Pay-What-You-Want Pricing Schemes: A Self-Image Perspective

Kahsay, Goytom Abraha; Samahita, Margaret

2014

Working Paper 2014:6

Department of Economics
School of Economics and Management

Pay-What-You-Want Pricing Schemes: A Self-Image Perspective

Goytom Abraha Kahsay
Margaret Samahita

February 2014

Pay-What-You-Want Pricing Schemes: A Self-Image Perspective*

Goytom Abraha Kahsay† Margaret Samahita‡

Abstract

Pay-What-You-Want (PWYW) pricing schemes are becoming increasingly popular in a wide range of industries. We develop a model incorporating self-image into the buyer's utility function and introduce heterogeneity in consumption utility and image-sensitivity, which generates different purchase decisions and optimal prices across individuals. When a good is sold at a fixed price higher than a threshold value, a price that the individual thinks is fair, the adoption of PWYW increases his utility and hence results in a weakly higher purchase rate. When a good is sold at a fixed price lower than this threshold, however, PWYW can lead to a lower utility. This may result in a lower purchase rate and higher average price, in line with previously unexplained evidence from field experiments. Moreover, an increase in the threshold value decreases the buyer's utility and may further lower the purchase rate, possibly resulting in a further increase in purchase price. Using simple assumptions of quadratic self-image function and uniformly distributed individual preferences, we investigate the conditions under which PWYW yields higher total welfare.

JEL classification: D03, D11, D49, D64, D82.
Keywords: Pay-what-you-want, self-image, fairness, voluntary contribution.

---

*We are grateful to Ayelet Gneezy, Lars Gårn Hansen, Håkan J. Holm, Frederik Lundtofte, participants at the 8th Nordic Conference on Behavioral and Experimental Economics, The Choice Lab NHH PhD Course in Behavioral Economics 2013, the 8th EBIM Doctoral Workshop on Economic Theory and various audiences at the University of Copenhagen and Lund University for helpful comments and suggestions.

†Department of Food and Resource Economics, University of Copenhagen. E-mail: goytom@ifro.ku.dk
‡Corresponding Author. Department of Economics, Lund University. E-mail: margaret.samahita@nek.lu.se

1 Introduction

"Pay-What-You-Want" (PWYW) is a recently emerging pricing scheme in which a good is up for sale and the buyer, should he decide to buy, chooses the price to pay for it.[1] A famous example, which illustrates its attractiveness to a seller, is the release of the band Radiohead's album "In Rainbows" in 2007, which at the time was highly anticipated. Fans were able to download the album from the band's website for any price they chose, including zero. Standard economic theory predicts that the rational decision for the buyer would be to pay nothing and get the album for free. However, hundreds of thousands of fans chose to pay a positive amount for the album, and the band in fact profited from this pricing format, making more money than from digital downloads of all their other studio albums combined.[2] Is this success merely due to the publicity surrounding the album's release, or is there something more beyond the standard economic theory?

Pure PWYW, which is the focus of this paper, has no minimum price to protect the seller.[3] Despite this, its adoption by various sellers in the food industry, such as 'Wiener Deewan' in Vienna and 'Lentil as Anything' in Melbourne, shows its potential for success. On the other hand, there are also PWYW ventures which have not been as successful (for example, 'Terra Bite Lounge' in Seattle which returned to a fixed-price scheme after adopting PWYW for a period of time). Although formal PWYW situations have only recently emerged and the pricing scheme is not yet widespread, the same principle of choosing what to pay is in fact found in another common phenomenon that is tipping. In many countries, it is a social norm for good restaurant (or other) services to be rewarded with a good tip from the customer. Although in this case the service has already been provided, just like PWYW the customer is under no obligation to pay an amount above zero. Despite this, the level of the tip is often above this minimum.

Besides the above real life examples, several field experiments (see, for instance, Gneezy et al. (2012); Kim et al. (2009)) also support the theory that individual behavior in PWYW situations does indeed deviate from what is normally predicted by the standard economic theory. These findings indicate that despite the option to "buy" the good for free, fewer individuals decide to purchase the good and those who do tend to pay a higher price in comparison with the typical fixed-price scheme. In particular, when the purchase of the good involves a pro-social element such as a donation to charity, even fewer people buy, at an even higher price.

Our paper is the first to present a model explaining the experimental evidence of lower purchase rate and higher average price in PWYW compared to a fixed-price scheme. We do this by introducing a self-image component in modeling individual behavior when presented with a PWYW opportunity. As proposed by Gneezy et al. (2012), the purchase decision in PWYW is a way of signaling to the self that the individual is unselfish towards the seller, and, in the case of PWYW with a donation, that he cares about social responsibility (Gneezy et al., 2010).

Self-image, as a motivation for over-participation in activities (including but not limited to pro-social activities), is not a new concept. For example, individuals have been known to over-pay for fair-trade/green products (Shaw et al., 2000; Nyborg et al., 2006; Doran, 2009), engage in over-education (Gallice, 2009) and over-participate in voluntary activities (Brekke et al., 2003; Samahita, 2013). In the case of PWYW situations, it seems that when there is uncertainty regarding the fair value or price of the good, individuals tend to over-pay in order not to harm

[1] "Pay-What-You-Want" is also known in the literature as "Pay-As-You-Wish" and "Pay-As-You-Like".

[2] See `http://www.wired.com/listening_post/2008/10/radioheads-in-r/`.

[3] A variant of PWYW with a minimum price is known as "Name-Your-Own-Price" (NYOP). See Kim et al. (2009) for a detailed explanation of the different participative pricing schemes.

their self-image in case of under-paying. If the price to over-pay is too high above an individual's willingness-to-pay, he will instead choose to forgo the purchase rather than under-pay.

In our model, we investigate the individual's purchase decision and his utility maximizing choice of contribution level. Individuals are heterogeneous in their consumption utility and image-sensitivity, resulting in different purchase decisions at varying prices. Our findings show that when a good is sold at a fixed price that is lower than the fair value threshold, a lower purchase rate can arise under PWYW. We also investigate the effect of an increase in this fair value, which is predicted to result in an even lower purchase rate and an even higher average price under certain conditions. Finally, we present a simulation study using a quadratic self-image function which supports our results and shows the potential for PWYW to be welfare-improving.

