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An Economic Model of Fair Use

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Abstract

The doctrine of fair use allows unauthorized copying of original works of art, music, and literature for limited purposes like criticism, research, and education, based on the rationale that copyright holders would consent to such uses if bargaining were possible. This paper develops the first formal analysis of fair use in an effort to derive the efficient legal standard for applying the doctrine. The model interprets copies and originals as differentiated products and defines fair use as a threshold separating permissible copying from infringement. Application of the analysis to several key cases (including the recent Napster case) shows that this interpretation is consistent with actual legal reasoning. The analysis also underscores the role of technology in shaping the efficient scope of fair use.

An Economic Model of Fair Use

1. Introduction

Copyright protection gives authors, artists, and composers an incentive to create original works by giving them exclusive control over the right to make copies. While this right overcomes the appropriability problem associated with intellectual property (owing to its public good nature), it also creates a distortion arising from the copyright holder's monopoly power. The limited duration of copyrights is one way that the law seeks to balance these offsetting effects (Landes and Posner, 1989). Another is by application of the fair use doctrine. Originally established by the Copyright Act, fair use allows unauthorized copying for limited purposes like criticism, scholarship, news reporting, and education based on the rationale that copyright holders would consent to such uses if bargaining were possible. In this sense, the allowed uses pass a "market test" for efficiency and should be permitted, subject to the constraint that they do not substantially impair the copyright holder's incentive to create the work in the first place (Gordon, 1982).

Technological advances, however, continually challenge courts to adapt the fair use standard to changing circumstances (Adesltein and Peretz, 1985). At the same time, scholars continue to disagree about the extent to which intellectual property should be granted any special legal protection.¹ The fair use doctrine is at the heart of this debate, for it defines the threshold between legal copying and infringement.

¹ See, for example, Boldrin and Levine (2002), Klein, Lerner, and Murphy (2002), and Depoorter and Parisi (2002).

The purpose of this paper is to develop a formal economic model of fair use in an effort to shed light on this debate. Although not the first economic analysis of fair use, this paper contains the first formal treatment.² The model treats the original work and copies as differentiated products lying on a continuum, and interprets fair use as a threshold separating permissible copying from infringement. The optimal threshold balances the social benefits of the use against the cost to the copyright holder (a Hand test for fair use).³ We argue that such a model is useful both for understanding how the law has applied the doctrine in previous cases, and how technological change is likely to affect its future application.

2. The Model

The model will highlight both the differential in costs between originals and copies, and the fact that copies are generally not perfect substitutes for the original, depending on the quality and extent of the copy. The cost differential is a supply-side issue that relates to the copying technology. As that technology improves, the marginal cost of producing a copy approaches that of the original. For example, photocopies of a book are cheaper to produce than are handwritten copies, and downloading music from the internet is easier than recording it off the radio. This technological aspect of the copyright issue can be isolated by treating the original and copies as homogeneous goods (perfect substitutes) but with different marginal costs of production.

Such a model, however, ignores the demand-side issue relating to the nature or content of the work itself, apart from its cost of production. To capture this, we suppose

² See Gordon (1982), Landes and Posner (1989), and Depoorter and Parisi (2002). Landes and Posner develop a formal model of copyright but only treat fair use as one application.

³ See *U.S. v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947), which develops a cost-benefit test for negligence.

that there is some underlying “good” that comes in different varieties or versions. At one extreme is the original work, while copies of differing quality or extent lie along a continuum. Some consumers will place the highest value on the original in its entirety, while others will be satisfied with inferior quality copies or with portions of the original. Consider, for example, a specialized textbook. Practitioners in the field will likely attach the highest value to the published version of the book, while students and those with a more limited interest may be satisfied with a photocopy of pertinent parts of it. This aspect of the problem is best captured by treating the original work and copies as differentiated products, and by assuming that consumers differ in their valuations of various versions of the underlying good. The most workable such model is the spatial model of differentiated products, which we adopt here.⁴

Specifically, assume consumers are distributed uniformly on the unit interval, with locations indexed by $z \in [0,1]$. We arbitrarily locate the original work at $z=1$. Assume that the author can produce units of the original at a constant marginal cost of c after incurring a fixed cost of creation, F . (We discuss the cost of producing copies of the original below.) Consumers purchase at most one unit of the original and derive gross benefits of v per unit. They also incur a “transport cost” of $(1-z)t$, where t is the unit cost of transportation. This transport cost is an aspect of consumer preferences and reflects the different valuations consumers attach to the various versions of the underlying good. For example, a consumer at z values the original at $v-(1-z)t$, which is decreasing as z is farther away from one.

