THE JOURNAL OF INDUSTRIAL ECONOMICS 0021-1821
VOLUME XLIV March 96 No. 1

CUSTOMER RETURN POLICIES FOR EXPERIENCE GOODS*

YEON-KOO CHE

This paper studies the economic rationale for customer return policies, by focusing on the "experience goods" aspect of many products. Return policies allow consumers to defer their purchasing decisions until after they gain some experience with goods. In so doing, they insure consumers against *ex post* loss, which allows a monopoly seller to charge more than otherwise. It is shown that the seller adopts the return policy when consumers are highly risk averse or retail costs are high. Consumers are strictly better off under the return policy, but there is too little adoption of the policy in equilibrium.

I. INTRODUCTION

MOST STORES allow free return of merchandise. Many electronic discount stores customarily allow return of their products within 30 days of purchase, and some catalog clothing marketers, like L. L. Bean, even accept returns years after the purchase. While retail superstores, such as Wal-Mart and Toys 'R' Us, are best known for their generous return policies, the types of retailers adopting return policies are much broader. According to one US survey, more than 95% of retailers interviewed allow some form of returns.[1] Clearly, consumers value the return policies. As many as 20% of personal computers sold to home buyers are known to be returned, for example.[2]

The standard economic rationale for return policies is that of warranties. Return policies insure customers against defective products, making risk-averse customers willing to pay more for a product than if there is no return policy. This warranty argument explains the use of return policies for products that are subject to random malfunctions. But return policies are used for a wide variety of products, for which defects are not an issue. Many return policies, for example, do not require customers to provide evidence or an explanation regarding the malfunction of the returned good. Rather, a customer's not liking a product is

* I am grateful to Severin Borenstein, Jinsook Cho, Ian Gale, Don Hausch, Lawrence White and two anonymous referees for helpful comments and suggestions.

[1] "Small Store Survival," a recent study of Illinois retailers conducted by the Illinois Retail Merchants Association (IRMA) and Arthur Anderson & Co. reveals that, of the retailers surveyed, 78% give cash refunds with a receipt, 59% give merchandise credit with a receipt, 44% give merchandise credit without a receipt, 32% give cash refunds without a receipt. Twenty-three percent limit the return period, while fewer than five percent say all sales are final. (See "Return to Seller," Sales & Marketing Management, August 1994, p. 21.)

[2] See "Corporate Focus: Packard Bell Prospers despite PC Industry Shake-Up; Computer Maker's Secret of Success: Focusing on the Consumer Market," *Wall Street Journal*, June 14, 1994.

often sufficient for stores to accept the return. The "no-questions-asked" full refund policy is customary with many big retailers.

For these latter products, a more compelling rationale for return policies has to do with their "experience good" nature: Customers do not fully know their preferences for the products until after they gain some experience with them. Such an experience good nature may reflect a simple psychological reaction, like "buyer's remorse," but it may also result from the fact that the purchaser of a good may not be its final consumer. For example, a shirt bought for a family member or as a gift may run into the problems of wrong color, wrong size, or wrong style. Return policies allow customers essentially to defer their purchasing decisions until after gaining some experience with the products. A consumer who has learned that he does not like a product can nullify his purchase by simply returning it.

This paper explores the consumer learning implications of return policies, by developing a model where customers realize idiosyncratic valuations of the good after their purchase. The analysis focuses on the following trade-off for a monopoly seller: on the one hand, the return policies insure consumers against *ex post* loss, allowing the seller to charge a higher price than otherwise; on the other hand, the seller can never induce consumers to buy at a price above their *ex post* valuations, which she could do, for some consumers, with a no-return policy. It is shown that the return policy is optimal if the consumers are sufficiently risk averse or retail costs are high. Superior risk sharing makes consumers strictly better off under the return policy, but the seller's failure to internalize this benefit leads to too little adoption of the return policy in equilibrium, relative to the socially efficient outcome.

I am not aware of any literature on consumer return policies. Pasternack [1985] and Marvel and Peck [1994] study the manufacturers' return policies toward retailers, with a special focus on channel coordination in the presence of aggregate demand uncertainty. The focus on consumer learning and delayed purchase distinguishes the current paper.

The paper is organized as follows. The model is described in Section II. Section III studies equilibrium adoption of return policies in the monopoly setting. Section IV explores its welfare implications. Section V concludes.

