

The Economics of Betamax: Unauthorized Copying of Advertising Based Television Broadcasts

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June 1985

I would like to thank Steve Margolis and Lester Telser for their suggestions. Financial support from the Olin Foundation at the University of Chicago, the Center For Research in Government Policy and Business at the University of Rochester and the Centre For the Economic Analysis of Property Rights at the University of Western Ontario is gratefully acknowledged.

The mass production of videotape recorders is altering the habits of television viewers throughout the world. In an historic decision, the Supreme Court in early 1984 ruled on the legality of home taping of broadcast television in the "Betamax" case, otherwise known as *Universal Studios Inc. v. Sony Corporation of America*. The case elicited great interest partly because of the highly visible participants and more fundamentally because of the large stakes and potential impacts on millions of individual Americans who own or who intend to someday own a videotape recorder (VCR). While much has been written about the case by legal academics and newspaper reporters, the rationales and implications of this case have been generally neglected by economists.

The economic issues involved in this case are quite different from those encountered with copying from other mediums (e.g. photocopying). In these latter instances, the unauthorized copiers are potential consumers of the product and the producer of the authorized copies may or may not be able to indirectly appropriate revenues from these copiers [e.g. Liebowitz (1981,1985), Besen (1984)]. In the case of copying advertising supported broadcasts, the copier is not a potential customer, and the linkage between appropriability and use is an indirect one, with the impact of copying on advertisers becoming the central focus of the analysis. These points will be elucidated below, after some preliminary discussions of copyright.

1. Some facts of the Betamax case.

Videotape recorders make an electromagnetic reproduction of television signals on videotape, allowing the later viewing of these signals to occur at the convenience of the VCR owner. Since most VCR's have their own television tuners, owners of such units can usually tape one show while viewing another. Used in conjunction with cameras, other VCR's, or videodisk players, VCR's can record home movies, make copies of other tapes or videodisks, or merely playback tapes previously recorded on other machines. There is little doubt, however, that VCR's are presently used primarily to record television broadcasts, and the Courts' analyses have focused on this particular activity.¹

The details of the Betamax litigation are that Universal Studios Inc. and Walt Disney Productions Inc. accused the Sony Corporation and several other defendants of infringing their copyrights.² In 1979 a district court found in favor of the defendants. A 1981 appeals court ruling overturned the lower court ruling. The Supreme Court reversed the appeals court's ruling by a narrow 5-4 vote. The majority opinion, written by Justice Stevens, held that since the harm to copyright owners from home-taping was minimal and speculative, home taping should be considered fair use (to be defined below). It also

¹ In fact, the district court and the Supreme Court explicitly stated that their finding held only for advertising based television, and not pay television. An analysis of the videotaping of pay television would be quite different and would run along lines similar to that found in Liebowitz (1981,1985).

² The defendants included the Sony Corporation (the manufacturer of the Betamax), Sony's American distributor, several retailers who sold the Betamax machine (Carter Hawley Hale Stores, Inc., Henry's Camera Corp.; Associated Dry Goods Corp.; Federated Department Stores Inc.), Sony's advertising agency (Doyle Dane Bernbach Inc.) and an individual who used the Betamax in his home to record a broadcast of the plaintiffs' copyrighted work (William Griffiths).

held that since VCR's could be used for substantial non-infringing activities, the manufacturers would not have been vicariously liable even had videotaping been considered an infringement. The minority opinion, authored by Justice Blackmun, concluded that VCR's were used primarily for entertainment ("non-productive" uses) and therefore home taping could not be considered fair use. It also claimed that copyright owners might very likely be harmed financially by VCR use, particularly as VCR ownership increases in the future. And finally, the minority opinion claimed that even if the unauthorized copying engendered by VCR's did make copyright owners worse off, such copying might have prevented their enrichment and this lack of enrichment was also a harm.

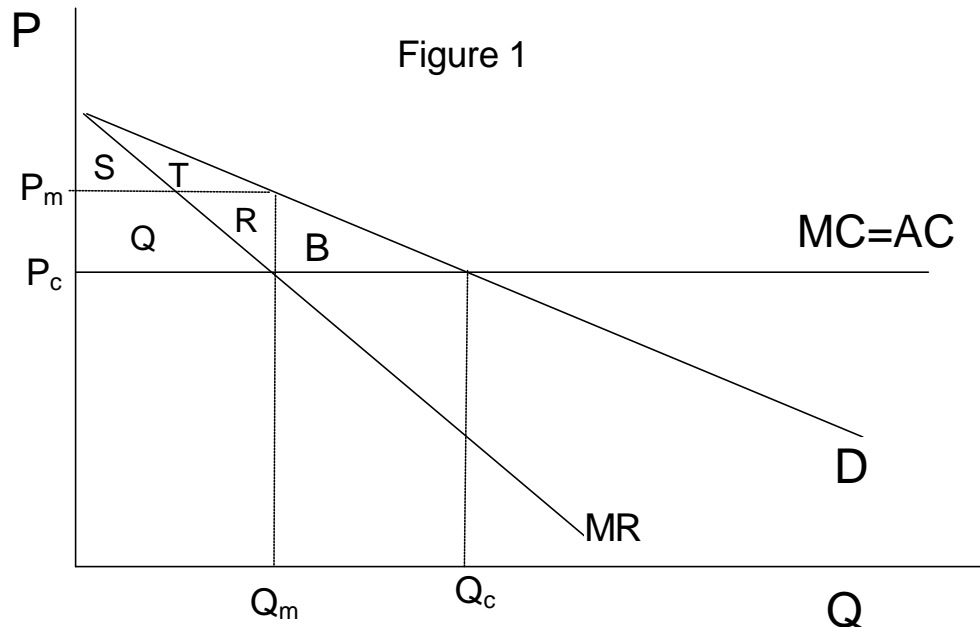
The case was a close one and the issue is not yet closed since the Court indicated that the issue might be better resolved in the political arena. Therefore, an understanding of the issues involved, which are primarily economic in nature, will serve a purpose beyond mere criticism of an inviolate decision. Central to these issues is an understanding of the economic role of copyright and fair use, which is the concern of the next two sections.

2. The Economic Rationale for Copyright

Intellectual property law provides the copyright holder an exclusive right to copy the intellectual product. The lack of competition in the reproduction of the intellectual product allows greater remuneration to the copyright holder than would otherwise be the case. A simple diagram can illustrate this proposition.