⁴ See, for example, Mas-Colell, Whinston, and Green (1995, pp. 396-400).

The total cost of purchasing the original work at a price p is thus $p+(1-z)t$ for a consumer located at z . Given the option of purchasing one unit of the original or purchasing nothing, a consumer at z will make the purchase if $v > p+(1-z)t$, or if

$$z > 1 - (v-p)/t \equiv z_M(p) . \quad (1)$$

If we normalize the measure of consumers to be one, then the demand for the original (in the absence of copying) is $1-z_M(p)$, which is downward sloping in p . (See Figure 1.) The author/producer, acting as a monopolist, will therefore choose the price to maximize profit, given by

$$\pi = (p-c)(1-z_M(p)), \quad (2)$$

which yields the monopoly price

$$p_M = (v+c)/2. \quad (3)$$

Substituting this price into (1) yields the equilibrium threshold between consumers and non-consumers

$$z_M = 1 - (v-c)/2t. \quad (4)$$

(That is, consumers on $z \geq z_M$ purchase the original while those on $z < z_M$ do not.) The author will find it profitable to create the work if the maximized value of variable profit exceeds the fixed cost F . We assume that this is true when the author has a monopoly over the right to copy the original. That is, we assume that $\pi_M > F$, where π_M is the maximized value of (2).

A. The Impact of Copying

Now assume that it is technologically possible for consumers to make copies of the original and that it is legal to do so. (Entry of competing firms, however, remains illegal.) Specifically, suppose that a consumer at location z can “self-produce” his or her

“ideal version” of the good at a cost of $c^c z$.⁵ An exact copy of the original would therefore cost c^c (given $z=1$). Thus, we assume that $c^c > c$, reflecting scale economies enjoyed by the author-producer, as well as expertise, experience, etc. (Technological improvements over time, however, will likely cause $c^c \rightarrow c$.) Self-producing an ideal version of the good is potentially beneficial for a consumer at location z if $v \geq c^c z$. We therefore say that consumers with $z \leq v/c^c \equiv z_c$ are *potential copiers* in the sense that they would rather make a copy than not consume the good at all. We assume hereafter that $v < c^c$, or that $z_c < 1$, implying that consumers with z near one would never make copies. (This assumption is inessential, however, and would obviously fail to hold if c^c becomes small enough).⁶

Given that copying is feasible and legal, consumers now have three options: purchase the original, make a copy of their ideal version of the good, or not consume the good at all. Figure 2 shows a situation where each option is chosen by a subset of consumers. Specifically, those with $z \in [0, z_c]$ make a copy, those with $z \in (z_c, z_M)$ do not consume, and those with $z \in [z_M, 1]$ buy the original.⁷ This situation occurs if $z_c < z_M$. In this case, potential copiers do not overlap with the monopolist’s market, so copying has no effect on the monopolists’ strategy, and hence does not infringe on his profit. Consequently, he should not object to such uses. The situation is different, however, when $z_c > z_M$, for now potential copiers overlap with potential purchasers. This case will arise when the technology of copying improves sufficiently. At that point, all consumers

⁵ We assume that a consumer would never self-produce anything but his or her ideal version of the good.

⁶ The basic conclusions are unaffected if $c^c \leq v$.

⁷ We assume that when indifferent, consumers either copy or buy the original rather than refrain from consumption. Below we assume that when indifferent between buying the original and making a copy, consumers buy the original.

will either make copies or purchase the original, depending on which involves a lower cost.

If the price of the original is p , a consumer at location z will buy the original if $p + (1-z)t \leq c^c z$, or if

$$z \geq \frac{p+t}{c^c+t} \equiv \hat{z}(p), \quad (5)$$

and make a copy otherwise (assuming no legal limit on copying). (See Figure 3.)