II. MODEL

A monopoly seller (retailer) faces a unit mass of consumers, each of whom desires at most one unit of a good. The seller is risk neutral and maximizes expected profits, and she incurs retail costs of $c \in [0, \bar{v})$ for each unit that she carries, which includes the payments to a manufacturer.

The consumers' preferences for the good are unknown at the time of purchase, but they are learned after purchase. A consumer's preference is parameterized by a "valuation" v that is drawn randomly from $[\underline{v}, \bar{v}]$, $0 \leq \underline{v} < \bar{v}$, by a distribution function $F(\bullet)$, which has a well-defined positive density function $f(\bullet)$. Note that customers are *ex ante* identical, and that their *ex post* realized valuations are purely idiosyncratic. I consider a simple return policy that provides cash refunds for a

return and henceforth refer to it as "the return policy." Under the return policy, consumers can return the good after learning their valuations, at zero cost.[3]

The von-Neumann utility function when a consumer purchases the good at the price of p and realizes v is $U(v-p)$, where $U(\bullet)$ is strictly increasing, (weakly) concave, and exhibits constant absolute risk aversion (CARA). The utility from no purchase is normalized to be zero: $U(0)=0$. The degree of risk aversion is measured by the certainty equivalent of the valuation, v_{ce} (i.e., $U(v_{ce})=E[U(v)]$). When consumers are risk neutral, $v_{ce}=E[v]$, while $v_{ce}=\underline{v}$ if they are infinitely risk averse.

III. EQUILIBRIUM ADOPTION OF THE RETURN POLICY

I first consider the case where the seller adopts the no-return policy. For any price p, a consumer purchases the good if and only if $E[U(v-p)]\geq 0$. Given this, the seller sets the highest p such that $E[U(v-p)]\geq 0$, if that price covers the retail costs, or else the seller does not sell the good. Clearly, the optimal price, p_n, satisfies $E[U(v-p_n)]=0$. The following lemma shows that the optimal price is the certainty equivalent of the valuation:

Lemma 1. With constant absolute risk aversion, $p_n=v_{ce}$.

Proof. I show that $E[U(v-v_{ce})]=kE[U(v)-U(v_{ce})]=0$ for some real number k. The second equality holds by the definition of the certainty equivalent. The first equality is shown as follows. Let $z\equiv U(v)-U(v_{ce})$. Then, $U(v-v_{ce})=\phi(z)\equiv U(U^{-1}(z+U(v_{ce}))-v_{ce})$. It suffices to show that $\phi(\bullet)$ is linear, which follows since $\phi''(z)$ is proportional to

$$\left[\frac{U''(U^{-1}(z+U(v_{ce}))-v_{ce})}{U'(U^{-1}(z+U(v_{ce}))-v_{ce})}-\frac{U''(U^{-1}(z+U(v_{ce})))}{U'(U^{-1}(z+U(v_{ce})))}\right]=0. \qquad (Q.E.D.)$$

It follows from Lemma 1 that, under the no-return policy, the seller earns

$$(1) \qquad \pi_n(v_{ce},c)\equiv\max\{v_{ce}-c,0\}.$$

Note that the seller's profit is inversely related to the degree of consumer risk aversion. Under the no-return policy, consumers bear the entire risk associated with their uncertain *ex post* valuation. As risk aversion increases, the seller must lower her price to compensate consumers for the risk.

Suppose now that the seller adopts the return policy. Then, all the consumers will attempt to purchase the good initially and decide whether to return it, after learning their valuations. Given a price, p, a consumer with *ex post* valuation v will return the good if and only if $v<p$. Thus, only $[1-F(p)]$ consumers will eventually keep the good. Given this, the seller's optimal strategy is to hold an inventory of precisely $q=1-F(p)$. This limited inventory leads to an initial rationing of some consumers, but eventually all consumers whose valuations exceed p will obtain

[3] In practice, even a free return policy requires a trip to the store, so returning a good may not be costless. A positive return cost does not alter the results of this paper qualitatively, however.

the good. Such a result will arise when the retailer adopts the policy of reselling returned goods to other consumers, as many discount superstores do.[4] Finally, the seller sets p to maximize her profit: $(p - c)[1 - F(p)]$. Assuming that $1 - F(v) - vf(v)$ is decreasing in v, there exists a unique optimal price $p_r(c)$. Under the return policy, the seller therefore earns

$$\pi_r(c) \equiv (p_r(c) - c)[1 - F(p_r(c))]. \tag{2}$$

Inspection of (2) reveals several features that distinguish the return policy. First, the seller's profit does not depend on the degree of consumer risk aversion. The return policy eliminates a consumer's risk of paying more than his *ex post* valuation, so the marginal consumer is not adversely affected by risk aversion. Second, the return policy opens up a screening opportunity: the seller can charge a high price and sell only to high-valuation consumers.[5] Clearly, this opportunity is relatively more valuable when the retail costs are high, since the seller can maintain her profit margin by selling only to high-valuation consumers. Such screening is impossible under the no-return policy.

