Bundling Donations to Charity with Product Purchases: A Business Incentives Model

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Abstract

This paper focuses on developing a business model that explains why certain companies would bundle their products with donations to charity. The model assumes that consumers are individuals that maximize their utility subject to their income and companies are agents that maximize their profits subject to prices and costs. The type of firm that we will focus on will be the monopoly. We will investigate the different situations where a monopoly might choose to engage in charity-linked product bundling and look at several factors that may lead to their decision to do so. These factors include: small vs. large prices, homogeneous vs. heterogeneous populations, and strong vs. weak consumer preferences for charitable donations. In the end, the model shows when a why a firm would choose to market a charity-linked product, even when it is the firm who pays for the entire price of the donation.

Contents

1 Introduction

In the past few decades, an increasing number of companies have begun to market some of their products by bundling them with donations to charity. This type of product bundling, which we refer to as charity-linked product bundling in this paper, has been empirically shown to help companies both on a corporate scale and on an individual product basis. The following is a list of a few companies that currently engage in charity-linked product bundling:

- Volvic Natural Spring Water: Volvic's "Drink 1, Give 10" campaign donates $0.04 to UNICEF for every liter purchased in order to help UNICEF provide clean drinking water to children living in Ethiopia[1].

- Endangered Species Chocolate Co.: The chocolate company donates 10% of their net profits to environmental organizations such as the World Wildlife Fund to help preserve the habitat of endangered species[2].

- L'Occitane en Provence: The skincare brand not only supports the L'Occitane Foundation but also pledges to contribute 15% of sales from its Limited Edition Shea Butter Ultra Rich Body Cream to the Susan G. Komen Foundation for breast cancer research[3].

- Product (RED)™ (includes companies such as Apple®, Dell, Motorola, etc.): A percentage of each sale of a (RED)™ product is do-

nated to The Global Fund to help AIDS/HIV research for individuals in Africa[4].

In one empirical study done by Michal Strahilevitz and John Myers, they showed that linking product purchases with donations to charity has a positive effect on sales, especially with products that are considered to be frivolous luxuries (i.e. chocolate, ice cream sundaes, etc.)[5]. In other empirical studies, researchers have found many individuals would choose to purchase charity-linked products over other brands of products because of their altruistic appeal and underlying economic benefits. These examples indicate that individuals do gain some level of utility from purchasing charity-linked products. However, why have so many corporations found it worthwhile to engage in charity-linked product bundling? For the past few years, charitable contribution from companies that engage in this type of product bundling has totaled over $1 billion dollars per year. Volvic, in particular, has already contributed enough funds to UNICEF to provide 62.5 million liters of clean water to children living in Ethiopia. In this paper, we will focus on modeling why so many companies such as Volvic have chosen to market charity-linked products and how they have been successful at generating more company profits by engaging in this type of product bundling.

2 Background and Motivation

2.1 Incentives as a reason for altruistic bundling methods

In an article published by the U.S. Department of State's Bureau of International Information, it reported that charitable donations in the U.S. reached a record high in 2006, with increasing expectations for the years to come. The article reported that over $ 295 billion was donated in total that year, and over 83.3% of the money was donated by individuals, not corporations and foundations[6]. This data suggests that individuals in the U.S. are motivated by many factors to engage in charitable activities. Generally defined, these factors are known as incentives or [things] that have a tendency to incite a particular course of action[7]. In their studies on charity-linked products, Strahilevitz and Myers refer to the value that individuals gain from charity as "warm glow" or some form of moral satisfaction[5]. They imply that individuals, by giving up their income or welfare to charities, gain a considerable amount of utility in return. In other studies, researchers have also found that some people are compelled to donate to charities due to social pressure from the people and community around them and some are even predisposed to donate to charities because they possess "enduring values which have been internalized and result in [such] behaviors"[8].

In their paper on cause marketing, Scott Smith and David Alcorn identify two distinct ways that an individual would be motivated to purchase a charity-linked product: economic motivation and altruistic motivation[9]. Of these two ways, they argue that economic motivation is the more prevalent and sustainable one because individuals who purchase charity-linked products are sensitive to the price of giving. If an individual perceives that the real amount of donation associated with purchasing a product is less than its cost, then that individual would choose to not purchase such a product. In their study, Smith and Alcorn found that the higher a consumer perceives the cost of donation to be, the less inclined they are to donate. In their study, Smith and Alcorn found that the higher a consumer perceives the cost of donation to be, the less inclined they are to donate. They suggest that the main reason individuals choose to purchase a product that is bundled with a charitable contribution is because they feel that some amount of transaction or donation cost is eliminated in the process. By purchasing the charity-linked good, individuals believe that they can not only gain the utility they expect from the good, but also the added utility of making a donation without having to pay for the full amount of the donation's cost.

As proof of Smith and Alcorn's explanation for economic motivation, in a study conducted by the National Commission on Philanthropy, they found that by eliminating specific forms of economic incentives, less people would

choose to donate to charity. Their results indicated that contributions to churches would fall by 14% and donations to hospitals and educational institutions would fall by nearly 50% if tax deductions for charity donations were eliminated. With the additional cost gained by no longer having tax deductibles, fewer individuals choose to donate to an issue or cause. Then in a later study conducted to examine the effect of coupon redemptions on charitable giving after the purchase of a charity-linked good, researchers found that this type of economic incentive (i.e. redeemable coupons that allowed individuals to cash in money for a charity) strongly motivated consumers to purchase charity-linked products. The reasoning behind this: the redeemable coupons convinced consumers that they were not paying for the price of the donation, and that by purchasing the product, they could gain the additional utility of making a donation to a charity without having to pay a cent for their donation. So, to conclude, we see that consumers are motivated by many factors to purchase products that are bundled with donations to charity. Corporations, by capitalizing on this fact, can increase the demand for their products by acting as the agent that distributes these products.

In microeconomic theory, all companies are treated as profit maximizing agents that set prices and production levels based on the aggregate demand for their product in the economy. Therefore, companies that choose to bundle their products with a donation to charity are purely expected to do so if

charity-linked product bundling increases their overall profits. By bundling their products with a charitable contribution, companies anticipate that the demand for their product would increase. But, in order to engage in charity-linked product bundling, these companies also incur additional costs such as the loss in revenues from making the donations and fixed costs associated with setting up the system (i.e. product relabeling, funds required to secure/communicate with a charity). So for a purely profit-maximizing firm, the profit that it gains through the increased demand must be greater than the donation cost that it incurs in order for it to find it worthwhile to engage in charity-linked product bundling. In this paper, we will develop a model of a monopoly that acts as a profit-maximizing firm. This monopoly would therefore only choose to market a charity-linked product if by doing so it earns more profit that it does by not doing so.

