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THE DURAPOLIST PUZZLE: MARKET POWER IN DURABLE-GOODS MARKETS

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Abstract

This paper presents the time-inconsistency problem of the durable-goods monopolist, the *durapolist*. The durapolist may encounter difficulties in garnering his potential monopolistic rent, because he is likely to reduce his prices over time. To overcome this time inconsistency, over the years durapolists have developed various business strategies. I have studied the main strategies, their anticompetitive effects and the ways they were treated by the courts, lawyers and economists. In particular, the various practices of commitments to future prices, planned obsolescence, tying arrangements, and leasing are examined.

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A. Introduction

The durapolist[1] is an ancient creature in our world and a distinguished member of the monopolists' family. The durapolist is the durable-good monopolist, a frequent guest in the courtroom, and a favorite subject of study among lawyers and economists following a seven-page note by *Professor Ronald Coase*.[2] Several scholars have argued that the durapolist has a limited market power and, therefore, should not be a concern of antitrust

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[1] ***Durapolist*** is an acronym for a *Durable-Good Monopolist.*

[2] Ronald H. Coase, *Durability and Monopoly*, 15 J. L. & ECON. 143 (1972).

agencies.[3] Others have indicated that the durapolist engages in certain practices that assist him in acquiring and maintaining market power. This paper explores the durapolist's practices and how have they been addressed by the courts, lawyers, and economists.

A durable good is a long-lasting good which can be consumed repeatedly. The monopoly over durable-goods markets is durapolists' invaluable asset. In other markets there are *consumable goods* (or *consumables*) that cannot be used more than once, even if they are characterized by longevity, such as canned food and cigarettes are. The markets for consumables may be controlled by the durapolists' close relatives, the consumable-good monopolists. However, in terms of potential market power, a monopoly over durables is functionally different than a monopoly over consumables and these differences are discussed below.

The unique characteristic of the durapolists is that the durability of their goods causes them to be inconsistent over time and as a consequence they cannot charge the static monopoly price. This is the Coase conjecture.[4] Historically, however, it is well known that many durapolists had a tremendous market power and, thus, the Coase conjecture presumably poses a puzzle: how do durapolists succeed in overcoming their time-inconsistency problem?

Overcoming the durapolist problem is the topic of this paper and specifically the practices and methods that durapolists employ in order to do so. My topic might be

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[3] Carlton & Gertner [1989]; Froeb [1989].

[4] Professor Coase drew attention to the durapolist's time inconsistency and hence it has been called after him: *Coase conjecture* or *Coasian dynamics*. For a mathematical proof of the Coase conjecture, *see*: Gul, Sonnenschein & Wilson [1986].

perceived as marginal because it merely explores incremental increases in monopoly power. Nevertheless, antitrust enforcers tend to perceive such incremental increases as a violation of §2 of the Sherman Act[5] and, therefore, my views may be of interest to durapolists and their counselors.

Overcoming the durapolist problem, however, might be a necessary condition for social prosperity, and this point *must* be made loud and clear: many durapolists are entrepreneurs, inventors, and innovators whose existence benefits society, although their pursuit is only for their own wealth. For these durapolists the examined margin, or at least part of it, may provide the required incentives to enrich the social pie with cream and strawberries. Thus, if 'shady practices' are prohibited and significant investments are involved, creating durable-goods markets and operating within may be economically irrational and against the self-interest of a hypothetical durapolist. Simply put, condemning 'shady practices,' which are employed to overcome the durapolist problem, may sometimes oppress "honestly industrial" expressions of "superior skill, foresight and industry," contrary to the goals of the Sherman Act.[6]

One more preliminary comment about the nature of the durapolists I have examined should be made. In many respects the differences between a monopoly and a cartel are insignificant. Both presumably constitute one unit that dictates the quantities or prices of goods on the markets. Therefore, I considered cartels of coordinated durable-

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[5] 15 U.S.C.A. §2.

[6] *United States v. Aluminum Co. of America*, 148 F.2d 416, 430-431 (2nd Cir. 1945).

goods sellers as durapolists. This generalization is of course oversimplified and thus, several implications of durable-goods cartels are highlighted in subsection *C.5.2* below.

The paper is organized as follows. Section II presents the durapolist's time-inconsistency problem and its respective social-welfare implications. Section III explores various business strategies of durapolists which are intended to create commitments to time consistency. Section IV analyzes different types of technological manipulations that assist in overcoming the durapolist problem. Sections V and VI investigate the applicability of tying and leasing practices as devices to overcome the durapolist problem. The uses of these practices by durapolists have gained much attention by the courts, lawyers, and economists and I examine their treatment. Section VII contains concluding remarks.

B. Geometric Illustration of the Durapolist Problem

B.1. The Durapolist's Time-Inconsistency Problem

This section provides a simple geometric illustration of the durapolist problem. Despite its simplicity, this illustration furnishes sufficient insights to understanding the durapolist problem and what can be done to overcome it. To illuminate the subsequent somehow technical discussion, one can bear in mind the case of a light-bulb durapolist. This hypothetical bulb durapolist incurs no costs of production, and at time zero he determines the durability of his bulbs; let assume one year or three years. Intuitively, we would think that the consumer is willing to pay for the three-year bulb three times the price she is willing to pay for the one-year bulb. Therefore, in selling three-year bulbs the

durapolist has supposedly earned the same revenue he would have for selling one-year bulbs, but has saved the costs of high-volume transactions.[7] The fallacy of this intuition is discussed in this section.

The light-bulb durapolist, as the rest of the durapolists, is perceived to have a *time-inconsistency problem* and because of this perception he earns less when selling three-year bulbs than he does when selling one-year bulbs. At the time of launching a new production line of durables, the durapolist calculates the optimal output, which will maximize his profits, and plans his steps in order to attain the monopoly price. This plan is the durapolist's optimal plan. Nevertheless, the durapolist has incentives to abandon the optimal plan when making subsequent production decisions. In durable-goods markets, some of the potential demand in period t is satisfied because of past purchases. Therefore, the demand the durapolist meets in period t is more elastic than the demand he met in period $t-1$ and in previous periods. Consequently, the durapolist has incentives to lower his prices in period t.

The consumer anticipates this behavior, and believes that "the optimal plan of the present moment is generally one which will *not* be obeyed," and the durapolist's "future behavior will be inconsistent with his optimal plan".[8] To put it differently, in year $\hat{t} \in \{1,2\}$ the consumer believes the price of the three-year bulb will fall next year, and

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[7] As Robert Barro [1972] put it:

> "[In a world of perfect capital markets,] if unit production costs do not diminish with decreased durability … costs of production would be lower when price, rather than durability, is the instrument for maximizing revenue (because lower replacement expenditure is involved). Therefore, at least to the extent that durability can be varied without affecting unit production costs, a profit-maximizing monopolist would choose the maximum durability" (at 598).

she is reluctant to pay the monopoly price. However, if the durapolist sells one-year bulbs, the consumer will again have to purchase a bulb next year. Therefore, she does not have expectations for price-cutting and she is likely to pay the monopoly price.[9] It seems, therefore, that durability is not necessarily what durapolists like.

B.2. The Model

Consider a two-period world inhabited by a durapolist,[10] who produces homogeneous goods which are characterized by durability $\lambda \in [0,1]$. When $\lambda=1$, the goods, like diamonds, are forever. That is, the goods are perfectly durable and can be consumed in the subsequent period of time with the same value of consumption as in the current period of time. In contrast, when $\lambda=0$ the goods are perfectly consumable. They have no durability and they cannot be consumed more than once.

To simplify the calculation, assume that the costs of production are zero, so that the durapolist can produce as much as he wishes in each period without incurring any cost. Both the durapolist and the consumers have the same discount factor δ, which is defined $\delta = \frac{1}{1+r}$, where $r \in [0,\infty]$ is the discount rate. Namely, $0 \leq \delta \leq 1$ for any discount rate between 0 to ∞. Assume also that the secondhand market is functioning perfectly and,

---

[8] Strotz [1955], at 165.

[9] This outcome relies on two assumptions: (a) the demand in terms of the number of consumers is constant; and (b) the supply is discrete, *i.e.*, the durapolist sells bulbs only at the beginning of every year. For implications of the latter assumption *see*: Stokey [1981]; Kahn [1986]; DeGraba [1994].

[10] There are different ways to interpret a two-period world. The simplest way is that the consumer's life lasts for two periods and she does not take future generations into account. The presented model follows Bulow [1982] and Tirole [1988]. For a framework of analysis of more than two periods but yet a simple one, *see* Strotz [1955]. Strotz's analysis does not refer to durapolists, but its implication is straightforward. *See* also: Lowenstein & Thaler [1989].

hence, the costs of consumption are ascribed only to imperfect durability and the costs of time. In period $t \in \{1,2\}$ the durapolist sells quantity q_t of his durables and this quantity is also consumed in period t. Let the marginal value of consumption for a consumer in period t be $\dot{v}_t = 1 - Q_t$, where Q_t is the quantity of consumed durables in period t and the value of consumption of one new unit of these durables is 1.

In period 2, there is a competing supply of used durables that were purchased in period 1. The value of this supply is λq_1 and therefore the marginal value of consumption in period 2 is $\dot{v}_2 = 1 - q_2 - \lambda q_1$. This is also the price that the consumer is willing to pay for q_2 new durables in period 2, because they have no prospective value for her. That is, $p_2 = 1 - q_2 - \lambda q_1$. In contrast, the durables, which were purchased in period 1, have some value for the consumer in period 2. Therefore, when the consumer purchases durables in period 1, she is also willing to pay their discounted prospective value ($\delta\lambda p_2$). Accordingly, the price that the consumer is willing to pay in period 1 is $p_1 = 1 - q_1 + \delta\lambda p_2$.

Let us begin in period 2, in which the durapolist chooses q_2 in order to solve:

$$\max_{q_2} \pi_2 = (1 - q_2 - \lambda q_1) q_2$$

The durapolist faces the following first-order condition:

$$\frac{\partial \pi_2}{\partial q_2} = 1 - \lambda q_1 - 2q_2 = 0$$

From this, we find that in order to maximize his profits in period 2, the durapolist sells the quantity $q_2 = \frac{1}{2}(1 - \lambda q_1)$, and the consumer is willing to pay for this quantity

$p_2 = \frac{1}{2}(1-\lambda q_1)$. As a result, the durapolist's profits in period 2 are $\pi_2 = \frac{1}{4}(1-\lambda q_1)^2$. Now, we can back up to period 1 and solve the durapolist's maximization problem for this period. The price the consumer is willing to pay in period 1 is:

$$p_1 = 1 - q_1 + \tfrac{1}{2}\delta\lambda(1-\lambda q_1) =$$

$$= 1 + \tfrac{1}{2}\delta\lambda - (1 + \tfrac{1}{2}\delta\lambda^2)q_1$$

Thus, the durapolist solves in period 1:

$$\max_{q_1} \pi_1 = (1 + \tfrac{1}{2}\delta\lambda)q_1 - (1 + \tfrac{1}{2}\delta\lambda^2)q_1^2$$

Accordingly, his first-order condition:

$$\frac{\partial \pi_1}{\partial q_1} = (1 + \tfrac{1}{2}\delta\lambda) - 2q_1(1 + \tfrac{1}{2}\delta\lambda^2) = 0$$

The quantity the durapolist sells in period 1 is $q_1 = \dfrac{1 + \frac{1}{2}\delta\lambda}{2 + \delta\lambda^2}$, and the price the consumer is willing to pay for this quantity is $p_1 = \frac{1}{2}(1 + \frac{1}{2}\delta\lambda)$. Thus, the durapolist's profits in period 1 are $\pi_1 = \dfrac{(1 + \frac{1}{2}\delta\lambda)^2}{4 + 2\delta\lambda^2}$. Now we can return to period 2 and find the durapolist's profits there. The price the consumer is willing to pay in this period is:

$$p_2 = q_2 = \tfrac{1}{2}(1-\lambda q_1) = \tfrac{1}{2} - \tfrac{1}{2}\lambda \frac{1 + \frac{1}{2}\delta\lambda}{2 + \delta\lambda^2}$$

Accordingly, the durapolist's profits in period 2 are:

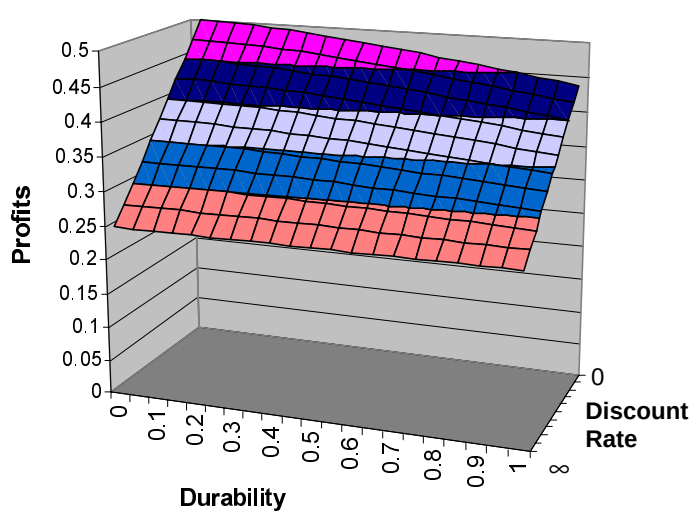
$$\pi_2 = \left(\tfrac{1}{2} - \lambda \frac{1 + \tfrac{1}{2}\delta}{4 + 2\delta\lambda^2} \right)^2 = \left(\frac{2 - \lambda + \tfrac{1}{2}\delta\lambda^2}{4 + 2\delta\lambda^2} \right)^2$$

This enables us to sum up the durapolist's profits for periods 1 and 2, in order to realize his total profits in terms of period 1:

$$\pi_{12} = \frac{(1 + \tfrac{1}{2}\delta\lambda)^2}{4 + 2\delta\lambda^2} + \delta \left(\frac{2 - \lambda + \tfrac{1}{2}\delta\lambda^2}{4 + 2\delta\lambda^2} \right)^2 .$$

B.3. The Durapolist's Chart and its Implications

This result of the durapolist's profits as a function of the durability and the discount rate can be portrayed in a three-dimensional graph as follows.



Geometric Illustration of the Durapolist Problem

In this graph, *the durapolist's chart*, axis *X* represents the durability, axis *Y* represents the discount rate and axis *Z* represents the profits as a function of the durability and the discount rate.

The durapolist's chart persuasively shows what the

light-bulb durapolist presumably failed to see at time zero:[11] the durapolist's profits decrease as the durability of his goods increases.

This durability/profit ratio is not linear. The marginal profit of reduced durability is reducing. Thus, for instance, under a zero discount rate, a reduction of *0.2* durability from *0.2* to *0* increases the profits by *0.8%* (from *0.496* to *0.5*), while the same reduction from *1.0* to *0.8* increases the profits by *3.65%* (from *0.438* to *0.454*). Simply put, the incentives to reduce durability are greater when the durability is higher. Or, alternatively, the incentives of the durapolist to reduce durability are higher than those incentives of his relative, the consumable-goods monopolist.

Furthermore, the durapolist's chart illustrates the impacts of the discount rate on the demand and supply for durability. A high discount rate means a low present value of future utility for consumers and producers, *i.e.*, future consumption and future profits are worth less today. From the consumer's point of view, it means that under a high discount rate she is less sensitive to shifts in durability and more sensitive to shifts in prices.[12]

---

[11] The following table provides the durapolist's profits under various combinations of durability and discount rate (*r*):

r/λ	**0**	**0.2**	**0.4**	**0.6**	**0.8**	**1.0**
0	0.5	0.496	0.485	0.47	0.454	0.438
25%	0.45	0.447	0.438	0.427	0.414	0.4
66.7%	0.4	0.398	0.392	0.384	0.374	0.363
150%	0.35	0.349	0.345	0.34	0.333	0.325
400%	0.3	0.299	0.298	0.295	0.292	0.288
∞	0.25	0.25	0.25	0.25	0.25	0.25

[12] The relationship between demand for durability and discount rate is used for different indices which measure the orders and/or shipments of durable goods as indicators for consumer confidence in the economy. Examples of such indices are the Commerce Department's monthly reports on orders of durable goods and the Conference Board's Index of Consumer Confidence. *See*: Kinsey & Collins [1994].

Thus, for instance, under a high discount rate, the consumer is willing to pay for a three-year bulb almost the same amount she is willing to pay for a one-year bulb.

From the durapolist's perspective, the discount rate has two main implications. First, when the discount rate is high future incomes count less and, therefore, the durapolist's incentives to reduce durability are lower than when the discount rate is low. Under infinite discount rate, durability has no impact on the durapolist's profits (0.25 for any durability). In contrast, under standard economic conditions, *i.e.*, a low discount rate, the durapolist earns from reducing the durability. Second, the incentives to reduce durability are stronger when the durapolist's discount rate is lower than the consumers' discount rate. This scenario is plausible when the durapolist is a firm and the consumer is an individual. It is likely that future profits are valued more for a firm than future consumption valued for an individual. Under these circumstances, reducing durability serves also as a device to slow down the decline of the durapolist's business that is caused by the high discount rate of the consumer.[13] To illustrate, assume that the consumer has an infinite discount rate and the durapolist's discount rate is significantly lower. The consumer is willing to pay for the three-year bulb no more than she is willing to pay for the one-year bulb. As a result, the durapolist's profits decline with durability because his prospective revenue is lower since the bulbs last longer. Therefore, by reducing durability the consumer is not worse off but the durapolist is better off.

[13] Barro [1972] proved this argument in a simple model and argued that the incentives to reduce durability exist only when the discount rate of the durapolist is lower than the one of the consumer.

The intermediate conclusion of this discussion so far, is that the durapolist has incentives to reduce the durability of his goods. Furthermore, these incentives are negatively correlated to the discount rate and with to the difference between the discount rate of the consumer and the durapolist. Simply put, the durapolist's chart illustrates the Coase conjecture and the fundamental belief that by reducing durability the durapolist may overcome his problem. Less clear, however, is what this 'durability' (λ) is, that by reducing it the durapolist earns more. The simple model above permits two elementary interpretations: the value of a durable in the subsequent period and the fraction of durables that survive consumption and can be used in the next period. In other words, $(1-\lambda)$ represents the loss of value which occurs in consumption over one period. The following sections interpret more deeply the notion of durability in this context while observing durapolists in action. Nevertheless, we will not be fully equipped to do so, unless some of the assumptions above are highlighted.

