Money Back Guarantees in Retailing: Matching Products to Consumer Tastes

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Retailers often sell products that consumers cannot fully evaluate before purchase. To reduce consumer risk, some retailers offer consumers money-back guarantees (MBGs). We develop a simple model that allows us to determine conditions in which MBGs work best to enhance profits and social welfare. According to our model, the profitability of an MBG for a particular product can be assessed by estimating salvage values of returned merchandise, the probabilities of mismatching the product to consumers, transaction costs of returning merchandise, and consumer value of product trial Preliminary evidence supporting our theory is presented.

Retailers often sell products that consumers cannot fully evaluate before purchase. Books, compact discs, household appliances, restaurant meals, and services such as cutting hair are examples. When consumers are uncertain about the benefits they would get from a product, they are less willing to purchase it than they would be if they could be assured that the product will meet their needs. Therefore, uncertainty about product features can prevent mutually beneficial exchanges between consumers and retailers. How can retailers reduce consumer uncertainty about product features?

Previous research has focused on ways to reduce consumer uncertainty about product features controlled by manufacturers. This uncertainty often relates to product *quality* (the ability of the product to perform effectively and properly) which is controlled by manufacturers. It is reasonable that manufacturers, not retailers, take responsibility for mitigating quality risk because they produce the product. Manufacturers can reduce quality risk through

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explicit quality warranties (Padmanabhan and Rao, 1993; Menezes and Currim, 1992; Lutz, 1989; Grossman, 1980). Under these warranties, manufacturers typically promise to fix or replace a product if it fails adequately to fulfill its performance claims within a given time period.

Manufacturers can also try to assure consumers about product quality via market signals such as high price (Bagwell and Riordan, 1991), advertising (Nelson, 1974), reputation of a retail outlet (Chu and Chu, 1993; Davis, 1993), and money-back guarantees (Moorthy and Srinivasan, 1994). Such market signals, however, may be imperfect quality indicators. For example, some manufacturers charge a higher price for their product than its quality warrants (Gerstner, 1985; Tellis and Wernerfelt, 1988), leaving some customers with the feeling that they overpaid for the product.

Surprisingly little research is available on how *retailers* reduce consumer uncertainty about product features. Such uncertainty is not limited to quality. In fact, a customer may buy a product that performs effectively and properly, but *does not match her taste.* For example, a recording of classical music that receives excellent reviews for sound quality can be unsatisfactory to a given customer because of its slow tempo. By communicating and interacting with the customer, a retailer may learn about her preferences and better assist her in finding a recording that matches her individual tastes (Wernerfelt, 1993). It is reasonable that retailers take responsibility for mitigating product matching risk because they have more control over the matching process than manufacturers do.

Money-back guarantees differ from manufacturers' warranties in several ways. A manufacturer's warranty only allows a refund or replacement if the product is defective or does not perform adequately (Heal, 1977). Usually it is offered by a manufacturer or a third party insurer who bears the cost of dealing with the defective merchandise (Padmanabhan and Rao, 1993). In contrast, money back guarantees are more commonly offered by retailers than by manufacturers and often allow refunds for any reason, "no questions asked." Therefore, we define a money back guarantee (MBG) as *a policy in which the retailer publicly agrees to refund the full purchase price to a customer for any reason, even if the product adequately fulfills its implicit or explicit performance claims.*

Retailers may be motivated to offer MBGs for several reasons. First, an MBG can enhance the store s image of concern for its customers. The additional customers that a store generates by such a reputation may increase storewide profits even when the policy is not profitable for some products (Schmidt and Kernan, 1985; Hart, 1988). Grossman (1981) gives an analogous argument for warranties. There also may be competitive pressure to offer an MBG. If a retailer fails to offer an MBG in a competitive market, it may lose customers to other stores that do have such a policy. Often, offering an MBG may not be very costly to the retailer since many manufacturers take back returned merchandise for a full or partial refund (Padmanabhan and Png, 1994). A policy of offering an MBG may indirectly stimulate sales because consumers who return merchandise may use this opportunity to buy other items. Furthermore, an MBG policy may help retailers reduce costs on in-store demonstrations because customers can try the products at their own homes.

We will show that a retailer may offer a money-back guarantee, even without the inducements just mentioned. Such a guarantee may increase a retailer's profits. They may increase the sales volume by encouraging consumers to try new products. In addition, they may allow the retailer to charge higher prices because the reduction in the risk from the product's being a poor match with their tastes may increase a consumer's willingness to pay.

In spite of the potential benefits from an MBG policy, several factors reduce the attractiveness of such a policy to retailers. Clearly, product returns result in lost sales. When a customer returns a product, the retailer will try to salvage the product through reselling it or returning it to the manufacturer. Sometimes consumers may be in a better position than retailers to salvage mismatched products (for example, giving a mismatched product as a present to somebody with different tastes). In these cases a retailer would prefer to compensate the consumer for her losses rather than offer an MBG if there were a practical way of doing so. A retailer's liberal return policy may encourage some consumers to "free-ride" by returning products they like after using them for some time. Lutz (1989) discusses a related problem with warranties.