In figure 1, the demand for physical embodiments of a particular intellectual product (copies of a given book title, say) is represented by the line D .³ The marginal revenue associated with this demand is represented by the line labeled MR . The average and marginal cost of producing the physical embodiments of the intellectual product (e.g. books) are assumed to be represented by the horizontal line $MC=AC$. [Note that the cost of creating the intellectual product is not included in the diagram.] It is well known that a single producer, shielded from competition and able to charge only a single price, would produce output Q_M and sell at price P_M since this is the profit maximizing price-quantity combination. It is equally well known that a competitive market, one in which free entry (in producing physical embodiments) was allowed, would produce output Q_C at a price P .

³ Figure 1 represents a static demand when in fact the intellectual product is a durable good lasting for many periods. Any intellectual product protected by intellectual property laws will generate a value in each period, that value fluctuating as demand and/or costs change, and also when the monopoly protection comes to an end. The present value of this stream of values would be the value of a given product.



The social value of the intellectual product is measured as the area under the demand curve for physical embodiments net of production costs (defined to include the costs of both the embodiments and the costs of creating the intellectual product). Thus a single seller of physical embodiments creates a social value equal to the sum of areas Q, R, S, and T minus the cost of creating the intellectual product.⁴ The potential value (net of costs) of the output reduction ($Q_c - Q_m$) caused by the granting of the monopoly, often referred to as deadweight loss, is equal to the area of triangle B.

Two insights emerge from this scenario. First, in a competitive market, since $P_c = AC$, revenues equal production costs of the physical embodiments of the intellectual product; there is no additional revenue left over to cover the cost of creating the intellectual product.⁵ Therefore, in a world with competitive production of physical embodiments of intellectual products, the only intellectual products which would be created are those not requiring the incentive impact of pecuniary remuneration.⁶ Second, allowing restrictions in the production of physical embodiments (e.g. through establishment of copyright) allows remuneration to creators of intellectual properties (equal to $Q + R$) and therefore is likely to increase the quantity of intellectual products created.⁷ This increase in the quantity of intellectual products is accompanied by a decrease in the quantity of physical embodiments produced of any particular intellectual product (Q_m instead of Q_c). If intellectual property laws are to be judged, the value of

⁴ There is a literature which assumes that the profits to the intellectual property creator, when positive, are dissipated through competition for the monopoly. Such competitive dissipation would reduce the social value of many intellectual properties below that assumed in the text. This point has been noted several times in the literature - e.g. Plant (1934), Loury (1979).

⁵ Competition implies that $PC=MC$. But a long run competitive equilibrium occurs when $PC=MC=AC$.

⁶ Other forms of remuneration such as prizes, government grants, patronage, etc. are excluded from this analysis.

⁷ This assumption is quite important. If producers do not take advantage of monopoly power when it is proffered, then no unnecessary deadweight loss will be created by the grant of such monopoly power.

additional intellectual products brought about by these laws needs to be contrasted to the decreased output of embodiments of those products which would have been produced without any intellectual property laws.

An 'optimal' intellectual property system would be one which produced all intellectual products of positive net value (positive net value meaning that $S+T+Q+R+B$ is greater than the cost of creating the intellectual product) and which also produced physical embodiments of intellectual products up to the quantity where the demand for the embodiments just equalled their marginal production costs. Under an optimal copyright law, those creators of intellectual products not requiring remuneration for their efforts would not be granted any statutory monopoly on the production of the physical embodiments of their work; no unnecessary deadweight loss would be created for these products. And when remuneration is required for the production of a product in this more "optimal" world, the duration of the monopoly would be just sufficient to provide such remuneration.

3. Fair Use: The Central Legal Concept

Much of the discussion of the Betamax case by legal academics centers on whether home taping should or should not be considered fair use. Prior to the 1976 revisions to the copyright act, the concept of fair use was a vague judicial doctrine under American Law. Although the 1976 statute codified this doctrine, its lack of precision was left basically intact. The 1976 statute (S 107) states:

The fair use of a copyrighted work, including such use by reproduction in copies or phonorecords...for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include:

- (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
- (2) the nature of the copyrighted work;
- (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
- (4) the effect of the use upon the potential market for or value of the copyrighted work.

Those who argue that home videotaping is not fair use emphasize that: broadcasts are almost always copied in their entirety; (2) the purpose of the taping is non-productive, i.e., entertainment as opposed to scholarship; (3) videotaping causes economic harm to copyright owners since advertising revenues decrease and/or videodisk or re-run markets are harmed.⁸ Those who argue that videotaping is not an

⁸ See, for example, Universal City (1980).

infringement tend to stress that: (1) the use is non-commercial in nature and (2) the economic impact of individual videotaping instances are negligible.⁹ As is proper in legal analysis, these discussions are based on an interpretation of the law, or its congressional intent, and not on what an economically rational ruling would be. However, economic analysis makes clear several coherent rationales for fair use and allows a delineation of the characteristics of home videotaping which are consistent with or contrary to the purposes served by fair use.

The fair use concept is easily accommodated as a judicial attempt to balance the benefits of increased production of intellectual properties with the cost of diminished consumption of particular intellectual properties.¹⁰ The fair use doctrine can be viewed as a method whereby the courts could circumvent the rigid rules of copyright law in instances when the benefits of increased consumption appeared to outweigh the harm from reduced production.

This can be more clearly seen by examining some possible examples. Some users of copyrighted works would not be willing to purchase an embodiment of the work at a price which would cover the marginal production costs of the embodiment. Individuals who laboriously hand-copied works prior to the advent of cheap reprography presumably fit into this category. Nevertheless, these individuals derived value from their use of the work and would have attempted to either borrow or copy the work in order to appropriate this value. In principle, the authors of the work might have charged a usage or copying fee, in order to appropriate some of the value generated by their work to these users. The transactions and monitoring costs involved in such negotiations, however, were likely to have swamped the revenues generated, and transactions in these instances were probably uneconomic. Forbidding these users from copying would not have increased the revenues of authors and therefore would not have increased the production of intellectual works. Allowing copying under these circumstances would have the salutary effect of allowing additional consumption with no offsetting loss in production.