First, the durables were assumed to be homogeneous over time. Namely, the durables produced in one periods are identical to those produced in earlier periods.[14] Second, the durability was presumed to be determined before the time of purchase and could not be changed by the durapolist or the consumer afterwards.[15] Third, it was assumed that the durapolist incurs no production costs, and in particular his production costs do not increase with durability.[16] Fourth, the consumer was assumed to be fully

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[14] For implications, *see* subsection D.4 (reduced variable durability).
[15] *Ibid.*
[16] *See* subsection D.3.1 (reduced built-in durability).

informed of the durability.[17] Fifth, it was also premised that the consumer incurs no maintenance costs. Sixth, the sales were characterized as discrete, rather than continuous; namely, the durapolist sells only at the beginning of each 'period of time,' and does not sell his durables continuously over time.[18] Seventh, the secondhand market was premised to be functioning perfectly and, therefore, durables lose value over time only because of their imperfect durability and the discount rate.[19] Finally, the durapolist was presumed to have no ability to commit to future prices.[20]

B.4. Welfare Analysis of the Durapolist's Time Inconsistency

The preceding discussion focused on the durapolist's profits and their correlation to durability and the discount rate. We observed that there is such a correlation, but we have not examined the effects, if any, on social welfare. This subsection analyzes the impacts of durability and discount rate on social welfare.

We begin by finding the social surplus that results from transactions between the durapolist and the consumer. In period t the consumer purchases q_t goods and consumes Q_t goods, where Q_t includes q_t and goods from the previous periods that survived their consumption. The consumer's marginal value of consumption is $\dot{v}_t = 1 - Q_t$ and, therefore, in period t, the consumer surplus is:

---

[17] *See* subsection D.4.1.

[18] *See infra* note 27 and accompanying text, and subsection C.3 (short-run price rigidity).

[19] For various implications of the secondhand markets *see* subsection D.5 (elimination of secondhand markets).

[20] *See* section C (commitment to future prices).

$$S_t^c = \int_0^1 \dot{v}_t dQ_t - p_t q_t = Q_t - \tfrac{1}{2} Q_t^2 - p_t q_t ,$$

The durapolist incurs no production costs and his surplus in period t is $S_t^d = p_t q_t$. This surplus is a merely a transfer from the consumer and, therefore, the social surplus in period t is:

$$S_t = Q_t - \tfrac{1}{2} Q_t^2$$

We now can find the aggregate social surplus that is generated in our two-period world. In period 1 the consumer purchases q_1 goods and has no goods left over from previous periods. Accordingly the social surplus in period 1 is:

$$S_1 = q_1 - \tfrac{1}{2} q_1^2 .$$

In period 2, the consumer has λq_1 goods left over from period 1, and he buys additional q_2 goods that generate surplus only in this period. The surplus that is generated by the goods, which were purchased in period 1, is not influenced by transactions in the secondhand markets because these only represent transfers. Thus, $Q_2 = \lambda q_1 + q_2$ and the social surplus in period 2 is:

$$S_2 = (\lambda q_1 + q_2) - \tfrac{1}{2}(\lambda q_1 + q_2)^2 =$$

$$= \lambda q_1 - \tfrac{1}{2}\lambda^2 q_1^2 - \lambda q_1 q_2 + q_2 - \tfrac{1}{2} q_2^2$$

In subsection B.2 we found that $q_2 = \tfrac{1}{2}(1 - \lambda q_1)$ and, therefore, S_2 may be presented as follows:

$$S_2 = \tfrac{1}{4}\lambda q_1 - \tfrac{1}{8}\lambda^2 q_1^2 + \tfrac{3}{8}.$$

Accordingly, the aggregate social surplus in terms of period 1 is:

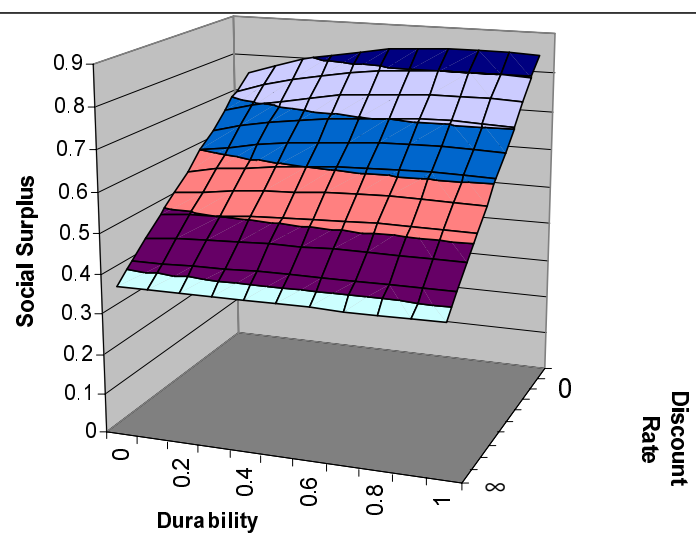
$$S = S_1 + \delta S_2 =$$

$$= q_1(1 + \tfrac{1}{4}\delta\lambda) - q_1^2(\tfrac{1}{2} + \tfrac{1}{8}\delta\lambda^2) + \tfrac{3}{8}\delta$$

In subsection B.2 we also found that $q_1 = \dfrac{1 + \frac{1}{2}\delta\lambda}{2 + \delta\lambda^2}$ and, therefore we can present the social surplus as a function of durability and discount rate:

$$S = \left(\frac{1 + \frac{1}{2}\delta\lambda}{2 + \delta\lambda^2}\right)(1 + \tfrac{1}{4}\delta\lambda) - \left(\frac{1 + \frac{1}{2}\delta\lambda}{2 + \delta\lambda^2}\right)^2(\tfrac{1}{2} + \tfrac{1}{8}\delta\lambda^2) + \tfrac{3}{8}\delta.$$

Again, as in the analysis of the durapolist's profits, a geometric presentation of this function provides a clear way to understand its implications and to analyze them. This time, we represent the social surplus as a function of durability and discount rate.



Geometric Illustration of the Social Surplus

The graph of the social surplus clearly shows the connection between durability, discount

rate and social welfare.[21]

First, the social surplus graph illustrates, again, that the significance of durability is diminished as the discount rate increases. Therefore, when the discount rate is infinite, durability has no impact on the social surplus because the players care only about the present.

Nevertheless, even under a very high discount rate (*400%* a period, when $\delta=0.2$), a reduction of durability from a level of *0.8* to a level of zero (*i.e.*, the level of consumables) renders a loss of approximately *4.5%* in the social surplus.

Second, we can observe that there is a general positive relationship between durability and the social surplus. This relationship is

is not constant; its coefficient diminishes as durability increases. At high levels of durability (above *0.8*), durability has a negative impact on the social surplus, albeit a slight one.

This outcome is another facet of the durapolist's time inconsistency. The increase in the social surplus is explained by the fact that the durapolist's time inconsistency

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[21] The following table provides the aggregate social surplus under various combinations of durability and discount rate (r):

r/λ	**0**	**0.2**	**0.4**	**0.6**	**0.8**	**1.0**
0	0.75	0.794	0.826	0.843	0.848	0.8438
25%	0.675	0.710	0.735	0.75	0.754	0.75
66.7%	0.6	0.626	0.645	0.656	0.659	0.6563
150%	0.525	0.543	0.555	0.562	0.565	0.5625
400%	0.45	0.456	0.465	0.469	0.47	0.4688
∞	0.375	0.375	0.375	0.375	0.375	0.375

enables consumers to buy more of his goods and, therefore, their surplus increases, while the durapolist surplus is negligible because it represents merely a transfer from the consumers. Time inconsistency, however, is only present in durables and not in consumables and this is why generally the social surplus increases with durability. Nonetheless, durability also causes the durapolist to limit his output in period 1 because he factors the impact of this output on his sales in period 2. As a result, durability also has a negative impact on social surplus and this is why we see a negative correlation between durability and social surplus at high levels of durability.

The numbers behind the social surplus may shed more light on this outcome. Under a discount rate between zero and *25%*, reductions of durability from a level of *0.8* to a level of zero render a loss of *12-13%* in the social surplus and from a level of *0.8* to a level of *0.6*, a loss of approximately *0.5%*. In comparison, an increase of durability from *0.8* to a perfect durability (*1*), under these levels of discount rate, leads to a loss of social welfare of approximately *0.5%*. This implies that higher durability is not always socially beneficial and the subsequent discussion develops this point further.

To the extent that distributive considerations are relevant, higher durability shrinks the portion of the surplus that the durapolist can grasp because of his time inconsistency.[22] As mentioned, the portion of social surplus, which the durapolist can capture, *may* impact

[22] The following table provides the division of the social surplus in the critical values of durability (*0*, *0.8*, *1*) when the discount rate is zero:

Durability (λ)	**Social Surplus**	**Durapolist Surplus**	**Consumer Surplus**
0	0.75	0.5 (66.7%)	0.25 (33.3%)
0.8	0.8483	0.454 (53.5%)	0.394 (46.5%)
1	0.8438	0.4375 (51.8%)	0.406 (48.2%)

his incentives to invest in entry to markets or to create new markets and this *can* be another social cost of durability.[23]

C. The Committed Durapolist: Commitment to Future Prices

C.1. A Matter of Confidence

In the famous *Alcoa* case, Judge Learned Hand commented that "[limitations to market power] also exist when a single producer occupies the whole market: even then, his hold will depend upon his moderation in exerting his immediate power."[24] Judge Hand premised that the durapolist's business plans are transparent to the consumers and, hence, his market power depends on his conduct rather than on the consumer's perception of this conduct. The essence of the durapolist problem, however, is his low credibility for being a consistent creature and the expectations that he will lower his prices. If credibility is the problem, logic dictates that the durapolist should find ways to commit to future prices. This logic follows a fundamental economic rule: a committed player can do at least as well as without a commitment.[25] This section presents several business strategies that durapolists have developed in order to gain credibility and the public confidence.

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[23] Lee & Lee [1998] provided an analytical framework of this point and particularly, the potential of underinvestment in R&D activities in durable-goods markets. *See*, also Waldman [1996].

[24] *United States v. Aluminum Co. of America*, 148 F.2d 416, 425-426 (2nd Cir. 1945). For an economic analysis of the *Alcoa* case, *see*: Gaskins [1974]; Swan [1980].

[25] Needless to say, a rational player would not commit to unprofitable conduct, or conduct that would make him worse off. *See*, generally: Schelling [1960]; Dixit & Nalebuff [1991], at 142-167. For a formal analysis of commitments by durapolists, *see*: Hart & Tirole [1988].

To illustrate the advantages of commitments, consider (again) the light-bulb durapolist who incurs no production costs. This time, he sees in front of him two types of consumers: high-value consumers who are willing to pay *$5* a bulb, and low-value consumers who are willing to pay *$2* a bulb. In total, there are *100* consumers and *k* of them are high-value consumers, where *k* is unobservable and distributed uniformly over *[0,100]*. Assume also that a consumer does not purchase more than one bulb, but if the price is too high she does not purchase at all.

At time zero, the durapolist determines his pricing policy and particularly decides between commitment and non-commitment. If the durapolist does not commit, the high-value consumers *believe* that it would take "in the twinkling of an eye" for prices to fall to *$2* and thus, they will be reluctant to pay more than *$2* a bulb.[26] Therefore, under a policy of non-commitment the durapolist sells *100* bulbs for *$2* each and his profits are *$200*.

In contrast, under a policy of commitment, the durapolist sells *k* bulbs for *$5* each and his profits are *5k*. Thus, from the durapolist's point of view, it is profitable to commit, if there are more than *40* high-value consumers. Given the distribution of the consumers, the probability for more than 40 high-value consumers is *60%* and the expected profits

[26] Coase [1972], at 143.

under a commitment are *$250*.[27] Simply put, a commitment places the light-bulb durapolist in a better position.[28]

Promises, however, do not count too much in our world and, hence, a mere promise on behalf of the durapolist generally does not help. Therefore, durapolists have developed a few business strategies to overcome their credibility problem and some of them are discussed below.

C.2. Reputation

Had the durapolist had a reputation for keeping promises, he would have had no obstacles to his market power. Unfortunately for the durapolist this is not the case. In general, his reputation is for breaking promises in order to maximize his short-run profits. This is his time-inconsistency problem. The durapolist is unlikely to sacrifice short-run profits even for greater long-run profits. One way to explain this irrational behavior is through the repeated decisions the durapolist must make regarding his pricing policies. Essentially, every time the durapolist sells his durables he has to decide whether to follow his optimal plan or to deviate from it and to charge the monopoly price according to the

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[27] In expectancy there are *50* high-value consumers and, therefore, when the price is *$5* the durapolist's profits are expected to be *$250*.

It should be noted that this example assumes a continuous supply of bulbs, in contrast to the model presented in section B. If the supply is discrete, under a policy of non-commitment the durapolist's profits will be between *200* and *250*

[28] Furthermore, tracks of past purchases enable the durapolist to price discriminate and, therefore, high-value consumers will be unlikely to reveal themselves by paying the high price. Fudenberg & Tirole [1998]; For further implications, *see* also chapters F-E. A less persuasive argument concerning the high-value consumers is that they are unlikely to pay the monopolistic price because they understand that only this willingness to pay renders the high level of prices. *See*, for example Posner [1976], at 203. This argument fails to recognize the consumers' collective-action problem.

residual demand. These repeated decisions provide situations in which sticking to the optimal plan is costly and therefore, may seem undesirable to the durapolist.[29] Some durapolists, however, have seen beyond the immediate horizons and thus, gained much prosperity. A prominent example of a durapolist who presumably maintains market power through reputation is the international diamond cartel, led by *DeBeers*.[30]

"A Diamond is Forever," so reads the DeBeers slogan, which leads the ultimate durapolist and manages its reputable time-consistency. *Cecil Rohdes*, the founder of DeBeers, devised the strategy of the diamond cartel in the 1880's, and his successor, *Ernest Oppenheimer*, developed and perfected it. This strategy is fascinating in its simplicity: persistence in restricting the number of diamonds released into the market and preventing the nominal prices from going down. Thus, for example, several studies of the industry noted that the quantity of diamonds sold on the market followed the prospective number of wedding engagements in any given year.[31]

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[29] An interesting analogy between the durapolist and a predator can be drawn. Both a predator and a durapolist who sticks to his optimal plan sacrifice short-run profits for the long-run profits. A predator lowers his prices to punish competitive behavior and thereby, incurs losses. Similarly, a durapolist who does not lower his prices does not earn as much as he could have. One main difference between the two is in the number of short-run unprofitable decisions. A predator needs to lower his prices only once (or very few times) to obtain market discipline, while the durapolist has to make a 'costly' decision every time he sells his durables. For the repeated game of the predator, *see* generally: Kreps & Wilson [1982]; Ordover & Saloner [1989].

[30] Again, for the purposes of this paper, durable-goods cartels are considered as durapolists. *See* subsection C.5.2 below.

[31] The cartel's success is facilitated by a complicated system of stockpiles, production quotas, tight price monitoring and sophisticated advertising. Much of this system is regulated through the cartel's *Central Selling Organization* (*CSO*), by which it determines who can buy which stones and how much each buyer must pay. *See*: Spar [1994], at 39-87; Lenzen [1970]; Anonymous, *How De Beers dominates the diamonds*, The Economist, Feb. 23, 1980, at 101; THE ECONOMIST INTELLIGENCE UNIT, DIAMONDS 1988, SPECIAL REP. NO. 1126 (DEC. 1987); THE ECONOMIST INTELLIGENCE UNIT, DIAMONDS: A CARTEL AND ITS FUTURE, SPECIAL REP. NO. M702 (AUG. 1992).

Indeed, in several instances, adhering to this strategy was very costly in the short run,[32] but DeBeers' affluence proves that a farsighted durapolist eventually gains more. In short, the diamond cartel has succeeded in overcoming the durapolist problem, by resisting the temptation of increasing output and, thereby, building reputation. In this, DeBeers has succeeded where others have failed.[33]

C.3. Short-Run Price Rigidity

Diamonds are forever, but most durables are not. As a consequence, a garden-variety durapolist does not have to precommit that his prices will *never* go down and a weaker commitment suffices.[34]

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[32] In 1981, for instance, the diamond sales fell 46% below their level in 1980, and left DeBeers with a stockpile estimated to be equal to a normal year's worth of sales. In the process, DeBeers spent between $700 million and $1 billion of its own cash reserves to support the diamond prices. Spar [1994], at 56. Likewise, in addition to the regular premium DeBeers was paying for Soviet/Russian stones to prevent them from entering the world market, in 1990, it gave the Russian government a $1 billion hard-currency loan for exclusive rights on selling the Russian diamonds. Spar [1994], at 64-73, 78-87.

[33] Again, in this paper I generally do not distinguish between a monopolist and a cartel. *See* subsection C.5.2.

[34] In *Allen-Myland*, the Court of Appeals for the Third Circuit intuitively linked the durapolist's credibility, which was assumed in *Alcoa*, to durability:

> "*Alcoa*'s analysis is persuasive… Refined aluminum can be melted down and reused repeatedly, and in any event, products made with it may last for decades before they are scrapped and the aluminum is recycled. It therefore may have been quite difficult for Alcoa to estimate future supply and demand for aluminum ingot over a long period of time with sufficient accuracy to maximize its profits by manipulating the supply of virgin ingot it produced…
>
> Computers, however, have considerably more limited lives than aluminum ingot. Technology and price/performance ratios have been advancing so rapidly in the computer industry that used machines cannot be re-leased indefinitely. Accordingly, a powerful manufacturer like IBM was in a position to maximize its profits by carefully controlling the number of mainframes that would later appear on the used leasing market." *Allen-Myland v. International Business Machines Corp.*, 33 F.3d 194, 203 (3rd Cir. 1994) (footnote omitted), *cert. denied*, 513 U.S. 1066 (1994).

Conceptually, it is a wonder why the consumer who purchases a one-year bulb has more confidence in the price than when purchasing a three-year bulb. After all, if the light-bulb durapolist can lower his prices every year, he can also lower them every week, day, or "in the twinkling of an eye."[35] There are various explanations for the consumer's confidence in short periods of time.[36] One straightforward explanation is that in reality price adjustments take time. Firms incur costs in deciding on price changes, generating new price lists, and catalogs, changing price tags, etc.[37] Therefore, prices may be characterized by short-run rigidity. Under such circumstances, when the durable's lifetime is relatively short, a consumer can anticipate that she will save little, if at all, by postponing the purchase of a short-life good. This is to say, it is easier for the durapolist to commit to future prices when the durability of his goods is lower.

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[35] *See supra* note 27. In the model presented in section II the consumer has such confidence because it was assumed that the selling was discrete. Namely, the durapolist sold his goods only at the beginning of each period, *e.g.*, only on January 1st of every year. There are several economists who assert that this assumption is unrealistic and, therefore, they suggest that reducing durability does not improve the position of the durapolists. *See*, for example: Stokey [1981]; Kahn [1986].