2.2 Effects of Product Type and Prices on Altruistic Purchases

In their paper on "Donations to Charity as Purchase Incentives," Michal Strahilevitz and John Myers found that charity-linked product bundling was more effective when used to promote frivolous products instead of practical ones[5]. They conducted three studies that analyzed the decisions of consumers when they were given a set of frivolous and practical goods that were bundled with a fixed coupon or a donation to charity. In all three of these studies,

Strahilevitz and Myers noticed that consumers were more likely to purchase a frivolous good such as chocolate than a practical good such as notebook paper when the product had a charity incentive. In particular, in their third study, a group of randomly selected U.S. college students were given a set of four coupons: two cash rebate coupons and two donation coupons for goods that they would purchase at a sweet shop (frivolous products) and at a school supplies shop (practical products). The results of this study clearly showed that charity incentives were more effective at increasing the demand for goods in the sweets shop rather than the school supplies shop. These findings are consistent with others reported by Linville and Fischer (1991) and by Gaeth et al. (1997), which suggest that certain types of goods are able to complement charitable giving better than other types of goods[1]0. Specifically, the altruistic utility offered by charity goods may simply be more complementary with the purchase of frivolous goods rather than practical goods. Viewing this rationally, consumers who are interested in purchasing a frivolous product such as chocolate, which leads to calorie uptake (a negative result), may just want to balance such a negative action with a donation to charity (a positive result).

Market statistics show that the prices of frivolous products are on average higher than the prices of practical goods[1]1. Frivolous goods such as luxury cars, expensive watches and jewelry, designer clothing, yachts, and large res-

idences are usually more expensive than their practical counterparts. This suggests that companies that market more expensive, frivolous products may gain more by engaging in charity-linked product bundling than companies that market goods that are more practical. In this paper, we will examine whether this effect would hold true in certain situations. As a note, please know that both frivolous and practical goods can be normal or inferior goods, depending on an individual's income and state of wealth.

2.3 Other Effects on Consumer Decisions to Purchase Altruistic Goods

Roger Bennett and Helen Gabriel list the following as critical factors that determine a consumer's decision to support charities[1]2:

- Household Income
- Self-perceived financial security
- Educational level
- Attitudes towards religion

In particular, Bennett and Gabriel argue that individuals who have a tendency to donate to charity are the ones that are more likely to purchase charity-linked products. In support of their argument, government statistics

cited by Charitable Giving, a privately-funded ministry, show that on average American families making over $ 300,000 a year give away 2.1% more than American families making less than $ 300,000 a year[1]3. However, in support of an earlier argument made by Smith, the report also states that over fifty percent of wealthy people in the U.S. are inclined to give to charity because of tax deductibles.

As for individuals who donate from year to year, Charitable Giving says that only a small proportion of these individuals would choose to not donate in subsequent years (less than 2%). People who did not give philanthropically as youngsters were also "less likely to do so as they mature and age"[1]3. These last two points emphasize that individuals who tend to give to charity usually choose to continue doing so and that individuals who do not usually choose to not do so. Combining this insight with the argument that Bennett and Gabriel made earlier, we can conclude that individuals who gain utility by donating to a charity would be more likely to purchase and continue purchasing a charity-linked good.

2.4 Corporate Pricing Strategy for Altruistic Products

At this point, we have identified several economic and altruistic incentives that would motivate an individual to purchase a charity-linked product (see *Incentives as a Reason for Altruistic Bundling Methods*). However, regard-

less of how an individual is motivated to purchase a charity-linked product, we argue that corporations can use this type of product bundling to increase consumer demand for their product. Why does this demand increase? Two reasons stand out: 1) consumers are motivated by the additional promise of donation in the altruistic and economic ways that were described earlier, and 2) corporations, by associating their product with a charity, are enlarging the size of their consumer base. For example, if a small localized company were to engage in charity-linked product bundling, then that company would not only attract more customers because it is selling a charity-linked product but also because more individuals would hear the product due to its affiliation with a charity. Studies have shown that some consumers are likely to switch from purchasing their more preferred brand of product to a charity-linked one because the latter one supports a charitable cause. Specifically, in a study conducted by Smith and Alcorn in 1991, 45.6% of their respondents indicated that they would be inclined to buy a charity-linked product instead of a more preferred product because it contributed to a charitable organization[9].

In light of these reasons and others, many companies do find charity-linked product bundling to be the "most creative and cost-effective product marketing strategy to evolve in years"[9]. Companies that engage in charity-linked product bundling usually use it to increase consumer demand for one of their existing products. Because of this, these companies frequently do not charge

different prices for their products before and after they are bundled with donations to charity. By not charging a different price, companies are able to fully convince consumers that they are not paying for the price of their donation, which an economic factor that many individuals consider when they are deciding whether or not to purchase a charity-linked product. As discussed earlier, many individuals feel that by purchasing a charity-linked product, they are in some way forfeiting a portion of the donation's cost while still gaining the full utility of making such a donation. Therefore, if companies do not keep the prices of their products before and after implementation of charity-linked product bundling the same, then many consumers would feel that they are being asked to pay for some portion of the donation, which added to the lack of knowledge that most consumers have about the exact amount of donation per purchase, would lead many of them to assume that they are paying for the full price of the donation. At that point, very few individuals would feel economically motivated to purchase the charity-linked good, which is the main reason that many consumers do choose to purchase these types of goods.

Companies, by keeping their prices the same, are also able to show consumers that they are not profit-seeking giants but rather altruistic agents. Giving that the company was maximizing its profits prior to engaging in charity-linked product bundling, consumers would feel that the company was

giving up a portion of its profits to help further a charitable cause. Though this is true, many consumers may not realize that these same companies are profiting by choosing to bundle their product with a donation to charity. By openly demonstrating that they are practicing corporate charity, these companies are able to motivate more consumers to purchase their charitable product. Thus, in most cases, a company would choose to set the same prices for their product before and after bundling it with a donation to charity. The following are examples of a few companies that charge the same price for their charity and non-charity products:

- Apple®sells the Product (RED)™ iPods and iPod nanos for the same price as other equivalent iPod products[14]. Other companies such as Dell, the Gap, and Motorola also sell their Product (RED)™ merchandise at the same price as other comparable merchandise.