The rest of this paper is organized as follows: Section 2 provides a review of the PWYW literature. Section 3 presents the model and its predictions, which are further explored in the simulation study in Section 4. The findings are discussed in Section 5, and Section 6 concludes.

2 Literature Review

PWYW can be seen as a class of participatory pricing mechanisms where a buyer has full control over the price setting (Kim et al., 2009). Besides the famous Radiohead example, this relatively new pricing strategy has been implemented in many areas including music, restaurants, accommodation, and soccer clubs (Mantzaris, 2008; Isaac et al., 2010; Riener and Traxler, 2012; Gautier and Klaauw, 2012). To explore the reasons behind the apparent success of these PWYW examples, studies have been done using field experiments as well as empirical data from three PWYW sellers: Google Answers, Magnatune and Wiener Deewan. The findings of these papers are reported in the top half of Table 1. In summary, a PWYW pricing scheme does attract non-zero payments. While as expected some PWYW consumers under-pay, there are also situations in which the average price is in fact higher compared to other fixed-price schemes, and the purchase rate lower. In some cases PWYW results in an increase in the seller's revenues.

Several studies have attempted to explain the success of PWYW in terms of the market conditions which allow this pricing scheme to succeed. These studies, summarized in the second part of Table 1, consists of theoretical papers and laboratory experiments, as well as a survey sent out to Magnatune customers to gain insights into their underlying motivations for paying above what was necessary. Explanations range from selfish consumers who pay to keep the seller in the market, to other-regarding behaviors exhibiting social preferences such as altruism, inequity-aversion and reciprocity.[4]

While such explanations can account for the positive prices paid and the opt-out behavior of some consumers in PWYW, none can explain the field experimental evidence of a higher average price and lower purchase rate compared to other fixed-price schemes. Our theoretical model, which incorporates self-image as previously suggested by Gneezy et al. (2012), successfully rationalizes these buyer behaviors. Our paper thus contributes to the literature and provides a framework for the analysis of welfare consequences under PWYW, while also presenting a novel application of self-image in economic modeling.

[4]See Rabin (1993) for a detailed discussion of incorporating a pro-social preference for fairness into the model.

Paper	Method	Results of PWYW Studies
Gautier and Klaauw (2012)	Field experiment	NYOP scheme attracts individuals with low pro-social reputational concerns and results in lower average price.
Gneezy et al. (2010)	Field experiment	Charity component increases demand under PWYW relative to a high fixed price.
Gneezy et al. (2012)	Field experiment	PWYW results in lower demand than a low fixed price, explained using identity and self-image concerns.
Kim et al. (2009)	Field experiment	PWYW prices are significantly greater than zero, PWYW can increase seller's revenues.
Regner (2009)	Empirical (Google Answers)	Tipping is motivated by reciprocity and reputation concerns. Customer's tipping history determines researcher's effort level.
Regner and Barria (2009)	Empirical (Magnatune)	Consumers pay more than minimum and even higher than suggested price, explained in terms of reciprocity.
Riener and Traxler (2012)	Empirical (Wiener Deewan)	Payments are positive, but decline with time. Increased demand results in higher revenues. Explained in terms of social norms.

Paper	Method	Suggested Explanations
Chen et al. (2009)	Theory	Existence of fair minded consumers with sufficient generosity, the good has low marginal cost, high concentration of low WTP consumers, and a competitive marketplace.
Fernandez and Nahata (2009)	Theory	Positive valuation of the good and a social-cost for free-riding.
Isaac et al. (2010)	Theory	Social norm for minimum contribution.
Mak et al. (2010)	Theory, lab experiment	Forward looking consumers with firms threatening to switch to fixed-price schemes.
Regner (2010)	Empirical (Magnatune survey)	Reciprocity and guilt, social norm for those paying around the recommended price.
Schmidt et al. (2012)	Lab experiment	Outcome-based social preferences, strategic considerations to keep seller in the market, PWYW seller in isolation.

Table 1: Existing PWYW Studies and Suggested Explanations

3 The Model

In order to isolate the effect of self-image, we start with a model in which we focus on a simple additive utility function. Individual i's utility from purchasing a good is defined as

$$U_i(c) = \underbrace{u_i(x) - c}_{\text{net material utility}} + \underbrace{f_i(c,r)}_{\text{self-image}} \qquad c, r \geq 0.$$

x is a vector of the good's characteristics. $u_i(x)$ is a concave increasing function representing the consumption utility of the good to the individual. c is the price paid for the good, which is the posted price in a fixed-price scheme, or the price chosen by the individual in PWYW. The consumption utility less the price paid results in the net material utility of the good to the individual.

The source of moral contention, which determines self-image, is whether or not the individual pays what is considered fair by the seller. This payment serves to signal to himself that he is fair and generous, possibly also in order not to appear cheap. Hence f is a function of the contribution level c and the seller's fair price r where, following Samahita (2013), it is increasing in the contribution level c at a decreasing rate: $f_c > 0, f_{cc} < 0$.[5] To motivate our choice of a Kantian monotonically increasing function, we argue that in the context of voluntary payments no upper bound applies. Individuals can always pay an amount higher than r to signal their generosity. They can then be viewed as "neurotic perfectionists" (Hamachek, 1978) whose self-esteem monotonically increases with effort level. Moreover, self-image is decreasing in the reference price parameter r, since an increase in r makes the choice of c relatively lower in comparison: $f_r < 0$. We therefore define $f(c,r) = 0$ whenever $c = r$, by construction of the model. The utility from no purchase is normalized to zero.

The seller's fair price r is obtained differently in PWYW and in a fixed-price scheme. In PWYW, there is no posted price to act as a guide for what is considered fair by the seller. The individual therefore recalls the good's fair value v and considers it to be the price the seller would have set.[6] This value is obtained exogenously from word-of-mouth or knowledge of close substitute products. While each individual may have his own private source of information regarding this fair value, we argue that the existence of a commonly held belief is a reasonable assumption for many familiar goods.