Similarly, for authors requiring no pecuniary remuneration in order to produce their works, allowing unfettered copying would not reduce the quantity of these works forthcoming. Here too, strict enforcement of copyright would have a deleterious effect on society since some users would be excluded from purchase by the price P_m . These two extreme cases illustrate instances whereby fair use exemptions can benefit society. As a general rule, fair use becomes a valuable alternative to strict enforcement of copyright when authors require small or no rewards or where authors would need to overcome great costs in order to appropriate small or no revenues from a class of users.¹¹

⁹ See for example Kallal (1977).

¹⁰ See Gordon (1982) for a more detailed discussion.

¹¹ The costs associated with copying have fallen dramatically with the advance of technology and may have caused individuals who would previously have bought physical embodiments to now make copies. A "fair use" of fifty years ago may today pose a much greater threat to authors since those now making copies may well have been those who would have purchased the item without the assistance of cheap copying. This increase in the copying of copyrighted materials has in turn caused concern among authors that their revenues might be jeopardized. While this concern may be justified, only an empirical investigation can determine the actual impact of copying on copyright-holders.

Fair use has also been used as a tool to try to achieve other goals. There is evidence that the courts generally consider scientific, educational or "productive" work to be of greater value than entertainment, and for this reason are more likely to allow copying of these types of works.¹² This position, without modification, makes little economic sense for two reasons: (1) scientific work does not have inherently greater economic value than entertainment; and (2) by freeing the copying of scientific work from copyright payments, the production of scientific work, which the courts (and legislature) seem to consider so invaluable, may in fact diminish when copyright protection is weakened. Gordon (1982), in trying to explain the purpose of these two components of the guidelines, has put forward the proposition that scientific uses generate positive externalities; she assumes that the value placed on the use of a work by the copier is less than society's value of that use and concludes that fair use (shorter copyright) may be necessary to alleviate this externality. Justice Blackmun has commented favorably on this reasoning. Yet I think that the conclusions do not follow from the assumptions. If society undervalues the contributions of scientific uses (i.e. the area under the demand net of costs), it will also undervalue the deadweight losses associated with restrictions on the number of uses made of these types of works. Internalizing Gordon's externality would require the equivalent of a subsidy for users, not a shorter copyright life. A subsidy on scientific uses would increase the number of such uses of an intellectual product and would also tend to increase the demand for and the quantity of products used as inputs in creating scientific uses. A shorter copyright life would lower the costs of using intellectual products, tending to increase the use of a particular intellectual product, as did the subsidy, but it would also decrease the quantity supplied of these inputs, since the return to creating this input would be diminished. It is possible that these two countervailing factors would lead to a net reduction of such scientific uses. An economic rationale for the Court's dichotomous treatments of scientific and educational works can be constructed, however. If the production of scientific and educational works is much less responsive to the pecuniary rewards of copyright than is the production of works of entertainment, optimal copyright would be shorter for scientific works or scientific uses.¹³ Although this explanation of the court's distinction between scientific and entertaining materials requires empirical

¹² See, for example, *Williams and Wilkens Co. v. United States*, 487 F.2d 1345 (1973) aff'd by an equally divided court, 420 U.S. 376 (1975). In this case a government medical library made photocopies of copyrighted medical journals. The lower court ruling, upheld by the Supreme Court, was that this practice constituted fair-use, in part because of the nature of the material at hand. The Supreme Court majority opinion stated: "We are convinced that medicine and medical research will be injured by holding these practices to be an infringement...we should not...place such a risk of harm upon science and medicine." See also *Universal City*, 1019, supra Note 9. A similar view was given in the appeals court ruling of the *Betamax* case which stated:

"We do not mean to suggest the increased access to such Disney products as 'Chip and Dale Mixed Nuts' is not a benefit to society. We only mean to say that the consequences attendant upon reduced consumer control of access do not in any way correspond to the deleterious consequences of reduced access identified...in *Williams and Wilkens*." (16,748)

¹³ If a work is used for dual purposes, scientific and commercial, say, and if the scientific use would provide very little revenue under strict copyright, but very high values, while the commercial use provided large revenue relative to its value, we might wish to hold scientific users to weaker copyright standards since they can free-ride, to a large extent, off of the payments made by commercial users.

verification, the assumption of sciences's lesser response to pecuniary incentives seems to hold some intuitive appeal.

In a similar vein, the courts often make a distinction between commercial and non-commercial (individual, private) uses of an intellectual property. For example, videotaping a movie for your own viewing is more likely to meet the fair use guidelines than if you were to show the film to your neighbors and charge admission. Such a distinction makes sense if the transactions costs involved in collecting copyright payments from individual users are greater than potential revenues and the costs of collecting from the commercial users are less than the potential revenues. In the former case, allowing fair use enhances consumption without diminishing production of intellectual properties while in the latter case allowing fair use would diminish production of intellectual properties.

The fourth factor in the fair use guidelines, the economic impact of copying on the copyright holder, is of central importance in determining the impact of copying on the pecuniary incentives of authors. As Justice Blackmun notes, however, in his dissent:

First, an infringer cannot prevail merely by demonstrating that the copyright holder suffered no net harm from the infringer's action. Indeed, even a showing that the infringement has resulted in a net benefit to the copyright holder will not suffice. Rather, the infringer must demonstrate that he had not impaired the copyright holder's ability to demand compensation from (or deny access to) any group who would otherwise be willing to pay to see or hear the copyrighted work. Second, the fact that a given market for a copyrighted work would not be available to the copyright holder were it not for the infringer's activities does not permit the infringer to exploit that market without compensating the copyright holder.

Blackmun brings up an important and interesting point. If VCR's greatly enhanced the value of all television programming (to be defined in more detail below), the quantity of television programs produced should increase if the copyright system were efficient. If revenues to copyright holders did not increase, then appropriability presumably would have decreased. Since constant or increasing copyright revenues can be consistent with decreased appropriability, the last fair use factor must be carefully examined if the fair use defense is to be prevented from reducing the production of copyrighted works below an efficient level.

I now proceed to an examination of the economic factors influencing videotaping's impact on broadcast and copyright revenues.