Intuition therefore suggests that consumer risk aversion and high retail costs would favor the adoption of the return policy, as is confirmed by the following proposition:

Proposition 1. There exists $\hat{c} \in (\underline{v}, E[v])$ such that the return policy is optimal for the seller, *regardless of* v_{ce}, if and only if $c > \hat{c}$. For $c \leq \hat{c}$, there exists $\hat{v}(c) \in [\max\{\underline{v}, c\}, E[v]]$ such that the seller prefers the return policy if and only if $v_{ce} < \hat{v}(c)$, where $\hat{v}(c)$ is non-increasing in c.

Proof. Let $\Psi(v_{ce}, c) \equiv \pi_r(c) - \pi_n(v_{ce}, c)$ denote the profit difference between the two regimes. $\Psi(\bullet, \bullet)$ is continuous.[6] Furthermore, $\Psi(\bullet, c)$ is decreasing for all $c < v_{ce}$, and $\Psi(v_{ce}, \bullet)$ is non-decreasing for all $v_{ce} > c$. To see the latter, use the Envelope theorem to get

$$\Psi_2(v_{ce}, c) = -[1 - F(p_r(c))] - (-1) \geq 0 \quad \text{for all } v_{ce} > c.$$

The first statement follows since $\Psi(v_{ce}, E[v]) = \pi_r(E[v]) > 0$ for all v_{ce} $(\leq E[v])$, and

$$\begin{aligned}\Psi(E[v], \underline{v}) &= (p_r(\underline{v}) - \underline{v})[1 - F(p_r(\underline{v}))] - \{E[v] - \underline{v}\} \\ &= -\int_{p_r(\underline{v})}^{\underline{v}} [v - p_r(\underline{v})]dF(v) - \int_{\underline{v}}^{p_r(\underline{v})} [v - \underline{v}]dF(v) < 0.\end{aligned}$$

Clearly, $\hat{c}$ must satisfy $\Psi(E[v], \hat{c}) = 0$. For any $c \leq \hat{c}$, define $\hat{v}(c) \in [\max\{\underline{v}, c\}, E[v]]$ to satisfy $\Psi(\hat{v}(c), c) = 0$; $\hat{v}(c)$ exists since $\Psi(\max\{\underline{v}, c\}, c) \geq 0$ for all $c \geq 0$,

[4] Such a practice is common in many stores, which use mark-down prices for returned goods. Some retailers appear to go further by selling them as new merchandise. Recently, Wal-Mart Stores Inc. and Toys 'R' Us Inc. were accused to routinely misrepresent and sell as new merchandise that has been returned, and sometimes damaged (see "Two Major Chains are Accused in Suit of Sales Deception," *Wall Street Journal*, April 30, 1993).

[5] This opportunity is absent under the no-return policy, since consumers are *ex ante* identical.

[6] $\pi_r(\bullet)$ is continuous by the Theorem of the Maximum (Debreu [1959]).

$\Psi(E[v], c) \leq 0$ for all $c \leq \hat{c}$, and $\Psi(\bullet, c)$ is continuous. It is also unique since $\Psi(\bullet, c)$ is strictly decreasing. The second statement then follows from the monotonicity of $\Psi(v_{ce}, \bullet)$. *Q.E.D.*

The proposition implies, in particular, that the return policy can never be optimal if consumers are risk neutral and retail costs are sufficiently small. The intuition for this result is clear. The no-return policy essentially implements the outcome of "selling the firm to the agent," well known in the principal-agent literature.[7] The seller (principal) transfers the entire risk to the consumers (agent) and by doing so generates the highest expected profits if consumers are risk neutral. By contrast, the return policy eliminates the consumers' downside risk, which means that the seller does not extract the full consumer surplus.[8] As the consumers become more risk averse, the no-return policy becomes less attractive, however, since the seller must lower her price to compensate consumers for the risk. Such risk compensation is unnecessary under the return policy. Likewise, the presence of high retail costs favors the return policy, relatively: the seller can protect her profit margin by selling only to high-valuation consumers under the return policy, whereas the seller has no such option under the no-return policy.