In a fixed-price scheme, the posted price p is set by the seller and is therefore used by the buyer as a clear signal of the seller's fair price, even though it may differ from the exogenous fair value v. Note that a difference in p and v may have other consequences for self-image.[7] For simplicity we disregard this element and appeal to strategic ignorance to avoid any image loss for the individual.[8] If the posted price is lower than the exogenous fair price, the individual will

[5] Brekke et al. (2003) present an alternative 'consequentialist' self-image function where $f_i(c,r) = -a(c-r)^2$, $a > 0$. In our model, such hump-shaped function gives rise to a situation in which all individuals under-contribute in PWYW.

[6] See, for example, Thaler (1985) and Xia et al. (2004) for a detailed discussion of the concept of fair price.

[7] For example, there may be other signaling concerns when a low price is observed for fair-trade or luxury goods (Sirgy, 1982; Bagwell and Bernheim, 1996), or if the individual suspects that the seller has been unethical to be able to charge a low price.

[8] See for example, Carrillo and Mariotti (2000); Dana et al. (2006, 2007); Bénabou and Tirole (2011) for the literature on strategic ignorance and self-serving biases. Alternatively, we argue that if the individual felt any image loss, he could have paid more than the posted price and the seller would hardly refuse this payment. Yet we do not see this in practice — giving support to our strategic ignorance reasoning and fairness towards the seller as the main source of self-image.

simply be happy that he finds a bargain, without self-image consequences related to fairness. In the same way, if the posted price is higher than the exogenous fair price, the individual does not derive any image gain for purchasing the good at the high price.

To summarize, in PWYW,

$$r = v \gtreqless c$$

while in a fixed-price scheme

$$r = p = c.$$

Consequently, self-image is zero in a fixed-price scheme.

Heterogeneity is achieved through variations in the individual's consumption utility and self-image function. The individual's consumption utility can take any positive real value, $u_i(x) \in \mathbb{R}^+$. We also characterize individuals based on their image-sensitivity, which is determined by the steepness of their self-image functions.

Definition 1. *An individual j is globally more image-sensitive than another individual i if:*

$$\frac{\partial f_j}{\partial c}(c, r) > \frac{\partial f_i}{\partial c}(c, r) \qquad \forall c.$$

This means that j derives more marginal benefit from contributing an extra dollar than i, although both individuals have the same marginal cost of contributing which is 1.

3.1 Solving the model

To solve the PWYW model with $r = v$, the individual first solves the following maximization problem:

$$\max_c U_i(c) = u_i(x) - c + f_i(c, v).$$

He then compares the utility from buying at the preferred price with the utility of not buying, which is zero, to make the purchase decision.

The first step gives the following first-order-condition:

$$\frac{\partial f_i}{\partial c}(c, v) = 1.$$

Let the optimal value of c satisfying the above condition be c^*. Then, if individual j is more image-sensitive than individual i, it follows that $c_i^* < c_j^*$.[9]

Assuming a reasonable value of v which is neither extremely low nor high, an economy composed of heterogeneous individuals with varying self-image functions making a PWYW purchase will result in some individuals under-paying and others paying at least v or higher.

Observation 1. *Consider individuals i and j, and fair value v such that $\frac{\partial f_i}{\partial c}(v, v) < 1 \leq \frac{\partial f_j}{\partial c}(v, v)$. It then follows that $c_i^* < v \leq c_j^*$.*

Proof. See Appendix. □

[9]From Definition 1, if j is more image-sensitive than i we have $\frac{\partial f_j}{\partial c}(c, v) > \frac{\partial f_i}{\partial c}(c, v)$ $\forall c$. At the optimal contribution level for i, $\frac{\partial f_j}{\partial c}(c_i^*, v) > \frac{\partial f_i}{\partial c}(c_i^*, v) = 1 = \frac{\partial f_j}{\partial c}(c_j^*, v)$. Hence, due to the concavity of f, $c_i^* < c_j^*$.

We now make the following definition regarding image-sensitivity in absolute terms:

Definition 2. *An individual i is classified as image-insensitive if $c_i^* < v$. Another individual j is classified as image-sensitive if $c_j^* \geq v$.*

Upon calculating his optimal buying price, the individual needs to make the decision of whether to buy or not. This is done by comparing the utility when he buys, $U_i(c_i^*) = u_i(x) - c_i^* + f_i(c_i^*, v)$, with the utility of not buying which is zero. This is where $u_i(x)$ plays a role.

The image-insensitive individual has a value of c_i^* less than v, which results in self-image loss. He will buy if the gain in net material utility by paying a low price, $u_i(x) - c_i^*$, outweighs the self-image loss. On the other hand, the image-sensitive individual has c_i^* higher than v which generates self-image gain. He will buy if this gain is higher than the net material loss incurred in paying a high c_i^*, or if his consumption utility $u_i(x)$ is high enough.

3.2 PWYW and Fixed-Price Schemes

Next we compare purchase rates under PWYW with purchase rates under a fixed-price scheme to investigate how the introduction of PWYW affects consumer market participation. The purchase rate is defined as the percentage of buyers in the economy.

Proposition 1. *The purchase rate is weakly higher under PWYW than a fixed-price scheme at price $p \geq v$.*

Proof. See Appendix. □

When the posted price is equal to or is higher than the fair price, both image-sensitive and image-insensitive individuals may gain from moving to a PWYW pricing scheme. This result is intuitive, since the image-insensitive individual can free-ride and choose a low price, with little loss in self-image. The image-sensitive individual is able to pay his optimal price and "buy" self-image. As a result, individuals who do not buy the good in the fixed-price scheme may be turned into a buyer under PWYW, while those who buy the good in the fixed-price scheme will still buy under PWYW. Hence, PWYW leads to a weakly higher purchase rate compared to a fixed-price scheme.

Proposition 1 implies that to investigate the lower purchase rate under PWYW, we need to focus on the case where the fixed price is lower than the fair price threshold.

Proposition 2. *The purchase rate is weakly lower under PWYW than a fixed-price scheme at price $p \leq c_i^* - f_i(c_i^*, v) \quad (\leq v) \quad \forall i$.*

Proof. See Appendix. □

Compared to a fixed price which is lower than the fair value of the good, a PWYW scheme may lower an individual's utility. This result is counter-intuitive, but can be explained by the self-image component. The image-sensitive individual has to pay his high optimal price, while the image-insensitive individual has to consider the image loss associated with paying a low optimal price without much gain in his net material utility. If the sufficiency condition holds for all individuals in the economy, PWYW will result in a weakly lower purchase rate than under a fixed-price scheme as the reduction in utility may turn a buyer into a non-buyer.