- The online shopping website *shopforcharitynow.com* charges the same price for its products, which are associated with donations to charity, as other stores where the same products can be purchased without a donation to charity[15].

To take things a step further, in an empirical study conducted by Daniel Elfenbein and Brian McManus, they examined whether consumers might even be willing to pay a higher price for a charity-linked good[16]. The reasoning behind their argument was that consumers value charity revenues at least partially as a public good. In the end, their results do suggest that

charity-linked items that are auctioned off on eBay sell on average 5% higher than the same items without a charity affiliation. However, they also note that consumers would be willing to pay more for a charity-linked good, up to a certain limit. Therefore, if we are able to find that companies who choose to set the same price for their product before and after bundling it with a donation to charity, and that by doing so they are still able to secure enough profit to cover their cost of engaging in charity-linked product bundling, then there would be even more reason for these companies to adopt this form of marketing. So in this paper, we will examine when a monopoly would choose to engage in charity-linked product bundling given that it charges the same price for its product regardless of whether it is bundled with a donation to charity.

3 Literature Review

Previous literature that looks at the effect of charity-linked product bundling on product sales and promotion have been mostly limited to empirical studies. As mentioned above, Strahilevitz and Myers published a paper in 1998 that examined the effectiveness of this type of product bundling. In the paper, they conducted three studies that monitored the effect of charity incentives on the sale and distribution of frivolous and practical products. In the end, they found that charity-linked product bundling was more effective when it was used to promote a frivolous product instead of a practical one.

They proposed that this result could have been due to "complementarity effects": people might have felt that altruistic utility, which is the utility they derive from charitable giving, is more complementary to the utility derived from frivolous products than the utility derived from practical products[5].

In 1991, Smith and Alcorn also examined the effect of charity incentives on consumer's purchasing decisions[9]. They conducted a nationwide telephone survey of adults, ages 18 and older. The following research questions were addressed: 1) are consumers willing to switch brands to support a manufacturer who funds charitable causes, and 2) are consumers altruistic enough to support the causes themselves without manufacturer donations? In the end, their study confirmed that a large segment of individuals (specifically, 45.6% of the individuals in the study) would be inclined to switch from buying their most preferred brand to another brand of product, given a charity incentive. In addition to this, Smith and Alcorn found that with increasing donation amounts, more individuals would be motivated to purchase a charity-linked good because it donated to a charity. Specifically, the intention to use a 10-cent donation coupon was reported to be somewhat or very likely by 26% of the sample, but increased to 48.3 % for a 25-cent coupon and 71.4 % for a 40-cent coupon[1]. These findings suggest that not only would a large

[1]These coupons were redeemable coupons that would be given to individuals who purchased a charity-linked product.

percentage of individuals choose to purchase a charity-linked product over a more preferred brand of the product, but also that an increasing number of individuals would choose to purchase a charity-linked product if the amount of its donation increased while its price remained the same. Lastly, Smith and Alcorn also discovered that individuals who are motivated by economic reasons to purchase charity-linked goods are the ones that respond the most to charity incentives. Of the individuals that are not motivated by economic reasons, some of them would choose to donate direct to charity because they feel very passionately about it, and others would choose to purchase a product regardless of any charity incentives. The largest group of individuals, however, was the economically-motivated segment (40%).

In this paper, we will develop a theoretical model in order to examine when a company would engage in charity-linked product bundling. To fully understand the effects of various parameters on consumer demand and a company's decision to engage in this type of product bundling, we will focus on a monopoly economy. Two cases will be examined: the homogeneous case and the heterogeneous case. In both cases, we will assume that consumers have preferences that are quasi-linear and that the monopoly keeps prices constant moving from no bundling to bundling cases. The good that the monopoly produces will be a normal good. Individuals are modeled with quasi-linear preferences to establish that consumer preferences for a charity-

linked good are somewhat complementary to their altruistic desires, which was supported by the study conducted by Strahilevitz. Furthermore, with an increase in household income, an individual with quasi-linear preferences would choose to consume more of the monopoly's good and to not donate more money directly to the charity. This is generally true given that most charities publicly announce the target amount of money they are trying to raise, and most individuals respond to this target by contributing an amount that they feel, along with everyone else's contributions, would allow the charity to reach its goal. Beyond that point, these individuals would feel that they are losing more money (i.e. donating more money) than is necessary to capture the full benefits offered by the charity. Similar to what was discussed before, these individuals are economically motivated to contribute to a charity: they want to minimize the amount of money that they need to contribute (i.e. their cost of donation) while still allowing the charity to reach its goal (i.e. the point at which they gain the most utility). Smith and Alcorn did identify most individuals to be this way; therefore, we will assume that all individuals in our population are this way.

4 The Monopoly Model

4.1 Hypotheses

Given the discussed in the background and motivation, we form the following hypotheses:

H1: The more utility that individuals gain from donating to a charity, the more profit that a company would gain by engaging in charity-linked product bundling.

H2: A company that produces products with a higher price would be more inclined to engage in charity-linked product bundling (i.e. the company would be more inclined because it earns more profit).

H3: Given that a company already engages in charity-linked product bundling, it would earn more profit if it increases the amount of donation it makes per sale, regardless of its customer base.

4.2 Approach

In this section, a basic model of charity-linked product bundling is presented. We will use the model to understand when a company would choose to engage in charity-linked product bundling and to test the three hypotheses that were presented above. The individuals in this model are modeled as consumers with a set amount of household income and preferences that are defined by

a quasi-linear utility function. Each utility function will be a function of a consumable charity-linked product and the total amount of money that is donated to a charity. The company is then modeled as a profit seeking firm that maximizes its profit function based on the aggregate demand, price, and donation percentage of its product.

In our model, we assume that the company is a profit-maximizing agent and that it behaves like most companies in today's market (i.e. it is interested in maximizing the economic incentives that drive consumers to purchase charity-linked products). This means that the company would only choose to market a charity-linked product if, by doing so, it is able to increase its profits, and that the company would also keep the price of its product the same before and after bundling it with a donation to charity. Therefore, we would only find a company willing to engage in charity-linked product bundling if 1) the demand for its product increases after its chooses to bundling it with a charity and 2) the profit that it gains from this increased demand is enough to offset the cost of their actions.