IV. WELFARE IMPLICATIONS OF THE RETURN POLICY

The analysis in the previous section yields several welfare implications. First, the return policy leads to better risk-sharing between the seller and risk-averse consumers, by eliminating the downside risk of the consumers.[9] This effect unambiguously benefits the consumers. Second, the return policy typically results in screening some low-valuation consumers. The welfare implications of this effect are ambiguous. If retail costs are small, then the screening will result in the loss of some consumer surplus. If retail costs are large, however, the screening of low-valuation consumers will result in an efficiency gain, since the return policy will simply reallocate a good from a consumer with low valuation to a consumer with high valuation, above the retail costs.

The combined effect is unambiguously positive, at least for the consumers. Consumers are always better off when the seller adopts the return policy. Under the return policy, the consumers are protected from any loss, so they receive strictly positive expected utility.[10] By contrast, the consumers receive zero expected utility under the no-return policy (see Lemma 1).

[7] I thank a referee for suggesting this interpretation.

[8] The consumer learning requires individual rationality to be met in *ex post* terms, which imposes a stronger constraint on the seller than *ex ante* individual rationality that holds under the no-return policy. See Maskin and Tirole [1990] and Gale and Holmes [1993] for further discussion on the effect of learning on the agent's individual rationality constraint.

[9] The return policy does not eliminate the upside risk of the consumers. If $p_r(c) = \underline{v}$, there is no downside risk to share, so the return and no-return policies are welfare-equivalent.

[10] Under the return policy, consumers receive $E[U(\max\{v - p_r(c), 0\})]$, which is strictly positive since $p_r(c) < \bar{v}$.

The consumers' strict preference for the return policy means, however, that the seller does not fully internalize the social gains from adopting the return policy. The consequence of the latter is too little adoption of the return policy in equilibrium, relative to the socially efficient outcome. The next proposition formalizes this observation, using the total certainty equivalent of the seller- and consumer-surplus as a welfare criterion.[11] It shows that the return policy dominates the no-return policy in welfare for a larger set of parameter values than in profit.

Proposition 2. The return policy is socially desirable whenever the seller adopts it. The converse may not hold. Formally, the return policy is socially desirable, *regardless of* v_{ce}, for $c > \tilde{c}$ for some $\tilde{c} < \hat{c}$; and, for $c \leq \tilde{c}$, it is desirable if $v_{ce} < \tilde{v}(c)$ for some $\tilde{v}(c) > \hat{v}(c)$.[12]

Proof. Under the no-return policy, the total certainty equivalent is simply the seller's profit: $W_n(v_{ce}, c) \equiv \pi_n(v_{ce}, c)$. Under the return policy, the total certainty equivalent is $W_r(v_{ce}, c) \equiv U^{-1}(E\{U(\max\{v - p_r(c), 0\})) + \pi_r(c)$. The first term of $W_r(v_{ce}, c)$ is strictly positive (since $p_r(c) < \bar{v}$), and it is continuous in (v_{ce}, c). Therefore, $W_r(v_{ce}, c) > W_n(v_{ce}, c)$ whenever $\pi_r(c) \geq \pi_n(v_{ce}, c)$. The proof is completed by noting that $W_r(v_{ce}, c) - W_n(v_{ce}, c)$ is continuous in (v_{ce}, c).[13] *Q.E.D.*

V. CONCLUSION

In this paper, I have studied the economic rationale for a consumer return policy, from the perspective of consumer learning about goods. The results of this paper do not just apply to the return policy for experience goods, but, to a limited degree, they also apply to various other return policies and other retail practices that promote customer learning of products. Widely used retail practices such as the money-back guarantee and limited-period free trial of a new products can promote customer learning of the products at low risk and can play a role similar to that of the return policy studied in this paper.[14] Likewise, part of the rationale for the in-store customer service and, to some extent, call-in technical support for products like personal computers can be understood in a similar vein.

[11] Expected total surplus is not an appropriate welfare criterion, since it does not capture the consumer risk aversion. Since the CARA utility function displays no wealth effects, however, the certainty equivalents of the total surplus can measure the level of welfare. This criterion is used by Holmstrom and Milgrom [1990, 1991] in their principal–agent models.