4. The Unusual Market for Television Broadcasting

The television broadcasting market is unusual in many respects and often has proven difficult to model.¹⁴ This is because the television viewer pays only indirectly, if at all, for

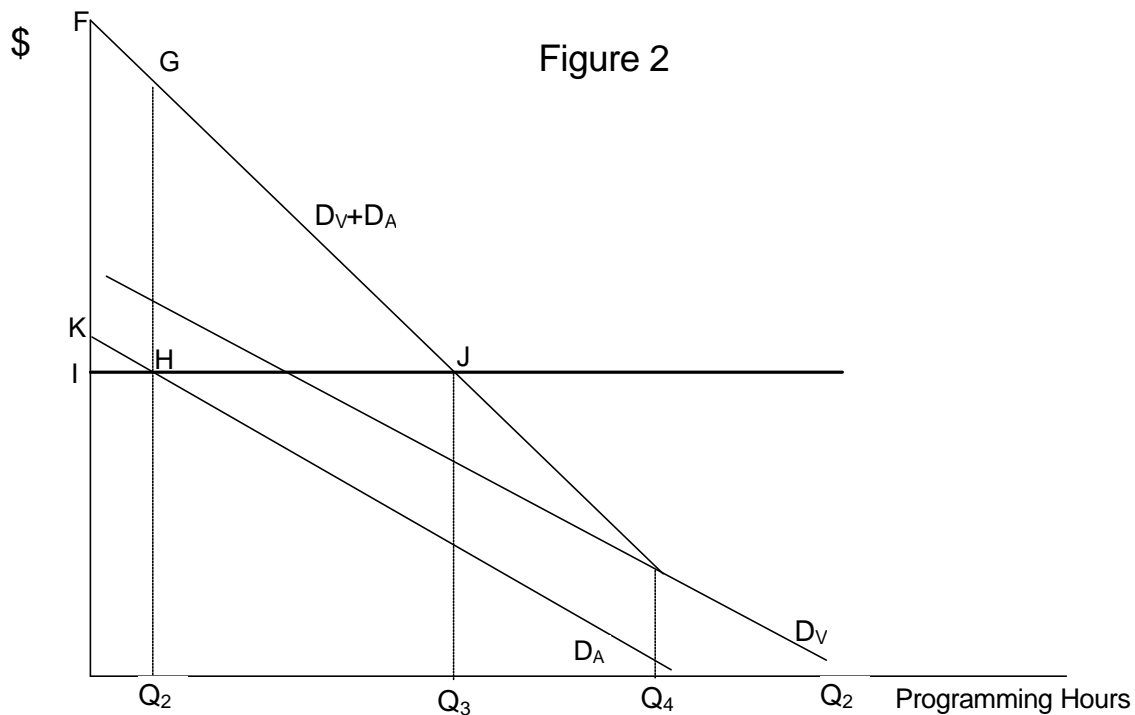
¹⁴ See the discussions of Telser (1966) and others in the May 1966 issue of the American Economic Review, page 457-475. These discussions tend to turn on the value of advertising to society and consumers, and whether the higher prices of advertised goods are socially inefficient or not.

his consumption of television programs. The payment for television programs is made, instead, by companies which buy advertising slots contained within the programming. Purchasers of advertised products pay higher prices because of these advertising costs. Because producers of television programs market only one of two jointly produced products, it can be demonstrated that television broadcasting creates a positive externality and is in some sense underproduced, although the comparison might be with an unattainable "nirvana" state.¹⁵ This discussion will be helpful in promoting understanding of the economic analysis of VCR use on broadcasters.

The product in the market examined here is television programs. One can define a unit of television programming as a 60 minute program (or, say, 48 minutes of program plus 12 minutes for advertisements). Different programs draw different audiences, varying in both size and demographic characteristics. The value of the program to advertisers depends on the number of advertising minutes, the efficacy of the advertisements, and the size and demographic characteristics of the audience; in other words, the value of the program to advertisers depends on the number of advertising contacts with viewers which it can provide.¹⁶ In figure 2 units of television programming are placed on the horizontal axis and the units are assumed homogeneous to the demanders (the advertisers). The curve DA represents the value of the advertising slots embedded in programs of a given quality. There are, in principle, an infinite number of curves such as DA, which broadcasters can alter by changing the nature of the programs, the advertising, or perhaps, the price viewers must pay (presently zero). The demands represented by the multiplicity of DA's are derived from the underlying demand for advertising contacts, discussed in more detail below.

¹⁵ See Demsetz (1969).

¹⁶ This includes such effects as the distance of audiences from broadcasters and the amount of choice viewers have. See the discussion of fragmentation and segmentation later in the paper.



Television programs are valued not only by advertisers but by viewers as well. The viewer's valuation of the programs ordered on the horizontal axis are represented by line D_V .¹⁷ Note that D_V is the vertical sum of individual demands for programming hours, because broadcasts of television programming are public goods. D_A , on the other hand, is the horizontal sum of advertisers' demands for programming units and the advertising contacts they provide, which are private goods. The social value for any particular unit of programming (included its embedded advertising) is simply the vertical sum of the jointly produced viewers' and advertisers' values, represented by the curve $D_V + D_A$.

If broadcasters could collect revenue from both viewers and advertisers, they would adjust the quality and number of programs, and the number and quality of advertisements (to be referred to as broadcasting parameters) so as to raise $D_V + D_A$ relative to costs and thereby maximize profits. Note that the socially efficient set of broadcast parameters would be those which maximized the net value of broadcasts, given by the area FJI in figure 2 (assuming no fixed costs).

Institutional factors are such that real world television broadcasters can only generate revenues from the advertising market. This restriction causes broadcasters to choose broadcast parameters which will increase D_A relative to costs (maximize KHI), and ignore

¹⁷ Although D_V is drawn as continuous and downward sloping, it need be neither if programs are not perfectly homogeneous to viewers. The values viewers place on programs may be inversely, directly, or randomly related to the values advertisers place on programs. For example, critics of television often argue that in an advertising based system, large minorities with intense desires are not catered to because advertising values do not reflect the values viewers place on programs. The ranking of programs (ordered on the horizontal axis) based on their advertising values (D_A), will generally be different than an ordering based on total values ($D_A + D_V$).

the impacts of their actions upon D_V . Therefore, the parameters likely to be chosen under these restrictions are almost certainly different than those which would occur in a market which could access revenue from viewers. The nature of television programming will therefore be different under a system of pure advertising as opposed to a mixed system of advertising and viewer payment. The details of these differences, however, can not be predicted a priori.