In summary, the individuals in this model will choose a level of product consumption that maximizes their utility, and the company would choose the price and percent donation of its product in order to maximize profits. The model only focuses on exploring the monopoly case in order to eliminate

competition from the mix of factors that could possibly influence a companys decision to engage in charity-linked product bundling[2]

4.3 Design

The players in this model are the individuals and the monopoly. Each individual i chooses his level of product consumption x_i (which may or may not be a charity-linked good) and personal donation to the public good g_i. This is subject to the amount of money, m_i, that the individual has and the price of the good p. To make the model easy to manipulate, we will assume that there are only two individuals in this economy (i.e. $i = 1, 2$) and that each individual has a fixed amount of household income, m.

To begin, each individual would face the following consumer optimization problem:

$$\max_{x_i, g_i} U_i(x_i, \overline{G_T}) \text{ s.t. } px_i + g_i = m \tag{1}$$
$$g_i \geq 0$$

Where $\overline{G_T}$ is defined as the total contributions to the charity:

$$\overline{G_T} = \sum_{all\ i} (tx_i + g_i) \tag{2}$$

[2]Exploring the competitive case would be an interesting area for future research.

The aggregate demand for the monopoly's profit would then be:

$$D(p,t,m) = \sum_{all\ i} x_i \tag{3}$$

Given this aggregate demand, the monopoly would then choose the price of its product, p, and the percentage of donation per sale, t, in order to maximize its profit. The monopoly is thus faced with the following maximization problem:

$$\max_{p,t} \pi = (p-t)D(p,t,m) \tag{4}$$

To build the model, we will examine the following two cases: (1) the homogeneous case, and (2) the heterogeneous case. For each case, we will consider when the monopoly would choose to engage in charity-linked product bundling, and the key factors that influenced its decision.

4.4 The Homogeneous Case

In the homogeneous case, the monopoly faces a population of two individuals with preferences defined by the following utility function:

$$U_i(x_i, \overline{G_T}) = x_i + \alpha_1 ln(\overline{G_T}) \tag{5}$$

Using this utility function, we can solve for the aggregate demand (Eqn. 3):

$$\begin{aligned}
\frac{\partial U_1(x_i, \overline{G_T})}{\partial x_i} &= 1 - \frac{\alpha_1(p-t)}{\overline{G_T}} \\
&= 1 - \frac{\alpha_1(p-t)}{t(x_1+x_2) + (m-px_1) + (m-px_2)} \\
&= 0 \\
\alpha_1(p-t) &= -(p-t)(x_1+x_2) + 2m \\
D^*(p,t,m) = x_1 + x_2 &= \frac{2m - \alpha_1(p-t)}{p-t} \qquad (6)
\end{aligned}$$

Looking at the aggregate demand function, we see that as each individual's household income increases (i.e. as m increases), they would consume more units of the monopoly's good. This result flows logically from what was stated in the introduction (see *Literature Review*): because these individuals are economically motivated to contribute to a charity, with any increase in income, they would always choose to consume more units of the charity-linked product instead of contributing more money to the charity. The aggregate demand also tells us that with increasing price p, the two individuals would choose to consume less of x, and that with increasing t, the two individuals would choose to consume more of x. These two results also make intuitive sense: with increasing price, the individuals would feel that they are netting more cost and thus consume less of the good, and with increasing donation amount, the individuals would feel that they are gaining more from purchasing the good, and thus consume more of it. Therefore, given this aggregate demand, the monopoly would then try to maximize its profit function by

selecting optimal values of price, p, and donation tax, t:

$$\pi(p, t, m) = 2m - \alpha_1(p - t) \tag{7}$$

The monopoly's profit function tells us that the monopoly would gain more profit with increasing values of t and decreasing values of p. At this point, if the monopoly chooses to not engage in charity-linked product bundling, its profit function would reduce to the following:

$$\pi(p, t = 0, m) = 2m - \alpha_1 p \tag{8}$$

And if the monopoly does choose to engage in charity-linked product bundling, its profit function would remain the same [3]:

$$\pi(p, t > 0, m) = 2m - \alpha_1(p - t) \tag{9}$$

In order for the monopoly to find it worthwhile to engage in charity-linked product bundling, the profit that it gains by doing so must be greater than the profit it would gain otherwise. Specifically, the following inequality must hold:

$$\begin{aligned} \pi(p, t > 0, m) &> \pi(p, t = 0, m) \\ 2m - \alpha_1(p - t) &> 2m - \alpha_1 p \\ \alpha_1 t &> 0 \end{aligned} \tag{10}$$

[3]The profit function does not contain a separate term that represents the fixed costs associated with setting up the product bundling system. These fixed costs are not being ignored; rather, they are buried in the variable costs for the system (i.e. the percentage donation, t, takes into account the fixed costs on a per unit basis).

Therefore, if the value of $\alpha_1 t$ is greater than zero, then the monopoly would choose to engage in charity-linked product bundling. Given that α_1 is a positive constant for normal goods, we see that with increasing values of t, the monopoly would earn α units more profit per unit increase in t. So to conclude, a monopoly faced with a homogeneous population of individuals would choose to engage in charity-linked product bundling and select optimal values of p and t according to the following constraints:

- $p^* \leq m$
- $0 < t^* < p$

To understand this result more intuitively, we will calculate the additional profit that the monopoly would make if it chooses to engage in charity-linked product bundling given the following set parameters:

- m=\$ 100
- p=\$ 50

We will select values of t that satisfy the above constraint (i.e. $0 < t^* < p$) and calculate the monopoly's profit difference when $\alpha_1 = 0.2$ and $\alpha_1 = 0.8$:

$\alpha_1 = 0.2$				
p	t	$\pi(p, t, 50)$	$\pi(p, t = 0, 50)$	Profit Difference
\$ 50	\$ 1	\$ 190.20	\$ 190	\$ 0.20
\$ 50	\$ 0.5	\$ 190.10	\$ 190	\$ 0.10

$\alpha_1 = 0.8$				
p	t	$\pi(p, t, 50)$	$\pi(p, t = 0, 50)$	Profit Difference
\$ 50	\$ 1	\$ 160.80	\$ 160	\$ 0.80
\$ 50	\$ 0.5	\$ 160.40	\$ 160	\$ 0.40

Looking at these tables, we see that when consumers gain more utility from donating to the charity (i.e. when $\alpha = 0.8$), the monopoly gains more profit by choosing to engage in charity-linked product bundling; this is clearly shown by the larger profit differences in the second table versus the first. Furthermore, we see that in both tables, the monopoly earns more profit when it chooses to increase the amount of donation that it makes per sale (i.e. when t increases from 1% to 2% of p). At this point, it is important to notice that for the homogeneous case, the price of the monopoly's good does not factor into its decision to engage or not engage in charity-linked product bundling. The difference between the monopoly's profit when it does and does not engage in bundling is only a function of α_1 and t; therefore, only when α_1 or t increases would the monopoly earn more profit. To see whether the price of the monopoly's good would ever have an effect on its decision to engage in charitable activity, we will now explore the heterogeneous case.

