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Pricing of Public-Utilities-Products under Positive Externalities

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Abstract

The paper studied on the pricing policy under positive externalities, focusing on the Chinese public utilities products. After analysis, referred to the models of Yang J [1] and Sundararajan [2], they focused on positive externality network products' customizing bundled pricing. What the difference is, they focused on network products, researching on the bundled pricing model under positive externality. This paper, however, is facing public utilities products, and the customized product bundling pricing models under positive externalities are given. In addition, it discusses the optimal-realizable-customized-bundling-pricing contracts for the monopoly companies under the situation of positive externalities existing.

Keywords

Pricing, Positive Externality, Public Utilities Products

1. Introduction

Under asymmetric information, the pollution-releasing enterprises will hide pollution-controlling information, which is a principal-agent problem of adverse selection; relevant literatures gave out the negative externality controlling models-outsourcing, rewards, motivation, and supervision mechanisms [3] [4] [5] [6] [7]. Though the negative externality is the focus of management, the authorities must realize that, the existing positive externality makes the producing of public utility products lacking initiative, further makes social benefits and enterprise benefits not consistent to each other. The problem may impact resources configuration of society also. So, positive externality controlling is the pressing issue that authorities must consider.

There are a lot of literatures focused on the pricing for public or private goods, or on the issues of externality. Feldman *et al.* [8], set a posted price in an auction for a public good which can lead to multiple equilibria of buyer behavior, with different equilibriums generating substantially different revenues. Kotchen [9] offers a perspective on VIBAs (voluntary- and information-based approaches) through the lens of public economic theory. Esp., Ahmadi Pour Anari *et al.* [10] studied the problem of optimal item pricing in the presence of historical network externalities and strategic buyers. Ver Eecke W [11] built upon the partial insight of Samuelson to claim that the three concepts of private, public and merit goods are ideal concepts which can be present jointly and in varying degrees in every economic event. Iyer *et al.* [12] revealed a robust result pertaining to innovation incentives across monopoly and competitive markets. Roumasset *et al.* [13] developed a theory in the context of watershed conservation and groundwater extraction taking advantage of *payment for ecosystem services* (PES) pricing. Zhang *et al.* [14] based on the characteristics of the digital products itself, cost of production, network market environment and the characteristics of the analysis of the consumers' behaviors, proceeding from the point of view of the network expansion, put forward the theory of groups pricing based pricing strategy. Chen *et al.* [15] predict that at the introduction stage, the price should be stable in order to communicate quality-related information efficiently. Therefore, manufacturers have incentives to use resale price maintenance (RPM) to reduce the noise from intra-brand price competition. Bloch *et al.* [16] analyzed the problem of optimal monopoly pricing in social networks where agents care about consumption or prices of their neighbors, and characterized the relation between optimal prices and consumers' centrality in the social network.

The paper studied on the pricing policy under positive externalities, focusing on the Chinese public utilities products. After analysis, referred to the models of Yang J [1] and Sundararajan [2], they focused on on positive externality network products' customizing bundled pricing. What the difference is, they focused on network products, researching on the bundled pricing model under positive externality. This paper, however, is facing public utilities products, and the customized product bundling pricing models under positive externalities are given. In addition, it discusses the optimal-realizable-customized-bundling-pricing contracts for the monopoly companies under the situation of positive externalities existing.

2. Basic Models

2.1. Assumptions

On the market of public utility products, a monopoly company sells N similar utility products. Any initial cost on these N utility products is considered sunk cost, and thus it can not be neglected. Consumer's budgets are determined by exogenous variables, consumers are different at the same time, whereof subjects to one of the distributions of $\left[\underline{k}, \bar{k}\right]$. Consumers' net effect of purchasing utility

products' bundle, can be obtained by using an quasi-linear utility function is expressed as

$$U\left(n(k),k,Q,p(k)\right)=W\left(n(k),k,Q\right)-p(k) \tag{1}$$

here, $n(k)$ is the similar utilities products in quantity that are purchased by consumers in its bundles. Q is the total amount that consumers consumed in utility products bundles/total consumption. $p(k)$ is the price corresponding to the utilities bundle which Contains $n(k)$ products, and $W\left(n(k),k,Q\right)$ is the total utility gained by consumers purchasing the bundles.