[36] Denicolo & Garella [1999], for example, provided a general model of rationing in durable-goods markets, which explains how the durapolist can price-discriminate his consumers over time without a commitment to future prices:

> "In a two-period model, [when the goods are not perfectly durable,] buyers who have been rationed in the first period will carry their demand over to the next one. This shifts the second-period demand function upward, reducing the monopolist's incentive to cut the second-period price. Rational customers thus have less incentive to postpone purchase, which improves the first-period demand. As a result the monopolist can better discriminate between high-value and low-value customers, and total discounted profit may rise… But with an infinite horizon, when the length of periods shortens to zero, rationing would become ineffective." (at 44.)

[37] Another popular explanation for price rigidity in concentrated markets is the 'kinked demand curve,' which was offered by Paul Sweezy [1939] (and simultaneously by a pair of British economists, Hall & Hitch), and popularized by Stigler [1947] who cast some doubts by an empirical study which concluded that "[t]he kink is a barrier to changes in prices that will increase profits, and business is a collection of devices for circumventing barriers to profits." For various discussions about price rigidity, *see*: Keynes [1936]; Carlton [1986]; Tirole [1988], at 253-256, 265-268; Baumol, Panzar & Willig [1988], at 12-13, 405-428. *See*, also Coase [1972], at 147:

> "What a consumer has to fear is an increase in supply during the period which [s]he (or someone to whom [s]he transfers the good) is deriving services from the good. The less

C.4. The Most-Favored Customer and Low-Price Guarantees

C.4.1. The Trick and its Competitive Consequences

One of the neatest tricks durapolists have ever employed is the notorious practice of *'most-favored-customer' clauses* as a device to attain some credibility. A most-favored-customer (*MFC*) clause, also called an *'anti-discrimination'* or a *'most-favored-nations'* clause, is a promise of *X* to *Y* to treat *Y* as he treats his most-favored customer. For instance, a durapolist may promise the consumer that for any reduction in his prices he will compensate the consumer with the difference. MFC clauses make price reductions expensive for a committed player and, hence, impose a restraint against price cutting and 'clearance sales.'[38]

Again, as in the case of short-run price rigidity, postponing the purchase is unlikely to yield a substantial saving to the consumer. Simply put, MFC clauses induce the durapolist to internalize the costs of reducing prices and, consequently, he is not faced with a time-inconsistency problem. As a result, an MFC clause provides the consumer with a '*low-price' guarantee*.[39]

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durable the good, the shorter is this period. But the shorter the period that the supplier has in which to increase supply, the greater will be the additional costs of increasing supply."

[38] *See*, generally: Cooper & Fries [1991]; Hovenkamp [1994], at §4.6d:

"Buyers may think price protection clauses protect *them* from subsequent price reductions that might be given to other firms. If A buys today at a price of $50, and tomorrow the seller sells to B at a price of $45, A will be entitled to a refund of $5. Nonetheless, such clauses are often a sign not of hard customer bargaining… The clauses effectively make discriminatory price reductions very expensive."

[39] MFC clauses and low price guarantees are different in a setting of more than one seller. An MFC clause provides the customer with an assurance that the seller will not give to another customer a better price. In contrast, low price guarantee provides the customer with an assurance that no seller will give a better price to anyone. When there is one seller in the market, as it is generally assumed here, there is no

The standard analysis of MFC clauses examines them as a device to facilitate horizontal collusion in concentrated markets,[40] and for this reason they were alleged by antitrust agencies as a violation of §1 of the Sherman Act and §5 of the FTC Act.[41] The courts, however, were generally less impressed by this scholarly and regulatory perspective and rejected these kinds of charges on the grounds of MFC clauses.[42]

Nonetheless, this analysis has inspired several commentators who analyzed MFC clauses as a device to overcome the durapolist problem.[43] This ramification has not left a

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difference between these two practices. For analysis of low price guarantee, *see* Eldin [1997]. For an analysis of both practices and their respective legal implications, *see*: Sargent [1993].

[40] *See*, for example: Cooper [1986]; Tirole [1988], at 330-332; Simons [1989]; Hovenkamp [1994], at §4.6d; Baker [1996]; Edlin [1997]; Hay [1999].

[41] *See*, for example: *United States v. Eli Lilly & Co.*, 1959 Trade Cas. (CCH) ¶69,536 (D.N.J. 1959); *In the matter of Ethyl Corporation*, 101 FTC 425 (1983); *United States v. Vision Serv. Plan*, 7 Trade Reg. Rep. (CCH) ¶50,775 (D.D.C. 1994); *United States v. Delta Dental Plan of Arizona, Inc.*, 7 Trade Reg. Rep. (CCH) ¶50,767 (D. Ariz. 1994).

[42] *In the matter of Ethyl Corporation*, 101 FTC 425 (1983), *rev'd sub nom., E.I. du Pont De Nemours & Co. v. FTC*, 729 F.2d 128 (2d Cir. 1984) (the appeal court vacated the Commission's decision and refused to hold that §5 could be "violated by non-collusive, non-predatory and independent conduct"); *Ocean State Physicians Health Plan v. Blue Cross & Blue Shield*, 883 F.2d 1101, 1111 (1st Cir. 1989), *cert. denied*, 494 U.S. 1027 (1990); *Blue Cross & Blue Shield United of Wis. V. Marshfield Clinic*, 65 F.3d 1406, 1415 (7th Cir. 1995) (Posner, C.J):

> "This is said to set a floor underneath these physicians' prices, since if they cut prices to their other patients their reimbursement from the Clinic will decline automatically. This is an ingenious but perverse argument. "Most favored nations" clauses are standard devices by which buyers try to bargain for low prices, by getting the seller to agree to treat them as favorably as any of their other customers… It is not price-fixing… Perhaps, as the Department of Justice believes, these clauses are misused to anticompetitive ends in some cases; but there is no evidence of that in this case."

[43] Aghion & Bolton [1987] (vertical contracts as a barrier to entry); Butz [1990] (a formal analysis of MFC clauses as a device to overcome the durapolist problem); Png [1991] (the same); O'Brien & Shaffer [1992] (a technical analysis of the profitability of vertical arrangements, including MFC clauses, for a monopolist); McAfee & Schwartz [1994] (MFC clauses and price rigidity); Goldberg & Greenberg [1995] (analysis of the *Ocean State* case).

more favorable impression on the courts and they generally discard it and resist acknowledging that it might be used to monopolize markets.[44]

The courts usually dismiss the allegation regarding the anticompetitive effects of MFC clauses because they tend to believe that a low-price guarantee benefits the consumer. As discussed, this belief has no sound foundation.[45] The durapolist may use MFC clauses in order to overcome his time-inconsistency, as 'competing' firms may used these clauses in order to facilitate coordination. Nevertheless, it is unclear whether, from the durapolist's viewpoint, this practice is as good as other practices, which he can employ to overcome his problem. Yet, there is no good reason not to infer that the practice violates antitrust laws, even though its usage by durapolists is rare.

C.4.2. Evidence from the Electric Industry

MFC clauses are extremely common in retailing and constitute a regular practice at Wal-Mart, Sears Roebuck, Circuit City, and others.[46] Their use by durapolists, however,

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[44] The health insurance industry has contributed most of the cases that raised the question of monopolization by MFC clauses. For surveys of the leading cases, *see* Celnicker [1991]; Dennis [1995a; 1995b]. *See*, also: *Kitsap Physicians Serv. v. Washington Dental Serv.*, 671 F. Supp. 1267, 1269-1270 (W.D. Wash. 1987) (the court opined that an MFC clause "makes good business sense" and it is "procompetitive"); *Reazin*, at 971 n. 30:

> "In *Ocean State*, Blue Cross conceded its monopoly power... The only question was whether Blue Cross violated section 2 [of the Sherman Act]. By contrast, the most favored nations clause here is not itself challenged as unlawful monopolization. Rather, it is only considered as evidence of, or as contributing to, Blue Cross' market or monopoly power. We need not reach the question addressed in *Ocean State* of whether use of the most favored nations clause could itself violate section 2."

[45] *See*, Dixit & Nalebuff [1991], at 102:

> "The neatest trick is enforcing price collusion through a punishment guarantee [*i.e.*, an MFC clause,] all in the name of competition."

[46] *See*: Sargent [1993]. Dixit & Nalebuff [1991] illustrated the strategy of MFC clauses with the deceased *Crazy Eddy* and its main competitor, *Newmark & Lewis*. For this purpose, they quoted one of Newmark & Lewis advertisements:

seems to be less common. This suggests that either the practice does not assist in overcoming the durapolist problem, or that the durapolist has more profitable practices. *The turbine-generator industry* may provide an example for a 'durapolist' who used this practice.

In 1960, there were three firms in the United States that manufactured electric-turbine generators: *General Electric* (*GE*), *Westinghouse*, and *Allis-Chalmers*. These three players had controlled the industry since the end of the nineteenth century, when steam was used to generate electricity. Generators are extremely durable and the three had maintained their prices through price-fixing agreements. In 1960 these agreements fell apart, when the firms were fined and their executives were sent to prison.[47] As a consequence, a price war was spurred, Allis-Chalmers was driven out of the market in December 1962, and left the pie to be divided between GE and Westinghouse. This almost unprofitable situation was stabilized in May 1963, when GE announced a new pricing policy. This new policy included three elements: (1) the pricing structure was

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> "If, after your purchase, you find the same model advertised or available for sale for less (confirmed printed proof required) by any other local stocking merchant, in this marketing area, during the lifetime of your purchase, we, Newmark & Lewis, will gladly refund (by check) 100% of the difference, plus an additional 25% of the difference, or if you prefer, Newmark & Lewis will give you a 200% gift certificate refund (100% of the difference plus an additional 100% of the difference, in gift certificates." (at 102-103.)

It is not implied that MFC clauses cannot present high competitiveness, although they are likely to facilitate tacit collusion in concentrated industries. Nevertheless, it is unclear what can be the purpose of a general use of this practice by a durapolist, other than commitment to future prices.

[47] GE, Westinghouse and Allis-Chalmers were exposed to a long series of antitrust suits. The aggregate amount of the claimed damages was estimated to be nine billion dollars (treble damages of three billion dollars.) Most of the suits were settled out of the courtroom. Interestingly, the settlements contained MFC clauses, under which the companies promised that the most beneficial out-of-court settlements would become available to all plaintiffs, regardless of when they settled. Sultan [1974], at 84-124. Ralph Sultan [1974, 1975] provides the thorough analysis of the industry. The description of the MFC practice can be found in *United States v. General Electric Co.*, 1977-2 Trade Cas. (CCH) ¶61,659 (E.D. Pa. 1977). For documentation of the price-fixing conspiracy *see*: Herling [1962].

simplified; (2) discounts were eliminated and a price book was published; and (3) a broad anti-discrimination clause guaranteed the consumers that for six months from the purchase time they *all* will be refunded if GE will sell below its list price. To increase the consumers trust in its commitment, GE hired the services of a public accounting firm to audit its policy and, in particular, the equal treatment for all its customers.

Westinghouse was less creative than GE and instead of developing its own policy, it copied GE's policy and its price book. GE and Westinghouse persisted with this practice until 1973 and succeeded in maintaining high profits despite the durability of their products.

The case of GE and Westinghouse does not comment conclusively on the practical profitability of MFC clauses for durapolists. The duopolistic structure of the industry and the inelasticity of the demand complicate to some extent the analysis of the practice. Yet, two issues should be highlighted. Firstly, GE dominated the market[48] and, therefore, it could be viewed as a durapolist. Secondly, if the MFC clauses imposed a bottom boundary for GE and Westinghouse, their purpose of stabilizing the duopoly does not change the fact that they were virtually equivalent to a solution to the durapolist problem.

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[48] According to the estimate of cumulative kilowatts shipments of the three manufacturers over the years 1898-1963 the market share were as follows: GE – 61.4%; Westinghouse – 31.2%; Allis-Chalmers – 7.4%. Sultan [1974], at 176. After the exit of Allis-Chalmers from the market, the market shares for the years 1964-1970 were: GE – 57.3%; Westinghouse – 33.1%; Import – 9.1%; Allis-Chalmers – 0.5% (returned to the market in 1970). Sultan [1975], at 228.

C.5. Extensions to the Most-Favored Customer

Unlike legal doctrines, economic creatures are flexible. Any profitable strategy has many variants which may be classified by the law as distinctive with different legal implications although their mechanisms are the same. In this respect, the practice of MFC clauses is not an exceptional and appears to have many widespread variants. Three of these variants are analyzed below: (1) returns and buybacks; (2) self-enforcement mechanisms of cartels; and (3) raising rivals' costs.

C.5.1. Returns and Buybacks

The closest variants to MFC clauses are presumably the practices of returns and buybacks. MFC clauses penalize the durapolist for lowering his prices by the difference between the high price and the low price and sometimes this difference is coupled with a multiplier.[49] The potency of MFC clauses is of course in the magnitude of the 'penalty' and, therefore, the greater the multiplier, the more persuasive the durapolist's commitment becomes. Returns and buybacks may seem to impose a very severe penalty on the durapolist which is the high price the durapolist charged before the price reduction.[50]

This perception is usually wrong because generally the consumer buys only durables she needs (*e.g.*, car, refrigerator or a stereo) and, therefore, after the refund she

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[49] For instance, the MFC clause of Newmark & Lewis, at *supra* note 46, provided a multiplier of 1.25 or 2.

will again buy the durable, albeit at the lower price. Thus, the durapolist's penalty is approximately the price reduction he set, as the penalty under MFC clauses without the multiplier. From the consumer's standpoint, the credibility of the commitment that returns and buybacks represent is relatively impaired because of the transaction costs they are associated with. Under an MFC clause, a consumer who bought a refrigerator and finds that the durapolist lowered his prices can almost costlessly claim the difference. In contrast, under a policy of returns or buybacks, the consumer will lose a workday to arrange the delivery of her refrigerator, some of her groceries will spoil and eventually she will have an identical refrigerator, although for a lower price. In short, the strategies of returns and buybacks as devices to overcome time-inconsistency seem to be dominated by the strategy of MFC clauses.

Furthermore, unlike MFC clauses, returns and buybacks have important economic functions other than restricting competition.[51] The practice of returns, for example, is a standard practice in the retailing markets as a form of insurance by manufacturers to the retailers and in this sense may be perceived as a substitute to consignment transactions.[52]

Moreover, return policies may constitute another parameter in which firms compete with each other. While MFC clauses may present tough competition in prices,

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[50] Coase [1972] suggested that a buyback policy may provide the consumers with a commitment to future prices (at 145, 148). For an analysis of the potential anticompetitive effect of returns polices, *see*: Marvel & Peck [1995]; Padmanabhan & Png [1993; 1997]. *See* also: Fudenberg & Tirole [1998].

[51] *See*, Eric N. Berg, *Building Good Will through Guarantees*, N.Y. TIMES, Nov. 23, 1989, at D1; Janice M. Horowitz, When *Gifts Become Problems*, N.Y. TIMES, Dec. 24, 1989, at C9. *See*, also Coase [1972], at 149:

> "[T]he supplier of a durable good may agee to buy it back at some specified price in the future because consumers are willing to pay for this reduction in risk."

[52] The distribution segment of the book industry, for example, is traditionally based on return policies.

returns policies also present competition in quality.[53] Collusion is less likely when there are more parameters to coordinate and especially non-quantified ones such as quality. Returns, therefore, are unlikely to serve as devices to impair competition. Therefore, the use of returns in these contexts (insurance for retailers and competing sellers) should be distinguished from the case of a durapolist (one seller) who sells his goods to end users and provide them with a guarantee of returns. The latter case is one in which a returns policy is functioning similarly to MFC clauses.

Like returns, buybacks also have several desirable functions. For instance, buybacks constitute a popular device to convince consumers to upgrade their durables (*i.e.*, trade-in), which have not yet completely depreciated. As a consequence, buybacks can cause the durapolist to internalize a larger fraction of the social costs of a reduced variable durability.[54] Nevertheless, buybacks may be used by a durapolist to eliminate secondhand markets. To illustrate, consider an industry with a healthy secondhand market in which the price of a used good is *60%* of a new good's price. By eliminating one used good, the durapolist earns *40%* of a new good's price minus its marginal cost. The

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[53] *See*: Bob Tedeschi, *Online Sales can be Messy, Especially those Pesky Returns*, N.Y. TIMES (interactive ed.), Aug. 23 1999; Berg, *supra* note 51 (the article was written before the era of the e-commerce):

> "Nowhere have guarantees become more prevalent than in the mail-order catalogue business, in which it has become almost standard to permit customers to return garments and other goods at any time for any reason."

[54] *See* subsection D.4. Lee & Lee [1998] showed that this internalization may render underinvestment in innovation. In their model durability may discourage R&D activities because a durapolist who introduces a new generation of products has to compensate consumers according to their purchase histories. *See*, also: *Borland, 1992 Annual Report*:

> "The Company's gross margins can be strongly affected in particular in periods by aggressive pricing strategies and return privileges associated with new product introductions and upgrades." (cited by Padmanabhan & Png [1997])

This argument is more complicated in network industries because buybacks in these industries may provide the durapolist with the critical mass that is required to make a present network obsolete. Thus, in network industries buybacks may facilitate planned obsolescence.

profitability of this strategy may increase, if the durapolist can employ the used goods to lower his marginal costs (*e.g.*, using replacement parts) or by increasing the costs of the players in the secondhand market.[55]

To sum up this point, generally, returns and buybacks do not seem to operate as devices to overcome the durapolist problem, *i.e.*, to acquire and maintain monopoly power. Indeed, returns and buybacks may be used as a commitment. However, the credibility of these strategies is not always high and, in general, they are dominated by other strategies. Furthermore, in many cases these practices appear to serve functions other than a commitment to high prices.

C.5.2. Self-Enforcement Mechanisms of Cartels

MFC clauses are intended to increase the costs of price reductions for the durapolist. Similarly, self-enforcement mechanisms of cartels are intended to prevent price-cutting by imposing costly punishments on the cartels' cheaters.[56]

This suggests that a cartel may be more consistent than a durapolist and, hence, more profitable in durable-goods markets.[57] Generally, my analysis in this paper does not distinguish between pure durapolists and stable cartels, such as the diamond, the incandescent-lamp and the turbine-generator cartels. This distinction, however, explains that some of the strategies that are used to stabilize cartels have a byproduct of overcoming time-inconsistency.

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[55] *See* also subsection D.5.

The theoretical significance of this point is that some cartels are better at maximizing profits than monopolists are and, thus, the social cost of cartels in durable-goods markets may be greater than under the rule of a durapolist. The practical significance is less 'impressive' because cartels are illegal anyway and, thus, the practical implications of this point are limited to the valuation of damages.

C.5.3. Raising Rivals' Costs

MFC clauses may also be used by durable-goods manufacturers as a device to achieve high marginal costs in the industry and thereby to eliminate the profitability of lowering prices.