Demand for the original in this case is therefore $1 - \hat{z}(p)$, and the author's problem is to set the price to maximize

$$\pi = (p-c)(1 - \hat{z}(p)). \quad (6)$$

This yields the equilibrium price

$$\hat{p} = (c^c + c)/2, \quad (7)$$

and threshold

$$\hat{z} = \frac{\frac{c^c + c}{2} + t}{c^c + t}. \quad (8)$$

Comparing (3) and (7) shows that $\hat{p} > p_M$ given $c^c > v$. However, the author's profit must be less than it was under the pure monopoly outcome. As a result, copying is now harmful to the author, creating the possibility that the author will not be able to cover his fixed cost of creation. Indeed, it is easy to show that the author's variable profit (the maximized value of (6)) is increasing in c^c , which implies that as c^c falls (i.e., as the technology of copying improves), the author's variable profit decreases because more consumers find it desirable to self-produce the good. (This assumes no corresponding decrease in c .) If profit falls below F , the author's incentive to create the original is

eliminated. This is the basis for legal protection of copyright. At the same time, we have seen that copying by consumers who would not have purchased the original anyway is non-harmful to the author. And because it confers a social benefit, it represents the basis for the fair use limitation on the author's copyright according to Gordon's (1982) standard. Below, we derive the optimal extent of fair use in the presence of this trade-off. First, however, we need to examine in detail how a fair use limitation affects the pricing strategy of the author.

B. Fair Use

Fair use represents a limit on the author's copyright by allowing some copying (self-production). We capture this formally by defining $\bar{z}$ as the upper bound on allowable copying. That is, $z < \bar{z}$ is fair use, but $z \geq \bar{z}$ is not. This is consistent with the interpretation of z as an index of how close the copy is to the original. For example, fair use allows "partial copies" (book excerpts or limited photocopying for personal use) but does not allow nearly complete copies. In terms of the model, fair use protects the author's monopoly power over the range $[\bar{z}, 1]$, but forces him to share the market with copiers over the range $[0, \bar{z})$. Given this characterization of fair use, we first examine the optimal pricing policy of the monopolist as a function of $\bar{z}$. Later, we derive the socially optimal extent of fair use.

Clearly, for $\bar{z} \leq z_M$, the author will adopt the monopoly pricing strategy derived above since only non-harmful copying is allowed. As noted, fair use has no effect on the behavior of the author in this range. This changes, however, as $\bar{z}$ is raised above z_M , for now, potential copiers overlap with potential purchasers of the original. Since the author retains monopoly power over the range $[\bar{z}, 1]$, it is initially optimal for him to set the

price so that all consumers in this range just find it desirable to continue purchasing the original, while all those who can legally make copies do so. Thus, the fair use constraint is binding. The profit-maximizing price under this strategy extracts all the surplus from the marginal purchaser, so $p + (1 - \bar{z})t = v$, which yields

$$\bar{p} = v - (1 - \bar{z})t. \quad (9)$$

(See Figure 4.) The resulting level of variable profit is

$$\pi(\bar{z}) = (\bar{p} - c)(1 - \bar{z}). \quad (10)$$

After substituting from (9), we have

$$\frac{\partial \pi}{\partial \bar{z}} = -[v - (1 - \bar{z})t - c] + (1 - \bar{z})t.$$

Using (3) and (9), we can show that this derivative is negative if and only if

$$p_M < \bar{p}, \quad (11)$$

which clearly holds for $\bar{z} > z_M$. Thus, the author's profit is decreasing in $\bar{z}$ in the relevant range, even though the price is increasing. Of course, this makes sense, since an increase in the extent of fair use beyond z_M erodes the author's monopoly power and hence his profit.

As $\bar{z}$ continues to increase, causing profit to fall further below the unconstrained monopoly level, a point may be reached where the author no longer finds it profitable to set the monopoly price. Instead, he may lower the price in order to attract some consumers who can legally make copies. If such a point is reached for $\bar{z} < 1$, fair use ceases to be a binding constraint, and the optimal price, as derived above, is $\hat{p}$. The switch point occurs when the profit in (10) equals the maximized value of the profit in (6), or when

$$(\bar{p}-c)(1-\bar{z}) = (\hat{p}-c)(1-\hat{z}). \quad (12)$$

To see where this point occurs, recall that $\hat{p} > p_M$ given $c^c > v$. Thus, as $\bar{p}$ rises above p_M , it eventually equals $\hat{p}$. This situation is shown in Figure 5. Since it must be true that $\hat{z} > \bar{z}$ at this point, the monopoly profit is larger. As $\bar{z}$ continues to increase, however, it eventually equals $\hat{z}$. It should also be apparent from Figure 5 that $\bar{p} > \hat{p}$ at this point (as indicated by the dashed lines), which implies that the monopoly profit remains larger. The switch point must therefore occur at $\bar{z} = z' > \hat{z}$ (if it occurs at all for $\bar{z} < 1$).