If now considering utility products' positive externalities of usage or consumption, when $Q=0$, $W\left(n(k),k,0\right)$ indicates the intrinsic value of the bundle that a consumer of type k obtained after buying the bundle consisting of $n(k)$ utility products, equivalent to the utility that only one person gained of purchasing. Introduced the modification form of the consumer utility functions of Chuang and Sirbu (1999) [17] to characterize, $W\left(n(k),k,0\right)$, that is

$$W\left(n(k),k,0\right)=s_oV\left(n(k),k\right)=s_o\int_{n=0}^{n(k)}\omega_o\left(1-\frac{n}{kN}\right)\mathrm{d}n \tag{2}$$

Among them, $V\left(n(k),k\right)$ shows that different types of consumers have different preference orders to the N utility products offered by monopoly companies. If $n(k)<N$, what the consumers actually purchased are the bundles consisted by their most preferred $n(k)$ utility products. Accordingly, type k refers to the corresponding consumer's percentage of positively evaluating the N utility products. And ω_0 is consumers' evaluation of the most preferred ones among these N utility products. In order to simplify the analysis assumes that all consumers' preference parameters ω_0 are all the same. Consumer's heterogeneity is expressed by parameter k, $k\in\left[\underline{k},\overline{k}\right]$, $\underline{k}>0$ and $\overline{k}>1$. And this indicates that the type $\overline{k}$ consumer's evaluation of all utilities products is strictly positive. Let $Q>0$, type k consumers' value obtained of buying the same type of bundle can be expressed as $W\left(n(k),k,Q\right)-s_oV\left(n(k),k\right)$.

For convenience, use subscripts to indicate the subscript's corresponding variables or parameters' derivatives or partial derivatives [16]. For example, to get $W\left(n(k),k,Q\right)$ first-order and second-order derivative, and about k and Q's mixed partial derivatives are represented as $W_n\left(n(k),k,Q\right)$, $W_{nn}\left(n(k),k,Q\right)$ and $W_{kQ}\left(n(k),k,Q\right)$ respectively. It is similar to assumptions in contracting theory, and it is about the standard nonlinear pricing assumptions about the consumer utility function, refer to Sundararajan research hypothesis [15], consumer utility functions satisfy the following properties:

1) The marginal utility of public utility products in the bundle diminishes, and the gross utility of consuming same bundle increases depending on the type of the bindles, and satisfy the Spence-Mirrlees single crossing conditions.

2) Let $M\left(k,Q\right)=\arg\max_{n(k)}W\left(n(k),k,Q\right)$, and $M\left(k,Q\right)$ is the finite positive number and unique. Let $n(k)<M\left(k,Q\right)$, then $W_n\left(n(k),k,Q\right)>0$; and let $n(k)>M\left(k,Q\right)$, then $W_n\left(n(k),k,Q\right)<0$. The consumer has a spending limit

and makes him gaining the most utility, and that exceeds the upper limit to make the consumer withstanding negative marginal utility.

3) $W_Q\left(n(k),k,Q\right)\geq 0$, $W_{nQ}\left(n(k),k,Q\right)\geq 0$, $W_{kQ}\left(n(k),k,Q\right)\geq 0$. This indicates consumers' total utility will increase according to the total consumption Q of the product on the public utility product market, reflecting the positive externality; while the marginal utility of consumption and types are increased also according to Q.

4) $W_{nnk}\left(n(k),k,Q\right)\geq 0$, $W_{nkk}\left(n(k),k,Q\right)\geq 0$. Similarly, $V\left(n(k),k\right)$ satisfies the following natures,

a) $V_k\left(n(k),k\right)>0$.

b) $V_{nk}\left(n(k),k\right)>0$.

c) $V_{nn}\left(n(k),k\right)<0$, $n(k)$ has the strict concavity in $V\left(n(k),k\right)$.

d) The purchasing volume of the limited maximum utility products. Let

$$m(k)=\arg\max_{n(k)} V\left(n(k),k\right) \tag{3}$$

Let $k\in\left[\underline{k},1\right)$, $m(k)=kN$; let $k\in\left[1,\overline{k}\right]$, $m(k)=N$. If $n(k)<m(k)$, then $V_n\left(n(k),k\right)>0$; and if $n(k)>m(k)$, then $V_n\left(n(k),k\right)<0$. The consumer type k's distribution function $F(k)$ and the distribution density $f(k)$ are all strictly greater than zero, the penultimate of type k's opportunities rate meets declining condition $h(k)=\dfrac{1-F(k)}{f(k)}, h_k(k)\leq 0, \forall k\in\left[\underline{k},\overline{k}\right]$.

Rationality is common knowledge; and the consumer knows his type. Due to information asymmetry, monopoly enterprise only observed the distribution of consumer types. For not losing generality, generate the total number of consumers in the market as a whole to 1.