Consider a durable-goods manufacturer with a significant market share. If the manufacturer can get an MFC treatment from important input suppliers, he assures that the marginal costs of the rest of the firms in the industry will be kept at a relatively high level. Therefore, the manufacturer might decrease the plausibility of price reductions and deter entry. The latter strategy, in its general form, is not unique to durapolists; however, its potential use to eliminate secondhand markets characterizes only durable-goods markets. Elimination of secondhand markets prevents a competitive supply of used goods and, thus, reduces the pressure to lower prices.[58]

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[56] For discussions about self-enforcement mechanisms of cartels, *see*: Priest [1977]; Ayres [1987]; Brodley & Ma [1993].

[57] Ausubel & Deneckere [1987] and Gul [1987] provided formal proofs for this argument.

[58] *See* also subsection D.5.

To illustrate, consider the war of *Eastman Kodak* against its competitors in the aftermarket of the photocopiers.[59] Kodak tried to drive its competitors out of the market by extorting agreements from its equipment manufacturers not to sell parts that fitted Kodak's equipment to anyone other than Kodak. The courts, which examined Kodak's war against its competitors, found this strategy to be a violation of §2 of the Sherman Act and, as a consequence, these contracts were invalidated.

An alternative strategy that Kodak could have employed and thereby attract less attention from the courts is MFC agreements. By signing MFC agreements with the equipment manufacturers, Kodak could have raised the costs of its competitors in the aftermarket and eliminate the trading of its used copiers.[60]

Indeed, the strategy of raising rivals' costs was suggested by several economists as a device to overcome the durapolist problem.[61] The technique itself in the general context of a 'manufacturer' who is interested in MFC clauses in order to erect entry barriers was

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[59] *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451 (1992); *Image Technical Services v. Eastman Kodak Co.*, 125 F.3d 1195 (9th Cir. 1997). *See*, also: Mackie-Mason & Metzler [1999].

[60] It should be noted that Kodak's main purpose was to acquire exclusivity in the aftermarket, and this was the focus of the case. Yet, it seems that another purpose was to eliminate the secondhand markets for Kodak's copiers since it also quadrupled some of its fees to begin servicing a copier bought from someone other than Kodak. Mackie-Mason & Metzler [1999], at 401.

Klein [1993] suggested that MFC clauses between Kodak and its *customers* could have limited the problem of Kodak's market power in the aftermarket. Such clauses would have forestalled the power of Kodak to raise the maintenance costs for its existing customers without raising these costs for its new customers. This sort of price discrimination was a main concern of the Kodak courts. One of the implications of Klein's suggestion is that MFC clauses between a seller and its *customers* regarding *maintenance services* for its primary goods may limit the seller's ability to eliminate the secondhand market. This argument holds only if the market for the primary goods is competitive. In the *Kodak* case, in contrast to the assumption of the Supreme Court, the market was not competitive. Kodak and Xerox shared a duopoly in the market for high-volume copiers.

[61] *See infra* note 99 and accompanying text. For a discussion about the strategy of raising rivals' costs in the context of MFC clauses *see*: Krattenmaker & Salop [1986], at 275 n. 207; Baker [1996], at 523-526. For a technical analysis *see*: Salop & Scheffman [1987] (implicit analysis); Ordover, Saloner & Salop [1990].

condemned by several courts,[62] but unfortunately other courts did not acknowledge its anticompetitive effects.[63]

D. The Manipulative Durapolist: Durability Reduction and Technology Manipulation

D.1. A Business Acumen but not Necessarily a Superior Product

In *Grinnell* the Supreme Court stated that "[t]he offense of monopoly under §2 of the Sherman Act has two elements: (1) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a *superior product, business acumen, or historic accident*."[64] This section examines some of the prevailing conducts of durapolists, which involve a business acumen but not necessarily a superior or desirable product, and which may be intended to acquire and maintain market power.

Technology manipulation, and particularly suppression of technology, is a favorite theme of urban legends and spooky tales. The accumulation of solar-technology patents by the *oil companies*, the introduction of 'terminator seeds' by *Monsanto*, and the suppression of a pain-control device by *Johnson & Johnson* are only a few examples for

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[62] *See*, for example: *Reazin v. Blue Cross & Blue Shield of Kan., Inc.*, 899 F.2d 951, 970-971 (10th Cir. 1990), *cert. denied*, 497 U.S. 1005 (1990) ("the jury could reasonably have concluded that [the most-favored-nations clause contributed to] Blue Cross' power over price").

[63] *Ocean State Physicians*, at *supra* note 42.

[64] *United States v. Grinnell Corp.*, 384 U.S. 563, 570-571 (1966) (emphasis added).

such stories.[65] Nevertheless, such schemes are generally not looked upon favorably in the courtroom, although durability is associated with competition at least implicitly.[66] Traditionally, courts have refused to interfere in business decisions concerning the use of technologies mainly because of the involved intellectual property rights.[67] These implications of the antitrust – intellectual property intersection are beyond the scope of this paper.

The section examines whether there are justifications on antitrust grounds to interfere in business decisions concerning durability. These justifications are the prerequisite for the practicability of analysis of the intellectual property – antitrust intersection in this context. The section provides a distinction between two types of technological reductions of durability and their respective analysis.

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[65] For the solar-technology patents *see*: Jensen [1997], at 102-103; Berman & O'Connor [1997]. For the cases of the pain-control device and Monsanto's terminator seeds *see* D.3.2 below.

[66] *See*, for instance: *National Society of Professional Engineers v. United States*, 435 U.S. 679, 695 (1978):

> "The assumption that competition is the best method of allocating resources in a free market recognizes that all elements of a bargain – quality, service, safety, and durability – and not just the immediate cost, are favorably affected by the free opportunity to select among alternative offers."

[67] *See*: *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405 (1908) ("[T]he very essence of the right conferred by the patent, as it is the privilege of any owner of property to use or not to use it, without question of motive." at 429.) *Hartford-Empire Co. v. United States*, 323 U.S. 386, 432-33, *clarified*, 324 U.S. 570 (1945):

> "A patent owner is not in the position of a quasi-trustee for the public or under any obligation to see that the public acquires the free right to use the invention. He has no obligation either to use it or to grant its use to others. If he discloses the invention in his application so that it will come into the public domain at the end of the 17-year period of exclusive right he has fulfilled the only obligation imposed by the statute. This has been settled doctrine since at least 1896" (footnote omitted).

Cf. Special Equipment Co. v. Coe, 324 U.S. 370 (1945) (Justice Douglas, dissenting). *See* also: *Automatic Radio Mfg. Co. v. Hazeltine Research, Inc.*, 339 U.S. 834 (1950); *SCM Corp. v. Xerox Corp.*, 645 F.2d 1195, 1204 (2nd Cir. 1981):

> "No court has ever held that the antitrust laws require a patent holder to forfeit the exclusionary power inherent in his patent the instant his patent monopoly affords him monopoly power over a relevant product market."

D.2. Planned Obsolescence: Built-In Durability vs. Variable Durability

A durapolist, as showed in section B, is better off when the durability of his products is lower and, hence, he has incentives to reduce durability. Professor Coase himself, when addressed the durapolist problem, suggested that he may reduce durability in order to overcome his time-inconsistency problem:[68]

> "[Some durapolists have the alternative] to make the good less durable. This may raise the costs of providing the stream of services afforded by the durable good, may result in charges over the future which have a [greater] present value… If a less durable good is produced, a higher price can be charged because consumers do not have to fear an increase in supply if they buy at the monopoly price."

Indeed, reduction of durability is allegedly a prevailing practice among durapolists, who may determine the durability either before the goods are released on the market or afterwards. When durability is determined before the goods are released into the market, it is built into the products (*built-in durability*), such as in the example of the light bulb. Durability, however, does not necessarily have to be planned (built-in) in advance and can be determined after the products are released into the market (*variable durability*). Annual style changes of cars and revised editions of textbooks are examples of the technique, which is employed in order to make *used* goods obsolete.[69] *Planned obsolescence*, the

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[68] Coase [1972], at 147

[69] *See*: Fisher et al. [1962] (empirical study of the costs of the annual model changes in the automobile industry); Yale's Note [1971] (antitrust implications of reduced variable durability in the automobile industry); Selander [1973] (a response to Yale's note); Miller [1974] (formal description of planned obsolescence in the textbook industry). *See* also Ferguson [1969] (preface to MICROECONOMIC THEORY, rev. ed.):

> "Since everyone knows the basic reason for a revised edition is to kill off the existing used book market, it would be idle to suggest otherwise" (at vii).

economic term for intentional reduction of durability, refers, therefore, to both reduced built-in durability and reduced variable durability.[70] These two methods of reduction of durability are inherently different in their causes and in their impacts and hence require distinctive discussions.

D.3. Reduced Built-In Durability

D.3.1. Policy Considerations

Built-in durability was presumed in the model presented in section II, and its reduction is the most direct way to reduce durability in order to overcome the durapolist problem.

This strategy raises a skepticism around the motives of a firm that holds a superior technology to suppress it. A suppression of technology by a durapolist exposes him to a higher threat from fringe firms, which might take over the market by introducing a superior technology.[71] Thus, for example, the durapolist of one-year bulbs who choose not to introduce bulbs with a longer lifetime creates incentives for fringe firms to enter the market with such bulbs. This skepticism, however, does not enjoy a general acceptance. There is a strand of thought that argues that market imperfections and historical events

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[70] For discussions regarding reduced built-in durability, *see*: Bulow [1986]. For reduced variable durability *see*: Bartkus [1976] (legal implications of alleged reduced variable durability with a focus on the computer industry); Rust [1986] (formal analysis of reduced variable durability); Waldman [1993]; Lee & Lee [1998].

[71] Baker [1995]; A representative line of this skepticism is the *Swan's independence result*, which presumably rebuts any relationship between market structure and quality or durability of products. *See*: Swan [1970a, 1970b, 1971]. For a survey of the literature in this issue until 1982 and the flaws of Swan's independence result, *see* Schmalensee [1979]; Liebowitz [1982].

may contribute to the persistence of monopolies with inferior products.[72] Furthermore, it is often argued that a monopolist may use 'sleeping patents' as a strategic device to restrain the fringe firms, or simply to overcome the durapolist problem.[73]

To the extent of their reliability, some of the alleged schemes regarding reduced built-in durability might be explained as attempts to overcome the durapolist problem. These schemes, however, are usually unobservable and more importantly unverifiable and, therefore, they cannot be addressed by the courts or antitrust agencies. Furthermore, reduced built-in durability may be coupled with complicated business circumstances and ambiguous market conditions which make its undesirability very vague. For example, the costs of higher built-in durability might be higher than what consumers are willing to pay. In the model presented in section B, it was assumed that the production costs are zero for any durability. In many instances, however, the production costs increase with the durability and thus higher durability does not always meet the demand either because of imperfections of the capital markets or because the rate of the increase in the production costs is higher than the rate of the increase in durability. Fixed costs, such as investments in R&D activities, amplify of course these effects.[74]

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[72] *See* for example: Williamson [1975], at 176-233; David [1985]; Klemperer [1987]; Arthur [1994]; Lee & Lee [1998]; Hendel & Lizzeri [1999].

[73] *See*: Gilbert [1981]; Gilbert & Newbery [1982]; Karp & Perloff [1996]. *See* also: Kaysen [1956], at 78-91 (description of the fashions United Shoe Machinery used its patents to maintain its market power).

[74] When the capital markets are imperfect the consumer who is willing to pay x for a one-year bulb, for example, will not always have the financial ability to pay $3x$ for a three-year bulb. For a formal analysis of a durapolist with increasing costs, *see* Kahn [1986]. *See* also Coase [1972], at 149: "[A] reduction in durability may enable a supplier to provide a given stream of services at lower cost."

Apart from these complications, when the consumer is reluctant to pay more for higher durability, the existence of good justifications for interference in business judgement may seem dubious.

As discussed, such reluctance may stem from a high discount rate or from anticipating inconsistent pricing behavior of the durapolist over time. In addition, Information asymmetry and other market imperfections might also render a reluctance in the consumer to pay more for durability. For example, if the consumer knows the price but her information concerning the durability is imperfect, she may be unwilling to pay a higher price for higher durability.[75] It should be noted that while time inconsistency and information asymmetry are reasons which are endemic to the durapolist's conduct, a high discount rate is not related to the durapolist conduct. This suggests that circumstances of time inconsistency and information asymmetry *may* justify interference in business decisions concerning reduction of built-in durability. Reducing built-in durability in order to overcome the time-inconsistency problem can be regarded as acquiring and maintaining monopoly power as a consequence of illegitimate 'business acumen,' coupled with an inferior product. Likewise, information asymmetry does not justify such illegitimate 'business acumen' and inferior products because there are many mechanisms to overcome information problems. The consumer's high discount rate, however, might indeed blur such justifications. This high discount rate suggests that there is insufficient demand in the market for durability, since the future is worth less to the consumer. Therefore,

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[75] Adverse selection problem characterizes one variant of this reluctance to pay for durability. This may happen when the durability of the 'high-durability goods' is unobserved and varies among different look-like identical goods.

interference in business judgement under these circumstances will generally be socially undesirable.

In short, the practice of reduced built-in durability is not necessarily socially undesirable. There are circumstances under which reduced built-in durability may be socially acceptable. Furthermore, there are sincere doubts about the practical capability of the courts and antitrust agencies to challenge this practice because of circumstantial complexities. Nevertheless, there are circumstances in which their identification warrants judicial or regulatory interference on antitrust grounds.

D.3.2. Some Evidence

The above discussion will remain wholly hypothetical, unless some evidence is provided. Such evidence is brought below in four cases. These cases demonstrate the plausibility of socially undesirable reduction of built-in durability and the need of antitrust treatment of this practice. In light of this purpose, the cases brought below are abbreviated.

(a) The Light-Bulb Industry. The incandescent-lamp cartel, which is used in this paper to illustrate the durapolist puzzle, is probably the most studied case of technology suppression.[76]

Incandescent bulbs have a simple technology which presents a tradeoff between the bulb's lifetime and its efficiency. This tradeoff is determined by the choice of the

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[76] *See*: Stocking & Watkins [1946], at 304-362; Bright [1949] (the most thorough study of the industry and the cartel strategies); Prais [1974]; Avinger [1981]; Reich [1992].

filament's materials and its specific structure. Essentially, the more efficiency (in terms of light and electricity costs) the shorter the lifetime of the bulb. Therefore, the 'superior product' in this case is found by solving an optimization problem with few parameters which has been always known to the bulbs' producers.[77]

There is compelling evidence that this optimization problem has been hypothetically 'solved' by the industry leaders, but in their production lines they had persisted in optimizing their profits, rather than the bulbs' lifetime.[78] As a consequence, for long decades until the 1950's, the lifetime of the produced bulbs was shorter than the optimal in fifty percent and more.[79] This became possible since the industry was cartelized and essentially was functioning as under the rule of one firm.[80] The world industry was organized under an international cartel, *Phoebus*, and domestic markets were

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[77] For a formal presentation of this optimization problem and its solution *see:* Prais [1974].

[78] *See*, for example, Edwards [1944], at 16:

> "Protected from foreign competition, American manufacturers have attempted to increase their business by reducing the durability of their light bulbs. They were able to find an excuse for their action in the fact that the efficiency of a light bulb is in inverse ratio to its length of life; but they were careful not to inform consumers of the decision to sacrifice durability, nor to allow an opportunity for the buyer to choose between more efficient and more durable bulbs."

[79] In one of the antitrust cases against *General Electric*, which dominated the industry, the District Court of New Jersey quoted the following inter-departmental memorandum which was written to executives of General Electric:

> "Two or three years ago we proposed a reduction in the life of flashlight lamps from the old basis on which one lamp was supposed to outlast three batteries, to a point where the life of the lamp and the life of the battery under service conditions would be approximately equal. Sometime ago, the battery manufacturers went part way with us on this and accepted lamps of two battery lives instead of three. This has worked out very satisfactorily…
>
> We have been continuing our studies and efforts to bring about the use of one battery life lamps… If this were done, we estimate that it would result in increasing our flashlight business approximately 60 per cent. We can see no logical reason either from our standpoint or that of the battery manufacturer why such a change should not be made at this time." *United States v. General Electric*, 82 F. Supp. 753, 896-897 (D. N.J. 1949).

[80] The enforcement of the cartel discipline has been a object for study of cartels' stabilization. *See*: Priest [1977], at 340-349; Kaplow [1984], at 1855-1862; Ayres [1987], at 318. For durable-goods cartels, *see* subsection C.5.2.

generally dominated by single firms through their ownership of basic patents and their licensing arrangements with other producers. Within this international 'scheme,' *General Electric* had a major role,[81] and the success of the government in the 1940's in a series of antitrust suits had virtually ended the happy days of the cartel and led to a change in the technological evolution of the industry.[82]

(b) The Razor-Blade Industry. King C. Gillette invented the disposal blades, by which his company, *Gillette*, gained and has maintained a 'global leadership' (as its executives like to state). The incipience of Gillette's blades was in the understanding that reducing durability is often associated with profits.

King Gillette invented the disposal blades following his boss' advice: "King, you're always thinking and inventing: why don't you try to invent something … which when used once, is thrown away and the customer comes back for more?"[83] Disposal blades replaced the traditional, durable straight razor, and there is no doubt that they made a significant contribution to men's daily lives. As Oliver Wendell Holmes noted: "[Shaving with razor blades,] could be performed with almost reckless boldness, as one cannot cut himself, and in fact had become a pleasant amusement instead of an irksome task."[84]

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[81] General Electric has never been an official member of Phoebus, nevertheless, "it has operated in essential harmony with it through foreign subsidiaries and through a long series of licensing agreements with the leading foreign companies, financial investments in them, or both." Arthur [1949], at 307-308.

[82] *See*: Arthur [1949], at 290-302; *United States v. General Electric*, 82 F. Supp. 753 (D. N.J. 1949).

[83] Adams [1978], at 19.

[84] *Ibid*, at 13.

Admittedly, Gillette has maintained its global leadership through endless improvements of its blades; however, the optimization of quality-durability has not always been at the forefront of its executives' motives. In other words, Gillette has not always offered its consumers the "best a man can get." The widespread blades until 1962 were *carbon blades* which had relatively low durability compared to *stainless-steel blades*. Stainless blades were introduced by Gillette in 1928 (the *Kroman blades*), but for various reasons the company decided to abandon this durable technology. Indeed, the archetypes of the stainless blades offered a less smooth and comfortable shave, but at least "some men were willing to sacrifice comfort for durability."[85] Gillette chose to ignore this demand, and it was *Wilkinson Sword*, a small fringe firm, which introduced its stainless blades in 1961. The introduction of stainless blades dramatically eroded Gillette's market share and profits; an erosion which continued until Gillette introduced its own stainless blades in 1963.[86]

Retrospectively, Gillette's costly delay in introducing stainless blades was explained by the preference of low-durability products which supposedly assure more

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[85] *Ibid*, at 240.