Figures 6 and 7 graph the author's variable profit and optimal price as a function of $\bar{z}$ for the case where $z' < 1$. As the analysis above showed, there are generally three ranges. In the first range, where $\bar{z} \in [0, z_M]$, the author sets the monopoly price p_M and earns maximum profits. Fair use copying in this range is non-harmful to the author and therefore poses no threat to his incentive to create the work (given our assumption that the unconstrained monopoly profit exceeds F). In the second range, where $\bar{z} \in [z_M, z']$, the fair use limit is binding, causing the price to increase above p_M and profits to fall. Allowable copying in this range is harmful to the author and will result in non-creation of the work if variable profit falls below the fixed cost F .

Finally, in the third range, where $\bar{z} \in [z', 1]$, the fair use limit is sufficiently liberal that it ceases to be a binding constraint. Here, the author lowers the price of the original to compete with copiers. Since profits are no longer affected by increases in $\bar{z}$, this case places a lower bound on the monopolist's profit (given the copying technology as embodied in c^c). Thus, if variable profits in this case exceed F , then legal prohibition of copying (self-production) is not needed to induce creation of the work. Copyright protection may nevertheless be needed, however, to prevent entry of competing *firms* that

would enjoy the same technological advantages that the author has over mere copiers (as captured by the fact that $c < c^c$).

3. Welfare analysis

The preceding analysis characterizes the monopolist's optimal reaction to different levels of legally allowable copying. In this section, we consider the socially optimal level of fair use, taking this reaction as given. As a benchmark, we first derive the efficient dividing point between self-production (copying) and purchase of the original (assuming it is efficient for all consumers to consume the good). Denoting this dividing point by z^* , we write social welfare as

$$W = \int_0^{z^*} (v - c^c z) dz + \int_{z^*}^1 [v - (1 - z)t - c] dz. \quad (13)$$

In this expression, the first term is consumers' surplus from copying, while the second is the sum of the producer's profit and consumers' surplus from production and sale of the original. Maximizing welfare with respect to z^* yields the optimal threshold

$$z^* = \frac{c + t}{c^c + t}, \quad (14)$$

where $z^* < 1$ given $c^c > c$. Note that this point occurs precisely where the cost of copying equals the total cost (production plus transport) of consuming the original, or where $c^c z = p + (1 - z)t$. (See Figure 8.) Thus, the optimal threshold minimizes the total cost of production for each z .

Generally, this first-best outcome will not be achievable, however, because of the monopoly power granted to the author. As a result, optimal fair use will maximize social welfare subject to the constraints that (1) the author sets his price to maximize profit, and (2) the author's maximized profit must cover his fixed cost of creation. To derive this

constrained welfare maximum, we will have to consider three cases. Before proceeding, however, note that (14) and (4) imply that $z^* > z_M$ if and only if

$$\frac{v-c}{2t} > \frac{c^c - c}{c^c + t}. \quad (15)$$

Since this condition may or may not hold, z^* may be larger or smaller than z_M .⁸ This fact distinguishes case one from cases two and three.

Case one: $z^* < z_M$. In this case, the first-best optimum is not attainable because the monopolist, by raising the price above marginal costs, overly limits the market for purchase. As a result, $\bar{z}$ should be extended up to z_M (i.e., $\bar{z}^* = z_M$) in order to maximize the consumer surplus from copying. This outcome is second-best because consumers in the range $z \in [z^*, z_M]$ would be more efficiently served by purchasing from the author at the competitive price $p=c$ than by making copies, but monopoly pricing by the author makes copying cheaper. Extending fair use up to z_M is therefore welfare-enhancing while being non-harmful to the author. As a result, no infringement claims should occur in this case.