2.2. Contracts under Positive Externalities

When there is a positive externality, because consumers' expectation may different to the total consumption of ultimately utilities products, which is likely to result in consumers' expectations to be non-rational; and even all consumers were formed the same expectations, but it is still possible that the actual total consumption is inconsistent with the expected one. Positive externalities of classical literature assume that consumers and monopolies can accurately predict the total actual final consumption, in order to reveal the positive externality's effect on the behavior of consumers and businesses. Therefore, this paper, using the ideology of Economides [18] proposed "macro-analysis method" to characterize positive externalities, namely consumers and monopolies' expectations to total consumption can be fulfilled-expectations. Even now, there is necessary to distinguish the following types of contracts to reflect differences and relations between the realizable expectations with non-realizable expectations, laying the Foundation for the following analysis. To facilitate the definition and comparison, assuming consumers are now fully involved in the purchase of utility products. Similar to Sundararajan [2] to define three types of contracts:

1) $s_p - Q$ Possible customized bundles contracts-when the utility gained by various types of consumers using utility products, is strictly greater than the reservation utility-zero, given any expected utility products consumption Q, the customized bundle contract $\left(n^F(x,Q), p^F(x,Q)\right)$ which satisfies the constraints (IC) and (PT) of consumers is called a $s_p - Q$ feasible contract, *i.e.*

$$\begin{aligned} &\text{(IC)} \quad k = \arg\max_x \left[W\left(n^F(x,Q),k,Q\right) - p^F(x,Q)\right], \forall k \in \left[\underline{k},\bar{k}\right] \\ &\text{(PT)} \quad \begin{array}{l} W\left(n^F(k,Q),k,Q\right) - p^F(k,Q) \\ \geq W\left(n^P(k,Q),k,s_p,Q\right) - c^P n^P(k,Q), \ \forall k \in \left[\underline{k},\bar{k}\right] \end{array} \end{aligned} \tag{4}$$

2) $s_p - Q$ Optimal customized bundled contracts-assuming monopoly enterprises and consumers were formed the same total consumption expectation, for any given utility product's gross consumption expectation Q, when $s_p - Q$ feasible customized bundle contract $\left(n^F(x,Q), p^F(x,Q)\right)$ —can realize the profit maximization of monopoly enterprise, it is called an $s_p - Q$ optimal customized bundle contract- $\left(n(k,Q), p(k,Q)\right)$, *i.e.*

$\max_{n^F(x,Q), p^F(x,Q)} \int_{\underline{k}}^{\bar{k}} \left[p^F(x,Q) - cn^F(x,Q)\right] f(x)\mathrm{d}x \quad \forall$ possible $\left(n^F(x,Q), p^F(x,Q)\right)$, and $\left(n^F(x,Q), p^F(x,Q)\right)$ satisfies customer's constraints of (IC) and (PT). When $s_p = 0$, this contract is called an Q-optimal customized bundle contract.

3) $s_p - Q$ Optimal realizable expected contract-is monopoly's $s_p - Q$ optimal realizable expected contract— $n(k,Q), p(k,Q)$ under the realizable expectation of gross consumption Q of utility products, so that the following conditions are true:

a) $Q = \int_{\underline{k}}^{\bar{k}} n^*(k) f(k)\mathrm{d}k$.

b) $n(k,Q) = n^*(k)$.

c) $p(k,Q) = p^*(k)$.

Then, $\left(n^*(k), p^*(k)\right)$ is called $s_p - Q$ optimal realizable expected contract. When $s_p = 0$, the contract is called Q-optimal realizable expected contract. Based on the revised method of Economides [18]—"positive externalities"—"macro-analysis method", the optimal bundle pricing policy that monopoly enterprises want to develop is actually an $s_p - Q$ optimal realizable expected contract.

3. Monopoly Bundling Pricing Policies

3.1. Basic Customized Bundle Contracts under No Positive Externality

When there is a positive externality for using the utility products, the optimal customized bundle contract established by the monopoly is equivalent to an Q-optimal realizable expected contract whereas $s_p = 0$, $s_o V\left(n(k),k\right) = W\left(n(k),k,0\right)$, and all consumer retention effect is zero at this time. So if no positive externalities, optimal customized bundle pricing contracts

of monopoly can be used as reference benchmark for that-when there are positive externalities-optimal realizable expected contract. Because the presence of positive externalities is just making the consumer's utility function containing additional constants Q, this does not affect the nature of customized binding contracts to develop, and $s_o V\left(n(k),k\right)=W\left(n(k),k,0\right)$. To the research of Yang J *et al.* [1] on product customized bundled pricing, at which point the consumer utility function just additionally times a constant s_o, and therefore can directly develop the conditions of corresponding optimal utility product customized bundle pricing contract and whereof itself. This can be represented by lemma 1:

