and U_P represent the total surplus integrals of the legal

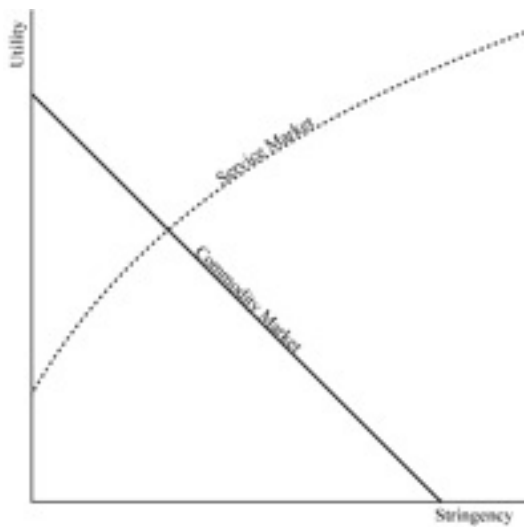


Fig. 5: The shape of the utility functions in both the service (production) and commodity (reproduction) markets.

and pirate markets, respectively. Since $U_P > U_L$, $U_L - U_P$ is negative. This difference, representing the total deadweight loss in the legal market, is the negative coefficient on stringency which determines how quickly utility is lost as stringency increases. $U_P - f$ will come out positive under most circumstances, since the externalities from reproduction in the pirate market will generally outstrip the cost of production in lost utility.

Total utility in the service market is defined as the integral from 0 to the equilibrium quantity of demand minus supply with respect to quantity: $U_S = \int_0^{q^e} (D(q) - S(q)) dq$. Because the equilibrium in this market increases with stringency, this integral is positively correlated to stringency. Yet as the supply curve bends rightward, total utility can only increase so much. Accordingly, the utility function will exhibit a positive first derivative and a negative second deriva-

tive - a continuously increasing but decelerating function of stringency.

Recall that the reproductive market diagram may be thought of as perpendicular to the original production market diagram at a single point, in the sense that it represents the market for a single piece of information, where the service market represents the total market for information production. Because of this, the commodity market can only exist for such

pieces of information that have been created in the service market. Therefore, our total social utility function with respect to stringency will be the product of the two utility functions: $U_T(\omega) = U_S(\omega) \cdot U_C(\omega)$.

An increase in the deadweight loss associated with a fixed price for reproduction, concomitant with an increase in demand for information, would make the slope of U_C more negative, shifting the optimum towards less stringency. Innovations which make the production of information easier, for example computers, simply shift the supply curve downwards (associated with a decrease in marginal cost). This would shift U_S upwards, increasing total utility at all points but not changing the optimum.

3. Arriving at the Maximum

The Insufficiency of the Democratic Process

The question must then be posed how we are to arrive at the maximum total social utility.

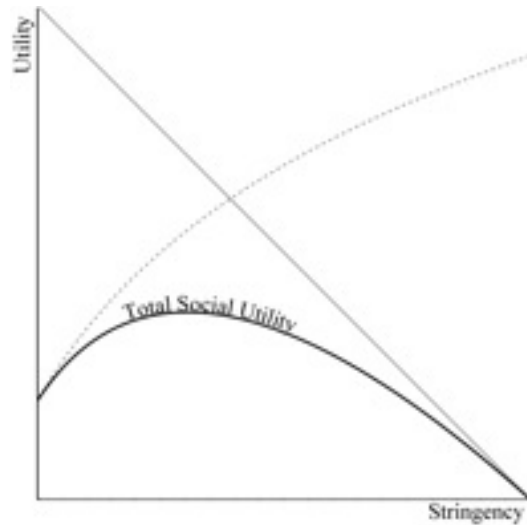


Fig. 6: Total Social Utility as a function of stringency, shown with the total commodity and service market utility functions.

Indeed, it is not a fixed point on either axis. Though we can determine the general shape from the relationships of the various markets, because the curve and slope of the social utility curves are dependent on the data of the market and consumer preferences, no particular point on the total social utility curve can be determined a priori.

The issue then becomes how to set intellectual property law according to consumer preferences and market data. The most obvious method would be through the democratic process: consumers express their preferences in their office as voters through the representative election of policymakers.

Such a system is more or less what we have now in most Western democracies, notwithstanding treaty agreements among various nations on the topic of intellectual property. But its history has not been one of responsiveness to consumer demands. Indeed, stringency has only ever gone in one direction: more stringency.²

There are two reasons for this, each of which feeds into the other. Firstly, there is no qualitative boundary by which intellectual property laws can be rightly determined by lawmakers, even democratically elected lawmakers. The curve is smooth and continuous, and utility isn't exactly the easiest thing to track. Even if total utility were measurable, the constant shifting of market data would make the measurements from one point in time incomparable to the measurements from another point in time.