Moreover, Proposition 2 guarantees that the image-sensitive individual, should he still make a purchase under PWYW, will pay a price higher than the fair price v and thus the fixed price p. For the image-insensitive individual, should he still make a purchase under PWYW, he will pay c_i^* which might be higher or lower than p. Thus, if there is a sufficiently high number of image-sensitive individuals making a purchase, the average price under PWYW will be higher than the fixed price p.

3.3 Variation in PWYW fair value

Suppose now that the exogenous fair value v is varied, for example due to a pro-social component in the good. Typically, a fair-trade version of a good will attract a higher fair value than a non-fair-trade version. We then have the following proposition:

Proposition 3. *An increase in fair value v results in a weakly lower purchase rate.*

Proof. See Appendix. □

As per the assumption that $f_r < 0$, if an increase in fair value is not followed by an increase in contribution level, self-image loss results. Such increase, such as through the introduction of a pro-social component, also demands an increase in contribution level to maintain self-image. However, a higher contribution also reduces the net material utility, and hence the total utility of making a purchase. If this decrease is sufficiently high, a buyer can be turned into a non-buyer, thus lowering the purchase rate.

With the condition

$$\frac{\partial c^*}{\partial v} > 0$$

and a sufficiently high number of image-sensitive individuals still making a purchase, the average price will be higher.[10]

4 Simulation

As our model has shown in the previous section, PWYW in different settings can give rise to different outcomes. In particular, its profitability for the seller and the welfare consequences will depend on the distribution of individuals' consumption utility and image-sensitivity. In this section we illustrate the PWYW outcomes using the assumption of an economy with uniformly distributed preferences.

Consider the following utility function:

$$U_i(c) = u_i(x) - c + \mu_i \left((c - v) - \frac{1}{2}(c - v)^2 \right) \qquad \mu_i > 0; c < v + 1.$$

That is, the self-image function takes the quadratic form. μ acts to differentiate the image-sensitivity amongst individuals, with a more image-sensitive individual having a higher μ_i and vice versa.

[10]This condition is fulfilled by, for example, the quadratic self-image function.

The optimal value of c is calculated by the process described in Section 3, and is given by

$$c_i^* = 1 + v - \frac{1}{\mu_i}.$$

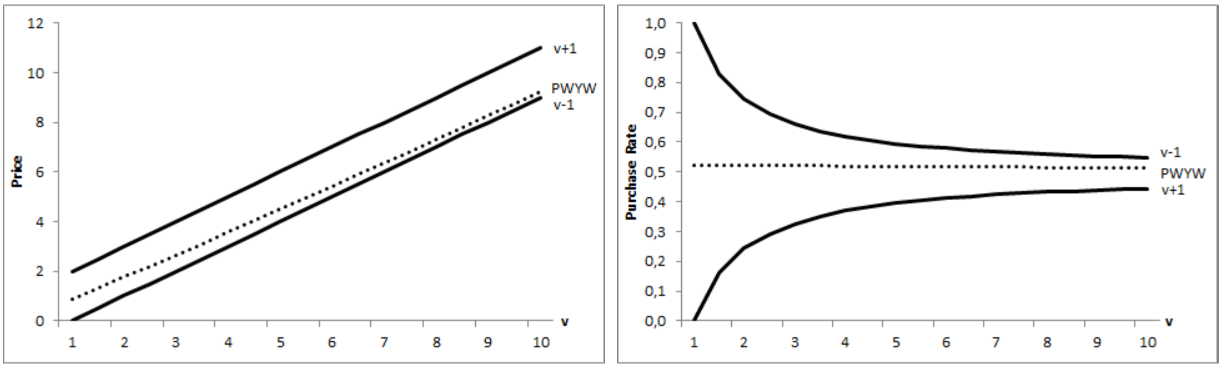
We assume a uniformly distributed consumption utility and image-sensitivity:

$$u_i(x) \sim U(0, 2v)$$

$$\mu_i \sim U\left(\frac{1}{1+v}, 1 + \frac{v}{1+v}\right)$$

such that $c_i^* > 0 \ \forall i$, and half the population are image-insensitive and the other half image-sensitive.

We run simulations across 10,000 individuals in the economy, with the following parameters: $1 \leq v \leq 10$, and p taking a high value of $v + 1$ or a low value of $v - 1$. The good is assumed to have zero marginal cost. Some brief analytical results are presented in the Appendix, together with the numerical results of the simulation, while graphical results are shown here.



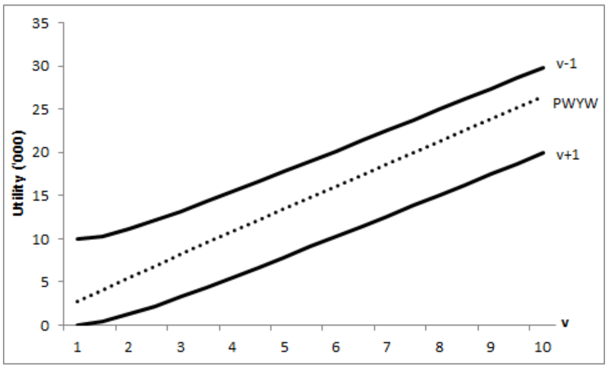
(a) Price (b) Purchase rate

Figure 1: Price and purchase rate comparison

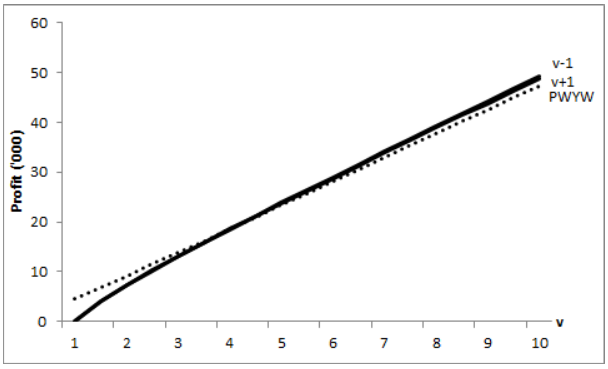
Figure 1 shows that with image concerns, the average PWYW price exceeds the low fixed price. However, as v increases, this difference becomes smaller as fewer image-sensitive individuals stay in the market.