For any given set of broadcast parameters which allow the curves D_V and D_A to be well defined, the television externality is easily ascertained. Assume that D_A in figure 2 is the advertiser's demand for programming resulting from the maximizing behavior of competitive broadcasters regarding the choice of broadcasting parameters. Q_2 units of programming will be produced and sold. D_V , the value viewers place on the programs is ignored by the market. Yet the total social value is the sum of D_V and D_A so that an efficient output of these programs would occur at quantity Q_3 . The positive externality causes too few programming hours to be produced and sold as long as D_V is positive at the chosen output (and we would expect D_V to be positive).

Externalities, of course, are the classic market failure whereby a competitive market will not achieve the efficient amount of the commodity produced. One could argue, then, that some method of internalizing this externality might benefit society. Of course, this would only make sense if the cost of internalizing the externality were less than the benefits conferred - a proposition of unknown empirical validity. One method of internalizing this externality could be the subsidization of television producers in an attempt to make the effective demand facing program producers $D_V + D_A$. An alternative remedy might be to try to alter the nature of the television market to allow broadcasters to collect revenues from viewers by charging them for the privilege of viewing as is now done by the various pay-TV networks now in existence.¹⁸ [The many cable networks that have come into existence since this paper was written are other examples.] Society, however, has not seemed overly concerned with the removal of this externality, perhaps indicating that the gains from internalizing it are small relative to the cost.

This apparent lack of concern poses something of a dilemma when considering the impacts of videotaping. If videotaping were to increase the valuation of programs by viewers (an upward shift of the D_V curve in figure 2) the size of the television externality would grow.¹⁹ Should the courts attempt to award revenues, in some fashion, to creators of television programs in the hope of mitigating the size of the externality? There are several reasons supporting a negative response to this question. First, it is not clear that the copyright arena is the appropriate place or that taxing VCR producers is the

¹⁸ Even if broadcasters could charge viewers for the right to watch programs, they would be able to achieve the price-quantity combinations on D_V only if they could perfectly discriminate across all viewers for each unit of programming. [The many cable networks that have come into existence since this paper was written are other examples].

¹⁹ VCR's alter efficiency in another interesting way. If VCR's decrease the number of quality-adjusted advertising contacts for a given amount of programming, the total advertising value of the programming falls, even though the cost of producing the programming remains constant. This loss of efficiency in the advertising medium is not a copyright problem, however, since it does not directly influence copyright holders. It is the change in revenues, not advertising contacts, which affects copyright holders.

appropriate remedy for this problem. Taxing VCR producers and giving the proceeds to copyright owners will not internalize the positive externality caused by VCR's, although it might eliminate the externality if the tax were burdensome enough (by eliminating the market for VCR's).²⁰ Imposing taxes on VCR's (and possibly decreasing DV back to its original position), however, could impose large costs by removing the consumer's and producer's surplus generated by VCR's with no balancing benefits. Second, attacking the root cause of the externality would seem to be a more productive approach than piecemeal fix-ups of disparate factors influencing the size of the externality, of which VCR use is only one. Third, the costs of internalizing the externality, even just those parts associated with VCR use, might be large relative to the gain. Yet these reasons are not powerful enough to discredit all arguments to ameliorate any increase in the externality caused by VCR's.

5. The Economic Impacts of Home Videotaping

5.1 Anticipated Harm to Copyright Owners

Both legal academics and the courts generally agree that determining the harm to copyright owners brought about by VCR use requires an estimate of the total impact of all videotaping and not just the impact of any specific case of videotaping.²¹ Unfortunately, determining the likely economic impact of videotaping is not a simple task. The analysis must focus on the potential impacts of VCR's on the advertising revenues generated by programs, which are in turn, related to the size and demographic characteristics of the audience. The plaintiffs predicted that harm would occur from each of four possible uses of VCR's: (1) recording material off-the-air never later seen by the VCR owner; (2) recording a program not being viewed live in order to later view it (time shifting); (3) recording a program, saving the tape and viewing the program several times (librarying); and (4) avoiding commercials while recording or playing back a tape. The district court considered each of these effects and it is useful to examine its analysis.

The district court decided that the recording of material never to be later seen did not injure copyright holders. Although it is possible that such behavior actually reduces television viewing because viewers no longer worry about missing their shows while doing something else, such an effect from material never later viewed seems extremely improbable.

The district court also stated that the second factor, time- shifting, was unlikely to harm copyright holders. Since the Supreme Court relied heavily on this finding it is worthy

²⁰ In a world of zero transactions costs, well defined rights and no wealth effects, VCR manufacturers would negotiate with copyright owners and government taxation of VCR's would not alter the number of VCR's produced. In such a world, however, no externalities are possible. See Coase (1960).

²¹ Both courts cite Nimmer's () analysis of these issues in which he claimed that the relevant question of harm could only be answered by examining the total impact of all such copying on the potential markets of the copyright holder.

of further investigation. Time shifting will only be important if an advertiser's valuation of a contact with a particular viewer depends on the time of day the contact is made. Although it is empirically true that advertisers pay different amounts per viewer during different day parts, this is due to the nature of the audience, not the time of day. For example, during the late afternoon, children and housewives make up a majority of the television audience and advertisers do not value this audience, per capita, as highly as one consisting of viewers having greater discretionary income, such as working men and women. There is no evidence of which I am aware which would indicate that a particular viewer is worth different amounts to advertisers depending on the time of day in which the viewing occurs.²² Although time-shifting has occasionally been referred to as fragmentation, it should not be confused with the more general spatial fragmentation sometimes discussed in the broadcasting literature. In that literature, advertisers are thought not to value distant viewers as highly as local viewers since distant viewers are less likely to purchase items from advertisers located in the city of program origination. Videotaping might, however, cause an analogous temporal fragmentation if the viewing of the program is delayed long enough by VCR use. For example, if a person first watches a tape of a 1980 television broadcast in 1982, the old advertisements will have lost much of their value because the 1980 products being advertised are likely to have changed considerably by 1982, making the advertising message obsolete. The Court's treatment of time-shifting seems to imply short delays, however, and long delays are probably best analyzed under the "librarying" factor, taken up next.