Lemma 1 when there is no positive externality of product using, *i.e.* $W\left(n(k),k,Q\right)=s_o V\left(n(k),k\right)$, if $\bar{k}<\dfrac{s_o\omega_o}{s_o\omega_o-c}$, then optimal customized bundle pricing contracts of monopoly $\left(n^{NE}(k),p^{NE}(k)\right)$ meet the following two conditions:

$$\frac{s_o V_n\left(n^{NE}(k),k\right)-c}{s_o V_{nk}\left(n^{NE}(k),k\right)}=h(k),\ \forall k\in\left[\underline{k},\bar{k}\right] \tag{5}$$

$$p^{NE}(k)=s_o V\left(n^{NE}(k),k\right)-\int_{x=\underline{k}}^{\bar{k}} s_o V_x\left(n^{NE}(x),x\right)\mathrm{d}x,\ \forall k\in\left[\underline{k},\bar{k}\right] \tag{6}$$

All consumers now are involved in purchasing products and the optimal customized bundle contract of monopoly could only be drawn are as follows:

$$n^{NE}(k,s_o)=\frac{(s_o\omega_o-c)kN}{s_o\omega_o\left(1+\dfrac{h(k)}{k}\right)} \tag{7}$$

$$\begin{aligned}p^{NE}(k,s_o)=&\frac{(s_o\omega_o-c)kN}{2s_o\omega_o\left(1+\dfrac{h(k)}{k}\right)^2}\left[2s_o\omega_o\frac{h(k)}{k}+s_o\omega_o+c\right]\\&-\int_{x=\underline{k}}^{k}\frac{(s\omega_o-c)^2N}{2s_o\omega_o\left(1+\dfrac{h(x)}{x}\right)^2}\mathrm{d}x\end{aligned} \tag{8}$$

Monopoly's corresponding optimal profit is

$$\pi^{NE}\left(n^{NE}(k,s_o),p^{NE}(k,s_o)\right)=\int_{\underline{k}}^{\bar{k}}\frac{Nk(s_o\omega_o-c)^2}{2s_o\omega_o\left(1+\dfrac{h(k)}{k}\right)}f(k)\mathrm{d}k \tag{9}$$

Equation (9) shows that all consumers do not realize the optimal consumption under monopolies' optimal-incentive-compatible-customized-bundle-pricing-strategy, that is, $n^{NE}(k)<kN,\ \forall k\in[\underline{k},1)$; $n^{NE}(k)<N,\ \forall k\in\left[1,\bar{k}\right]$.

3.2. Optimal Realizable Expected Contracts under Positive Externalities

When there are positive externalities of using utility products, different types of

consumers have access to a different value. Because now what the consumers buy are formed from several similar utilities products' customized bundles, and consumers buy different bundles, thus the size of positive externalities is not only concerned with the total consumption of utility product, but also related to the obtained intrinsic value due to consumers' consumption of different sizes of the utility product bundle. Based on the above analysis, the type k consumers' gained total value through buying their most preferred $n(k)$ utility products can be expressed as:

$$W(n(k),k,Q)=s_oV(n(k),k)+\eta s_oV(n(k),k)Q=s_oV(n(k),k)(1+\eta Q) \quad (10)$$

Among them, $\eta s_oV(n(k),k)Q$ is the obtained value of total utility products consumption Q, η is external strength and $0<\eta<1$. Through a simple analysis, now $s_oV(n(k),k)(1+\eta Q)$ meets all nature of the consumer's utility function in basic model under existing positive externality. So, we can take full advantage of the conclusions of benchmark customized bundle pricing contracts.

For developing monopolies' optimal realizable expected customized bundle contracts we introduce the actual total consumption function $G(Q)$,

$$G(Q)=\int_{\underline{k}}^{\bar{k}} n(k,Q)\,f(k)\,\mathrm{d}k \quad (11)$$

Among them, $n(k,Q)$ is the only optimal bundle of Q-optimal customized bundle contract corresponding to expected total consumption Q of utilities product. For closing to the actual situation of the consumer's consuming public utilities products, let Q be a finite non negative, its upper bound is $Q_{\max}$, and $G(Q)>0$, corresponding to Q about existing nature of realizable expected total consumption is described by lemma 2.