These limitations may explain why some retailers offer a money-back guarantee only on selected items. Apparel stores, for example, typically offer cash refunds on regularly stocked merchandise, but some do not offer refunds on clearance items. Another example relates to computer stores that offer money-back guarantees only on computers or printers but not on opened software. The restrictions on software are probably due to the ability to get nearly the full benefits of the software once it has been copied onto one's computer. The possibility of such "moral-hazard" behavior is addressed in the model we develop below.

This paper presents a model that shows that a retailer can profit by offering MBGs, even without competitive pressure or a manufacturer's incentives to do so. Here, social welfare is enhanced compared with a situation in which the retailer does not offer an MBG, for example, merchandise is sold "as-is." We derive a simple rule to help managers evaluate the profitability of MBGs. The rule can be applied by estimating the following parameters related to the limitations mentioned above: salvage values of returned merchandise, probability of mismatching a product to consumers, transaction costs of returning merchandise, and consumer value of product trial. Some empirical evidence and casual observations are presented that are consistent with predictions of the model.

THE BASIC MODEL

Consider a monopoly retailer who sells a product that can be fully judged only after purchase. A monopoly framework allows us to isolate the incentive of providing an MBG *for matching* a product to consumer tastes separate from any competitive pressures to do so. To evaluate the product, consumers must purchase it and try it for a fixed period. Each consumer considers buying only one unit, and repeat purchase of the identical item does not take place. For example, a consumer is unlikely to buy an additional compact disc, book, or dress that is identical to the one already purchased. Although consumers have incomplete information about how they will like the product, they are informed about prices and the retailer's return policy as explained below. The product's inherent quality is known with certainty but the product may not match a consumer's tastes.

We assume that consumers are homogeneous in all respects except how they value the product. Two segments exist: those that obtain a high value V over the life of the product, and those that obtain no consumption benefit but a salvage value, s, which reflects the value they can get from reselling the product secondhand.[1] A consumer can fully determine whether the product matches her tastes only *after* the period of trial. There is a probability, γ, that the product will be a good match for a random consumer, yielding utility V. The probability is assumed to be known to both consumers and to the retailer. The product will be a poor match for the consumer with the probability $(1 - \gamma)$.

A retailer can decide to sell the product "as-is," meaning no returns are allowed, or offer an MBG under which buyers may return the product after a fixed trial period for a full refund. Buyers consume a proportion, β, of the product during trial. This implies that if the product is a good match the consumer receives a "trial value" of βV during the trial period. If she keeps the product, she will receive a remaining consumption value is $(1 - \beta)V$. If the product is not a good match, the consumer receives a trial value of zero and if she keeps the product, she receives a salvage value of s. For the sake of consistency we assume that the salvage value when there is a poor match is less than the value of the remaining consumption when there is a good match, $(1- \beta)V$. If a buyer takes advantage of the MBG, she incurs a transaction cost, T, which reflects the traveling costs, lost time, and possible mental anxiety resulting from returning the merchandise to the store.

To keep the model as simple as possible, we consider expected profits from a random consumer. The wholesale price the retailer pays per unit is C, and P denotes the retail price. If the product is returned to the retailer, he can obtain a net salvage value, S, for it. Note that the salvage value cannot exceed the wholesale price C. If the product is returned to the manufacturer for full credit, the salvage value is equal to the wholesale price, C, less any handling expense. If, on the other hand, the retailer must resell the product in a secondary market, the sale eliminates a future sale that the retailer could have made if the product would not have been returned. Since the retailer can buy a brand new product at the wholesale price C, the returned unit is not worth more than C to him.

The consumer maximizes expected surplus, and buys the product if the surplus from doing so is greater than or equal to zero. A consumer's expected surplus is the expected value from the product less price and any expected transaction costs. This surplus can be used as a measure of customer satisfaction. Clearly the consumer's buying decision depends on the retailer's price and MBG policy. Therefore, the profit maximizing retailer needs to take into account the consumer surplus maximizing behavior when deciding price and MBG policy. We derive the equilibrium prices and MBG policy for the retailer in the next section.