As predicted in Proposition 1, when $p = v + 1$ PWYW always yields a higher purchase rate and utility for the consumers. On the other hand, according to Proposition 2 the opposite would occur when the fixed price is lower than the fair value. The utilities of both image-sensitive and -insensitive individuals are reduced by going to PWYW, since the image-sensitive individuals now have to pay their higher optimal contributions while the image-insensitive individuals lose image by paying their low optimal prices. These are seen in the purchase rate comparison in Figure 1 and the utility comparison in Figure 2.

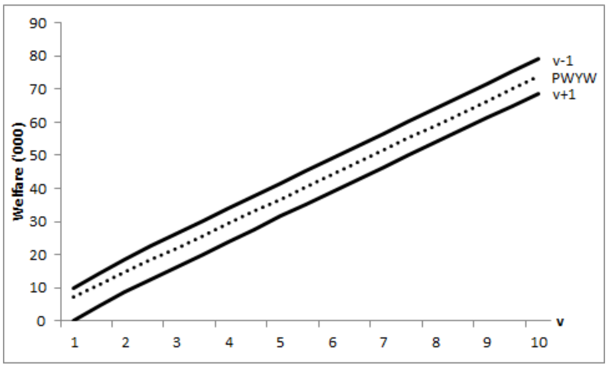
Figure 2 also shows that profits under fixed-pricing exceed PWYW profits for high values of v. Therefore, PWYW is more beneficial to a seller for goods with low fair values, where individuals are less concerned about under-paying and losing image. At higher fair values, the seller is better off using a fixed-price scheme. Overall, from a total welfare point-of-view, PWYW is preferred to a fixed price higher than the fair value, but not to a fixed price lower than the fair value.



(a) Utility



(b) Profit



(c) Welfare

Figure 2: Utility, profit and welfare comparison

5 Discussion

The simple self-image model above successfully captures the different behaviors of individuals when faced with PWYW pricing schemes. While self-image concerns are more likely to arise in pro-social purchases where payment is more consequential, the concerns of being fair to the seller or not appearing cheap exist both when the good has a pro-social dimension or is a pure market good.

Given an accurate guess of the exogenous fair price v, any difference between v and the fixed price p is due to the seller's competitive strategy. If the seller aims to increase revenue by setting a fixed price that is higher than the fair value, individuals will naturally prefer the PWYW scheme due to their ability to choose a low price or derive self-image benefits at a high price. As the simulation results show, when the fixed price exceeds the fair value, PWYW is preferred and gives consumers a higher total utility. At low fair values, PWYW even benefits the seller. Overall, PWYW yields a higher total welfare.

It is when the seller's chosen fixed price is lower than the fair value that individual behavior deviates from what is expected in standard economic theory, giving rise to a higher average purchase price and lower purchase rate.

The lack of participation in PWYW schemes, despite the possibility to pay a zero amount for the good, can be explained by the reluctance of individuals to pay a price deemed fair or suitable for the good when that optimal price is too high compared with the good's consumption utility to the individual. Rather than paying a lower price or nothing, thus incurring a loss in self-image, the individual chooses to opt out of the scheme. Compared to a fixed-price scheme, PWYW can therefore result in a lower purchase rate.

The higher average price can also be explained by self-image. An individual's optimal contribution c^* is determined by utility maximization which takes self-image into account, and it is found at the point where the slope of the self-image function is equal to the slope of the cost function. This optimal price is higher than v for image-sensitive individuals, and is therefore also higher than the fixed price p. With a sufficiently high number of image-sensitive individuals making a purchase, the average price will be higher under PWYW than under the fixed-price scheme.

Our model can therefore explain the experimental findings observed in Gneezy et al. (2012, 2010) and Kim et al. (2009), reported below.

	Tour Boat Experiment Results			Theme Park Experiment Results		
	FP \$5	FP \$15	PWYW	FP	PWYW	PWYW + Charity
Purchase rate	64%	23%	55%	0.50%	8.39%	4.49%
Average price	\$5	\$15	\$6.43	\$12.95	\$0.92	\$5.33

Table 2: Field Experimental Results (Gneezy et al., 2010, 2012)

As explained by our model, Table 2 shows that tour boat photos for sale at a low fixed price of \$5 attracts the highest purchase rate, followed by a PWYW treatment which yields an average price of \$6.43, while a high fixed price of \$15 attracts the lowest purchase rate. Despite being able to buy the photo at \$5, the passengers' commonly held belief about the fair price v, as implied by our model, appears to be higher than \$5, as a result causing those who intended to pay a lower amount to drop out instead of under-paying. As stated in Gneezy et al. (2012), the PWYW participants were told that the normal price was \$15, but they were unaware of the other treatment with a \$5 selling price. Clearly, for the participants the important driver of behavior is not the information on prices, but the commonly held exogeneous belief about the fair value — if this threshold was below \$5, the average PWYW price could have been lower. Similar results were obtained in the theme park experiment, whereby a high fixed price of \$12.95 yields an extremely low purchase rate, but the adoption of PWYW increases the purchase rate, at a much lower average price.

In both experiments by Gneezy et al. (2012, 2010), the actual fair price v is unobservable. We have assumed that individuals obtain this value exogenously and concede that there may be problems associated with the uncertainty of this value for goods with complex characteristics, though it is not the case in the examples discussed here. As our simulation results show, however, given some minimal assumptions regarding the distribution of individuals PWYW yields an average price which is very close to the unobserved fair value for comparison purposes.

In addition, Kim et al. (2009) include a question about the buyer's internal reference price in their survey of PWYW consumers, and in doing so, manage to elicit the perceived value of v. In the buffet lunch experiment (see Table 3), with a fixed price higher than the elicited value of v, consumers gain from the PWYW pricing scheme and on average under-pay. As a result, however, sales are higher and revenue increases by 30%. In the hot beverages experiment, the fixed price is lower than the elicited fair price. The average PWYW consumer is image-sensitive and pays slightly more than v. Having to pay a higher price to be fair, unit sales decrease and revenue only increases by 3%.