Case two: $z^* > z_M$, and the author's variable profit evaluated at $\bar{z} = z^*$ is at least as large as his fixed cost of creation, F . In this case, the optimal level of fair use is $\bar{z}^* = z^*$, and the first-best outcome is achieved. While copying in this range is harmful to the author, it does not reduce profit enough to deter creation. Nevertheless, copyright holders may seek legal protection of their monopoly by challenging uses in this case.

Case three: $z^* > z_M$, but the author's variable profit at z^* is less than F . In this case, fair use should be set at the level z_F where $\pi(z_F) = F$. As a result, $z_M < \bar{z}^* = z_F < z^*$. Fair use falls short of the first best in this case because of the constraint that the author's

profit must cover F . Uses are especially threatening to copyright holders in this case, so they will likely meet with vigorous legal action.

As a final point, note from (8) and (14) that

$$\hat{z} - z^* = \frac{2}{c^c + t}(c^c - c) > 0. \quad (16)$$

Thus, optimal fair use will never occur in the range where $\bar{z} \geq \hat{z}$ --that is, $\bar{z}^*$ will always be strictly less than z' in Figures 6 and 7. In other words, it is never efficient to set fair use in the range where it is non-binding on the author.

A numerical example illustrates the preceding analysis. Let $v=3$, $t=2$, $c=1$, and $c^c=3.5$. The monopoly price and variable profit are thus $p_M=2$ and $\pi_M=.5$, while $z_M=.5$. For $\bar{z} > z_M$, price is given by (9) and variable profit by (10). As shown in Figures 6 and 7, profit is decreasing in $\bar{z}$ until it reaches $z' \approx .829$, at which point the price drops from $\bar{p}=2.66$ to $\hat{p}=2.25$, and variable profit levels out at $\hat{\pi}=.284$. For this example, the first-best threshold between copying and consumption of the original is $z^*=.667$, which exceeds z_M . Thus, welfare is maximized at $\bar{z}=.667$ (the first-best outcome) if $\bar{\pi}=.443 > F$ at this point (case two above). However, if $.443 < F$, then $\bar{z}$ must be reduced until $\bar{\pi}=F$ (case three). (Recall that we assumed $\pi_M > F$.)

4. Application of the Model to Copyright Law

The law of fair use is based on Section 107 of the Copyright Act, which codified for the first time the factors determining fair use. These factors are: (a) the purpose and character of the use, including whether such use is of commercial nature or is for nonprofit educational purposes; (b) the nature of the copyrighted work; (c) the amount and substantiality of the material used in relation to the copyrighted work as a whole; and

⁸ Since the right-hand side of (15) is increasing in c^c , the inequality is more likely to hold as c^c declines.

(d) the effect of the use on a copyright owner's potential market for and value of his work.⁹ Factor (a), the extent to which the use in question is commercial, and factor (d), the effect of the use on the value of the copyright, are both concerned with the role of copyright protection in promoting creation of original works. Further, since factor (b), the nature of the copyrighted work, has been interpreted by courts to afford greater protection to "creative" works,¹⁰ it also relates to this aspect of fair use. Taken together, these factors represent the legal counterpart to the author's profit constraint in the model.

Factor (c) concerns the extent to which the use in question resembles the original work--uses that are closer to the original are less likely to be judged as fair. This factor is captured in the model by the index z , which measures the "proximity" of the copy to the original. Consistent with the law, the model defines fair use in terms of an optimally chosen threshold for z .

The first important infringement case to apply these factors was *Williams & Wilkins Co. v. United States*,¹¹ which was a claim by a publisher of medical journals that the unauthorized photocopying and dissemination of journal articles by government libraries was an infringement of its copyright. The court found for the defendant, ruling that the use was fair. In reaching this result, the court emphasized the value of the copies in promoting scientific advancement rather than for commercial use, and the limited number of copies made. Further, it noted that the plaintiffs offered little evidence of adverse financial effects. These conclusions suggest that the use in question was welfare-enhancing, while causing no harm to copyright holders. The court's finding of fair use is

⁹ 17 U.S.C. § 107.

¹⁰ *A&M Records, Inc. v. Napster, Inc.*, 114 F.Supp. 896, 913 (2000).