ANALYSIS OF MONEY-BACK STRATEGY

Selling As-Is

As a benchmark, we will compare the retail profitability and expected consumer surplus under an MBG to the values occurring when an MBG is not offered, for example, selling "as-is." Because consumers cannot return unwanted merchandise under this selling strategy, a random consumer only decides whether to buy the product or not. She will buy the product if the expected surplus from using it is nonnegative. The consumer's expected surplus from purchasing the product is obtained by subtracting the price from the expected value of the benefits the product provides (V if it is a good match and s if it is not):

$$U_{AS\text{-}IS} = \gamma V + (1-\gamma)s - P_{AS\text{-}IS} \geq 0 \tag{1}$$

The retailer's expected profit per customer is

$$\Pi_{AS\text{-}IS} = P_{AS\text{-}IS} - C \tag{2}$$

The profit maximizing retailer will raise the price until the consumer's expected surplus reaches zero since she will not buy at a higher price. Setting Equation 1 equal to zero, solving for price, and substituting the result in Equation 2 gives the optimal price and profit when selling as-is:

$$P^*_{AS\text{-}IS} = \gamma V + (1-\gamma)s \tag{3}$$

$$\Pi^*_{AS\text{-}IS} = \gamma V + (1-\gamma)s - C \tag{4}$$

Offering a Money-Back Guarantee

Under an MBG buyers can return merchandise for a full refund. Therefore, a random consumer makes two sequential decisions: first, whether to buy the product, and second, conditional on buying it, whether to return it or not (see Figure 1).

In the first decision, she will buy the product if her expected surplus before purchase is nonnegative:

$$U_{MBG} = \gamma(V - P_{MBG}) - (1-\gamma)T \geq 0 \tag{5}$$

The first term of Equation 5 is the contribution to expected utility from a good match. The second term is the contribution to expected utility from a poor match, which is $-T$ since under an MBG policy she loses only the transaction cost of returning the product. We will call this condition the "participation constraint" since the customer will not participate in the market if this condition is not satisfied.

In the second decision, a consumer will return a product and claim the MBG if the product's value after trial is less than the purchase price minus the transaction cost. If the product is a *poor match*, the product will be returned if the value the consumer receives from returning the product, $P - T$, is larger than her salvage value. A consumer may choose to return the product even when it is a *good match*. She will do so if the value she receives from returning the product, $P - T$, is greater than the remaining consumption value $(1 - \beta)V$. We will call the second scenario moral-hazard behavior (Tirole, 1986), because the consumer "free-rides" on the retailer's MBG. To prevent such behavior, the retailer must set the price low enough so that customers who find a good match will not claim the MBG. That is, the retail price must satisfy

$$P_{MBG} \leq (1-\beta)V + T \tag{6}$$

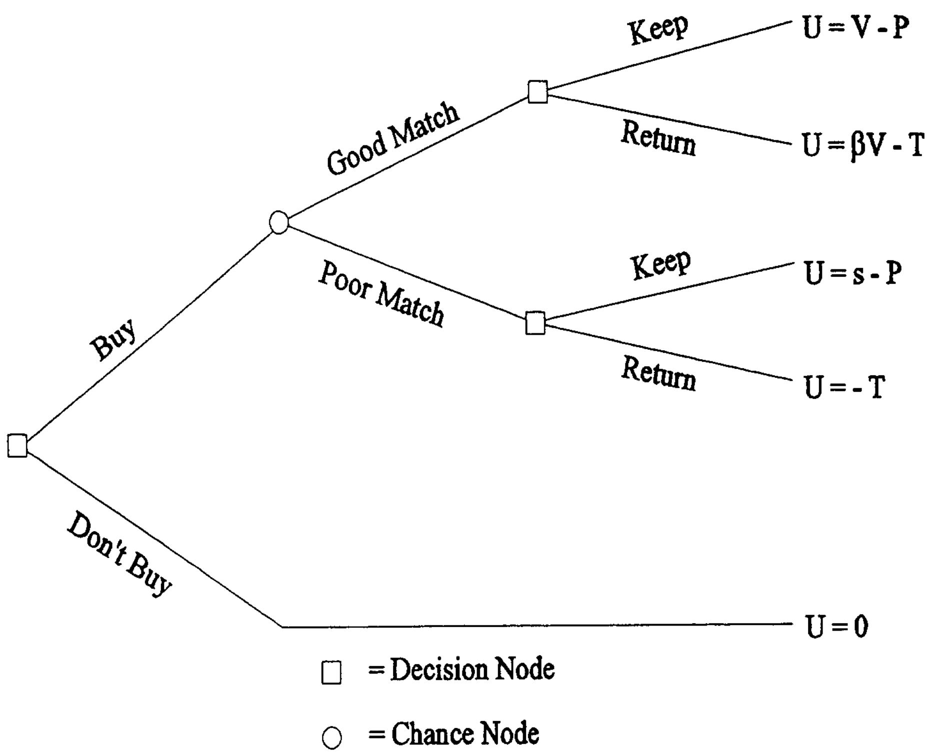

Figure 1. **The Sequence of Consumer Decisions**

which we will call the "moral-hazard constraint." When P_{MBG} satisfies conditions in Equations 5 and 6, a consumer will purchase the product and will keep it if it is a good match. The product will be a good match with a probability of γ, in which case the consumer pays the price and keeps the product and the retailer earns profits of $P_{MBG} - C$. With a probability of $1 - \gamma$, the consumer will find the product to be a poor match and will return it, leaving the retailer with only the salvage value, S, less the cost C. Therefore the expected profit per customer under an MBG is