4.5 The Heterogeneous Case

In the heterogeneous case, the monopoly faces a population of two individuals with ϵ defined as the probability that an individual would have preferences defined by the following utility function:

$$U_1(x_i, \overline{G_T}) = x_i + \alpha_1 ln(\overline{G_T}) \tag{11}$$

And $(1 - \epsilon)$ as the probability that an individual would have preferences defined by the following utility function:

$$U_2(x_i, \overline{G_T}) = x_i + \alpha_2 ln(\overline{G_T}) \tag{12}$$

We will assume that $\alpha_1 > \alpha_2$ and $\overline{G_T}$ is specifically equal to:

$$\overline{G_T} = t(x_1 + x_2) + g_1 + g_2 \tag{13}$$

Four possible scenarios can then occur:

1. With probability ϵ^2, both individuals will have the utility function defined by the first utility function.

2. With probability $(1-\epsilon)^2$, both individuals will have the utility function defined by the second utility function.

3. With probability $\epsilon(1 - \epsilon)$, the first individual will have have the first utility function and the second individual will have the second utility function.

4. With probability $\epsilon(1-\epsilon)$, the first individual will have have the second utility function and the second individual will have the first utility function.

For the first case, if we assume that both individuals have their preferences defined by the first utility function, then the aggregate demand would be the same as what was found in the homogeneous case:

$$D^*(p,t,m) = \frac{2m - \alpha_1(p-t)}{p-t} \tag{14}$$

For details regarding this demand function, please refer to the homogeneous case. As a quick recap, we notice that as m and t increase, the two individuals would consume more of the monopoly's good, and as p increases, they would consume less of the good. Furthermore, as α increases (i.e. both individuals gain more utility by donating to the charity), the aggregate demand decreases holding all else constant. This indicates that when individuals value their contribution to the charity more, they would choose to donate more to the charity and purchase less of the good.

For the second case, if we assume that both individuals have their preferences defined by the second utility function, then the aggregate demand would be the following:

$$D^{**}(p,t,m) = \frac{2m - \alpha_2(p-t)}{p-t} \tag{15}$$

This aggregate demand is similar to the previous case (and the homogeneous case) except that it is now a function of α_2 instead of α_1. This result occurs because both individuals have preferences that are defined by the second utility function instead of the first. For specific details regarding this demand function, please refer to the earlier cases. As a quick recap, the aggregate demand is still increasing with t and m and decreasing with p and α.

Then for the last two cases, if we assume that one of the individuals has preferences defined by one utility function and the other has preferences defined by the other utility function, then the aggregate demand would be one of the following expressions:

$$D_1^{***}(p,t,m) = \frac{2m - \alpha_1(p-t)}{p-t} \tag{16}$$

$$D_2^{***}(p,t,m) = \frac{2m}{p} \tag{17}$$

This result is more complicated than the first two cases because we introduce the notion that both individuals can choose to not donate directly to the charity. Given that α_2 is less that α_1, one of the two individuals would decide to free ride on the other individual, which essentially means that this individual would choose to not donate any money directly to the charity and instead only purchase the monopoly's good. However, in this case, there exists the possibility that both individuals may decide to not contribute to the charity if α_1 is not that much greater than α_2. In this situation, the utility that both individuals gain from the charity good is not very high;

therefore, both of them might choose to not contribute to the charity. This result would only occur if the individual with the higher preference for the charity good (i.e. the individual with preferences defined by the first utility function) also does not find it marginally beneficial to donate to the charity knowing that the other individual would not be contributing to the charity. Mathematically, this would hold if the marginal utility in g_i that this individual gains by donating any amount of g_i is always negative given that the other individual does not directly donate anything to the charity. In short, the following condition must hold:

$$\frac{\partial U_1(x_i, \overline{G_T})}{\partial g_i} \leq 0$$
$$\frac{\alpha_2(p-t)}{2tm + g_i(p-1)} - \frac{1}{p} \leq 0$$

Recognizing that $\frac{\partial U_1(x_i, \overline{G_T})}{\partial g_i}$ is a monotonically decreasing function, we can prove that this condition would hold for all values of g_i by simply showing that the condition holds when g_i is equal to zero. With this, we are able to solve for the inequality that defines when both individuals would choose to not donate directly to the charity. This is found to be:

$$\alpha_1 \frac{p-t}{2tm} \leq \frac{1}{p} \tag{18}$$

Therefore, if the above condition is satisfied, then both individuals would decide to not donate directly to the charity and instead choose to just purchase the monopoly's product. This would set the aggregate demand equal to D_2^{***} because both individuals do not find it desirable to donate directly to the

charity (i.e. both g_1 and g_2 are equal to zero). However, if this condition is not satisfied, then the individual the gains more utility from the charity good (i.e. the individual with preferences defined by the first utility function would continue to donate directly to the charity while the other individual does not. In this case, the aggregate demand function would be equal to D_1^{***}, which is the same as the aggregate demand found for the first case (and the homogeneous case). Once again, this aggregate demand is increasing in m and t and decreasing in p and α_1.

In the follow two sections, we will examine the monopoly's actions given that the condition in Eqn. 18 is or is not satisfied.