¹¹ 487 F.2d 1345 (1973).

therefore consistent with the efficient standard as described by case two (or possibly even case one) of the model.

A decade later, the Supreme Court re-examined the fair use standard in *Sony Corp. v. Universal City Studios*,¹² which alleged “contributory infringement” by the manufacturer of home video equipment that permitted unauthorized recording of copyrighted television programs. In reversing an earlier appeals court decision against Sony, the Court held that the use in question was fair because it provided a clear benefit to consumers (the ability to “time-shift” programs), was non-commercial in nature, and imposed little if any harm on copyright holders. Again, the use met the economic standard for fair use as prescribed by case two of the model.

Williams & Wilkins, and to a lesser extent *Sony*, involved technologies where most uses were judged to be fair in the sense of enhancing welfare without substantially harming the copyright holder’s interests. Given this legal standard, Klein, Lerner, and Murphy (2002) question why plaintiffs and the court disagreed about the fair use standard, resulting in the unsuccessful legal challenges. One explanation is that one or both of the parties erred in estimating the harm from a given use. Another, favored by the authors (and consistent with case two of the model), is that some technologies allow both welfare-enhancing and harmful uses. Thus, copyright holders reasonably file suit to protect their economic interests, but the court takes a broader view and judges as fair those uses that enhance social welfare.

The court and plaintiffs agreed on the fair use standard, however, in the recent case of *A&M Records, Inc. v. Napster, Inc.*¹³ The case concerned an internet service that

¹² 104 S.Ct. 774 (1984).

¹³ 114 F.Supp. 2d 896 (2000).

allowed consumers to download and share copyrighted music free of charge. In finding against fair use in this case, the court noted that the copies were identical to the originals, and, in contrast to the previous cases, were primarily for commercial rather than private use. Further, it found that the copying adversely affected the economic interests of plaintiffs in at least two ways: by directly reducing the demand for their products, and by creating a barrier to entry into the market for digital downloading of music.¹⁴ The court therefore found the use to be an infringement of the plaintiffs' copyright.

In contrast to the earlier cases, *Napster* falls into case three of the model, where technological advancement permits uses that, while possibly welfare-enhancing, are so damaging to the copyright holder's profit as to impair incentives to create the original. Indeed, the progression from *Williams & Wilkins* to *Napster* shows how technological change continually challenges the courts to re-define the optimal fair use standard. In the early cases, technology was the limiting factor, permitting only uses that were beneficial while imposing little harm on copyright holders. Efficiency clearly dictated that such uses be judged fair. However, continued improvements in technology have increased the threat to the value of the copyright--and hence the incentive to create original works--ultimately forcing the court to set a limit on fair use. In mirroring this progression, the three cases in the model reflect the evolutionary trend in fair use litigation.

5. Conclusion

The analysis in this paper has highlighted the role of fair use in achieving an optimal balance between the incentive effects of copyright protection on one hand, and the distortions arising from the copyright holder's monopoly power on the other. By employing a differentiated product model, we were able to develop a threshold test for

¹⁴ 114 F.Supp. 2d 896, 913 (2000).

fair use that closely resembled the sort of reasoning that courts actually use. In this way, the model validates existing law. Beyond that, the model underscores the role of technology in shaping the optimal fair use standard. And as the *Napster* case illustrates, the emergence of technologies that permit both fair and infringing uses will only increase the role of the court in delineating the optimal scope of fair use.

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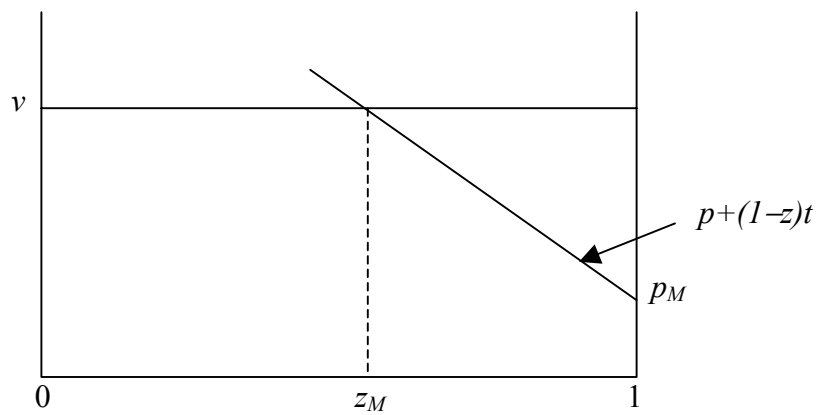


Figure 1.