$$\Pi_{MBG} = \gamma P_{MBG} + (1 - \gamma)S - C \quad (7)$$

To maximize expected profits, the retailer will raise price until either the participation constraint in Equation 5 or the moral-hazard constraint in Equation 6 is binding. Figure 2 illustrates how these constraints vary with the transaction cost. The probability of a good match, γ, multiplied by the trial value βV, is the expected trial value. The retailer needs to be concerned about moral-hazard behavior when the expected trial value is large compared with the transaction cost of returning the merchandise. A consumer who purchases the product with the intent to return it will receive the expected trial value $\gamma\beta V$ at the cost of returning the product T. If $\gamma\beta V$ is greater than T, a consumer should purchase the product regardless of its price because the expected net benefits are positive from doing so. Here, the

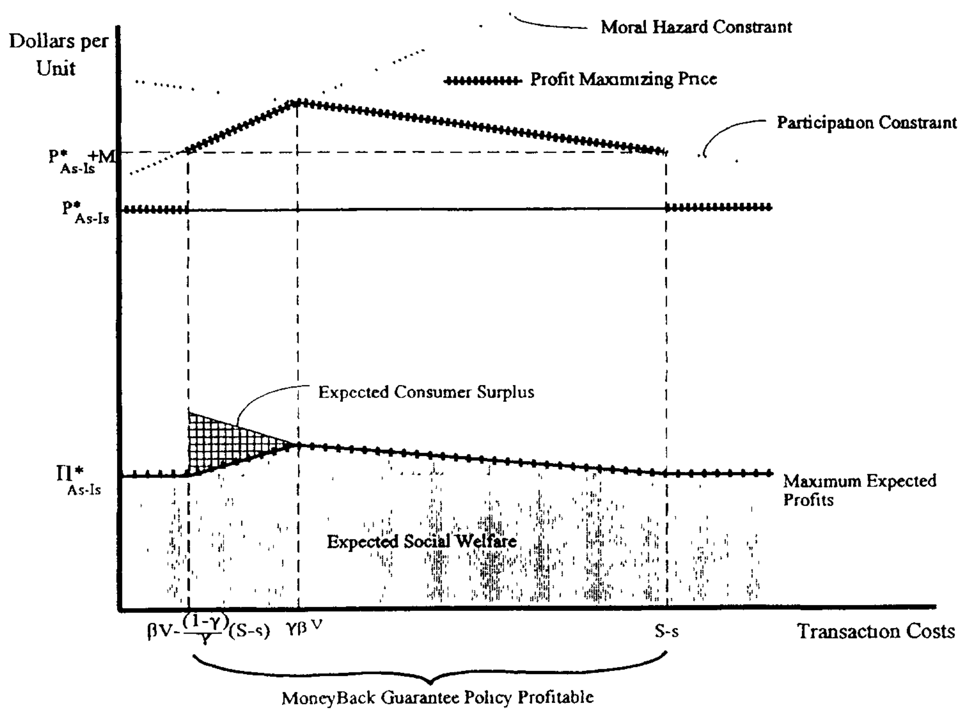

Figure 2. **Prices, Profits and Refund Policy as Functions of Transaction Costs**

retailer should lower the price to make the option of keeping the product that is a good fit more attractive than the option of returning it. The highest price that encourages keeping a product that is a good match is the one for which the moral-hazard constraint is binding.

Verifying that both the participation constraint and the moral-hazard constraint are equal when T is equal to $\gamma\beta V$ is easy. If the expected trial value is smaller than the transaction cost, the retailer can raise the price until the participation constraint is binding without the risk of accepting returns from satisfied customers. In both cases, the retailer will maximize expected profits by charging the highest price that satisfies the binding constraint. As a result, we must consider separately the profit maximizing MBG policy when each of the two constraints is binding.

Participation Constraint is Binding ($T > \gamma\beta V$). Setting Condition 5 equal to zero, and solving for the price gives

$$P^*_{MBG} = V - T(1-\gamma)/\gamma \tag{8}$$

Substituting this in the profit expression in Equation 7 gives

$$\Pi^*_{MBG} = \gamma V + (1-\gamma)(S-T) - C \tag{9}$$

Comparing expected profits from Equations 9 and 4 shows that when the participation constraint is binding, an MBG is more profitable than selling as-is if

$$T < S - s \tag{10}$$

We will call the term $S - s$ the retailer's *salvage advantage*. This term reflects the premium that the retailer has in salvaging a poor match. According to Equation 10, if offering an MBG is more profitable than selling as-is, the retailer's salvage advantage must exceed the consumer's transaction costs from returning merchandise.