The Condition is Satisfied

If the condition in Eqn. 17 is satisfied, then the aggregate demand in the last two cases would be D_2^{***}. This results because both individuals do not gain very much utility by donating to the charity (i.e. the values of α_1 and α_2 are small). Given this, the expected demand for the monopoly good would be:

$$E[D(p,t,m)] = ...$$
$$\epsilon^2 \frac{2m - \alpha_1(p-t)}{p-t} + (1-\epsilon)^2 \frac{2m - \alpha_2(p-t)}{p-t} + \epsilon(1-\epsilon)\frac{4m}{p} \tag{19}$$

Looking at this expected demand, we can see that consumer demand for the monopoly's good still increases as both individual's income increases (i.e.

as mm increases). This results because both individuals are economically motivated to contribute to the charity and would always choose to donate the minimum amount possible to gain the most utility from the charity (see *Literature Review*). So beyond a certain point, they would always choose to spend their money purchasing the monopoly's good instead of donating more money directly to the charity. The aggregate demand function also indicates that as t increases or p decreases, both of the individuals would consume more of the charity-linked good. These results make intuitive sense because as the price p of the monopoly's good increases, consumers would feel that they are paying more to gain the same utility from the good, and as the donation amount t of the monopoly's good decreases, consumers would feel that they are not gaining as much utility from the good. Lastly, the aggregate demand function also monotonically decreases with increasing values of α_1 and α_2; this can be understood as a preference factor: as the utility that an individual would gain by contributing to the charity increases, he would feel more inclined to donate directly to the charity instead of purchasing the charity-linked product.

Given the aggregate demand, the expected profit of the monopoly would then be:

$$E[\pi(p,t,m)] = ...$$
$$\epsilon^2(2m - \alpha_1(p-t)) + (1-\epsilon)^2(2m - \alpha_2(p-t)) + \epsilon(1-\epsilon)\frac{4m(p-t)}{p} \quad (20)$$

The first two terms of the monopoly's profit function tells us that the monopoly would gain more profit with increasing values of t and decreasing values of p. However, the last term in the profit function (i.e. $\frac{2m(p-t)}{p}$) behaves in opposition to the first two terms; for this term, the monopoly would be earning more profit per increase in p and less profit per increase in t. At this point, if the monopoly chooses to not engage in charity-linked product bundling, then its profit function would reduce to the following:

$$E[\pi(p, t = 0, m)] = \epsilon^2(2m - \alpha_1 p) + (1 - \epsilon)^2(2m - \alpha_2 p) + \epsilon(1 - \epsilon)4m \quad (21)$$

And if the monopoly does choose to engage in charity-linked product bundling, its profit function would remain the same [4]:

$$E[\pi(p, t > 0, m)] = ...$$
$$\epsilon^2(2m - \alpha_1(p - t)) + (1 - \epsilon)^2(2m - \alpha_2(p - t)) + \epsilon(1 - \epsilon)\frac{4m(p - t)}{p} \quad (22)$$

In order for the monopoly to find it worthwhile to engage in charity-linked product bundling, the profit that it gains by doing so must be greater than the profit it would gain otherwise. Specifically, the following inequality must

[4]The profit function does not contain a separate term that represents the fixed costs associated with setting up the product bundling system. These fixed costs are not being ignored; rather, they are buried in the variable costs for the system (i.e. the percentage donation, t, takes into account the fixed costs on a per unit basis).

hold:

$$E[\pi(p, t > 0, m)] > E[\pi(p, t = 0, m)]$$

$$0 \leq t(\epsilon^2\alpha_1 p + \alpha_2 p - 2\epsilon\alpha_2 p + \epsilon^2\alpha_2 p - 4\epsilon m + 4\epsilon^2 m)$$

This inequality would hold if the monopoly sets p^* according to the following constraint:

$$p^* \geq \frac{4m\epsilon(1-\epsilon)}{\alpha_1\epsilon^2 + \alpha_2(1-\epsilon)^2} \tag{23}$$

Therefore, as long as the price of the monopoly's good is sufficiently large, then the monopoly would find it worthwhile to engage in charity-linked product bundling. This constraint tells us that as each individual's household income increases (i.e. as m gets larger) and as the utility that they gain by donating to charity decreases (i.e. as α_1 and α_2 get smaller), the price of the product would have to be higher in order for the monopoly to find it profitable to engage in product bundling. These two results may not seem intuitive at first, but if you consider the case where the monopoly does not choose to engage in the product bundling: with increasing m and decreasing α_1 and $alpha_2$ there would be more demand for the good. Then, in order for the monopoly to find it worthwhile to engage in charity-linked product bundling (i.e. in order for the monopoly to make more profit by marketing the charity-linked good), the price of the good must increase as the value of m increases and the values of α_1 and α_2 decrease. We did not find this result earlier when we examined the homogeneous case, so the interesting thing to

note about this result is that it was brought about by heterogeneity.

The specific values of t^* that the monopoly would choose would then depend on the condition defined in Eqn. 18. Only if this condition is satisfied would this case have occurred. Thus, by rearranging the terms in that inequality, we can solve for t^*:

$$t^* \geq \frac{(p^*)^2 \alpha_1}{\alpha_1 p^* + 2m} \tag{24}$$

Because each individual in this population cannot purchase one unit of the good if its price exceeds their income and the monopoly would be earning negative profit if t^* were greater than p^*, the following values of p^* and t^* are obtained:

$$\frac{4m\epsilon(1-\epsilon)}{\alpha_1 \epsilon^2 + \alpha_2 (1-\epsilon)^2} \leq p^* \leq m \tag{25}$$

$$\frac{(p^*)^2 \alpha_1}{\alpha_1 p^* + 2m} \leq t^* < p^* \tag{26}$$

As one can see, with increasing values of p^*, the range of acceptable values for t^* would decrease. Also, as α_1 increases, the range of acceptable values for t^* would narrow. This makes intuitive sense because if individuals gained high utility from charity contributions, then the monopoly would have to increase its donation amount in order to entice them to purchase the charity-linked good, but at the same time, because these individuals have a high preference for the charity good (i.e. these individuals have high values

of α_1), the monopoly might also have to charge them a lower price to entice them to purchase its good (recall that both individuals in our economy are economically motivated to purchase the charity-linked good). However, as the value of m increases (i.e. both individuals have higher incomes), the range of acceptable values of t^* increases. This indicates that a monopoly that faces a population of more wealthy individuals would have an easier time trying to encourage them to buy its charity-linked product (i.e. the range of t^* is larger, so it is easier to select an acceptable value of t). Lastly, we notice that as the monopoly's uncertainty about each individual's preferences decreases, the range of p^* would get larger (i.e. with ϵ=1, the monopoly's range for p^* would extend from zero to m) with the possibility that the monopoly would revert back to its strategies for the homogeneous case.

To conclude, we find that in the case where the inequality in Eqn. 18 is satisfied, the monopoly would only find it profitable to engage in charity-linked product bundling if its product's price is sufficiently high. This appears to coincide with what Strahilevitz and Myers found in their 1998 empirical study on charity-linked goods: the marketing strategy seemed to work better with higher-priced luxury goods[5]. We will now examine the case when the constraint in Eqn. 18 is not satisfied.