When a pro-social element is added to the good, thus increasing its fair value, individual contri-

	Buffet Lunch		Hot Beverages	
	FP	PWYW	FP	PWYW
Unit sales	157	253	872	813
Average price	€7.99	€6.44	€1.75	€1.94
Elicited v		€7.85		€1.92

Table 3: Experimental Results (Kim et al., 2009)

bution has to increase to maintain self-image. Without any change to the consumption utility of the good, this shift serves to make a purchase less likely. This is consistent with the findings in Gneezy et al. (2012) (see Table 2), where people were less likely to buy a photo when told that half their PWYW payment would support a charity, and those who still made a purchase paid a much higher price. An increase in the fair value means that an individual has to pay more to keep the same level of self-image, so for some individuals it is better not to buy at all, rather than risk under-paying and causing negative self-image. For these individuals, the pro-social element apparently does not add to the utility of the good, or at least not enough to compensate for the increase in contribution.

Ultimately, the feasibility of PWYW to a seller depends on the purchase decision and price paid by individuals, which in turn depend on the distribution of individual preferences in the economy. Assuming an economy consisting of individuals with uniformly distributed consumption utility and image sensitivity, our simulation illustrates the model's predictions, and also highlights the welfare consequences of PWYW. For sellers, PWYW is only beneficial when enough image-sensitive consumers buy the good. This condition is fulfilled when the good is of relatively low fair value. At high levels of fair value, fixed-pricing is preferred. For consumers, PWYW utility is higher when the fixed price is higher than the exogenous fair price. It also follows that in such situations, the PWYW total welfare is higher than the fixed-price welfare. If the seller is able to sell a good at a lower price, however, fixed-pricing is preferred over PWYW.

In situations where the seller enters a market with relatively low image-sensitivity or consumption utility, it would be unwise to adopt PWYW (for example, Terra Bite Lounge in Seattle switched back to a fixed-price scheme due to its location, frequented by a lot of teenagers with presumably low image-sensitivity or consumption utility).[11] The same precaution should also be taken if the seller anticipates image-insensitive customers to self-select into the market (see, for example, Gautier and Klaauw (2012); León et al. (2012)). The fact that many PWYW settings have appealed to consumers' pro-social preferences also alludes to the possibility of individuals having different image-sensitivity to different sellers, or that a charitable component, while raising the fair value of the good, also invokes an increase in the image-sensitivity of the individual (see, for example, Gravert (2014)). A charitable organization using PWYW to raise funds by selling burgers will arguably attract higher contributions than if a fast-food chain were to adopt PWYW for a day.

6 Conclusion

PWYW as a pricing mechanism has been implemented in a wide range of industries characterized by low marginal costs. Clearly, in the appropriate setting it can be a profitable strategy for sellers to adopt. Various field experiments have confirmed the fact that buyers do pay a positive

[11] See `http://www.nytimes.com/2010/05/21/us/21free.html?_r=0`.

amount, which previous literature has attributed to other-regarding social preferences. However, no existing model has been able to explain the other field experimental observations of higher average price and lower purchase rate when compared to fixed-price schemes.

We fill this gap by incorporating self-image into the buyer's utility function when considering a PWYW purchase. Individuals are either image-insensitive or image-sensitive, and make their purchase decision based on their heterogeneous consumption utility of the good. Consistent with field experimental findings, when the good's fixed price is sufficiently high, going to PWYW increases utility for both types of consumers, as a result increasing the purchase rate. Only if the good's fixed price is lower than its fair value threshold can PWYW result in a lower purchase rate. The propositions derived from our model can explain the higher average price and lower purchase rate in terms of the individual's self-image. Moreover, an increase in fair value can further lower the purchase rate, and in some situations increase the average price.

Under some simple assumptions, the simulation results indicate that the welfare-improving quality of PWYW is limited to a certain range of prices. For sellers, it is only beneficial at low fair values, while for consumers PWYW is only preferred to a high fixed price.

Finally, our model presents some interesting dimensions for future research. First, our analysis focuses purely on self-image. It may be fruitful to see what happens when a social dimension is added. Second, it is not always possible to exogenously come up with a fair price. Introducing uncertainty and endogeneity in the fair value can be an important avenue for further investigation.

References

Bagwell, L. S. and Bernheim, B. D. (1996). Veblen effects in a theory of conspicuous consumption. *The American Economic Review*, 86(3):349–373.

Bénabou, R. and Tirole, J. (2011). Identity, morals, and taboos: beliefs as assets. *The Quarterly Journal of Economics*, 126(2):805–855.

Brekke, K. A., Kverndokk, S., and Nyborg, K. (2003). An economic model of moral motivation. *Journal of Public Economics*, 87(9):1967–1983.

Carrillo, J. D. and Mariotti, T. (2000). Strategic ignorance as a self-disciplining device. *The Review of Economic Studies*, 67(3):529–544.

Chen, Y., Koenigsberg, O., and Zhang, Z. J. (2009). Pay-as-you-wish pricing. Working paper.

Dana, J., Cain, D. M., and Dawes, R. M. (2006). What you don't know won't hurt me: costly (but quiet) exit in dictator games. *Organizational Behavior and Human Decision Processes*, 100(2):193–201.

Dana, J., Weber, R. A., and Kuang, J. X. (2007). Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness. *Economic Theory*, 33(1):67–80.

Doran, C. J. (2009). The role of personal values in Fair Trade consumption. *Journal of Business Ethics*, 84(4):549–563.

Fernandez, J. and Nahata, B. (2009). Pay what you like? Available at SSRN: http://ssrn.com/abstract=1433845.

Gallice, A. (2009). Education, dynamic signalling, and social distance. *Oxford Economic Papers*, 61(2):304–326.

Gautier, P. A. and Klaauw, B. v. d. (2012). Selection in a field experiment with voluntary participation. *Journal of Applied Econometrics*, 27(1):63–84.

Gneezy, A., Gneezy, U., Nelson, L. D., and Brown, A. (2010). Shared social responsibility: a field experiment in pay-what-you-want pricing and charitable giving. *Science*, 329:325–327.

Gneezy, A., Gneezy, U., Riener, G., and Nelson, L. D. (2012). Pay-what-you-want, identity, and self-signaling in markets. *Proceedings of the National Academy of Sciences*, 109(19):7236–7240.

Gravert, C. (2014). Pride and patronage – the effect of identity on pay-what-you-want prices at a charitable bookstore. Aarhus Economics Working Papers 2014-04.