Librarying was another factor which the district court did not consider likely to be detrimental to the copyright holders. Here, the court's reasoning is somewhat suspect. The first point made by the court was that not much librarying was likely to occur, since videotapes were expensive; this point may be correct, but it rests on empirical facts, not *a priori* reasoning (it should also be noted that the cost of blank tapes has fallen dramatically since the district court's decision). In addition, the court also stated that librarying would not harm copyright holders because viewers, seeing the advertisements during each viewing, would be just as valuable to advertisers as an identical audience watching re-runs. Because of the obsolescence of the advertising messages over long periods of time, however, this reasoning is fallacious. Further investigation would be needed to determine the importance of this potential deleterious effect on advertising contacts.

²² A study by F. Fisher, J. McGowan and D. Evans might appear to contain a contrary finding. See They concluded that "Policy decisions which concern audience diversion must take this [differences in values of audience by time of day] into account by examining the temporal as well as the spatial aspects of such diversion." p. 707. This conclusion was based on the finding (not original to this article--for a similar finding see Park (1970) who found prime-time viewers to be worth more to advertisers than non-prime-time viewers. However, such a result is almost certainly due to the difference in audience characteristics at various times of day and/or differences in programming attractiveness (for evidence that programming attractiveness influences the value of viewers to an advertiser see Liebowitz (1982)). Therefore, for a given viewer of a given program, altering the time of day in which he views the program should not alter his value to advertisers.

The fourth, and most serious impact to be examined by the courts is the VCR aided avoidance of commercials. Advertisement avoidance can occur in two ways: (1) the viewer can delete the commercials upon the initial viewing using a pause switch; (2) or the viewer can fast-forward through the commercials when viewing a previously recorded tape. If VCR owners avoided commercials to a significant extent, it might be detrimental to copyright owners and might justify the taking of some remedial action on the part of the Court. The price of a unit of advertising, however, will probably change when the number of advertising contacts changes so that the impact of advertisement-deletion on advertising revenues is uncertain. This point is important enough that a more detailed analysis should prove valuable.

5.2 Advertising revenues and Advertising Contacts

Television broadcasters generate revenues by selling time slots to advertisers. These advertisers can be thought of as buying the opportunity to make advertising contacts (or, more precisely, advertising contact-minutes) with a given number of viewers. The desire of advertisers to purchase these contacts can be represented by a downward sloping demand curve in the market for these purchases although the precise slope of the demand for television advertising contacts can only be discovered through empirical methods. It is conceivable (barely) that the demand for television contacts is horizontal since television is only one of many mediums in a perfectly competitive market. I am not aware of any empirical work examining the demand for advertising contacts.

The slope of the demand curve for advertising contacts is very important for all discussions of audience size and advertising revenue. For example, if universal ownership of VCR's reduced the total number of advertising contacts due to, say, the elimination of 30% of the advertisements by viewers, this decrease in the number of contacts should raise the market price of an advertising contact. Whether total revenue to advertisers went up or down would depend on the elasticity of demand for advertising contacts. If the elasticity were less than 1 (a possibility only in a competitive market), the decrease in the quantity of advertising contacts caused by VCR owners "zapping" commercials would actually increase the total revenue to broadcasters. If the elasticity were greater than 1 total revenue would fall, but by less than the percentage drop in advertising contacts. Only if the elasticity were infinite (a horizontal demand) would the decrease in advertising revenue be as large as the decrease in advertising contacts.²³

It is now clear that a determination of the impact of VCR's on advertising revenue requires a knowledge of two factors: (1) the change in the number of advertising contacts brought about by VCR use; and (2) the elasticity of demand for advertising

²³ Although this discussion may appear extremely rudimentary, this simple point does not appear to have been fully appreciated in past analyses. In particular there is a tendency to equate audience contacts (size) with revenues. For example, Jay Eliasberg, former vice president of research for the CBS broadcast group said in congressional testimony: "In the simplest terms, the producers of television programs will in the long run be paid for their product in proportion to the effective size of the audiences that their programs reach."

contacts. Although there is little that is known about the second factor, some discussion of the first factor is possible.

5.3 The Extent of VCR aided Advertising Deletion.

There can be no doubt that viewers delete commercials when they use VCR's. A survey of VCR use conducted by the Betamax defendants indicated that VCR owners fast-forwarded through 25% of commercials, and that the pause button was used to eliminate commercials 8% of the time. A survey by the plaintiffs found that commercials were deleted more than 40% of the time upon playback and that the pause button was used to eliminate commercials 40% of the time for the 20% of programs which were viewed while recording.²⁴ How this form of commercial avoidance compares with more traditional forms, such as going to the bathroom or getting something to eat, is not clear.

While the degree of commercial avoidance is an important factor in the determination of the reduction in advertising contacts, equally important is an estimate of the frequency of use of VCR's. Since a single machine can not both record and play back at the same time, it is unlikely that average television households can use the VCR for any but a small portion of their viewing. For example, the average television household watches about 7 hours of television per day.^{25,26} Almost half of this viewing occurs during the prime-time period of 7:00-11:00 p.m. and a majority of television revenues are generated during this prime-time period. It is simple to demonstrate that the average household, which presumably prefers viewing prime-time programs during the prime-time period, could not engage in a great deal of videotaping of prime-time programs unless it owned more than one VCR. Assume, for example, that a household has taped 3 hours of prime-time programming from Monday's (M) programs and that there are 3 hours of prime-time programming which members of the household would like to watch on Tuesday (T). They would not be able to simultaneously record Tuesday's programs and also watch the tapes of Monday's programs since a single VCR cannot both record and playback at the same time. In fact, if members of the average household enjoy watching 3 hours of prime-time television shows every night, they would be virtually unable to use the VCR unless they increased their television viewing above what it would have been had they not owned a VCR. Therefore it is not surprising that surveys of VCR use indicate that only 3.3 recordings were made during a week and only 2.4 recording were played back per

²⁴ These surveys are likely to be unreliable because the population of users at the time of the surveys was likely to be very different from the eventual population of VCR users. The first people to buy VCR's are likely to be those who place the greatest value on owning a VCR, perhaps because either time shifting or commercial editing is of great importance. Therefore, the population of initial owners is likely to include disproportionately high percentages of wealthy individuals, those who particularly detest commercials or those who have jobs that cause them to miss their favorite shows. Thus the amount of taping and the amount of commercials deleted are likely to be higher in a survey conducted when the VCR industry is immature than when the use of VCR's is more widespread.