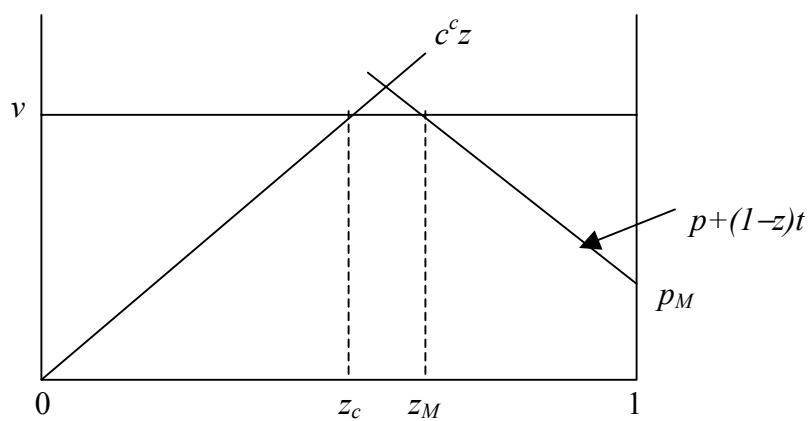


Figure 2.

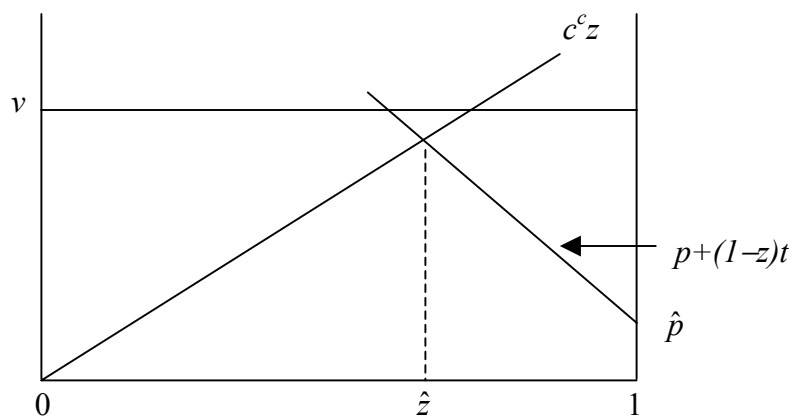


Figure 3.

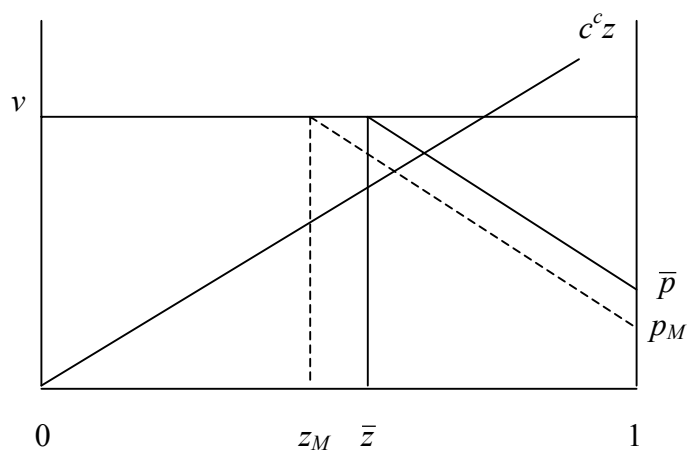


Figure 4.