[12] The proposition does not contain the "only if" part, since the social welfare difference between the two regimes cannot generally be shown to be monotonic in $(-v_{ce}, c)$.

[13] Continuity of $W_r(v_{ce}, c)$ in v_{ce} is not immediate since v_{ce} affects $W_r(v_{ce}, c)$ indirectly through the curvature of $U(\bullet)$. With CARA utility functions, v_{ce} uniquely determines $U(\bullet)$, through the risk coefficient. Continuity then holds since both v_{ce} and $U(\bullet)$ vary continuously with the risk coefficient.

[14] The money-back guarantee and free trial offer are common for many newly-introduced goods and services. For example, many credit card companies make such offers when introducing travel agency, diner's club and catalogue shopping services. Free trial offer is also used for new machines. For example, PerSeptive, a biotech lab instrument maker, used a sales strategy: Pay nothing for it now and return it later if you don't like it (see "Biotechnology: Biotech Company is Questioned about 'Try It Out' Sales Strategy," *Wall Street Journal*, November 8, 1994).

This paper represents an exploratory study of a largely unexplored – yet practically important – issue, so the model captures only the most salient feature of the return policy. A more comprehensive study should attempt to extend the model in several ways. First, I have considered only two choices for the firm: the return policy and the no-return policy. In practice, firms offer a variety of return policies, differing in terms of return requirements and return periods. This variety presumably allows firms to vary the difficulty of return and, more importantly, fine tune the amount of consumer learning prior to the purchasing decision. In some cases, a manufacturer's quality decision, such as the size of clothes, can also affect the actual return.[15] Second, consumer moral hazard must be incorporated. The possibility of consumers abusing return policies is an important consideration that limits their use. Some of the well-known cases include return of TV sets after Super Bowl Sunday, return of camcorders after a daughter's wedding, or "borrowing" of party dresses for special occasions.[16] Return policies must be designed to mitigate these kinds of moral hazard problem. For example, prohibiting cash refund (i.e., return only in kind) is effective against some of the above moral hazard problems. Third, a more detailed specification of consumer preferences can be introduced to add realism. For example, one can think of a specification of consumer preferences that involves ex ante diversity as well as ex post diversity. Finally, oligopoly competition must be introduced. Some of the return policies may be introduced as a result of competition among retailers rather than because of the profit and efficiency gains that we studied in this paper. These extensions will reveal new dimensions in the adoption of return policies and warrant further studies.

YEON-KOO CHE,
Department of Economics,
University of Wisconsin-Madison,
WI 53706, USA

ACCEPTED SEPTEMBER 1995

REFERENCES

DEBREU, G., 1959, *Theory of Value: An Axiomatic Analysis of Economic Equilibrium* (John Wiley & Sons, New York).

GALE, I. and HOLMES, T., 1993, 'Advance-Purchase Discounts and Monopoly Allocation of Capacity,' *American Economic Review*, 83, pp. 135–46.

HOLMSTROM, B. and MILGROM, P., 1990, 'Regulating Trade Among Agents,' *Journal of Institutional and Theoretical Economics*, 146, pp. 85–105.

HOLMSTROM, B. and MILGROM, P., 1991, 'Multitask Principal–Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design,' *Journal of Law, Economics and Organization*, pp. 24–52.

[15] Catalog marketers often make the sizes of their clothes fuller than store sizes because they have found that shoppers are less likely to return goods that are slightly too large – while they will almost always return clothes that are too small. See "Fashion: Go Figure: Same Shopper Wears Size 6, 8, 10, 12," *Wall Street Journal*, November 11, 1994.

[16] See "Unfair Returns From Retailers Plague Many Electronics Makers," *Wall Street Journal*, September 26, 1994, and "Retailing: At Clothiers, It's Many Unhappy Returns When Buyers Turn Out To Be 'Borrowers,'" *Wall Street Journal*, June 2, 1992.

MASKIN, E. and TIROLE, J., 1990, 'The Principal–Agent Relationship with an Informed Principal: The Case of Private Values,' *Econometrica*, 58, pp. 379–410.

MARVEL, H. P. and PECK, J., 1994, 'Demand Uncertainty and Returns Policies,' mimeo., The Ohio State University.

PASTERNACK, B. A., 1985, 'Optimal Pricing and Return Policies for Perishable Commodities,' *Marketing Science*, 4, pp. 166–76.