[86] Another product that Gillette favored less, despite its relatively *low* durability, is the *disposable razor*. The disadvantage of disposable razors is that in every purchase the consumer makes a costless decision of which razor to buy. In contrast, when the consumer has sunk costs in the razor, a decision not to buy the compatible blades is costly. For this reason, disposable razors are regarded as *'Commodity Hell'* and inferior to durable razors with disposable blades. *See* section E (tying arrangements). Gillette's decision not to enter the market of disposable razors caused it yet another painful loss when Bic almost swept the market in the 1970's. Gillette responded to this entry (in its European markets) with a counter-entry, as it did in the case of Wilkinson. *See*: McKibben [1998], at 96-99; James Surowiecki, *The Billion-Dollar Blade*, NEW YORKER, Jun. 15, 1998, at 43:

> "Commodity hell is exactly what American Corporations fear most, because when your product is a commodity – essentially interchangeable with all its competitors – the only way to get market share is to cut the price. That means that your profit margin is continually dropping."

profits,[87] and in the history of Gillette, this decision is perceived as a mistaken business judgement which led to painful losses. Antitrust laws are not designated to replace business judgement, even if this judgement brings about losses for the deciding firms. Yet, Gillette's mistaken decision is ascribed to the period of time beginning in 1956, when the appearance of the stainless blades could have been anticipated, and not to the entire period since it made the decision to abandon the stainless blades.

Therefore, it is suggested, some antitrust attention should have been drawn to Gillette's conduct in this period of time and especially to its relationships with the fringe firms. The case of the stainless blades illustrates that a durapolist who sticks to a low-durability technology might eventually lose its position to fringe firms with superior products. This, however, may occur only if the durapolist does not stifle the developments of the fringe firms, as might be the case of the stainless blades. Gillette's patents on the stainless-blade technology were quite broad and even Wilkinson Sword was forced to pay a royalty to Gillette because its blade technology was covered by Gillette's patents. It is plausible, therefore, that Gillette, which virtually did not market stainless blades, fought against commercial attempts to introduce stainless blades through its intellectual property rights on this technology and by other means.[88]

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[87] McKibben [1998], at 56-59; Adams [1978], at 238-247, and particularly at 242:

> "A mammoth defection to a stainless blade costing about twice as much, but lasting some three to four times as long, would have an obviously unpleasant impact on profits."

[88] *See* for example: *Gillette Safety Razor Co. v. Triangle Mechanical Laboratories Corp.*, 13 F. Supp. 194 (E.D. N.Y. 1935), *rev'd*, 87 F.2d 699 (2nd Cir. 1937).

(c) The Pain-Control Technology. Very few cases of technology suppression have been brought before the courts. *McDonald v. Johnson & Johnson* is one of them.[89] In 1974, Johnson & Johnson (*J&J*), a manufacturer of pharmaceutical products and other goods, acquired StimTech. StimTech was a small firm that held a few patents on an innovative, electronic pain-control device, which potentially would have competed with J&J's pain-control drugs. Needless to say, in comparison to pain-control drugs, the device had two major 'disadvantages': it was durable and it was non-addictive.

These disadvantages could be translated to numbers. In 1983, one chronic-pain sufferer cost taxpayers $16,029 for worker's compensation and healthcare in two years. In contrast, these costs when the device was used were $1,351.[90] By selling drugs, therefore, J&J could presumably reap some of this difference. In 1979, the former owners of StimTech sued J&J with three allegations: violation of antitrust laws, breach of contract and fraud. The alleged antitrust violations referred to the suppression of the industry of pain-control devices. In the trial court the plaintiffs were awarded $170.4 million (treble $56.8 million compensatory damages) for violations of the Sherman Act. But in appeal, the Court of Appeals for the Eighth Circuit vacated the antitrust judgement on standing grounds. Therefore, the court of appeals did not examine the antitrust implications of J&J's conduct, although it held that the "plaintiffs' proof of acquisition and suppression

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[89] *Johnson & Johnson v. McDonald*, 537 F. Supp. 1282 (D. Minn. 1982), *rev'd*, 722 F.2d 1370 (8th Cir. 1983). *See* also: *Alling v. Universal Manufacturing Corp.*, 7 Cal. Rptr. 2d 718 (Ct. App. 1992) (fluorescent technology).

[90] Francesca Lunzer, *No Pain, No Gain*, FORBES, Nov. 21, 1983, at 321. *See* also: Anonymous, *New Killers of Chronic Pain*, BUS. WEEK, Dec. 10, 1979, at 127.

[of technology does not meet] traditional tests of establishing a per se violation of restraint of trade under section 1 [of the Sherman Act]."[91]

This case of the pain-control device involved financial and marketing complications, but again its alleged 'scheme' seems similar to the previous cases – suppression of a durable technology in the interest of higher profits.

(d) Monsanto's Terminator Seeds. In May 1998, *Monsanto*, the world's third largest seed corporation, acquired *Delta & Pipe Land*, a large American cotton-seed company. Two months earlier, Delta & Pipe Land and the USDA were awarded a patent on a technique that genetically disables a seed's ability to germinate when planted a second season.[92]

Some observers claim that the new seeds are designed to abolish the ancient practice of farmers to save seeds from one growing season and plant them in another season. Simply put, it is argued that the 'durability' of the new seeds is lower in order to force farmers to buy seeds more often.[93]

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[91] *McDonald v. Johnson & Johnson*, 722 F.2d 1370, 1373 (8th Cir. 1983).

[92] The patent covers various types of corps and not only cotton and it was awarded to both Delta & Pipe Land and the US Department of Agriculture since the USDA invested in the research. At the time of this writing, Monsanto's acquisition is still under regulatory scrutiny. *See*: Tokar [1998]; Ferrara [1998]; Karen Lundegaard, *Ga. Growers Sue Maker of Cotton Seeds*, WALL ST. J. (interactive ed.), Mar. 24, 1999; Leora Broydo, *A Seedy Business*, MOTHER JONES, Apr. 7, 1998 (<http://www.motherjones.com/news_wire/broydo.html>).

[93] According to observers the goal of reducing the 'durability' of Monsanto's seeds is not new and Monsanto has tried to achieve this purpose by contractual means. Thus, it is reported, that Monsanto requires farmers to sign agreements promising not to plant seeds that their crops produce. These agreements, of course, are inferior to terminator seeds since it is too costly to enforce them. *See*: Jeffrey Kluger, *The Suicide Seeds*, TIME, Feb. 1, 1999, at 44; BARNABY J. FEDER, *Plant Sterility Research Inflames Debate on Biotechnology's Role in Farming*, N.Y. TIMES (interactive ed.), Apr. 19, 1999.

At the time of this writing, the new seeds have not been commercially marketed yet and, therefore, their impact could not be estimated. Nevertheless, the acquisition of Delta & Pipe Land by Monsanto represents more than a 'merger' between two firms in a concentrated industry, and attention should be drawn to the presumable durability aspects.[94]

D.4. Reduced Variable Durability

D.4.1. Outlook on the Private Costs-Benefits of Variable Durability

Variable durability, as discussed, is durability which is determined after the good was released into the market. Variable durability has several forms but for the purpose of simplicity only the form of frequent introductions of new *styles* (or *models*) of durables is discussed here. In this section, the terms *model* and *style* refer to a version of a product and the terms *new model* or *style* refer to a new version which differs from the previous version in one variant or more, regardless of their significance.

It is not so obvious why, if at all, reduced variable durability may assist in overcoming the durapolist problem. Reduced variable durability may coincide with the durapolist's time-inconsistency problem itself.[95] Consider the introduction of a new-model car. If the consumer is willing to pay a premium for the new model, this

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[94] The concerns of the Department of Justice seem to focus on the vertical aspects of the merger and, in particular, the interrelations between the development of crops and their production. Durability may be one facet of these concerns. *See*: Jerry Guidera, *Justice Department Picks on More than Cotton in Monsanto Bid*, DOW JONES NEWSWIRES, Jul. 1, 1999; David Barboza, *Monsanto Faces Growing Skepticism on Two Fronts*, N.Y. TIMES (interactive ed.), Aug. 5, 1999.

[95] Waldman [1993], for example, described reduced built-in durability as the 'cure' for the durapolist problem and reduced variable durability as the 'illness' (the durapolist problem.)

introduction essentially decreases the value of the previous model(s). Therefore, if the consumer anticipates such an introduction, the initial price she is willing to pay for the new car is bounded. The consumer anticipates introductions of new-model cars presumably because a car durapolist may find it hard to resist the temptation of introducing a new model. Past sales shrink the residual demand for new cars with which the durapolist is faced and, hence, the durapolist has incentives to expand the residual demand by offering new cars with slight, fashionable changes. In short, reduced variable durability presumably represents the durapolist who does not internalize the effects of his present behavior on the value of the durables he previously sold, and as a result may render some inefficiencies or profit reduction.[96]

Inconsistent behavior of the durapolist, however, may be only a partial explanation for the practice of frequent introductions. Considering the prosperity of durapolists who employ this practice, their inconsistent behavior appears to be negligible in this context. Indeed, the standard explanations for this practice attribute it to the very consistent behavior of profit maximization.

The consistent behavior hypothesis furnishes two types of explanations for profit-maximization behavior which do not coincide with each other. These two are strategic behavior and economies of scale, and both rely on the premise that higher frequency of introductions of new models requires from actual and potential competitors more capital to compete effectively. Generally, small firms are more sensitive to high capital requirements than big firms since their costs per unit are higher. Small firms' costs per

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[96] For representative analyses of this argument *see*: Miller [1974]; Waldman [1993].

unit are higher because they can spread the costs of the design, engineering, retooling and advertising only over a small volume of production.[97] As a consequence, frequent introductions are more costly for small firms than for big firms.

The explanations of strategic behavior, such as predatory conduct and raising rivals' costs, maintain that the practice is used to exclude competition and sometimes even involves losses in the short run.[98] In contrast, many commentators assert that the practice ought to be viewed merely as a legitimate and desirable use of scale economies.[99]

It seems, therefore, that although time-inconsistency may urge durapolists to accelerate the frequency of introductions of new models, it is not a central motive for this practice. The prevailing use of this practice by highly profitable firms, such as the automobile manufacturers in their glamour days, presumably indicates that the influence

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[97] This argument is virtually a mirror image of the argument which links marginal costs to durability. If the marginal costs are higher regardless of the durability, let say because of a tax per unit, the durapolist's monopolistic price for a one-year bulb is higher than one-third of the monopolistic price of a three-year bulb since his markup will be significantly lower. As a result he will be induced to offer three-year bulbs (or longer cigarettes instead of shorter ones). *See*: Barzel [1976] (analysis of tax per unit); Pashigian, Bowen & Gould [1995] (analysis of the impact of increase in the costs of introducing new cars on the frequency of introductions).

The latter logic led several economists to suggest that a durapolist who keeps his marginal costs high is also unlikely reduce prices and, therefore, his time-inconsistency is mitigated. Namely, high marginal costs as a device to overcome the durapolist problem. *See*, for example: Bulow [1982]; Kahn [1986]; Karp & Perloff [1996].

[98] *See:* Menge [1962]; Yale's note [1971]; Bartkus [1976]; Ordover & Willig [1981]; Ordover, Sykes & Willig [1983]; Sidak [1983]; Petty [1988]; Kwoka [1993].

[99] *See*, for instance: McGee [1973] (the study was sponsored by Ford); Selander [1973] (the study was conducted during a clerkship for General Motors); Pashigian, Bowen & Gould [1995]; Scherer [1996], at 291-295; Areeda & Turner [1975], at 732:

> "The design, engineering, and retooling costs of any particular variation will obviously be less costly per unit when spread over a larger volume of production…
>
> Yet the disadvantages from which small rivals may suffer do not warrant antitrust attack on the monopolist who exploits them. The small-volume producer has the option of maintaining an unchanged product while offering buyers the benefit of the costs saved by avoiding changeovers. If the cost savings are negligible as compared to costs of the large producer who does changeover, the small rival is simply the victim of economies of scale."

of the consistent behavior hypothesis is the decisive one. Yet, one joint underlying assumption of the time-inconsistency and the consistent behavior hypotheses must be examined. The two hypotheses, on their different variants, premise that the consumer is willing to pay a premium for a new style. In many instances new styles include only slight changes, which sometimes are merely cosmetic and insignificant and, hence, the willingness to pay renders losses for the consumer since it presents a decline of the opportunity costs of holding a used durable (or buying such) when a new style is introduced.[100] Therefore, the underlying assumption proposes a puzzle: why is the consumer willing to pay a premium for a new style and thereby render a loss of value to her old goods or the good she has just bought? Or, to put it differently, *why is the consumer willing to pay more for a lower durability?*[101]

One explanation is that the consumers simply like 'new' goods and even small changes are worth a lot for them. Other explanations may suggest that the consumer choice is impaired because of various market failures. Four of these explanations discussed below: (a) imperfect information and bounded rationality; (b) a free-riding problem; (c) network externalities; and (d) bounded freedom of choice in consumption.

(a) Imperfect Information and Bounded Rationality. The simplest (and the most controversial) explanation, for the consumer's willingness to pay a premium for

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[100] Pashigian, Bowen & Gould [1995] provided statistical evidence to the correlation between loss of value of used durables (cars) and introductions of new durables. One aspect of this evidence is that when the changes between two models *seem* to be less significant the depreciation of used goods is lower. *See* also: Lazear [1986] (dynamics of downward price course of new goods).

[101] In section B, it was assumed that generally the consumer was willing to pay more for a higher durability. It was also discussed that when the discount rate of the consumer was high, she was willing to pay less for

insignificant product variations (or lower durability) is that she does not rationalize her decisions. Quantifying the value of deluxe seatbelts, power steering, or alternatively, renovations of the ninth edition of the Durapolist's Handbook is not an easy task and it is affected by many factors, such as advertising, fashion trends and misconceptions. This reason is one of the main explanations for the success of the practice of the three-year cycle in the American automobile industry which had lasted for almost fifty years until the 1970's and is discussed below.

(b) A Free-Riding Problem. Unlike the durapolist, who is a single producer, consumers are many and dispersed. Given their collective-action problem, each consumer takes the prices of all goods (used, new, and prospective used) as given due to her insignificant impact on them. Consequently, each consumer sees in front of her the positive value in purchasing a new model coupled with the negligible loss of value of her old durable. Alternatively, the consumer does not grasp that her preference of a new-model durable over a used, old-model durable virtually renders a loss of value of the durable she has just purchased.

(c) Network Externalities. Network effects are the value of a good for its owner that is ascribed to the number of users of the same good.[102] Correspondingly, network externalities are the marginal value for present consumers that is brought about by a new consumer. This value, as discussed below, can be either positive or negative. When it is positive, the consumer is supposedly unlikely to switch to another good and

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additional durability. Yet, even when the durability was infinite the consumer was not willing to pay less for higher durability, but rather the same price for any durability.

correspondingly, when it is negative the consumer is likely to switch. Both positive and negative network externalities may provide another explanation for the consumer's willingness to pay for 'insignificant' style changes.

(c1) Positive Network Externalities. Additional consumers of specific model car spur the demand for complementary goods, such as garage services and replacement parts, and as a result reduce the prices of these goods. Durable-goods producers sometimes use these effects to pull consumers to new products by an *asymmetric compatibility*. In this context, asymmetric compatibility means a backward compatibility of new models with no forward compatibility of older models.

In the presence of asymmetric compatibility, users of a new model enjoy the network externalities caused by the users of both the old model(s) and the new one, while users of the old model(s) do lose some of the network effects when one of them switches to a new model. Thus, the introduction of a new product, which is characterized with an asymmetric compatibility, may render a depreciation in the old goods and willingness to pay for the new product.

Classic examples for asymmetric compatibility are the file formats of Microsoft's Word and Excel. Old versions of Word and Excel cannot read the files of newer versions, while the new versions can read and convert the files of older versions. Furthermore, a user of a new version can convert her files to the formats of old versions and thereby she is not discouraged from buying a new version.

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[102] *See* generally: Liebowitz & Margolis [1998]; Shapiro & Varian [1999].

(c2) Negative Network Externalities. As noted, networks may also present negative externalities in different contexts and especially in those which are related to fashion. Physical similarity, as opposed to functional similarity, is not favored by fashion fans. From their point of view, the similarity is a negative network externality which dims their quality signals (being 'in' and unique.) Insignificant changes in shape, color and style may temporarily offset these types of negative externalities, while keeping the positive ones, which are attributed to functional similarities. Thus, for example, paying a premium for a car with an exceptional color, decorations and leather may offset the negative externalities of similarity without losing the positive externalities which are presented in garage services and replacement parts. This premium reflects the consumer's willingness to pay for 'insignificant changes,' in order to signal her quality.[103]

(d) Bounded Freedom of Choice. Students do not choose their textbooks although they pay for them. In contrast, their professors who choose the textbooks for them get the textbooks for free and their costs are merely the revision of their class notes. The professors, therefore, do not internalize the full costs of their choice of textbooks. The alternative may be favorable. Persistent instruction with old editions decreases the costs to students because of the robust market for secondhand textbooks. In general, whenever the one who dictates the standard of the consumed durables does not internalize the full costs of her decision, a costly shift to a slightly changed model of durables may occur.

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[103] For early economic writing on fashion demand, *see* Leibentsein [1950]; Robinson [1961]. For recent studies *see*: Pesendorfer [1995]; Bagwell & Bernheim [1996]. The sociologist *Georg Simmel* articulated (implicitly) this combination of positive and negative externalities regarding fashion:

> "[F]ashion expresses and at the same time emphasizes the tendency toward equalization and individualization, and the desire for imitation and conspicuousness." (Simmel [1904], at 308).

D.4.2. Policy Considerations

Reduced variable durability appears to be a confusing phenomenon from the legal point of view. On the one hand, it imposes costs on the consumer, but on the other hand it seems to furnish many benefits especially to durapolists, but also to consumers and to the general technological and social progress. These cost-benefit complications raise doubts concerning the desirability of antitrust intervention in this practice[104] and, indeed, several courts have held that the consumers' preferences should determine the value of introductions of new models and not any antitrust tribunal.[105]

As discussed, reduced variable durability is partially possible because of well-known market illnesses, such as information asymmetry, free riding and network externalities. Antitrust policy often addresses these market imperfections in different contexts and, therefore, it is unclear why reduced variable durability causes confusion, and should be exempted from the scope of antitrust laws. In the presence of market imperfections the revealed consumers' preferences are distorted and, therefore, a desirable

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[104] *See*, for instance: Areeda & Hovenkamp [1996], ¶781b:

> "[M]ore troubling is a product's new attribute that is claimed to be a significant advantage when "in fact" it is not… [O]ne might doubt that significant market power could arise from such claims for goods purchased by ultimate consumers. More fundamentally, rivals cannot be injured unless buyers prefer the attribute that you or we consider unimportant. But if buyers want it, is an antitrust court entitled to say that buyers should not have it? We doubt that the court has any choice but to accept the consumer sovereignty, especially in the absence of any criteria or calculus for deciding otherwise."