²⁵ This assumes that VCR's continue to be configured as they are now. Future VCR's (already being sold in other countries) will allow the playback of one tape while another one is being recorded. These machines are the equivalent of having two machines, and the statements in the text wouldn't hold for television viewers with such machines.

²⁶ Source: TV Basics, Television Bureau of Advertising, New York, 1982.

week.²⁷ The term "recording" in the above statistics might mean a two-hour hour movie or a half-hour situation comedy. Assuming that each recording were 1 hour long, VCR viewing would make up only 2.5 hours per week, or 5% of the average household's 50 hours of viewing per week.

Table 1 gives various possible decreases in the percentage of audience contacts for advertisers based on different assumptions about the percentage of the viewing public which owns VCR's, about their use of taped programs to replace the viewing of over-the-air broadcasts, and about the percentage of commercials deleted. The best guess for the number of advertisement deletions is found in column 2, where it is assumed that VCR playback of home-made tapes accounts for 5% of total viewing time. In that column, the dimunition in the number of advertising contacts ranges from .17% to 5%. The lower right-hand corner gives the most extreme reduction in advertising contacts, 20%, based on 100% VCR ownership, 100% advertising deletion and 20% VCR viewing. Note that this table also assumes that without VCR's, all advertising contacts would be consumated. To the extent that viewers get something to eat, go to the bathroom or just "tune out" during the advertisements, the true reduction in advertising contacts by VCR's will be less than that reported in table 1. Another factor mitigating the reduction in contacts is the attention required to successfully eliminate commercials; VCR owners need to pay close attention to the advertisements so as not to run past the end of the commercial and cut into the program (note, however, that there is no sound when fast-forwarding)

Table 1					
% Decrease in Advertising Contacts					
% of Households owning VTR's	% of Advertisements deleted	Viewing home-made Video Tapes as% of Total Viewing			
		2.5%	5.0%	10.0%	20.0%
10%	33%	0.08%	0.17%	0.33%	0.67%
	50%	0.13%	0.25%	0.50%	1.00%
	100%	0.25%	0.50%	1.00%	2.00%
25%	33%	0.21%	0.42%	0.83%	1.67%
	50%	0.31%	0.63%	1.25%	2.50%
	100%	0.63%	1.25%	2.50%	5.00%
50%	33%	0.42%	0.83%	1.67%	3.33%
	50%	0.63%	1.25%	2.50%	5.00%
	100%	1.25%	2.50%	5.00%	10.00%
75%	33%	0.62%	1.25%	2.50%	5.00%
	50%	0.94%	1.88%	3.75%	7.50%
	100%	1.88%	3.75%	7.50%	15.00%
100%	33%	0.83%	1.67%	3.33%	6.67%
	50%	1.25%	2.50%	5.00%	10.00%
	100%	2.50%	5.00%	10.00%	20.00%

The decreases in advertising contacts represented in table 1 are, of course, larger than any revenue decrease which might result. Without knowledge of the elasticity of

²⁷ See Levy (1983).

demand for advertising contacts it is not possible to say very much about the changes in revenue associated with these reductions in advertising contacts except that the reduction in advertising revenues will be smaller than the reduction in advertising contacts.

5.4 Ways in which VCR's Might Increase Advertising Contacts.

It is possible that VCR's might increase advertising contacts. For example, if VCR's increased the total amount of television viewing, total advertising contacts might increase and the revenue to copyright holders might increase as well. Indeed, VCR's provide conditions under which one might expect to find that the individual viewer will choose to watch more television than he otherwise would since each hour of television viewing is now of higher perceived quality. However, it need not be the case that VCR's increase viewing time. It depends on whether the ultimate consumption good is programs, or the services generated by programs. For example, it is well known that increasing the size of chocolate bars, holding the price of bars constant, will have an ambiguous impact on the consumption of candy bars (but an unambiguous impact on chocolate consumption), if consumers demand chocolate and not chocolate bars as the ultimate end product. Similarly, VCR's increase the value of television services in any hour period, but the number of hours of television viewing "consumed" will depend on the viewers' elasticity of demand for television services as long as it is the "services" of television programs which people actually value. Thus the expected impact of VCR's on time spent viewing television is ambiguous.

Unfortunately, there exist only a few shreds of empirical evidence on this issue. The impact of a wider choice of programming on viewing habits has been examined by researchers interested in predicting the impact of additional stations on viewing habits caused by either cable retransmission of distant stations (and the wider choice of signals it allows) or the value of additional networks to viewers in areas with only one or two networks. An FCC staff study in 1970 concluded that additional television signals did not appear to increase viewing. A study by Noll, Peck and McGowan (1973) found that a second network station increased viewing by 30% but that adding a third only increased viewing by 7%, implying that since most viewers presently have access to three networks and often several independent stations, their viewing time would presumably not change very much as VCR's increased their choice of programs. Two studies of more recent vintage which examined this impact with somewhat greater precision came to similar conclusions. Park's 1979 study attempted to estimate the impact on viewing from the extra signals carried on cable, holding factors such as reception quality constant. He concluded "there is no indication in these data that more signals lead to more viewing: the coefficient of NTSA (number of stations) is small, negative (wrong sign), and insignificant." Liebowitz (1982) came to a similar conclusion, with the number of stations generally having a negative, though insignificant impact on viewing. Thus, based on these studies it seems unlikely that VCR's would increase the total amount of television viewing.

It is also possible that VCR's might alter the quality of advertising contacts. Even if the additional choice brought about by VCR's does not increase the amount of time individuals spend watching television, it certainly will increase viewer satisfaction and the intensity with which people watch television. It will also allow advertisers to pinpoint their advertisements more precisely to specific groups since individuals will probably self-select themselves into more precisely defined groups based on a program's appeal to viewers of particular socio-economic backgrounds. The confluence of these effects (termed the "segmentation" effect) tends to increase the quantity of quality adjusted advertising contacts for any given size audience. Liebowitz (1982) attempted to measure this impact and found that the segmentation brought about by additional stations carried on cable television (often doubling or tripling the number of alternative stations) tended to increase advertising rates per viewer by a modest 5-10%. Since it is difficult to compare the increased viewer choices offered by VCR's with that offered by cable retransmission of over-the-air broadcasts, there is great uncertainty regarding the change in advertising rates likely to be caused by VCR's.