Moral-Hazard Constraint is Binding ($T < \gamma\beta V$). When the moral-hazard constraint as expressed in Equation 6 holds with equality, we get the price that maximizes expected profits,

$$P^*_{\text{MBG}} = (1 - \beta)V + T \tag{11}$$

When this price is charged, Equation 5 implies that consumers get an expected surplus of

$$U^*_{\text{MBG}} = \beta V - T \geq 0 \tag{12}$$

and Equation 7 implies that the retailer earns expected profits of

$$\Pi^*_{\text{MBG}} = \gamma[(1 - \beta)V + T] + (1 - \gamma)S - C \tag{13}$$

Note that the consumer's expected surplus given in Equation 12 is positive since the condition that the moral-hazard constraint is binding, $T < \gamma\beta V$, implies T is less than βV. Comparing the maximum expected profit under an MBG expressed by Equation 13 to the maximum profit when selling as-is in Equation 4, gives the rule that guarantees that an MBG is more profitable than selling as-is for the case when T is less than $\gamma\beta V$:

$$T > \beta V - (1 - \gamma)(S - s) / \gamma \tag{14}$$

Combining conditions in Equations 10 and 14 gives the total range of transaction costs for which MBG will be more profitable than selling as-is,

$$\beta V - (S - s)(1 - \gamma)/\gamma < T < S - s \tag{15}$$

Condition 15 can be stated as the following result:

> **Profitability of MBG**: *An MBG is more profitable than selling as-is if: (a) the retailer's salvage advantage is higher than the buyer's transaction cost of returning merchandise or (b) the transaction cost is sufficiently large relative to the buyer's expected trial value to prevent moral-hazard behavior by consumers.*

THEORETICAL AND EMPIRICAL IMPLICATIONS

The above analysis has several interesting theoretical and empirical implications. First, we show in the Appendix that *the retailer requires a price premium for offering an MBG (over the price he charges under selling as-is). The premium must be at least M, where*

$$M = [\gamma(V - s) - (S - s)](1 - \gamma)/\gamma \tag{16}$$

This value M can be viewed as the lowest premium that the retailer will accept in compensation for the service of offering an MBG. It allows the retailer to offset the expected opportunity cost of accepting returned merchandise. This minimum premium increases as s or V increases. When V or s is high, consumers are willing to pay a high price for the product when it is sold as-is. When the retailer offers an MBG, he forgoes this high price when a consumer returns the product. As a result, the retailer requires a large price premium when offering an MBG to compensate him for the lost profits that he would receive from an as-is policy. However, the value of M will decrease as S increases because a large S implies that the retailer's foregone profit when he accepts returned merchandise is small.

Second, we can gain intuition of how consumer transaction costs determine the profitability of MBG and customer satisfaction (as measured by the consumer surplus). Figure 2 shows prices and profits as functions of consumers' transaction costs. For a large consumer transaction cost ($T > S - s$), an MBG will not be very valuable to consumers because they will incur a high transaction cost when there is a bad match. Therefore, consumers are unwilling to pay a significant price premium for the product with an MBG. The relatively low price consumers are willing to pay will not be sufficient to compensate the retailer for accepting returned merchandise. As a result, selling as-is at the price, $P^*_{\text{AS-IS}}$, is the most profitable alternative. As transaction costs decrease, consumers will find the MBG more valuable. The retailer has the incentive to capture this additional value by increasing price.

When the transaction cost drops below the retailer's salvage advantage, $S - s$, an MBG becomes more profitable than selling as-is because the buyer is willing to pay a significant price premium and the retailer has a relatively high salvage value for returns. However, as T decreases relative to the expected trial value and reaches the critical value, $\gamma\beta V$, opportunistic consumers will try to return the merchandise after trial for a full refund even if it is a good match. To prevent this unprofitable moral-hazard behavior, the retailer reduces price and the profitability of an MBG declines as consumer transaction costs decrease. When consumer transaction costs are very low, selling as-is becomes the more profitable alternative for the retailer because the retailer can no longer charge a sufficient price premium and deter consumers' moral-hazard behavior.

For some product categories such as durable goods, the value of β may be quite small because the expected product life is long relative to the trial period. For the extreme case in which β equals zero, the moral-hazard constraint as expressed in Equation 6 is never binding because the retail price cannot exceed V. For these product categories an MBG may be a useful tool for ensuring customer satisfaction if returned merchandise has a sufficiently large salvage value.