The Condition is Not Satisfied

If the condition in Eqn. 18 is not satisfied, then the aggregate demand for the last two cases would be D_1^{***}. This results because the individual with the higher α (i.e. the individual with preferences defined by the first utility curve) would still find it worthwhile (i.e. utility maximizing) to donate directly to the charity. Given this, the expected demand of the monopoly good would be:

$$E[D(p,t,m)] = \epsilon(2-\epsilon)\frac{2m-\alpha_1(p-t)}{p-t} + (1-\epsilon)^2\frac{2m-\alpha_2(p-t)}{p-t} \quad (27)$$

Looking at this expected demand, we can see that the consumer demand for the product still increases with increasing household income, m. Furthermore, as t increases and p decreases, the demand for the monopoly's good would increase. This makes intuitive sense because as the value of t increases, individuals would feel that they are gaining more utility by purchasing the charity-linked good, and as p decreases, they would be paying less to gain the same the utility from the good. Lastly, we can also see that as either α_1 or α_2 decreases in value, the aggregate demand for the good would increase. Once again, this can be understood as a preference factor (for a more detailed explanation, see the case where the condition was satisfied).

Given the aggregate demand, the expected profit of the monopoly would then be:

$$E[\pi(p,t,m)] = \epsilon(2-\epsilon)(2m-\alpha_1(p-t)) + (1-\epsilon)^2(2m-\alpha_2(p-t)) \quad (28)$$

This function is still increasing in t and decreasing in p. At this point, if the monopoly chooses to not engage in charity-linked product bundling, then its profit function would reduce to the following:

$$E[\pi(p, t = 0, m)] = \epsilon(2 - \epsilon)(2m - \alpha_1 p) + (1 - \epsilon)^2(2m - \alpha_2 p) \tag{29}$$

And if the monopoly does choose to engage in charity-linked product bundling, its profit function would remain the same[5]:

$$E[\pi(p, t > 0, m)] = \epsilon(2-\epsilon)(2m-\alpha_1(p-t))+(1-\epsilon)^2(2m-\alpha_2(p-t)) \tag{30}$$

In order for the monopoly to find it worthwhile to engage in charity-linked product bundling, the profit that it gains by doing so must be greater than the profit it would gain otherwise. Specifically, the following inequality must hold:

$$\begin{aligned} &E[\pi(p, t > 0, m)] > E[\pi(p, t = 0, m)] \\ &\quad \epsilon(2 - \epsilon)(2m-\alpha_1(p - t)) + (1 - \epsilon)^2(2m - \alpha_2(p - t)) \\ &\qquad\qquad > \epsilon(2 - \epsilon)(2m - \alpha_1 p) + (1 - \epsilon)^2(2m - \alpha_2 p) \\ &\quad t(\epsilon(2 - \epsilon)\alpha_1+(1 - \epsilon)^2\alpha_2) \geq 0 \end{aligned} \tag{31}$$

This inequality would always hold as long as t^* is greater than zero. Similar to the homogeneous case, we see that with increasing values of t, the monopoly

[5]The profit function does not contain a separate term that represents the fixed costs associated with setting up the product bundling system. These fixed costs are not being ignored; rather, they are buried in the variable costs for the system (i.e. the percentage donation, t, takes into account the fixed costs on a per unit basis).

would earn more profit (specifically, per unit increase in t, the monopoly would earn $\epsilon(2-\epsilon)\alpha_1 + (1-\epsilon)^2\alpha_2$ units more profit). Therefore, a monopoly that faces a heterogeneous population of individuals would choose to always engage in charity-linked product bundling, given that the constraint in Eqn. 18 is not satisfied. In order to keep this constraint unsatisfied, we must set the upper bound of t^* equal to the following:

$$t^* < \frac{(p^*)^2\alpha_1}{\alpha_1 p^* + 2m} \tag{32}$$

Then because each individual in this population would not be able to purchase the good if its price exceeds their income, the monopoly would select optimal values of p and t according to the following:

$$p^* \leq m \tag{33}$$

$$0 < t^* < \frac{(p^*)^2\alpha_1}{\alpha_1 p^* + 2m} \tag{34}$$

As you can see, with increasing values of p^*, the range of acceptable values of t^* increases. This results because with an increase in the price of the product, the upper bound of the constraint on t^* relaxes. Furthermore, we see that with increasing values of household income, the value of t^* must be smaller and that with increasing values of α_1, the range of acceptable values for t^* increases. All of these relationships result because of the inequality identified in Eqn. 18. The moment that t^* becomes too large, this case would no longer exist because the inequality would be satisfied.

The effect of price, donation amount, and α_1 on the profit that the monopoly could gain by engaging in charity-linked product bundling for this case are similar to the homogeneous case. Once again, with a larger α_1, the amount of money that the monopoly would gain by product bundling would be greater. Given that the monopoly does choose to engage in charity-linked product bundling, by increasing the value of t, the monopoly can also gain more profit. In the following two tables, the additional profit that the monopoly would gain by engaging in charity-linked product bundling is listed. The values for p, m, ϵ, and α_2 are preset to:

- p=\$ 50
- m=\$ 100
- ϵ=0.5
- α_2=0.1

The values of α_1 and t are changed to observe their effects on the profit gains of the monopoly:

$\alpha_1 = 0.7$				
p	t	$\pi(p, t, 50)$	$\pi(p, t = 0, 50)$	Profit Difference
\$ 50	\$ 1	\$ 173.05	\$ 172.50	\$ 0.55
\$ 50	\$ 0.5	\$ 172.78	\$ 172.50	\$ 0.28

$\alpha_1 = 0.9$				
p	t	$\pi(p, t, 50)$	$\pi(p, t = 0, 50)$	Profit Difference
\$ 50	\$ 1	\$ 165.70	\$ 165	\$ 0.70
\$ 50	\$ 0.5	\$ 165.35	\$ 165	\$ 0.35

5 Discussion and Conclusion

5.1 First Hypothesis

In both the homogeneous and heterogeneous cases, we found that as an individual's preferences for charity increased (i.e. as α_1 and α_2 increased), the monopoly would gain more profit if it chose to engage in charity-linked product bundling. For the homogeneous case, we saw this result when we calculated the additional profit (i.e. profit difference) that the monopoly would gain if it chose to market the charity-linked product (see the tables in the homogeneous case). As the value of α_1 increased from 0.2 to 0.8, the profit difference increased by a factor of four. We could similarly see this result by looking at the variable expression of the profit difference for this case: $\alpha_1 t$. From this, it is clear that as the individual gains more utility from donating to the charity (i.e. as α_1 increases), the monopoly would gain more profit by engaging in charity-linked product bundling.