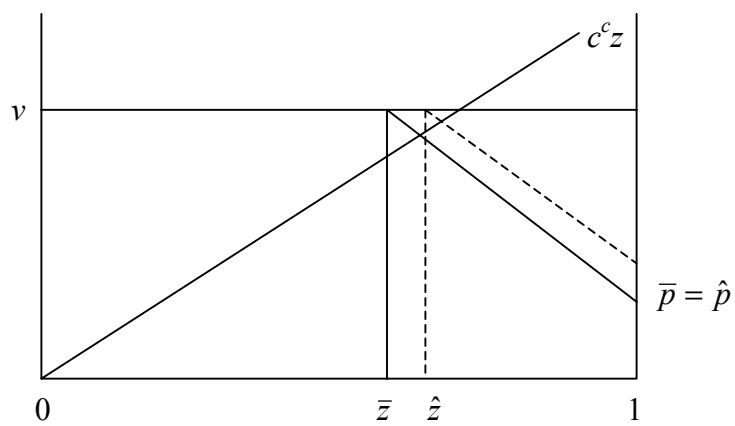


Figure 5.

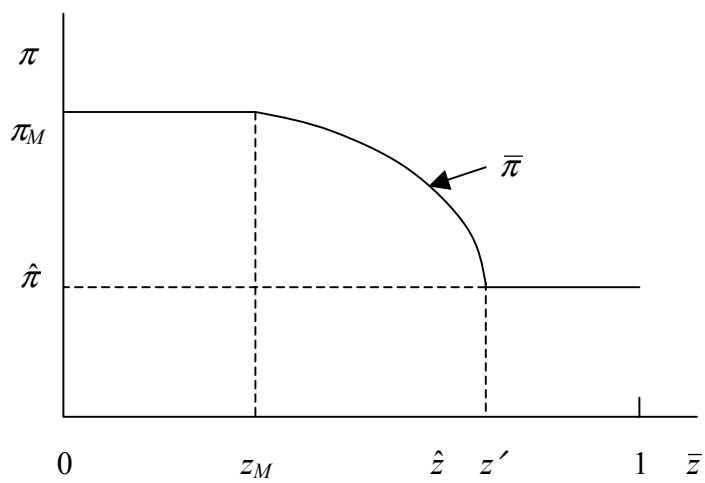


Figure 6.

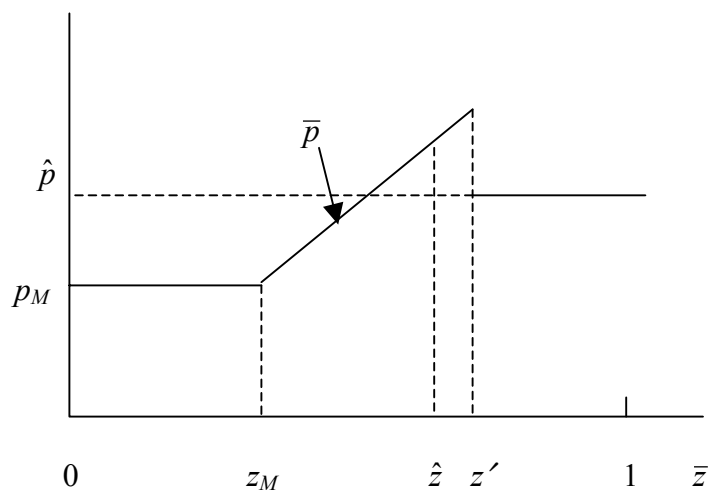


Figure 7.

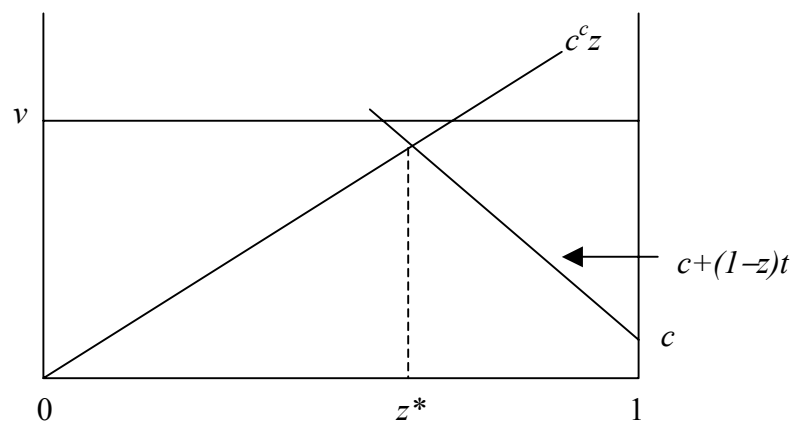


Figure 8.