For other product categories, such as food products, β can be close to one because much of the product's value can be obtained during the product trial. This may also be the situation for products that can be easily duplicated with little loss in quality (such as cassettes or computer software that does not require documentation for use). As the value of β increases, the residual consumption value of satisfied consumers, $(1 - \beta)V$, grows smaller, so it becomes more attractive for them to return the product. If $(1 - \beta)V$ is less than or equal to s, then an MBG policy that is attractive to dissatisfied consumers will also be attractive to satisfied consumers and everybody will return the product if an MBG is offered. In a situation like this, our model suggests that an MBG should not be offered unless there is a way of controlling returns by satisfied customers.

One can get a sense for the likelihood that an MBG will be offered from Figure 2, which illustrates the range of transaction costs over which an MBG is profitable. When this range is large, we would expect a greater likelihood of offering an MBG than would be the case when the range is small. As expected, this range shrinks as the retailer's salvage advantage, $S - s$, decreases because the value of the potential gains from returning merchandise to the retailer is small. The range is also small for large values of γ because it is unlikely that the product will be a bad fit, implying that the gains from allowing consumers to return merchandise are small. Furthermore, the range over which an MBG is profitable decreases when β increases.

The model's implications of this model regarding the existence of an MBG are summarized in the following hypotheses:

> **Hypotheses.** *MBGs are more likely to exist when: (1) the retailer's salvage advantage term, S-s, increases, (2) the fraction of the total value obtained during trial, β, decreases, and (3) the probability of matching product to a consumer's tastes, γ, decreases.*

SOCIAL WELFARE GAIN FROM MONEY-BACK GUARANTEES

Next we will show that an MBG can improve social welfare by encouraging consumers to try new products. It follows from Equation 3 that a lower probability of product fit may drive the price consumers are willing to pay to such a low level that trade between consumers and the retailer will not take place at all. An MBG can "create a market" by increasing the price consumers are willing to pay because it raises the consumer's effective salvage value for mismatched merchandise. That is, *sometimes, providing an MBG may be the only profitable way for the retailer to sell the product.*

The MBG is said to be socially efficient compared to selling as-is if it makes both consumers and retailers better off. A necessary condition for this is:

> **Social Welfare Result.** *An MBG is socially efficient compared to selling as-is if the retailer's salvage advantage exceeds the transaction cost associated with returned merchandise.*

To prove this result, we need to compute and compare expected social welfare under the two selling regimes: MBG and selling as-is. Expected social welfare in economics is the sum of the dollar value of expected consumer surplus and retailer's profit. Under selling as-is, expected social welfare is equal to expected profit, expressed in Equation 4, because the price is set to extract all consumer surplus.

Under MBG there are two cases to consider: high and low transaction costs. In both cases expected social welfare is equal to the value given in Equation 9. Consider first the case in which the transaction cost is sufficiently high so that the participation constraint is binding. The retailer will charge a price that is equal to the consumer's expected value with the MBG. As a result the consumer is left with zero expected surplus and social welfare is equal to the profit given in Equation 9. In the second case the transaction costs are sufficiently low that the moral hazard constraint is binding. The profit maximizing retailer will charge a price that is low enough to deter returns by a satisfied consumer. This price is lower than the consumer's expected utility with the MBG, implying that the consumer has a positive expected surplus. The dollar value of this expected surplus for a given transaction cost is illustrated in Figure 2 by the height of the crosshatched triangle that measures the difference between the participation constraint and the moral hazard constraint. The resulting social welfare is the sum of the expected consumer surplus given in Equation 12 and the retailer's profit in Equation 13,

$$W^*_{MBG} = U^*_{MBG} + \Pi^*_{MBG} = \gamma V + (1 - \gamma)(S - T) - C \quad (17)$$

which is also equal to Equation 9.

Since expected social welfare is equal to Equation 9 for both cases, we can say that expected social welfare under an MBG is larger than welfare under selling as-is (Equation 4) if condition of Inequality 10 is satisfied. Note, however, that Inequality 10 gives the necessary condition in the social welfare result above. Therefore, the result holds.

The expected welfare gain achieved when it is profitable for a retailer to offer an MBG is illustrated in the shaded area of Figure 2. Expected social welfare increases as transaction costs decrease. However, as T falls below the critical point, $\beta V - (1 - \gamma)(S - s)/\gamma$, an MBG ceases to be profitable because the price required to prevent moral-hazard behavior is too low. In this region, MBG is not offered, even though total welfare would be greater if the retailer were to offer an MBG. Interestingly, when a retailer is free to choose whether to offer an MBG, welfare may be enhanced if the transaction costs associated with obtaining a refund were increased. That is, when transaction costs are low, an MBG may not be offered even when it may be socially desirable. Here, imposing restrictions or hassles on exchanges may increase both retailer profits and social welfare.

SUPPORTING OBSERVATIONS

In this section we present some empirical evidence that is consistent with the theory presented above. This evidence is preliminary, and more rigorous empirical tests will help further validate the implications of the model.