Hamachek, D. E. (1978). Psychodynamics of normal and neurotic perfectionism. *Psychology: A Journal of Human Behavior*, 15(1):27–33.

Isaac, R., Lightle, J., and Norton, D. (2010). The pay-what-you-like business model: warm glow revenues and endogenous price discrimination. Available at SSRN: http://ssrn.com/abstract=1612951.

Kim, J.-Y., Natter, M., and Spann, M. (2009). Pay what you want: a new participative pricing mechanism. *Journal of Marketing*, 73(1):44–58.

León, F. J., Noguera, J. A., and Tena-Sánchez, J. (2012). How much would you like to pay? Trust, reciprocity and prosocial motivations in El trato. *Social Science Information*, 51(3):389–417.

Mak, V., Zwick, R., and Rao, A. R. (2010). "Pay what you want" as a profitable pricing strategy: theory and experimental evidence. In *Proceedings of the Management Science and Operations Seminar Series*.

Mantzaris, A. (2008). Pay-what-you-like restaurants. `http://www.budgettravel.com/feature/0804_PayWhatYouCan,1342/`. Accessed: 2013-07-29.

Nyborg, K., Howarth, R. B., and Brekke, K. A. (2006). Green consumers and public policy: on socially contingent moral motivation. *Resource and Energy Economics*, 28(4):351–366.

Rabin, M. (1993). Incorporating fairness into game theory and economics. *The American Economic Review*, 83(5):1281–1302.

Regner, T. (2009). Social preferences?: Google answers! Jena Economic Research Papers 2009-035.

Regner, T. (2010). Why consumers pay voluntarily: evidence from online music. Jena Economic Research Papers 2010-081.

Regner, T. and Barria, J. A. (2009). Do consumers pay voluntarily? The case of online music. *Journal of Economic Behavior & Organization*, 71(2):395–406.

Riener, G. and Traxler, C. (2012). Norms, moods, and free lunch: longitudinal evidence on payments from a pay-what-you-want restaurant. *The Journal of Socio-Economics*, 41(4):476–483.

Samahita, M. S. (2013). Effect of effort on self-image: monotonically increasing self-image functions. *Economics Bulletin*, 33(1):152–157.

Schmidt, K., Spann, M., and Zeithammer, R. (2012). Pay what you want as a marketing strategy in monopolistic and competitive markets. Available at SSRN: http://ssrn.com/abstract=2191934.

Shaw, D., Shiu, E., and Clarke, I. (2000). The contribution of ethical obligation and self-identity to the theory of planned behaviour: an exploration of ethical consumers. *Journal of Marketing Management*, 16(8):879–894.

Sirgy, M. J. (1982). Self-concept in consumer behavior: a critical review. *Journal of Consumer Research*, 9(3):287–300.

Thaler, R. (1985). Mental accounting and consumer choice. *Marketing Science*, 4(3):199–214.

Xia, L., Monroe, K. B., and Cox, J. L. (2004). The price is unfair! A conceptual framework of price fairness perceptions. *Journal of Marketing*, 68(4):1–15.

Appendix

A Proofs

A.1 Proof of Observation 1

Proof. Consider individual i. At his optimal contribution level, $\frac{\partial f_i}{\partial c}(c_i^*, v) = 1$. Hence,

$$\frac{\partial f_i}{\partial c}(v, v) < 1 = \frac{\partial f_i}{\partial c}(c_i^*, v).$$

Due to the concavity of the self-image function with respect to c, it follows that $c_i^* < v$.

Similarly, at individual j's optimal contribution level, $\frac{\partial f_j}{\partial c}(c_j^*, v) = 1$. Hence,

$$\frac{\partial f_j}{\partial c}(c_j^*, v) = 1 \leq \frac{\partial f_j}{\partial c}(v, v).$$

Due to the concavity of the self-image function with respect to c, it follows that $v \leq c_j^*$. □

A.2 Proof of Proposition 1

Proof. Suppose individual i is presented with a fixed-price scheme, where the asking price is p. With $r = p$, his purchase utility is

$$U_i(p) = u_i(x) - p.$$

Assume now that the seller chooses to introduce PWYW. The new price paid by i is then equal to c_i^*, and his utility from making a purchase is

$$\begin{aligned}
U_i(c_i^*) &= u_i(x) - c_i^* + f_i(c_i^*, v) \\
&\geq u_i(x) - v + f_i(v, v) \\
&= u_i(x) - v \\
&\geq u_i(x) - p \qquad \forall p \geq v \\
&= U_i(p)
\end{aligned}$$

where the first inequality follows from the optimality of c^*. Therefore, $U_i(c_i^*) \geq U_i(p)$, and PWYW yields a weakly higher utility than the fixed-price scheme at any price p greater than or equal to the fair price v. A non-buyer can be turned into a buyer under PWYW, hence weakly increasing the purchase rate. □

A.3 Proof of Proposition 2

Proof. The individual's purchase utility under a fixed-price scheme is

$$U_i(p) = u_i(x) - p.$$

Under PWYW, his utility from making a purchase is

$$U_i(c_i^*) = u_i(x) - c_i^* + f_i(c_i^*, v).$$

If $p \leq c_i^* - f_i(c_i^*, v)$, $U_i(c_i^*) \leq U_i(p)$ and his utility is weakly lower under PWYW. A buyer can be turned into a non-buyer, thus weakly decreasing the purchase rate.

$c_i^* - f_i(c_i^*, v) \leq v \ \forall i$ follows from the optimality of c^*. □

A.4 Proof of Proposition 3

Proof. Writing the optimal level of contribution c^* as a function of v, the individual's utility from purchasing the good is

$$U_i(c^*(v)) = u_i(x) - c^*(v) + f_i(c^*(v), v).$$

Taking the partial derivative with respect to v,

$$\begin{aligned}\frac{\partial U(c^*(v))}{\partial v} &= -\frac{dc^*(v)}{dv} + \left(\frac{\partial f}{\partial c^*} \cdot \frac{dc^*(v)}{dv} + \frac{\partial f}{\partial v}\right)\\ &= \frac{\partial f}{\partial v} < 0\end{aligned}$$

following the assumption that $f_r < 0$, and where the second equality follows from the first-order-condition. A buyer can be turned into a non-buyer, thus weakly decreasing the purchase rate. □

B Analytical Results

Using the assumptions made in Section 4, at the optimal contribution level c_i^*, the individual's PWYW utility is

$$U_i(c_i^*) = u_i(x) - v + \frac{(1-\mu_i)^2}{2\mu_i}.$$

The relative strength of effects of fair price or self-image depends on the image-sensitivity of individuals μ_i and fair price v. For a given individual, the self-image effect dominates the price effect if

$$\frac{(1-\mu_i)^2}{2\mu_i} > v.$$

Intuitively, this requires an individual to be highly image-sensitive or the fair price to be low.