[105] *See*: *California Computer Prods. v. IBM*, 613 F. 2d 727, 744 (9th Cir. 1979); *Berkey Photo v. Eastman Kodak*, 603 F. 2d 263, 287 (2nd Cir. 1979):

> "[N]o one can determine with any reasonable assurance whether one product is "superior" to another. Preference is a matter of individual taste. The only question that can be answered is whether there is sufficient demand for a particular product to make its production worthwhile, and the response, so long as the free choice of consumers is preserved, can only be inferred from the reaction of the market…

antitrust policy should take these imperfections into account. Indeed, antitrust agencies or courts should *not* determine which technology or model is superior or better for the consumer; however, as in other contexts, they should acknowledge that the revealed preferences may be distorted and, therefore, to direct their remedies toward these market imperfections. Essentially, *this* approach is the standard antitrust view, as opposed to any other suggestion.[106]

D.4.3. Some Evidence

This subsection briefly presents two industries in which reduced variable durability is employed: the automobile industry and the color industry. Admittedly, the following descriptions are very abbreviated and do not assume to represent the general practice of frequent introductions of new models. Nevertheless, I believe these examples illustrate that generally durapolists may benefit from the practice at the expense of the consumers. Furthermore, the examples demonstrate that traditional anticompetitive practices and concentrated market structures may facilitate the practice of frequent introductions. This suggests, again, that at least in some instances ignoring the anticompetitive effects of the practice practically deviate from the standard antitrust approach.

> *If a monopolist's products gain acceptance in the market, therefore, it is of no importance that a judge or jury may later regard them as inferior*, so long as that success was not based on any form of coercion." (emphasis added.)

[106] *See* Kaplow [1985], at 536-537:

> "In fact, the whole of antitrust concerns the study of imperfect markets. Thus, it seems obviously counterproductive to carry on antitrust analysis without carefully addressing the possibility that defects in the competitive process are central to understanding the behavior under scrutiny."

(a) The Automobile Industry. As mentioned, most of the writing in the field of reduced variable durability has concentrated on the American automobile industry between the 1920's and the 1970's. In this period of time, the industry was controlled by the Big Three (General Motors, Ford and Chrysler), who employed various anticompetitive practices such as tying and vertical arrangements.[107] In addition, the Big Three practiced a reduced variable strategy of a *three-year cycle*. A cycle began with the introduction of a new design, followed by a 'minor facelift' in the second year, and ended with a 'major facelift' in the third year.[108] These cycles provided commentators with an abundant field of debate over the nature of the practice.

Indeed, many commentators have produced appealing arguments, which were usually very detailed as the complexity of an industry of multi-production-lines provides. Nevertheless, reality has provided the simplest, but yet the most compelling evidence. Under competition, the frequency of introductions of new models is lower, while the quality of the products increases faster.[109] Commencing the 1970's, which were characterized by a dramatic strengthening of foreign competitors, the frequency of

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[107] During this period of time General Motors held on average a market share of 46%. In 1969, for example, ninety-seven percent of domestic production of passenger vehicles was held by the Big Three (General Motors – 53.7%; Ford – 26.3%; Chrysler – 16.9%). The Big Three had also accounted for about ninety percent of automobile sales in the United States between 1935 to 1970. STANDARD & POOR, INDUSTRY SURVEYS: *Autos – Basic Analysis* (Oct. 1, 1970), at A161. For discussions, *see*: Menge [1962]; Fisher, Griliches & Kaysen [1962]; Yale's Note [1971]; Selander [1973]; Kwoka [1993]; Pashigian, Bowen & Gould [1995]; Baker [1995]; Scherer [1996], at 279-335.

[108] Scherer [1996], at 291-295.

[109] Scherer & Ross [1990], at 254-256; Scherer [1996], *id*; Baker [1995]. For the face of the industry today *see*, for example: Fara Warner and Gregory L. White, *Ford Bets on Safety, not Style, for Comeback of the Taurus*, WALL ST. J. (interactive ed.), Mar. 30, 1999:

> '"People tell me the Camry is plain vanilla," says Don Esmond, general manager of Toyota's U.S. sales unit. The Camry has been the top-selling sedan in the U.S. for two years running. "I tell them that vanilla is still the No. 1-selling ice cream." … Mr. Esmond says … that

introductions of new model cars fell significantly, while the quality of cars in terms of safety, energy consumption and air pollution had generally increased.[110] Since the 1980's, the automobile manufacturers introduce new models usually twice a decade, presumably because of the cutthroat competition.[111]

In short, while the cause of accelerated introductions of new cars is perhaps vague, it might be a mystery why they do not take place under competitive conditions as the theoretical analysis predicts.[112]

(b) The Color Marketing Group. In 1998, when the khaki color was seen everywhere, you probably knew that the fashionable colors were green and yellow. After all, intelligent readers are always acquainted with the fashion's order. However, did you know in January 1999 that the color of the beginning of the new millennium would be blue? If not, you would probably be interested to know that *the Color Marketing Group* (*CMG*) 'forecasted' it accurately.[113]

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consumers in the mid-size car market rank safety features ninth among the top 10 reasons for choosing their car. Leading the list? Reliability and dependability."

[110] Obviously, the energy crisis and of the 1970's and other macroeconomic factors have significanlty contributed a lot to this trend. There is also some evidence that the costs of introducing new models have increased and therefore the practice was less profitable. Pashigian, Bowen & Gould [1995].

[111] See: Keith Bradsher, *Car Makers Get Strong Start To 1999 Sales*, N.Y. TIMES, Feb. 3, 1999, at C1; Anonymous, *A New Kind of Car Company*, ECONOMIST, May 9, 1998, at 61; Anonymous, *Could it Happen Again?*, ECONOMIST, Feb. 20, 1999, at 19.

[112] One explanation is that competitive conditions in industries which are characterized with fashionable goods, render monopolistic competition with differentiated goods. This sort of competition puts pressure on producers to maintain high prices and therefore, their incentives to introduce new goods are lower. *See:* Pesendorfer [1995].

[113] Daniel M. Gold, *Blue M&Ms were Just the Beginning*, N.Y. TIMES (interactive ed.), Dec. 27, 1998; Ben Pappas, *Out with the Yellow, in with the Blue*, 163 FORBES 47, Jan. 11, 1999.

CMG is an international trade association, based in Alexandria, Virginia, which repeatedly succeeds in forecasting future fashionable colors.[114] The group was established in 1962 in the interests of saving the world from the aftermath of the postwar color technology, "which had so expanded the usable universe of hues that without some sort of coordination, the public was in imminent danger of being overwhelmed by mismatched home furnishings, clashing car interiors, repellent fashion combinations."[115] In short, CMG was established to save the consumers from a crisis of widespread bad taste due to an overwhelming supply of choices.[116]

CMG's unprecedented success in forecasting the future requires an explanation, which perhaps lies in the fact that CMG's members "include in-house color marketers at Fortune 500 companies[117] as well as color consultants who charge tens of thousands of dollars for a two-week assignment."[118] This, however, is not the only reason for the self-fulfilling prophecy of CMG. No less important is the wide coverage of CMG's

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[114] Garry Trudeau, *Hues You Can Use: Will That Taupe Fabric Still be Hot Next Year? Stand by. The Color Cartel is on the Job*, TIME, Jan. 27, 1997, at 67:

> "[The] Color Marketing Group [is] the Virginia-based color cartel that has held a largely unknowing public under its sway for more than 30 years. It was the CMG that forecast avocado refrigerators in the late '60s and mauve motel rooms in the '70s and hunter-green automobiles in the '90s. And it was the CMG that predicted the 1996 consumer palette would be, in the words of former president Laraine Turner, "kissed by the yellow.'"

[115] *Ibid*.

[116] According to CMG's publications, it is "a not-for profit, international association of 1,500 Color Designers involved in the use of color as it applies to the profitable marketing of goods and services."

[117] CMG hosts several leading competitors from the automobile industry, such as Ford, General Motors, Mercedes-Benz, Honda, Toyota, Volkswagen, and others. Likewise, competitors like Adidas, Nike, and Reebok also find it useful to forecast together the future colors. Indeed, this appeal of joint forecasting seems to attract competitors from many industries to CMG.

[118] Deborah L. Jacobs, *The Titans of Tint Make Their Picks*, N.Y. TIMES, May 29, 1994, at C7. *See* also: Daniel Akst, *The Culture of Money: Having Our Colors Done*, N.Y. TIMES, Apr. 4, 1999, at C6:

predictions by the media, which assures that manufacturers will follow them.[119] It is not surprising, therefore, that some observers have defined the 'mission' of CMG's conferences as "[determining] which colors will be big sellers on the nation's clothing racks, showroom floors and supermarket shelves."[120] Or, as the slogan of CMG goes: "Forecasting the Color of Profit."

To be sure, the coordination of future fashionable colors is essential for durapolists and their weaker relatives, the durable-goods producers, in employing costlessly reduced variable durability. Changing the colors of durables every season does not require retooling of the production lines nor an increase in the advertising budget. However, such a change does not make the durables of the last season obsolete as long as their colors are still sold on the market for the same price. Therefore, a coordination of all the central fashion leaders is required in order to use colors as a device to make durables obsolete. CMG presumably facilitates such coordination.[121]

D.5. Applications: Elimination of Secondhand Markets

> "The Mount Olympus of the world of color is an organization called the Color Marketing Group, in which people from various industries get together either to divine or dictate, depending on our level of cynicism, the colors that people will like and want."

[119] It should be noted that CMG is not the only player in the 'color industry,' although it seems to dominate it, considering that its 'competitors' are few and smaller. In general, however, it will not be farfetched to state that the industry is not characterized with competition.

One of the main competitors of CMG, is *the Color Association of the United States* (*Caus*), which was established over eighty-five years ago. This association, according to one of its executive directors "use[s] a little art, a little science, some economics, some psychology [and] some fortune-telling" in order to forecast the next fashionable colors. *See*: Anastasia Toufexis, *The Bluing of America: Color psychology is used routinely to manipulate tastes*, TIME, Jul. 18, 1983, at 62; Lisa Belkin, *The 'In' Colors of '87 are being Picked in '85*, N.Y. TIMES, Dec. 26, 1985, at A1. For the color industry in the United Kingdom, *see*: Stephen Hancock, *The Colours of Money*, MARKETING, Sep. 28, 1995, at 42.

[120] Jacobs, *supra* note 118.

The distinction between built-in durability and variable durability is often blurred and so is the question whether the durability was reduced. This blurring makes the task of dealing with planned obsolescence even harder. Nevertheless, these difficulties only stress the significance of antitrust treatment. As discussed, imperfect information has never been an exception to the antitrust laws, albeit lack of information limits judiciary and regulatory scrutiny to a large extent. Imperfect information, as above mentioned blurring represents, forestalls the existence of healthy competition in the markets and, thus, warrants antitrust intervention.[122] This subsection discusses circumstances in which there might be some uncertainty.

Elimination of secondhand markets is a hybrid type of planned obsolescence. This strategy has the characteristics of both reduced built-in durability and reduced variable durability. Simply put, elimination of secondhand markets cripples the free market and in this sense it constitutes a 'restraint of trade' and renders misallocation of resources.[123] The

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[121] For an interesting theoretical analysis, which predicts fashion cycles in colors, *see* Karni & Schmeidler [1990].

[122] *See*: Beales, Craswell & Salop (1981); Craswell (1982); *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451, 475-476 (1992):

> "Given the potentially high costs of information and the possibility that a seller may be able to price discriminate between knowledgeable and unsophisticated consumers, it makes little sense to assume, in the absence of any evidentiary support, that equipment-purchasing decisions are based on an accurate assessment."

[123] *See*: Salop Scheffman [1987]. The inefficiencies of the *dead hand rule* may illustrate the costs of crippling the secondhand markets. The dead hand rule refers to a situation that the former owner of a good (seller, legator, etc.) restricts the use of the good by the present owner. *See*: Posner [1998], §18.3. The Widener library at Harvard expounds upon these inefficiencies (although *not* a restraint of trade). The library was donated in the memory of *Harry Elkins Widener*, a known bibliophile, who went down with the Titanic. When she made the donation, Widener's mother stipulated that the library could not be remodeled ("not a brick, stone, or piece of mortar shall be changed"). As a result, in order to build a breezeway between the Widener and Houghton Libraries, the architects had to run it out the window to do it legally.

existence of the strategy emphasizes the failure of the theory of the durapolist's indirect control over the secondary market.[124]

Elimination of secondhand markets reduces durability because it delimits the lifetime of a good to the use of its first user, although subsequent users could have used it as well. This reduced durability can be determined both before the durables were released into the market and afterwards. For example, the durapolist can condition the sale with resale restrictions,[125] or after the durables are on the markets the durapolist can recapture them for elimination.[126]

As already mentioned, elimination of secondhand markets has anticompetitive effects other than overcoming the durapolist problem. Usually, this practice is used to handicap rebuilders of equipment and, thereby, to prevent an alternative, cheap source of competing supply of competing durables or maintenance services. Elimination of

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[124] This 'theory' was originated by Judge Lernad in the *Alcoa* case. *See* subsection C.1.

[125] *See*, for example: *Williamsburg Wax Museum, Inc., v. Historic Figures, Inc.*, 810 F.2d 243 (D.C. Cir. 1987) (the alleged wax-figures durapolist imposed resale restrictions).

[126] *See*, for example: *Pacific Mailing Equipment Corp. v. Pitney Bowes, Inc*., 499 F. Supp. 108 (N.D. Cal. 1980) (destroying mailing machines in order to eliminate secondhand markets; the court prohibited the practice); *Allen-Myland v. International Business Machines Corp.*, 33 F.3d 194 (3rd Cir. 1994), *cert. denied*, 513 U.S. 1066 (1994) (IBM recaptured old parts in order to eliminate the secondhand markets); *United States v. Varian Associates*, 1992-1 Trade Cas. (CCH) ¶69,772 (N.D. Ill. 1992) (consent decree prohibiting defendant from acquiring used equipment).

The practice of eliminating the secondhand market is especially popular in the textbook industry. Textbook publishers shred substantial numbers of books to keep them from competing with their titles at full retail prices. They hire companies ("destruction companies") to remove and shred unwanted books. McGraw-Hill, the largest textbook publisher in the US, filed in 1994 a suit against 20 used-book dealers and destruction companies for reselling used McGraw-Hill textbooks scheduled for destruction. McGraw-Hill stated that textbooks valued at $20 million were diverted from recycling shredders from October 1993 to December 1994 and that 60 percent reached the market. Jon Nordheimer, *Pulp Nonfiction: When Textbooks Refuse to Die*, N.Y. TIMES, Aug. 14, 1995, at D7; Anonymous, *McGraw-Hill Settles Suit on Book Reselling*, N.Y. TIMES, Jun. 18, 1996; at D9. It should be noted that in other instances books are destroyed in order to lower the inventory costs.

secondhand goods was condemned by several courts for this reason, [127] while one court also acknowledged the connection between time consistency and such elimination.[128]

Given these reasons for elimination of secondhand markets, the only plausible justification for the practice may be the initial investment in creating the markets (or developing them). It is often argued that the ability of an inventor (or a creator) to recoup his investment in R&D is curtailed because of imitators who have access to his goods. In addition, the durapolist problem implies that even without imitators a gifted inventor may be curtailed as well, because of his time-inconsistency problem. Therefore, under these circumstances, the practice should allowed some immunity from the antitrust laws. In general, however, absent this defense, the durapolist's practices that are designed to eliminate the secondhand market should be considered a violation of §2 of the Sherman Act.

D.6. The Presumable Distinctiveness of Planned Obsolescence

Planned obsolescence, or reduced durability, improves the lot of durapolists. Likewise, tying, predatory pricing, price discrimination, resale price maintenance and other practices may do the same for monopolists (including durapolists). Conceptually,

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[127] *See*, for example: *Varian Associates* (1992); *Allen-Myland* (1994), at 203 n. 11:

> "By recapturing old parts from upgraded mainframes, IBM effectively curtailed [its competitors] ability to reconfigure their used machines into different models that could have competed against IBM's [models]."

[128] *Id*, at 203:

> "[*Alcoa*'s analysis of time consistency] is particularly true when, as here, that control was enhanced by IBM's policy of recapturing old parts that could otherwise have been used to extend the useful service lives of existing used mainframes by allowing them to be upgraded

therefore, if the antitrust laws are designed to address the latter practices they should also address planned obsolescence.

The doubts regarding such a treatment, I believe, deviate from the standard antitrust approach for no apparent serious reason. Undoubtedly, durability is one of the parameters, as price and quality, which define a product. Therefore, if durapolists and durables' manufacturers employ anticompetitive practices to set durability in order to increase their profits their practice should be treated by courts as price fixing or quality fixing, which are generally illegal *per se*. For example, if car manufacturers fix the colors for the next season it is not substantially different from fixing prices. Likewise, Consumers may be willing to pay for presumably insignificant attributes because of the same market imperfections that enable monopolists to exploit more profits through tying. On the same token, reducing durability in order to force the consumer to buy more often is substantially equivalent to tying, which dictates to the consumer the goods she buys and the terms of the transaction. In short, when a durapolist acquires his market power and maintains it through the 'business acumen' of reducing durability, there is no preliminary reason not to infer that a durapolist violated §2 of the Sherman Act. Again, this conclusion does not contradict the existence of legitimate justifications for overcoming the durapolist problem as discussed.

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and placed with new customers. We therefore conclude that the district court erred when it added leases of used IBM mainframes into the relevant market."

E. The Tying Durapolist: Tying Arrangements

E.1. Tying Durables

A tying arrangement is a sale (or lease) of one product or service on condition that the buyer (or the lessee) takes another product or service.[129] Durability is a prevailing characteristic of *tying* goods,[130] and this characteristic seems also to be in the minds of lawyers and economists when analyzing tying arrangements. Typical examples that accompany the tying analysis are of a machine to which are tied complementary goods (such as replacement parts and services) or production inputs (such as toners and paper). Tying goods, however, are not exclusively durables, and as the definition of the tying arrangement provides the tying good might be a consumable as well.[131]

Tying arrangements may be condemned under the antitrust laws or under the intellectual property laws, where intellectual-property rights are involved.[132] Roughly speaking, the legality of tying arrangements depends to a large extent on the market power in the tying market with some extensions usually related to the anticompetitive effects in

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[129] *See*: *Northern Pacific Railway v. United States*, 356 U.S. 1, 5-6 (1958); Scherer & Ross [1990], at 565-569.

[130] *See*: Areeda, Elhauge & Hovenkamp [1996], at ¶1732b:

> "The tying product has usually been more durable than the tied product. The typical tying product was a machine that processed, handled or consumed the tied product."

[131] *See* for example: *Jefferson Parish Hospital No. 2 v. Hyde*, 466 U.S. 2 (1984) (hospital services); *Times-Picayune Pub. v. United States*, 345 U.S. 594 (1953) (advertising space).