The first hypothesis implies that a retailer will be more likely to offer an MBG for products for which his salvage value, S, is high. One would expect that retailers who sell fashion-oriented items would experience a large variation in their salvage values because these products are quickly outdated due to seasonal and fashion changes. Items tend to be placed on clearance sale at the end of a season or when they become unfashionable. These events in turn cause retail salvage value, S, to decrease because the store must clear outdated items at very deep discounts. Therefore, a reasonable statistical test to check consistency with the hypothesis would be whether a fashion-oriented store is more likely to offer an MBG for regular items than for clearance items (because clearance items have a lower salvage value).

To test this hypothesis, retailers of women's clothing were surveyed in three shopping malls in Sacramento, California. The mall contained a total of 374 stores, of which 62 were

TABLE 1

Return Policies and Percentage of Stores Offering Policy (59 Clothing Stores in Sacramento California)

Policy	*Regular*	*Clearance*
Money back: no receipt required	12%	12%
Money back: with receipt, else store credit	83%	63%
Total MBG	95%	75%
Store credit only	5%	15%
No returns	0%	10%
Total No MBG[2]	5%	25%

women's clothing. Of these, 59 agreed to participate and respond to a short questionnaire about their return policies for *regular* merchandise and for *clearance* merchandise. The policies were classified into one of the following four categories: (1) Money Back, no receipt required, (2) Money Back with receipt, otherwise store credit only, (3) No Money Back, store credit only, and (4) No Money Back, no exchanges. The sample distribution of return policies across the stores is reported in Table 1.

The first column shows that, for regular merchandise, most stores (83%), offered an MBG only with receipts, otherwise store credit was given. Some retailers mentioned that this policy is used to prevent abuse by customers who may have obtained the item on sale, by shoplifting, or from another retailer. These are additional types of moral-hazards faced by retailers. Other policies, such as "Money-back no questions asked" and "Store credit only" were less common. An interesting observation is that no store sold regular merchandise "as-is."

In contrast, the second column of Table 1 shows the distribution of policies for clearance merchandise. Here fewer offered MBGs, even with sales receipts. Instead, some stores shifted to selling as-is, or store credit only policies. This shift in distribution was significant under a contingency test: ($X^2(1) = 9.44$, $p < .01$). Hence, the likelihood of an MBG does decrease as the proxy of salvage value decreases, consistent with the theory's predictions.

Measures of s, γ, T and βV would be best obtained by surveys of consumers to estimate their salvage value, probability of mismatching, etc. For example, s might be estimated by developing a measure of the extent a resale market exists and by observing the typical fraction of the original price that can be earned from reselling a used product. Resale markets may be readily observed with some products, such as used cars, but there are many products for which resale markets are not as easily observed. Want ads, garage sales and flea markets may also provide sources of information about a consumer's salvage value for various products. The probability of a good fit, γ, might be estimated through surveys of consumer dissatisfaction with various product types.

While a formal consumer survey on the factors influencing an MBG policy is beyond the scope of this analysis, we can make some informal observations that are consistent with the above analysis. There are often restrictions on the return of products from which consumers can get most of the benefits over a short period of use (i.e., β is large). For example, many retailers, such as CompUSA, do not give refunds or exchanges for products that can be easily copied such as compact discs or computer software. Copying allows customers to capture most of the product's benefits in a short period of time. Since β is large for these products, the hypotheses above predict that MBGs are less likely in these cases. For other types of products, retailers may impose restrictions that limit the fraction of a product's benefits that can be realized prior to a return. Many clothing retailers (e.g., Macy's) do not give refunds on products that show noticeable signs of wear. Other retailers restrict the length of time over which a customer can get a refund (e.g., Radio Shack). These examples are consistent with the above hypotheses on the effect of β.

The third hypothesis states that an MBG will be more likely when the probability of a match γ decreases. When an identical product is frequently purchased, as happens for consumer non-durable goods, consumers are likely to know whether a product will fit with their tastes. In such a situation one would expect the value of an MBG as a matching device to be limited. The fact that grocery and drug stores tend not to have a generous MBG policy is consistent with this hypothesis. A careful empirical analysis of the consumer factors that influence the profitability of an exchange policy provides a direction for future research.

CONCLUSION

We have shown that a money back guarantee (MBG) may enhance profits compared to selling as-is, even without competitive pressure. The profitability of the MBG for a particular product is influenced by the relative salvage values of returned merchandise to consumers and retailers, the probabilities of mismatching products to consumers, transaction costs, and consumer expected value from product trial. We also show that an MBG can enhance social welfare. The two main results obtained are:

1. An MBG can be more profitable than selling as-is if the retailer has a salvage value advantage over consumers that is greater in value than the consumer transaction costs of returning merchandise. In this case, an MBG is also socially efficient.
2. An MBG will not be profitable compared to selling as-is if the consumer transaction cost is too small relative to the buyers' trial value, so that moral-hazard behavior prevails.

