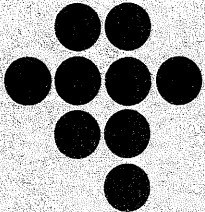


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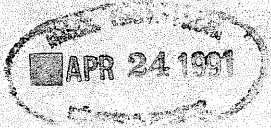
Research
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THE EFFECT OF REPRODUCTION TECHNOLOGY
ON INTELLECTUAL PROPERTY
MARCH 22, 1984

DR. STANLEY M. BESEN, Rand Corporation
CAROL RISHER, Association of American
Publishers



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LISA VAWTER, RAPPORTEUR

Dr. Besen presented the preliminary conclusions of his study, "Copying, Reproduction Costs, and the Supply of Intellectual Property: A Theoretical Approach". He emphasized that the analysis was still preliminary. First, the study was only a working draft, and had not received a formal Road review. Second, the theoretical work was still being refined. Third, no empirical work has yet been conducted.

Before describing his model, Dr. Besen listed five assumptions on which he based his work.

1. Originals and copies are perfect substitutes. The consumer places the same value on both.
2. Producer costs equal the cost of producing the first copy (F) plus a constant marginal cost (C) for all originals beyond the first (Q). Thus $F + CQ$ equals producer costs.
3. A fixed number of copies (n) per original are made.
4. Copying costs per original (r) are constant and positive.
5. A perfect market for copies exists, i.e., all copies made are sold.

He also assumed that copying would occur irrespective of whether or not it was legal, because enforcement of copyright is prohibitively expensive. Dr. Besen's analysis is "exclusively economic" in its approach to analyzing the effect of copying technologies on intellectual property.

The basic model begins in a circumstance where no copying exists; then a technology is introduced which makes copying from originals possible (see graph 1). When the technology is introduced, the cost of the copies cannot exceed the cost of purchasing the original less the gain from selling the resulting copies since originals and copies are perfectly substitutable.

The effect of introducing the new technology is to increase the demand for originals, since either their costs can be shared or copies can be made and sold. The increase in demand for the originals, however, will be less than proportional to the number of copies which can be made. (see graph 2). Introducing copying generally causes the price of originals to rise. If the cost of reproduction (r) is less than the cost of producing originals, then it is in the interest of the producer to allow copying to take place.

The profit for producers when copying technology exists exceeds profits in a copyless environment when r is less than c. In addition, in these circumstances consumer surplus is increased by copying.

When the cost of reproduction (r) exceeds the cost of producing extra originals (c), Besen notes that three types of inefficiencies occur (see graph 3).

1. Output is produced at more than minimum cost, since the costs are lower if the producer makes additional originals, than if copies are made.

2. The higher price reduces the number of originals purchased.

3. This in turn reduces producer profits and may limit the number of firms supplying originals.

In this situation ($r > c$) both producers and consumers would benefit from the banning of copying.

Finally, the products can set the price of originals just below r , in order to discourage copying. The pricing strategy that is adopted will depend on the value of r relating to that of c .

Dr. Besen presented a second model to illustrate the relationship between r , c , and P^* , on the price of an original.

He assumed:

1. Two groups of equal size. One group had access to copying technology and the other had access to originals only.
2. The two groups have identical demand for originals.
3. No copies were made for the restricted group.
4. There is no price discrimination between groups.

Graph 4 illustrates the market demand of the two groups in the absence of copying. The lower curve $P = a - bQ$ is the curve for both potential copiers and those who do not copy. The horizontal sum of the two groups or aggregate is the outer demand curve D_m . Graph 5 shows the new demand curve for the copying group. The demand of noncopiers is not affected. Notice in this case the aggregate demand curve D_m is kinked.

With copying, three types of equilibria are possible given the demands of the two groups. First, the publisher can raise the price of originals so high that originals are purchased only by members of the group engaged in copying. The noncopiers are worse off since they cease purchasing.

Second, the producer may set his price somewhere below the price where non-copiers are totally excluded, but above the

initial price of originals.

Third, the producer may set the price of an original just below r . Besen calls this "limit pricing".

Except where limit pricing is adopted, non-copiers are made worse off when copying is introduced. Copiers may be better or worse off. Note, however, that they may be better off even if copying is inefficient.

Dr. Besen concluded his remarks by saying that "There's not going to be any general theory of the effect of copying on intellectual property". He noted that the effects of copying depended on the commodity demanded, the cost of copying and the producers' costs. He said his model was a theoretical approach to how the market might behave given certain conditions.

Ms. Carol Risher initially addressed the need to broaden some of Besen's assumptions. Her first area was the time ingredient. When a consumer is pressed for information, he or she will pay more for it. The higher cost that ready access provides must be weighed against the time it takes to make a copy. Reproducing hard copy on a copier takes much longer than replicating software, and this time differential has a value for the consumer.

Next, she asked who pays these costs. In many cases it is the individual. Increasingly the cost is borne by the organization or corporation which obtains the information for the user. With no direct cost to the user, he or she would prefer to have an original.

The usage of the material is important as well. Ms. Risher observed that some users acquire copies because they feel they must have the information in whatever form, while others view the originals as somehow more definitive. And individuals will be inclined to pay the higher price of originals when resale is anticipated. Subsequent usage also influences copying, as in the use of the cost of computer software.

Ms. Risher was adamant that copyright protection was enforceable. She cited the recent NYU case in which nine professors and the university copy shop were sued for not observing copyright restrictions.

New electronic technologies for the sending and reproduction of information have the creators of intellectual property up in arms. Ms. Risher mentioned the optical digital disk as an example. This technology can scan print material, change it into machine readable form (digital) and store it on an LP-like disc. When played, the disc can activate a display screen at a remote location and trigger a laser printer. Each disc can act as its own master, enabling copying at an exponential rate. Authors of

works which may be transformed and stored on an optical digital disc would like to ensure copyright and royalty integrity. They have determined that their interests and rights would be best protected by establishing a copyright and royalty agreement before dissemination of their work through this medium begins. Ms. Risher agrees that some guarantee should be provided to the proprietors to allow "dissemination without driving the producer out of business". One mechanism she suggested was a license agreement between the proprietors and the distributors.

Dr. Besen was given a chance to respond to Ms. Risher's comments. He admitted that copyright could sometimes be enforced, as the NYU case illustrates, but he noted that proving harm from copying is extremely difficult, and that infringement is often difficult to detect. Ms. Risher's talk did broaden the scope of discussion to the technical and legal aspects of copyright infringement, which his paper omits. "My paper is concerned only with what you can do with price. It assumes you've done all you can do with attorneys and engineers".

An interesting question came from the floor on the possible benefit to publishers resulting from issuing free copies of books. Ms. Risher responded by drawing a distinction between finite and infinite goods. The toothpaste sample which may come in the mail is eventually used up. Books are not exhausted, but last and can be copied, so the damage is greater than the benefit.