Due to this limitation, the best we can hope to achieve through the democratic process is a rough and unresponsive approximation of an optimum which may or may not be better off than having no protection at all. But even this is not what we have. Because of the lack of benchmarks

² William W. Fisher III, *The Growth of Intellectual Property: A History of the Ownership of Ideas in the United States* (Harvard University, 1999).

which might guide lawmakers towards a better approximation of the optimum, intellectual property laws are particularly susceptible to what the Public Choice school of thought calls regulatory capture.³ Because there are no qualitative boundaries by which lawmakers might be restrained, the authority for a little intellectual property enforcement is essentially the authority for a lot of intellectual property enforcement. And being more organized by default, the interests of the producers of information hold greater sway in government than the interests of the consumers.⁴

A Challenger Appears: Spontaneous Order as a Possible Solution

It may be noted that the plot of total utility in the service and commodity markets looks roughly like a supply and demand curve. The problem of the determination of optimal intellectual property protection is actually very similar to the problem of Catallactics. Both intellectual property stringency and prices must be ultimately reducible to consumer preferences and market data⁵ - demand and supply, respectively, in the case of prices. Neither can be determined optimally by government fiat, a problem which in the case of prices has been well documented with regard to the fall of Communism.⁶

Spontaneous order arises from institutions “which are indeed the result of human action, but not the execution of any human design”.⁷ Notable examples include the evolution of lan-

³ James Buchanan, *The Calculus of Consent: Logical Foundations of Constitutional Democracy* (Ann Arbor: University of Michigan Press, 1962).

⁴ William Landes, *The Economic Structure of Intellectual Property Laws* (Belknap: University of Harvard Press, 2003).

⁵ Ludwig Von Mises, *Human Action* (Foundation for Economic Education, fourth edition, 1996). cf. Part 4, *Catallactics or Economics of Market Society*.

⁶ Ludwig Von Mises, *Human Action*, cf. Chapter XXVI, *The Impossibility of Economic Calculation under Socialism*.

⁷ Adam Ferguson, *Essay on Civil Society* (1767).

guage,⁸ and of course, the market economy.⁹ Its emergence requires the presence of rationally constructed general rules¹⁰ (or at least rules which are a priori, in the case of language), as making such rules endogenous to the process of spontaneous order presents problems of definitions - for example requiring that mere existence entails justification.¹¹

Therein lies the problem with spontaneous order as a potential solution. Where both quantity and price are endogenous to the model of supply and demand, stringency under a fundamentally anarchic superpolitical structure are necessarily exogenous so long as sovereign states set their own stringency.

The nature of intellectual property is such that it, by virtue of being totally separated from its medium, is transnational. It is effectively the same problem of the welfare state and open borders: if there are to exist welfare states with free mobility of labor, the states must coordinate similar welfare policies lest the indigent flock to the more generous states and bankrupt the system. Likewise, since the borders to intellectual property can be closed only with great difficulty (though this has not stopped governments like China and Iran from trying), without coordination of intellectual property laws, stringency becomes impossible to enforce. Information reproduction becomes concentrated in the more lenient states. Even now vast amounts of pirated material are available on Russian servers, and it is impossible for the United States to stop its own citizens from accessing it without total China-style internet filtering.

There could be imagined a political superstructure in which spontaneous legal order

⁸ John Marks, *Two Kinds of Order* (The Educational Research Trust, 1984).

⁹ Friedrich Hayek, *The Use of Knowledge in Society* (1945).

¹⁰ Norman Barry, *The Tradition of Spontaneous Order* (The Institute for Humane Studies, 1982).

¹¹ Roger Arnold, *Hayek and Institutional Evolution* (The Journal of Libertarian Studies 4;4, 1980).

could arise: a federalist system with open borders, as the United States was originally intended to be,¹² allowing for legal competition and experimentation on a more local level. In this way, the legal structure of whatever authorities the states still have to themselves can be said to be spontaneously arisen and optimal, notwithstanding the costs of moving to a different state, which could allow for distortions.

Yet under such a system, the equilibrium for entitlements is zero, for reasons outlined above. This is the reason entitlements in the United States are handed out on the federal level - the reason the New Deal was implemented nationally rather than left to the states, for each state would have an incentive to be the less generous. In exactly the same way and for the same reasons, any intellectual property protection must be coordinated at the superstate level, which defeats the design of the system in the first place. Like entitlements, intellectual property protection is by the nature of the problem beyond the scope of determination any more dynamic than “best guess at the optimum”.

4. Conclusion

Representative democracy is fundamentally pathological with regard to problems like entitlements and intellectual property, for the reasons outlined by the Public Choice school of thought. We must therefore decide, given a nonzero optimum, are we better off giving the authority to a governing body to set stringency exogenously, an authority unlikely to ever be revoked or reversed even if stringency approaches a level harmful to overall utility, or withholding such authority, content to remain at the total utility afforded by zero stringency?

¹² James Madison, *Federalist No. 51* (Independent Journal, 1788).