While we have presented preliminary empirical research and heuristic evidence that gives support to our theory, more empirical work relating to the profitability of refund policies would be desirable. Potential measures for some variables in the model are summarized in Table 2. While some of these measures may not be easily quantified, they may give a retailer insight regarding the appeal of MBGs for certain product categories. Developing quantitative measures of some of these variables could help a manager determine whether an MBG would be profitable.

This model does not account for potential constraints on moral hazard behavior. There are several ways a retailer can combat moral-hazard behavior when offering an MBG. New databases allow retailers to detect customers who often return merchandise. A retailer can impose higher transaction costs on customers who are suspects of moral-hazard behavior or

TABLE 2

Some Measures of Variables that Influence the Attractiveness of a Money Back Guarantee (A "Yes" or Large Value Correlates Positively with the Listed Variable)

S	• Can the retailer repackage and resell the item? • Is the product non-perishable or not frequently modified or updated? • Does limited use have little impact on the ability to sell the product?
s	• Is there a well-defined market for used items? • Is the typical resale price a large fraction of the purchase price?
β	• Can the product be duplicated once purchased in a form that does not substantially reduce the value it provides? • What is the expected product life? • Does the product have a limited number of use occasions?
T	• Are there few convenient store locations? • Is the product large or otherwise difficult to transport? • Is it expensive to repackage and ship the product for a return?
γ	• Has a small fraction of the product been returned historically? • Do consumers report a high degree of satisfaction with the product or category? • Is the product purchased by the same person who will consume it?

refuse to do business with them. Our model assumes that consumers do not deal repeatedly with the retailer. Losing the opportunity to do repeat business with a reputable retailer may deter moral-hazard behavior. The model also assumes that consumers do not feel guilty or immoral about returning satisfactory products (Etzioni, 1988). If consumers do feel guilty about returning products that they have liked, one could view the cost of returning the product to be higher for satisfied customers than for dissatisfied customers. If the moral hazard problem is not severe or can be controlled, an MBG will be a more attractive tool.

Further theoretical work could develop more general models to capture the effects of various factors not addressed in the current model. For example, allowing greater consumer heterogeneity in transaction costs or in salvage value would help explain the phenomenon that some consumers *keep* products for which they are getting a lower value than the price they paid. When the proportion of the product's value consumed during trial is small, consumers who are only marginally dissatisfied may decide to keep the product because it is not worth it to them to incur the cost of returning the product. Other important factors for future research include competitive retail environments and sellers of multiple products. As we pointed out in the introduction, a competitive retail environment and selling multiple products will strengthen the motivation to offer MBGs.

This paper has looked at a narrowly defined money-back guarantee policy. Additional research should consider other aspects of the optimal design of return policies: When should a retailer offer a money-back guarantee, and when should he offer store credit only? How should a retailer determine the optimal time limit for a money-back guarantee? When should a customer be required to show a receipt to obtain a return? These issues are interesting topics for future research.

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APPENDIX

Derivation of the Minimum Price Premium

A retailer will only offer an MBG if the transaction cost is greater than $\beta V - (1 - \gamma)(S - s)/\gamma$ or less than $S - s$. If the transaction cost does not satisfy these conditions, the retailer will sell the product as-is at a price of $\gamma V + (1 - \gamma)s$. Consider the case in which the transaction cost is at the lowest level that will encourage the retailer to offer an MBG. If the lower bound is positive, the moral hazard constraint is binding. By substituting the lower bound on transaction cost for T in the binding moral hazard constraint, as expressed in Equation 6, we get the lowest price that can be charged without encouraging satisfied consumers to return the product,

$$P_L = V - (1 - \gamma)(S - s)/\gamma$$

Subtracting $P_{AS\text{-}IS}$ from P_L we get $[\gamma(V - s) - (S - s)](1 - \gamma)/\gamma$, which is the value of M described in the text.

At the upper bound for transaction cost, $S - s$, the participation constraint in Equation 5 is binding. By substituting the upper bound on transaction cost for T in the binding participation constraint and solving for P, we get the highest price that can be charged without discouraging purchase,

$$P_H = V - (1 - \gamma)(S - s)/\gamma$$

which is the same as P_L. This implies that the difference between P_H and $P_{AS\text{-}IS}$ is M. With transaction costs between $\beta V - (1 - \gamma)(S - s)/\gamma$ and $S - s$, the price satisfying the relevant constraint with an MBG is higher than at the end points, and the retailer earns a price premium greater than M.

NOTES

1. Note that we measure consumer (utility) in dollars. This approach, which is common in economic modeling, helps simplify the analysis, but it may not capture all aspects of consumer values.
2. We classified "Store Credit Only" as a "No MBG" policy, because it restricts the customers to use the credit only at that store. In contrast, money-back is a better value because it allows customers to use the returned money at any store.

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