[132] *See*: Areeda, Elhauge & Hovenkamp [1996], §17; Hovenkamp [1994], §§ 5.5, 10. Under the federal antitrust laws, tying may be illegal under §§1-2 of the Sherman Act (15 U.S.C.A §§1-2), §3 of the Clayton Act (15 U.S.C.A. §14) and §5 of the FTC act (15 U.S.C.A §52). When intellectual property rights are involved, tying arrangements may be condemned under the Patent Misuse Doctrine and its extensions to other intellectual property rights. *The 1988 Patent Misuse Reform Act* (35 U.S.C.A. §271(d)) narrowed this doctrine to a large extent. *See* also: *The 1995 Antitrust Guidelines for the Licensing of Intellectual Property*.

the tied markets. This law of tying seems to have provided a perpetual battlefield for antitrust commentators on the question of whether tying may facilitate an extension of market power.[133] Perhaps because of this persistent war, the durapolist problem has not been treated in the context of tying. This section addresses the tying arrangements as a device to overcome the durapolist problem. In doing so, I join those who argue that tying may extend market power.

E.2. Tying to Overcome the Durapolist Problem

E.2.1. Framework of Discussion

Tying may be used as a device to overcome the durapolist problem through price discrimination or by providing a commitment to future prices. As a device for price discrimination, the implication of tying to overcome the durapolist problem is straightforward, although it is not generally discussed in the literature. The implication of tying as a commitment appears to be neglected in the context of the durapolist problem.

To illustrate these two implications, consider a durapolist of salt-dispensing machines. The durapolist costlessly produces one model of machine, which is characterized by longevity. Potentially, there are *100* customers that are divided into *k*

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[133] There are two fundamental views regarding this issue: the efficiency-motive view and the market-power-motive view. In general, the efficiency-motive view, which is associated with the Chicago School, argues that tying is a device for maximizing profits in a given market structure. *See*: Director & Levi [1956]; Bowman [1957]; Posner [1976], at 171-184; Bork [1978], at 140-144, 365-381. In contrast, the market-power-motive view argues that tying may also serve as a device to extract more profits through market distortions such as barriers to entry, market foreclosure and extension of market power (leverage). *See*: Turner [1958]; Kaplow [1985]; Whinston [1990]; Slade [1998]. The market-power-motive view was originated in early tying cases. *See*: *A. B. Dick* (1912) (Chief Justice white, dissenting); *Motion Picture* (1917); *Carbice Corporation of America v. American Patents Development Corp.*, 283 U.S. 27 (1931).

high-value customers and *(100-k)* low-value customers, where *k* is unobservable and distributed uniformly over *[0,100]*. The high-value customers are willing to pay up to *$7* per year to have the machines on their production lines, and the low-value customers are willing to pay up to *$3* per year. A customer does not need more than one machine on her production line, but if the price is too high she will not have a machine at all. The maintenance of these machines requires certain services and replacement parts, and their operation requires salt. The costs of these complementary goods vary among the customers according to the intensity of their use of the machines: *$2* per year for the high-value customers, and *$1* per year for the low-value customers. The inputs markets are perfectly competitive and the interest rate is *0.1*.

Under these assumptions, the inputs' prices are their costs and, therefore, if the durapolists sells his machines, the customers are willing to pay for the machines the net present value of their future payments (*$5* or *$2*). Thus, the high-value customers are willing to pay up to *$50* per machine, and the low-value customers are willing to pay up to *$20* per machine.

Three scenarios portray the durapolist's profits under these assumptions: (a) no price discrimination and no commitment; (b) price discrimination; and (c) commitment.[134]

Under the scenario of no price discrimination and no commitment, the durapolist sells *100* salt-dispensing machines for *$20* each, earns *$2,000* and the expected social

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[134] The scenario of price discrimination, as we will see, provides the strongest commitment and, therefore, when the homogeneity of the customers is relatively high, as in the example (two groups of identical customers), there is no need of a specific commitment under a scenario of price discrimination. When

surplus is *$3,500*. Under the scenario of price discrimination, the durapolist is expected to sell *50* machines for *$20* each and *50* machines for *$50* each. The durapolist's profits under this scenario are *$3,500* and this is the entire social surplus. Finally, under the scenario of commitment, the durapolist is expected to sell *50* machines for *$50* each, to earn *$2,500* and this amount is also the entire social surplus.

This simple example suggests that absent distributive considerations, from the social point of view, the scenario of no price discrimination and no commitment is equivalent to the scenario of price discrimination. In contrast, the scenario of commitment is inferior in comparison to the former scenarios because it yields a lower social surplus. Accordingly, if price discrimination is effectively forbidden and the durapolist can commit to future prices, society is worse off.

Therefore, supposedly there are instances in which price discrimination is better for society. Indeed, this observation is generally accepted when R&D investments are involved. Under these circumstances, it is largely held that price discrimination *may* be justified to some extent, in order to furnish inventors and creators with the appropriate incentives to invest in R&D activities.[135] Nevertheless, the analysis of tying in the context

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the consumers' heterogeneity is high a commitment may put the durapolist in a better position, but essentially does not change the analysis.

[135] The Robinson-Patman Act, 15 U.S.C.A. §13, presumably prohibits price discrimination. *See* Hovenkamp [1994], at §14.6. For a discussion concerning the intellectual property rights and price discrimination, *see*: Bowman [1957], at 15-31; Baxter [1966]; Bowman [1973], at 98-118; Posner [1976], at 177-179; Kaplow [1984], at 1873-1882; Scherer & Ross [1990], at 494-502. For a formal analysis, *see*: Husman & Mackie-Mason [1988].

of price discrimination often fails to recognize the scenario of commitment.[136] This facet of tying is my focus in this section.

E.2.2. Tying for a Price Discrimination

Tying is a convenient technique to facilitate price discrimination.[137] To illustrate, imagine for a moment that the durapolist may sell his salt-dispensing machines for *$10* (or lease them for annual rent of *$1*) and offer two types of packages of inputs. One type is of a low-value package, *$2* per year, and the other type of a high-value package of *$6* per year. The durapolist's profits on these packages are *$1* and *$4* respectively, and in addition he earns *$1,000* on his machines. Thus, the durapolist's total expected profits are the net present value of these incomes, which equals to *$3,500*.[138]

As the example implies, price discrimination is a solution to the durapolist problem. The durapolist's time-inconsistency problem stems from the perception of his customers that he employs intertemporal price discrimination.[139] However, if the durapolist discriminates in prices, postponing purchases is unlikely to reduce the price for the customer and, thus, the durapolist does not cope anymore with time-inconsistency.

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[136] Ordover, Sykes & Willig [1985] and Whinston [1990] provided models in which tying could be interpreted also as a commitment. *See*, also: Borenstein, Mackie Mason & Netz [1995] (discussing the profitability of tying in durable-goods markets).

[137] Tying that facilitates price discrimination is often called *metered tying*. For a general analysis, *see*: Hansen & Roberts [1980]; McGee [1987]. For an illustration of price discrimination through tying of automotive replacement parts, *see* Scherer [1996], at 308-312.

[138] $\pi = 100\frac{1}{0.1} + 50\frac{1}{0.1} + 50\frac{4}{0.1} = 3{,}500$.

[139] Stokey [1979] showed why a monopolist might be worse off when he employs intertemporal price discrimination. Essentially, her model addresses the durapolist problem.

E.2.3. Tying for a Commitment

Now, let us concentrate on the circumstances in which price discrimination is effectively prohibited and, therefore, the durapolist cannot discriminate between his customers.

Assume, also, that the durapolist has succeeded in tying the inputs to his machines, for example, by leasing his machines and punishing lessees who buy inputs from other input suppliers. From the customers' point of view the durapolist is the sole supplier of inputs. Under these assumptions, the durapolist's best pricing is to give his machines for free and to supply their inputs for *$7* per year. This pricing provides the high-value customers with a commitment to high prices and, thus, the net present value of the durapolist's profits is expected to be *$2,500*.[140]

Strategically, the best option for the high-value customers is to reject this offer. If more than *40* high-value customers accept the offer, the durapolist realizes that *k* is sufficiently big, and lowering his prices will be detrimental. However, given the collective-action problem customers face, it is doubtful whether enough high-value customers will be strategically smart. As a result, the durapolist may create a credible commitment.

The reason for the credibility of this pricing is that when the durapolist sells

consumables (supplies) he cannot price-discriminate between his customers over time.[141] Accordingly, the durapolist maximizes his profits according to his perception of *k*. Namely, if the durapolist perceives *k* as lower than *40*, he will provide supplies to all his customers for a low price. In contrast, if the durapolist observes that *k* is bigger than *40* he will provide supplies only to the high-value customers for higher prices.

The above analysis requires a caveat. I have not found a case of tying that fits the above description but does not include price discrimination.[142] This lack of direct evidence, I believe, does not preclude the viability of my analysis. Price discrimination is a better strategy for the durapolist because he captures more surplus than under commitment without price discrimination. Therefore, as long as price discrimination is possible, a strategic use of tying in order to create commitment to future prices is a dominated strategy.

E.3. Policy Considerations

The above discussion leads to two conclusions. First, tying may facilitate price discrimination to overcome the durapolist problem. There is one 'new' aspect in this proposition, which is focused on overcoming the durapolist problem. The link between

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[140] The durapolist profits on each package of inputs are *$5* and, therefore, $\pi = 50\frac{5}{0.1} = 2{,}500$. United Shoe Machinery had similar pricing (free services), but its contracts were for long terms and it could discriminate between customers. *See* Kaysen [1956], at 250-256.

[141] Again, in a certain point of time the durapolist cannot price-discriminate because of the law enforcers.

[142] To some extent, the cases of United Shoe Machinery (Kaysen [1956], American Can and Continental Can (McKie [1955; 1959]) may fit the described scenario although they also contained price discrimination.

The cases of the durable-goods sellers that succeeded in tying the aftermarkets to their goods fit to some extent this analysis, although these cases are usually associated with various market imperfections. *See*,

tying and price discrimination has been thoroughly studied. In this sense, the analysis illustrates how tying and price discrimination can be employed to extend market power. Overcoming the durapolist problem through these practices seems to be a neglected perspective. Aside from this perspective, the standard analyses of tying for price discrimination and the desirability of price discrimination in various settings fit the durapolist's case as well.

The second conclusion refers to tying as a device for commitment. If tying is permissible and price discrimination is impossible, a durapolist may overcome his problem through tying that creates a credible commitment.

This conclusion provides a new perspective of tying arrangements. Tying arrangements may have anticompetitive effects even if they are not used to leverage market power to related markets or to deter entry into the tying market. Tying may enable the durapolist to acquire *more* market power than he would have had otherwise.[143]

This perspective presents another fragile link in the theory concerning a fixed sum of market power.[144] One link has gained much publication and study since *Kodak* (1992). In *Kodak*, the Supreme Court analyzed Kodak's argument that "higher service prices will

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for instance: *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451 (1992). For an analysis of these cases, *see:* Borenstein, MacKie-Mason & Netz (1995).

[143] The *Jerrold Electronics* case illustrates the emphasis on the incremental increase in the market power of the durapolist. In this case, tying of services was held as reasonable restraint because it was "instituted in the launching of a new business with a highly uncertain future. [But as] the industry took root and grew, the reasons for the [tying] disappeared." Namely, tying is reasonable if it constitutes a necessary condition for the existence of the market, even it creates the monopoly. This rule is equivalent to the discussed considerations to allow price discrimination when intellectual property rights are involved. *United States v. Jerrold Electronics Corp.*, 187 F.Supp. 545, 557 (E.D. Pa. 1960).

[144] *See*, Posner [1976], at 173: "[A] fatal weakness of the leverage theory is its inability to explain *why* a firm with a monopoly of one product would want to monopolize complementary products as well."

lead to a disastrous drop in equipment sales."[145] The majority held that the existence of information and switching costs break the link between equipment (durables) and services (consumables). Similarly, when tying is used to provide a credible commitment to high prices, higher prices of consumables lead to a *beneficial* reduction in durables' sales.[146]

To the extent that the federal antitrust law of tying can be characterized,[147] the perspective of tying as a device to create a credible commitment appears to be uncovered by the antitrust law because of its stress on the tied market.[148] Under the so-called *per se* rule against tying, this perspective is not always covered, because of the requirement for an involvement of a 'not insubstantial' amount of interstate commerce in the *tied* product market.[149] Likewise, under the rule of reason, the courts' examination is usually focused on the market power in the *tied* market,[150] which is not required in order to overcome the durapolist problem through tying. Indeed, a durapolist may have market power in the

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[145] *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451, 472 (1992). For a another analysis of this "false dichotomy" in the copier industry, *see* Blackstone [1975] (the case of SCM).

[146] The *Kodak* court explained that "[the] significant information and switching costs [in markets for complex durable goods] could create a less responsive connection between service and part prices and equipment sales" (at 473). The commitment perspective implies that even a responsive connection does not necessarily exclude anticompetitive effects.

[147] This aspiration appears to be almost farfetched due to the inconsistency of the way the tying law is applied by the courts. *See*: Areeda [1991], ¶¶1700-1701, 1730.

[148] *See*, for instance, *Northern Pacific Railway v. United States*, 356 U.S. 1, 6 (1958):

> "[Tying arrangements] deny competitors free access to the market for the tied product, not because the party imposing the tying requirements has a better product or lower price but because of his power or leverage in another market. At the same time buyers are forced to forego their free choice between competing products."

See, also, *Jefferson Parish Hospital No. 2 v. Hyde*, 466 U.S. 2, 36 (1984) (O'Connor, J., concurring):

> "Tying may be economically harmful primarily in the rare cases where power in the market for the tying product is used to create additional market power in the market for the tied product."

[149] *See*: *Fortner Enterprises v. U.S. Steel Corp.*, 394 U.S. 495, 498-499 (1969); *United States Steel Corp. v. Fortner Enterprises*, 429 U.S. 610 (1977).

[150] *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451 (1992).

inputs markets either because of his size or because he created a technological tying,[151] but the existence of this market power is not a necessary condition.

In summation, tying is typically of consumables to durables, and the implications of this setting appears to be neglected by durapolists' researchers. Tying may be employed by durapolists to overcome their time-inconsistency problem and this is the promising opportunity that tied consumables provides. This perspective sheds a new light on the anticompetitive effects of tying arrangements which has generally been ignored. In legal terms, tying is a device to acquire and maintain monopoly power by durapolists in their markets, and not only to leverage their market power to related markets.[152] Again, as emphasized throughout this paper, this presumable violation of §2 of the Sherman Act may be justified to encourage creative activities, but the nature of these justifications goes beyond the scope of this paper. Once the concerns for impairing the competition have been established, as in this section, there is reason to progress and to examine these justifications.

F. The Leasing Durapolist: Lease-Only Practices

F.1. Leases and Durable Goods

Unlike a consumable, a durable can be leased or rented. Leases and rents (hereinafter: *leases*) have several important economic functions such as risk allocation and

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[151] Technological tying usually means that the tied inputs have value only when used with the tying good. For instance, replacement parts for a Kodak copier have no value if they are not used with such a copier. *See*, generally: Areeda, Elhauge & Hovenkamp [1996], ¶1757.

financial devices. Leasing, however, may be used for anticompetitive purposes as well and, therefore, lease practices and especially lease-only policies have been one of the main study subjects in durable-goods markets.

A lease-only policy reminds us of planned obsolescence in the sense that both offer goods for shorter periods of time than they could have been offered. For this reason, several commentators have suggested that the analysis of a lease-only policy and planned obsolescence is generally the same.[153] Given the complexity of planned obsolescence, the appeal of this view is that lease policies supposedly provide an aesthetic analytical framework since they are observable and verifiable.

Indeed, as discussed below, the look-alike lucid appearance of lease policies has tempted many teachers to focus on this facet of lease policies in addressing the durapolist problem and his ways to get around it.[154] This once popular theory is generally not accepted out of textbooks and in this section I discuss the whys and wherefores. Furthermore, the use of leasing practices as a device to overcome the durapolist problem indirectly is also discussed. Leasing as already noted may facilitate other practices that assist in overcoming the durapolist problem. In light of the rich literature on this practice, the discussion is abbreviated.

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[152] For leverage through tying, *see*: Kaplow [1985]; Whinston [1990].

[153] *See*, for example, Coase [1972], at 147:

> "The production of less durable good as against a more durable good is very similar to a policy of leasing since, by making the good less durable, the producer sells the services provided by the good for short period of time (because the good wears out) whereas in leasing the same result is achieved by selling the services of a given durable good in short period segments."

[154] *See*, Posner [1976], at 184:

F.2. The Hypothetical Leasing Durapolist

The leasing durapolist does *not* sell durables. His consumers essentially buy a stream of consumables (machine services) from him. Therefore, by leasing, the durapolist switches the goods he sells from durables to consumables. To put it differently, when the durapolist leases his durables he allegedly internalizes the costs of an inconsistent-behavior pattern, because the durables' ownership does not change and remains in the hands of the durapolist. For this reason and others, the practice of *lease-only* is generally illegal under the antitrust laws.

A simple illustration of the lease-only policy as a device to overcome the durapolist problem can be derived from the example which was used to clarify the value of commitment in subsection C.1.

This time, consider a copier durapolist who incurs no production costs and sees in front of him high-value and low-value consumers. There is no discount rate, the high-value consumers are willing to pay up to *$5* a year for copier services and the low-value consumers are only willing to pay up to *$2* a year. Assume that there are *100* consumers and k of them are high-value consumers, where k is unobservable and distributed uniformly over *[0,100]*. A consumer does not need more than one copier, but if the price is too high she will not have a copier at her office. If the copier's lifetime is ten years, the

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"Professor Coase has argued that the lease-only policy of a monopolist of a durable-good … may be designed to overcome the difficulties encountered in trying to charge a monopoly price for a durable good. Perhaps the lease-only policy should have been forbidden on that ground."

durapolist can sell it to the high-value consumers for *$50* and to the low-value consumers for *$20*.

If the durapolist sells his copiers, the result is as discussed in section in subsection C.1. Under a policy of non-commitment, the durapolist sells *100* copiers for *$20* each and his profits are *$2,000*. In contrast, under a policy of commitment, the durapolist sells *k* copiers for *$50* each and his profits are *50k*. Thus, from the durapolist's standpoint, it is profitable to commit if there are more than *40* high-value consumers. Given the distribution of the consumers, the probability for more than 40 high-value consumers is *60%* and the expected profits under a commitment are *2,500*.

Assume, now, that at time zero, the durapolist decides between outright sale of his copiers and leasing them for one-year periods.[155] In this case, the durapolist decides to lease at a price of *$5* a copier for annual expected profits of *$250*, because under the alternative of outright sale his respective profits per year are *$200*. If the durapolist leases, in the second year he already knows the number of high-value consumers and probably their identity, since they revealed themselves in the first year when they leased the copier for *$5*. Accordingly, the durapolist can decide what would be the best pricing for his copiers.