Similarly, in the first heterogeneous case when both of the individuals would

choose to not donate directly to the charity (i.e. the case where the constraint defined in Eqn. 18 was satisfied), we can also see that the monopoly would gain more profit if it were marketing the charity-linked good while the values of α_1 and α_2 increased. To see this result clearly, the following is the additional profit or profit difference that the monopoly would gain if it decides to market the charity-linked good instead of the regular good[6]:

$$p - \frac{4m\epsilon(1-\epsilon)}{\alpha_1\epsilon^2 + \alpha_2(1-\epsilon)^2} \tag{35}$$

From this expression, one can see that as the values of α_1 and α_2 increase, the second term in the expression would decrease, and the overall profit difference would increase. This shows that as either individual gains more utility from charitable giving, the additional profit that the monopoly would make by engaging in charity-linked product bundling would increase. In addition to this result, we can also see that as values of α_1 and α_2 increase, more and more companies would find it worthwhile to engage in charity-linked product bundling because the lower bound of the constraint defined for p^* (see Eqn. 25) would decrease.

Then finally in the second heterogeneous case where one of the individuals was still donating money directly to the charity (i.e. the case where the constraint defined in Eqn. 18 was not satisfied), we found results that were

[6]The profit difference is calculated by subtracting the right-hand-side (RHS) of Eqn. 23 from its left-hand-side (LHS).

the same as the homogeneous case. Specifically, one can refer to the tables in that section to see the effect of α_1 on the profit difference that the monopoly would earn if it chooses to market a charity-linked product.

5.2 Second Hypothesis

In both the homogeneous case and the heterogeneous case where one individual was still donating directly to the charity (i.e. the case where the constraint defined in Eqn. 18 was not satisfied), we did not see any effects of prices on the decision of the monopoly to engage in charity-linked product bundling. But in the heterogeneous case where both individuals were no longer donating directly to the charity (i.e. the case where the constraint defined in Eqn. 18 was satisfied), we found that a monopoly would only decide to bundle its product with a donation to charity if it was selling a product that was sufficiently pricey. Specifically, if we looked at the conditions defined for p^* in that case, we would see that as m increased, the monopoly would only find it worthwhile to engage in charity-linked product bundling if it sold a product that was more expensive than before (see Eqn. 25). Alternatively, if both individuals started to gain more utility from charitable giving, then the range of acceptable values for p^* (i.e. values of p that would make charity-linked product bundling worthwhile for the monopoly) would increase and a monopoly that sold a lower priced product would also be able to benefit from engaging in charity-linked product bundling.

As a final note, if the population of individuals became more homogeneous, the monopoly would slowly revert back to behaving the way it did in the homogeneous case. This indicates that as the monopoly's uncertainty about the two individual's preferences decreases because the population is becoming more homogeneous, then its strategy for deciding whether or not to market a charity-linked product would reduce to what it did in the homogeneous case. However, in general, we live in a society filled with individuals that have a wide range of preferences, so it would be unreasonable to believe that any one company would ever be certain about everyone's preferences. Tying this result back to what Strahilevitz and Myers found in their study on charity-linked goods, it does appear that companies that market higher-priced luxury goods may find it more beneficial to engage in charity-linked product bundling.

5.3 Third Hypothesis

In both the homogeneous and heterogeneous cases, the model shows that a monopoly would earn more profit as it increases its percentage of donation, t, while choosing to continue marking the charity-linked product. In the homogeneous case, this was demonstrated using two tables with two different values of t. Specifically, as the value of t increased from \$ 0.5 to \$ 1, the additional profit that the monopoly would earn (i.e. the profit difference)

increased twofold. We a similarly arrive at this result by looking at the variable expression of the profit difference for this case: $\alpha_1 t$. From this, we can see that as the value of t increases, the monopoly should expect to earn more profit by choosing to market the charity-linked good.

Then in the heterogeneous case where one of the individuals was still contributing money directly to the charity (i.e. the case where the constraint defined in Eqn. 18 was not satisfied), this same result was found and shown using two different tables. In these tables, when the value of t increased, the difference between the profit that the monopoly would gain by engaging in the product bundling and the profit that it would gain otherwise increased. Specifically, as the value of t increased from \$ 0.5 to \$ 1, the additional profit that the monopoly would earn (i.e. the profit difference) increased from \$ 0.28 to \$ 0.55 when α_1 equaled 0.7 and from \$ 0.35 to \$ 0.70 when α_1 equaled 0.9. By looking at the variable expression for the profit different in this case, we can see that as t increases, the additional profit that the monopoly would gain increases by a factor of $\epsilon(2-\epsilon)\alpha_1 + (1-\epsilon)^2\alpha_2$ per unit increase in t (see Eqn. 31). So from both the table values and the variable expression for profit different, we can clearly see that the monopoly would be able to increase its profits by increasing the amount of donation it makes per sale of its product[7].

[7]This is assuming that the monopoly already finds it worthwhile (i.e. profitable) to engage in charity-linked product bundling

Then in the heterogeneous case where both individuals were no longer donating directly to the charity (i.e. case where the constraint defined in Eqn. 18 was not satisfied), we saw the same result again. If the monopoly found it worthwhile to engage in charity-linked product bundling (i.e. the values it selects for p and t must satisfy Eqns. 25 and 26), then by increasing t, the monopoly would be able to secure a higher profit from its sales. Specifically, the following expression is the profit difference that the monopoly would make, given that neither p or t are equal to zero:

$$E[\pi(p, t > 0, m)] - E[\pi(p, t = 0, m)] = ...$$
$$t(\epsilon^2\alpha_1 p + \alpha_2 p - 2\epsilon\alpha_2 p + \epsilon^2\alpha_2 p - 4\epsilon m + 4\epsilon^2 m) \tag{36}$$

Looking at this expression, it is clear that the profit difference would have increased if the monopoly chose to increase the value of t. So, in summary, we found that a monopoly that engages in charity-linked product bundling would be able to increase its profit margin by increasing its donation percentage to the charity.

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