In particular, recall that

$$u_i(x) \sim U(0, 2v)$$
$$\mu_i \sim U\left(\frac{1}{1+v}, 1 + \frac{v}{1+v}\right).$$

Assuming v is exogenous, the two distributions are independent and have the joint density

$$g(u_i(x), \mu_i) = \frac{v+1}{4v^2}$$

in the relevant domain.

The purchase rate under PWYW is $\Pr(U_i(c_i^*) \geq 0)$, which can be expressed as

$$\begin{aligned}
\Pr(U_i(c_i^*) \geq 0) &= 1 - \Pr\left(u_i(x) < v - \frac{(1-\mu_i)^2}{2\mu_i}\right) \\
&= 1 - \int_{\frac{1}{1+v}}^{1+\frac{v}{1+v}} \int_0^{v-\frac{(1-\mu_i)^2}{2\mu_i}} g(u_i(x), \mu_i)\, \mathrm{d}u_i(x) \mathrm{d}\mu_i \\
&= 1 - \left(\frac{v+1}{4v^2}\right)\left(\frac{2v^2+v}{v+1} - \frac{1}{2}\ln(2v+1\right) \\
&= \frac{2v-1}{4v} + \frac{v+1}{4v^2} \cdot \ln(2v+1)^{1/2}
\end{aligned}$$

which converges to 0.5 rather quickly from above (see Figure 1). In particular, the maximum value of 0.5260 is obtained at $v = 1.7383$.

On the other hand, with fixed-pricing utility is

$$U_i(p) = u_i(x) - p$$

and the purchase rate is

$$\begin{aligned}
\Pr(U_i(p) \geq 0) &= 1 - \Pr(u_i(x) < p) \\
&= 1 - \frac{p}{2v}.
\end{aligned}$$

This purchase rate is at most 0.5, and hence less than the PWYW purchase rate, when $p \geq v$ as per Proposition 1. However, if $p < v$, the purchase rate is greater than 0.5, and as soon as $p < 0.948v$, this purchase rate will be greater than that under PWYW.

C Numerical Results

			PWYW		
v	Price	Purchase Rate	Profit	Utility	Total Welfare
1	0.889	0.523	4 646	2 720	7 366
1.5	1.323	0.523	6 919	4 102	11 021
2	1.764	0.523	9 224	5 473	14 696
2.5	2.209	0.523	11 546	6 831	18 377
3	2.659	0.522	13 878	8 178	22 056
3.5	3.113	0.521	16 204	9 516	25 720
4	3.570	0.520	18 554	10 845	29 399
4.5	4.032	0.519	20 932	12 167	33 100
5	4.495	0.519	23 316	13 484	36 800
5.5	4.960	0.519	25 721	14 795	40 516
6	5.427	0.518	28 124	16 101	44 225
6.5	5.898	0.518	30 526	17 402	47 928
7	6.368	0.517	32 937	18 701	51 637
7.5	6.841	0.517	35 334	19 995	55 329
8	7.317	0.516	37 733	21 287	59 020
8.5	7.792	0.515	40 122	22 576	62 698
9	8.268	0.515	42 537	23 862	66 399
9.5	8.744	0.514	44 938	25 146	70 084
10	9.222	0.513	47 347	26 428	73 775

Table 4: PWYW Simulation Results

			FP $p = v - 1$		
v	Price	Purchase Rate	Profit	Utility	Total Welfare
1	0	1.000	0	9 922	9 922
1.5	0.5	0.829	4 146	10 316	14 462
2	1	0.744	7 441	11 128	18 569
2.5	1.5	0.694	10 412	12 115	22 527
3	2	0.660	13 194	13 184	26 378
3.5	2.5	0.637	15 930	14 300	30 230
4	3	0.621	18 615	15 444	34 059
4.5	3.5	0.608	21 266	16 608	37 874
5	4	0.596	23 820	17 785	41 605
5.5	4.5	0.587	26 402	18 973	45 374
6	5	0.579	28 970	20 167	49 137
6.5	5.5	0.574	31 565	21 367	52 932
7	6	0.569	34 110	22 572	56 682
7.5	6.5	0.564	36 628	23 780	60 407
8	7	0.559	39 158	24 990	64 148
8.5	7.5	0.556	41 685	26 204	67 889
9	8	0.553	44 248	27 419	71 667
9.5	8.5	0.550	46 759	28 636	75 394
10	9	0.547	49 212	29 855	79 067

Table 5: Low Fixed Price Simulation Results

			FP $p = v + 1$		
v	Price	Purchase Rate	Profit	Utility	Total Welfare
1	2	0.000	0	0	0
1.5	2.5	0.161	4 025	421	4 446
2	3	0.245	7 353	1 237	8 590
2.5	3.5	0.291	10 185	2 216	12 401
3	4	0.327	13 064	3 277	16 341
3.5	4.5	0.352	15 836	4 388	20 223
4	5	0.369	18 465	5 530	23 995
4.5	5.5	0.383	21 065	6 691	27 756
5	6	0.395	23 688	7 866	31 554
5.5	6.5	0.403	26 176	9 052	35 227
6	7	0.411	28 777	10 244	39 021
6.5	7.5	0.417	31 245	11 443	42 688
7	8	0.424	33 928	12 646	46 574
7.5	8.5	0.428	36 406	13 854	50 260
8	9	0.433	38 979	15 065	54 044
8.5	9.5	0.436	41 411	16 278	57 688
9	10	0.438	43 840	17 493	61 333
9.5	10.5	0.441	46 284	18 709	64 993
10	11	0.443	48 752	19 926	68 678

Table 6: High Fixed Price Simulation Results