If the high-value consumers are identified, starting in the second year, the durapolist price-discriminates between his customers, *i.e.*, he charges the high-value

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[155] As already discussed, the advantage of reduced 'durability' relies on the assumption of discrete selling or short-run price rigidity. Absent this assumption, a reduced durability or a lease-only policy may not assist to overcome the time-inconsistency problem. For a formal analysis of this argument in the context of leases, *see* DeGraba [1994].

customers *$5* a year and the low-value customer *$2* a year. This way, the durapolist's profits are maximized and the deadweight loss is minimized.[156]

The other scenario is that the durapolist cannot price discriminate between his customers. This can happen for three reasons: (1) the high-value consumers anticipated in the first year the consequences of their willingness to pay and, therefore, they did not reveal themselves; (2) *k* varies annually, *i.e.*, there are fluctuations in the demand of the high-value consumers; and (3) there are effective legal restrictions against price discrimination.

Under this scenario, the durapolist's profits are *$200*, when either (a) price discrimination is prohibited and *k* is fixed and below *40*; or (b) the high-value consumers are strategically smart. When *k* varies, the durapolist's expected profits are *$250*. And when *k* above *40* and the durapolist credibly commit to his future lease policy his profits are more than *$250*.

This example provides a simple lesson. High-value customers are unlikely to enter to lease contracts at high prices, reveal their identity and thereby expose themselves to price discrimination.[157] The durapolist, therefore, may improve his position with a lease-only policy only if he commits to a non-discrimination policy, commits to future rents, or

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[156] Under price discrimination, the durapolist's annual profits are expected to be *$350*. In expectancy there are *50* high-value customers and *50* low-value customers and their aggregate rents are *50*5+50*2=350*. The deadweight loss is minimized because all of the customers purchase copier services. For extended discussion, *see* subsection E.2.

[157] Note that this case does not present a collective action problem such as the case of tying. Here it is profitable for each high-value consumer not to reveal himself regardless of what the rest of the consumers of his type do. *Cf.* subsection E.2.3.

does not keep records of his customers.[158] To put it differently, the success of lease-only depends on a commitment for consistency. Lease-only policies, therefore, do not seem to overcome time inconsistency because their alleged success assumes a commitment to consistency.[159]

F.3. The Leasing Durapolist at Trial

The leasing durapolist was popularized among lawyers and economists by Judge Charles Wyzanski and his 'law clerk,' the economist Carl Kaysen, who worked together on the *United Shoe Machinery* (*USM*) case.[160] Judge Wyzanski condemned the lease-only practice, mainly because he perceived it as a high barrier to entry to the shoe machinery market. As a consequence, USM was obliged to sell its machines at prices which were equivalent to the respective lease prices.

Indeed, the use of this practice in order to overcome a time-inconsistency problem was not addressed by the court, perhaps because Kaysen was not familiar with such an analysis that was relatively new at the time.[161] Instead, the court stressed the fact that

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[158] The Robinson-Patman Act, 15 U.S.C.A. §13, presumably prohibits price discrimination. Hovenkamp [1994], at §14.6. Hart & Tirole [1988] provided a formal model which showed that the durapolist's profits are lower in the rental case without any form of commitment than in the case of outright sale. Fudenberg & Tirole [1998] provided a model which linked the information concerning the consumer's identity to solutions for time-inconsistency problems.

[159] An alternative conclusion is that lease-only policy may be beneficial for the durapolist, if a prohibition against price discrimination is enforced effectively. *See* subsection E.2.3.

[160] *United States v. United Shoe Machinery Corp.*, 110 F. Supp. 295 (D.Mass.1953), *aff'd per curiam*, 347 U.S. 521 (1954). Kaysen's Ph.D. dissertation was based on that case and in 1956 he also published his analysis in a book. Kaysen [1956].

[161] *See*: Strotz [1955]. Judge Wyzanski endorsed Kaysen's view that a purchased machine generally presented a sunk cost and therefore a rational consumer would not take it into account in his calculation. In doing so, the court did not consider that the value the consumer can save from her investment in a

USM had maintained its market power through deterring entry by long-term leases and elimination of the secondhand market for its machines.[162]

The USM decision was not questioned by the Supreme Court and it has provided the authority for successful government attacks on leasing policies in other industries and against other giants such as IBM, Xerox, American Can and Continental Can.[163] The reasons for these successes may be worth a study due to their contrast to cases where 'midgets' were involved and the courts rejected the "what appears to be a novel theory under the antitrust laws."[164]

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machine could have been decreased due to a time-inconsistency problem. *See*: *United Shoe* (1953), at 324; Kaysen [1956], at 68-69.

[162] As discussed, secondhand markets constitute part of the durapolist problem, because they provide the consumers with a competitive, cheap source of supply. Therefore, any wise durapolist would zealously endeavor to eliminate them. Kaysen [1956], at 73; Waldman [1997] analyzed the role of a lease-only policy as a device to eliminate the secondhand market. *See: United Shoe* (1953), at 325:

> "United's lease system makes impossible a second-hand market in its own machines. This has two effects. It prevents United from suffering that kind of competition which a second-hand market offers. Also it prevents competitors from acquiring United machines with a view to copying such parts of the machines as are not patented, and with a view to experimenting with improvements without disclosing them to United."

[163] The famous cases are those in the industries of computers, copiers and can machinery. These cases were subjects for several case studies, sometimes for the purpose of litigation. For the computer industry, *see*: *United States v. International Business Machines Corp.*, 1956 Trade Cas. (CCH) ¶68,245 (S.D.N.Y. 1956) (consent decree); Brock [1975], at 155-159; Fisher, McGowan & Greenwood [1983], at 191-196; DeLamarter [1986], at 106-117. For the copier industry, *see*: *In re Xerox Corp.*, 86 FTC 364 (1975); Blackstone [1975]; Breshnahan [1985]. For the can-machinery industry, *see*: McKie [1955, 1959].

[164] *Souza v. Estate of Bishop*, 821 F.2d 1332, 1334 (9th Cir. 1986). In *Souza*, the defendant apparently dominated the market for residential land in Honolulu. The *Souza* court cited in its decision the decision of the second circuit in the case of *Berkey Photo v. Eastman Kodak*: "[A]ny firm, even a monopolist, may generally bring its products to market whenever and however it chooses." *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 286 (2d Cir.1979). In the *Berkey* case, Kodak allegedly employed a practice of planned obsolescence (variable reduced durability) in order to monopolize the market. *See supra* note 105 and accompanying text.

In another case, a private antitrust suit was filed against an alleged wax figure durapolist. *Williamsburg Wax Museum, Inc., v. Historic Figures, Inc.*, 810 F.2d 243 (D.C. Cir. 1987). This durapolist refused to sell his wax figures to *one* of his customers, but agreed to lease him the figures. In addition, the durapolist imposed different resale restrictions on his customers. The plaintiff argued that these policies "were designed to preclude a secondhand market." (at 246). While the court acknowledged that "[l]easing requirements, in combination with other practices, can sometimes impede competition and thereby violate

Professor Coase might be inspired by some of these cases, although it seems that he did not reckon that the USM's leases were used to overcome the durapolist time-inconsistency problem.[165]

In textbooks, however, the USM case is often used to illustrate the Coase conjecture and the solution for time-inconsistency problems.[166] This popularity has not gained a general acceptance among lawyers and economists and many cast doubts on the applicability of the Coase conjecture in the USM case.[167] In particular, it is argued that USM dictated long-time leases and fined its customers for terminating leasing contracts.[168] Furthermore, USM had kept very detailed records of its customers, which were used to price-discriminate against its customers. Therefore, It would be fair to say that USM's lease-only policy has not been used to overcome any time-inconsistency problem,

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the antitrust laws," it dismissed the allegation that the specific combination in that case (leasing and resale restrictions) constituted a violation of the antitrust laws.

[165] Professor Coase's analysis was theoretical and he did not mention USM or any other durapolist. Nevertheless, while the USM's leases were for ten years, Professor Coase argued that a lease-only policy assists in overcoming time inconsistency if the durapolist leases his durables "for relatively short period of times." Coase [1972], at 145.

[166] *See*, for example: Posner [1976] at 184; Tirole [1988], at 81-83; Scherer & Ross [1990], at 457.

[167] *See*, for example: Bork [1978], at 136-160, 164-175; Flath [1980]; Wiley, Rasmusen & Ramseyer [1990]; Goldberg [1990]; Masten & Snyder [1993].

[168] According to USM's formal policy, which was stated in its lease contracts, in the case of the replacement of a USM's machine by a competitive machine, the lessee continued to be liable for the unexpired period. In practice, USM did not enforce this policy, although it penalized many customers who turned to its competitors. The choice of the penalized customers and the magnitude of their fines were unclear and appear to be random. This combination of a formal policy with the informal looked-alike random policy has increased, of course, the perceived costs of breaching leasing contracts with USM. Kaysen [1956], at 64-73. The data that Kaysen used for his analysis referred to the period of time *after* the government's complaint against USM was filed (Dec. 15, 1947). Therefore, it is generally possible that generally the fines and the respective perceived costs of breaching were higher.

although it had other anticompetitive effects, such as deterring entry, tying, price discrimination and elimination of secondhand markets.[169]

F.4. Policy Considerations

The widespread opinion concerning the absence of connection between the USM's lease-only policy and overcoming its time-inconsistency problem is convincing. A lease-only policy, however, may serve various purposes other than overcoming the time inconsistency. In particular, it may facilitate price discrimination,[170] tying,[171] elimination of secondhand markets,[172] and erecting barriers to entry.[173] *These practices may be used*

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[169] For a formal analysis of long-term contracts as a barrier to entry, *see* Aghion & Bolton [1987]. Long-term leases are equivalent in this sense to selling, but they are coupled with more advantages, such as tying and price discrimination. Elimination of secondhand markets (subsection D.5) and tying (section E) may be used as devices to overcome the durapolist problem. It should be noted that in the leading cases of lease-only, one of the main goals of the practice was to prevent fringe firms from access to the machines and thereby developing competing machines. *See supra* note 163.

[170] *IBM Corporation v. United States*, 298 U.S. 131 (1936) (business machines); Kaysen [1956], at 75-78, 124-130 (Shoe Machinery); McKie [1959], at 55-65 (can-closing machinery). The *Williamsburg* case, *supra* note 164 may also illustrate a technique of price discrimination. In *Williamsburg*, the alleged wax-figure durapolist, *Lynch Display Corporation*, fixed the rent for its wax figures on 10% of the gross receipts of the wax museums and, thereby, the rent varied according to the income of the museums from their exhibitions of Lynch's wax figures.

[171] *See*, for example: *IBM Corporation v. United States*, 298 U.S. 131 (1936) (business machines and punch cards); *International Salt Co., Inc. v. United States*, 332 U.S. 392 (1947) (salt machines and salt); McKie [1955; 1959] (can-closing machines and tin cans); *Advance Business Systems & Supply Co. v. SCM Corp.*, 287 F.Supp. 143 (D.Md. 1968) (copiers and their supplies and service); *In re Xerox Corp.*, 86 FTC 364 (1975) (copiers and their supplies and service).

[172] *Allen-Myland v. International Business Machines Corp.*, 33 F.3d 194 (3rd Cir. 1994) (recapturing old parts in order to eliminate the competing secondhand market); *Pacific Mailing Equipment Corp. v. Pitney Bowes, Inc.*, 499 F.Supp. 108 (N.D. Cal. 1980) (destroying old machines in order to eliminate the secondhand market). *See* also *United Shoe Machinery* (1953), at 344-345:

> "[The leasing practices] represent something more than the use of accessible resources, the process of invention and innovation, and the employment of those techniques of employment, financing, production, and distribution, which a competitive society must foster. They are contracts, arrangements, and policies which, instead of encouraging competition based on pure merit, further the dominance of a particular firm. In this sense, they are *unnatural barriers*; they unnecessarily exclude actual and potential competition; they restrict a free market." (emphasis added).

as devices to overcome time inconsistency and, therefore, lease-only policy can be ancillary device to overcome the durapolist problem. Accordingly, the objections for the prohibition on lease-only policies warrant an examination.

First, in light of the supposed functional similarity between a lease-only policy and planned obsolescence, several scholars have suggested that requiring the durapolist to sell induces him to reduce the durability of his goods.[174] Second, these scholars have pointed out that the leasing durapolist incurs the costs of planned obsolescence since he owns the durables and, therefore, leasing provides the durapolist with additional incentives not to make his goods obsolete. Finally, under the assumption that the durapolist will always find ways to get around his problem, it has been argued that leasing practices have a lower deadweight loss than other practices.

This view is focused on the so-called *Coasian Dynamics* and consequently it misses the point for three main reasons. First, a lease-only policy is usually not designed to directly overcome time inconsistencies and, therefore, the interchangeability between

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[173] *United Shoe* (1953); McKie [1955, 1959]. As discussed, there are various ways by which a lease-only practice may erect barriers to entry, *e.g.*, long-term leases and forcing two-level entry through tying. The latter may be facilitated by elimination of the secondhand market, which raises the costs of fringe firms (R&D costs and replacement parts). In *Van Dyk*, the Court of Appeals for the Third Circuit rejected this argument because the leases were short term. *Research Corp. v. Xerox Corp.*, 631 F.2d 251 (3rd Cir. 1980). Bucovetsky & Chilton [1986] suggested that under a threat of entry, the durapolist improves his position by selling rather than leasing. Their model premises that a lease-only policy is designed to overcome time inconsistency and does not take into account other anticompetitive effects which deter entry. In contrast to Bucovetsky & Chilton's argument, IBM did fight to maintain a high level of leasing, although it was under a threat of entry. *See*: *Telex Corp. v. International Business Machines Corp.*, 510 F.2d 894, 916-19 (10th Cir. 1975); *Greyhound Computer v. International Business Machines*, 559 F.2d 488, 498 (9th Cir. 1977):

> "There was ample evidence that IBM officials became concerned that the balance between sales and rental had turned too heavily toward sales, and deliberately set about to reverse the trend."

[174] Bulow [1982, 1986]; Malueg & Solow [1987]; Waldman [1993; 1996]; Hendel & Lizzeri [1999].

this policy and reduced durability is unclear. USM, for instance, was known for frequent introductions of improved models of its machines. Second, as discussed, both leasing policies and planned obsolescence may be used to deter entry and to raise rivals' costs. Therefore, lease-only and planned obsolescence may go hand in hand, rather than substitute each other. For instance, in many circumstances leasing practices lower the costs of planned obsolescence because the 'innovative' lessor can cheaply recycle the old goods, or, alternatively, prevent his competitors from using old parts in order introduce new, cheaper models.[175] Third, the argument regarding the minimization of the deadweight loss implicitly premises that the durapolist's market power is a fixed sum. Namely, it is assumed that the durapolist cannot leverage his market power to related markets and it is assumed that there is no significance to entry barriers in terms of market power.[176] The durapolist can garner a higher reward if he employs a lease-only policy with other business strategies, and therefore the deadweight loss argument has no sound foundation.

Indeed, leasing even by the durapolist has important economic functions. Nevertheless, these advantages do not justify lease-*only* policies and can be achieved by leasing companies or with a mixed policy of selling-leasing by the durapolist.[177] In

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[175] *See* subsection D.5. *See* also: *Pacific Mailing Equipment* (1980), *supra* note 172; *Allen-Myland* (1994), *supra* note 172; *Greyhound Computer v. International Business Machines*, 559 F.2d 488, 498 n. 22 (9th Cir. 1977):

> "Leasing was more advantageous to IBM than selling the same equipment [because it] facilitated introduction of newly developed products, since lessees were not inhibited by a large investment in either the new or the old machine."

[176] For a presentation of the 'fixed-sum argument' and its flaws, *see* Kaplow [1985]. For the relationship between market power and barriers to entry, *see*: Baumol, Panzar & Willig [1988].

[177] As noted, IBM has used various strategies to turn its mixed policy toward leasing. These efforts apparently gained some success. Nevertheless, the existence of competing leasing companies and the

particular, generally there is no economic reason to allow the durapolist to offer *only* long-term leases, although the existence of switching costs and risk allocation considerations may make these leases economically desirable. A long-term lease is plainly a product and, therefore, if its marketing makes economic sense this product is expected to be on the market.

The alternative seems to be undesirable, even assumed for the argument that a lease-only policy presents no barriers to entry. The detection of tying, price discrimination, planned obsolescence or destruction of used goods is complicated and expensive, as well as the expected litigation. In contrast, outlawing one of the flagships that carry these practices is much cheaper.

Once more, socially we may like durapolists to employ various policies that reimburse them for their investments in creative activities and even awarding them for these activities. This justification, however, is not unique to the leasing durapolist and is placed in the general discussion concerning the limits of antitrust intervention.

Many lawyers and economists, who criticized the *United Shoe* rule, have expressed their sincere concern with whether the "Shoe is dead" since no court has ever pronounced its death. To expedite this long-awaited death pronouncement, they mercilessly beat the horse, which they found alive but not well shod.[178] This old horse, I suggest, is not only

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market for purchased mainframes suggest that although the durapolist cannot be perfectly monitored, his market power is restricted when he is required to sell.

[178] Wiley, Rasmusen & Ramseyer [1990], at 703: "The horse we beat is not dead. But … neither is it well shod."

alive, but is also still kicking as in its youth although it is not the horse Professor Coase sold us.

G. Concluding Remarks

My concluding remarks start where I began and this may suggest that I have not gone too far. Durapolists may have time inconsistencies which hinder them from charging the static monopoly price. To overcome these problems, durapolists often engage in various practices that bring them closer to the static monopoly price. This incremental increase in the durapolists' market power is a violation of §2 of the Sherman Act, in the absence of proper justifications, such as encouraging R&D activities and efficient management.

Most of the practices that I examined, were mentioned by *Professor Coase* in his seven-page note and this may imply, again, that indeed I have not come a long way. My points that are worth being stressed are as follows:

(a) Any regulation of durapolists' practices must take into account its *ex ante* impacts on potential durapolists. In particular, the impacts on investment decisions concerning the creation of new markets or the development of existing ones.

(b) Under a durable-good monopoly, most-favored-nations clauses to a significant share of the customers are used as devices to maintain market power.

(c) The social costs of durable-goods cartels are higher than is usually assumed, because cartels have mechanisms in place to avoid time inconsistencies.

(d) Planned obsolescence is not always socially undesirable, but given verifiability, there are circumstances of planned obsolescence with high social costs that justify antitrust intervention.

(e) Tying may provide a device to overcome the durapolist problem.

(f) Lease-only policies may have anticompetitive effects, but overcoming time inconsistencies is not one of them. These anticompetitive effects, however, may be used to overcome time inconsistencies.

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