5.5 The Net Impact of VCR's

Since the positive impacts of VCR's on advertising contacts seems likely to be small and the negative impacts of advertising deletion caused by VCR's are also likely to be small, it seems fair to conclude that evidence presently available indicates that the net impact of VCR's on advertising contacts is likely to be small. This in turn implies that copyright holders are likely to receive payment for their work which would be similar to the payment they would have received had VCR's not been in use. The logic of the fair use concept would seem to imply that VCR use should be considered an exception to copyright infringement since no diminution of creative activity is likely to follow from VCR use and users would clearly benefit. VCR's probably exacerbate the inefficiency due to the externality caused by the non-payment by viewers, but this externality is not primarily caused by VCR's and, I have argued, should not be a consideration of the courts.

6. Some Proposed Remedies

Although the Supreme Court decision ruled out any judicial "remedies" for the current situation, Congress is already hearing pleas for various proposals. Many commentators on this case have proposed taxes on VCR's or videotapes with the revenues to be disbursed by a copyright tribunal.²⁸ Although the externality argument provides one economically sound reason for including viewers' valuations in the analysis of VCR's, the sentiment behind proposals to tax VCR's can be traced to bogus reasoning quite divorced from the externality problem. The latter part of the earlier quotation from Justice Blackmun illustrates this logic. He claimed that when a party exploited a market for copyrighted goods, that party should be required to make payment to the copyright owner. Similar statements can be found throughout congressional hearings (1983,1984) on the subject. The ramifications of such a belief are wide ranging and not well understood by proponents of these arguments.

²⁸ E.g. See Ramos (1979) or Congressional hearings in 1982 or 1983.

VCR manufacturers earn revenues selling a product which would, for practical purposes, have little value if not for the existence of copyrighted intellectual products. Notice, however, that an identical argument can be made for the producers of television sets, t.v. guides, antennae, Neilson ratings, t.v. stands, etc.. All these products are strong compliments with television programming and are "exploiting" the television market to earn revenues. Should they all pay a portion of their revenues to copyright owners (as cable television owners now do for retransmission of over-the-air broadcasts)? There are many other complementary products in the world (gasoline production/distribution and automobiles, electricity and appliances, floor cleaners and floors, etc) and if one believes that the producers of one complementary good should pay producers of other complementary goods for the right to "exploit" the market for the joint product, there is no limit to the potential scope of taxes and subsidies. In addition, it is not at all clear on whom the taxes should be levied. After all, what would be the worth of television programs without the physical means of reproducing them over-the-air, or a guide to allow viewers to learn when particular shows were being broadcast? Perhaps copyright owners should pay part of their revenues to the manufacturers of these complimentary products?

Of course, this leads to an endless circle of taxes and subsidies. There is, of course, no economic justification for such a policy. Producers of complementary goods each share in the net value produced by their joint products. The ability to predict the existence of complementary goods is sufficient to ensure the production of a particular good. If producers are uncertain about the existence of complements, they can try to produce both goods themselves (as various computer manufacturers try to ensure an adequate supply of software for their machines). Only if these avenues were not functioning properly might government policy serve a useful function.

The effects of banning VCR'S, a particularly crude remedy, would be dramatic in many respects, but would only benefit copyright owners if VCR's were reducing advertising revenues, which, as we have seen, is unclear. The television externality is in no way addressed. Potential buyers and sellers of VCR'S would suffer very large losses which could be measured as the sum of consumers' and producers' surplus in the VCR market which would almost certainly dwarf the loss of advertising revenues to broadcasters. This large potential loss to VCR manufacturers might help explain why copyright owners have been trying to impose copyright liability on VCR manufacturers even though the broadcasters are not likely to be seriously harmed by VCR use. VCR manufacturers have large potential quasi-rents which the copyright owners might be able to appropriate by threatening to close down the market.²⁹

The proposed "remedy" seems to be either a tax on VCR's or on videotapes. Both taxes are similar in that they both raise the marginal cost of VCR use. But the tax on tapes would deter users from building up libraries of tapes whereas the tax on machines does not discriminate between uses in this way. These taxes do not discriminate between VCR owners who delete advertisements and those who don't, although one

²⁹ See Klein (1978).

would want a tax to alter behavior precisely on this margin. In fact, these taxes give no incentives to induce people to stop deleting advertisements. The taxes will merely induce people to buy fewer VCR's and the purchase and use of VCR's will decrease from what it would have been, even in those instances when VCR's would have been used for copying non- copyrighted materials.

It is also unclear that the revenues generated will promote the creation of new programs in an efficient manner. The behavior of the Copyright Royalty Tribunal, which would probably disburse these revenues in a manner similar to that used for disbursing royalty payments to copyright owners made by cable television operators, has been extremely arbitrary.³⁰

While it is highly uncertain that any remedies are necessary, there is one which more precisely focuses on the activity which actually reduces advertising contacts. If a tax of some kind must be implemented, it should be put on remote-control fast-forward devices. The costs of getting up and manually adjusting a VCR whenever a commercial comes on seems high enough to deter advertisement deletion for those owners who do not have remote control; and for those persons who absolutely detest commercials, other forms of advertisement avoidance, such as talking, reading or leaving the room probably already dominate their activity, making them worth little to advertisers. With the tax in this form, people who do not care about deleting commercials could avoid the tax, while those who wanted to delete commercials would pay the tax. The extra precision of this tax would cause a much smaller loss in efficiency than the blunter alternatives.

7. Conclusions

I have endeavored in this paper to examine the economic logic of various aspects of the Betamax case. I have attempted to provide a unifying economic rationale for copyright and fair use. The likely impact of VCR's on broadcasters and copyright owners was then examined with the primary conclusion being that VCR use does not have a simple or well-known impact on copyright owners; it may either increase or decrease their revenues. The total size of this impact, regardless of its sign, is not likely to be large. Finally, I have demonstrated that many of the proposed solutions create inefficiencies of their own which might outweigh any possible benefit.

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³⁰ The cable revenues were held up in litigation for several years. The proposed allocation of funds appears to bear little correspondence to those shows which generate the most revenues. See Shenon (1981) or Non-network firms (1980).

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