Lemma 2 if $Q\in A=\{Q\,|\,0\le Q\le Q_{\max}\}$, and $G(Q)$ is the actual total consumption function, then when $G_Q(Q)$ is continuous and $0<G_Q(Q)<1$, $G(Q)$ is a contraction mapping, and there must be a unique fixed point of contractive mapping $Q^*>0$, making $G(Q^*)=Q^*$—the realizable expected total consumption. According to lemma 2, directly based on $G(Q)$, we can describe Q-optimal realizable expected customized bundle contract, such as Lemma 3 stated:

Lemma 3 if $G(Q)=Q$, then the corresponding Q-optimal customized bundle contract $(n(k,Q),p(k,Q))$ is an optimal realizable expected customized bundle contract $(n^*(k),p^*(k))$, meet:

1) $n^*(k)=n(k,Q)$;

2) $p^*(k)=p(k,Q)$. If $\forall Q,n(k,Q)$, then the inequality conditions $\bar{k}<\dfrac{s_o\omega_o(1+\eta Q^*)}{s_o\omega_o(1+\eta Q^*)-c}$ and $0<\eta\left[V_n(n(k,Q),k)-h(k)V_{nk}(n(k,Q),k)\right]<-V_{nn}(n(k,Q),k)(1+\eta Q)$ are established, and the only optimal realizable expected customized bundle contract that monopoly enterprises can make while existing positive externalities in the product usage:

$$n^*(k) = n\left(k, Q^*\right) = \frac{\left[s_o\omega_o\left(1+\eta Q^*\right)-c\right]kN}{s_o\omega_o\left(1+\eta Q^*\right)\left(1+\frac{h(k)}{k}\right)} \tag{12}$$

$$\begin{aligned} p^*(k) &= p\left(k, Q^*\right) \\ &= \frac{\left[s_o\omega_o\left(1+\eta Q^*\right)-c\right]kN}{2s_o\omega_o\left(1+\eta Q^*\right)\left(1+\frac{h(k)}{k}\right)^2}\left[2s_o\omega_o\left(1+\eta Q^*\right)\frac{h(k)}{k}+s_o\omega_o\left(1+\eta Q^*\right)+c\right] \\ &\quad -\int_{x=\underline{k}}^{k}\frac{\left[s_o\omega_o\left(1+\eta Q^*\right)-c\right]^2 N}{2s_o\omega_o\left(1+\eta Q^*\right)\left(1+\frac{h(x)}{x}\right)^2}\mathrm{d}x \end{aligned} \tag{13}$$

Now the total consumption of the realizable expected public utilities products is:

$$Q^* = \int_{\underline{k}}^{\bar{k}} n^*(k)\, f(k)\mathrm{d}k \tag{14}$$

At the same time, optimal realizable expected customized bundle contract has the following natures— $n^*(k) > n^{NE}(k)$, $p^*(k) > p^{NE}(k)$, $\forall k \in \left[\underline{k}, \bar{k}\right]$. As there is a positive correlation among-consumers' gained value under positive externality, the utilities product customized bundle intrinsic value he gained, and realizable expected total consumption, positive externality will not only enhance the consumers' willingness to pay, but also through positive effect of the total consumption toward gross utility of consumer to promote the purchase. This makes the monopoly enterprises who want to achieve maximum profits-enhancing a full range of quantity-price pair for each item in the menu while formulating its optimal realizable expected customized bundle contract, to get more consumer surplus. a monopoly's realizable expected customized bundle contract adjustment under positive externalities is shown in **Figure 1**.

With monopolies' full-range enhancing of optimal number of quantity-price pair menu, economics instinct tells monopoly's profits must be increased accordingly as well, so getting monopoly's corresponding optimal profit $\pi^*\left(n^*(k), p^*(k)\right)$,

$$\pi^*\left(n^*(k), p^*(k)\right) = \int_{\underline{k}}^{\bar{k}} \frac{Nk\left[s_o\omega_o\left(1+\eta Q^*\right)-c\right]^2}{2s_o\omega_o\left(1+\eta Q^*\right)\left(1+\frac{h(k)}{k}\right)} f(k)\mathrm{d}k \tag{15}$$

As $\left[s_o\omega_o\left(1+\eta Q^*\right)-c\right]^2 \Big/ \left[s_o\omega_o\left(1+\eta Q^*\right)\right] > \left(s_o\omega_o - c\right)^2 \Big/ \left(s_o\omega_o\right)$, after comparison we get $\pi^*\left(n^*(k), p^*(k)\right) > \pi^{NE}\left(n^{NE}(k), p^{NE}(k)\right)$. This means that monopolies' consumer remaining $s(k)$—under positive externalities expected customized bundle contract—is:

$$s(k) = \int_{x=\underline{k}}^{k} s_o V_x\left(n^*(x), x\right)\left(1+\eta Q^*\right)\mathrm{d}x, \quad \forall k \in \left[\underline{k}, \bar{k}\right] \tag{16}$$

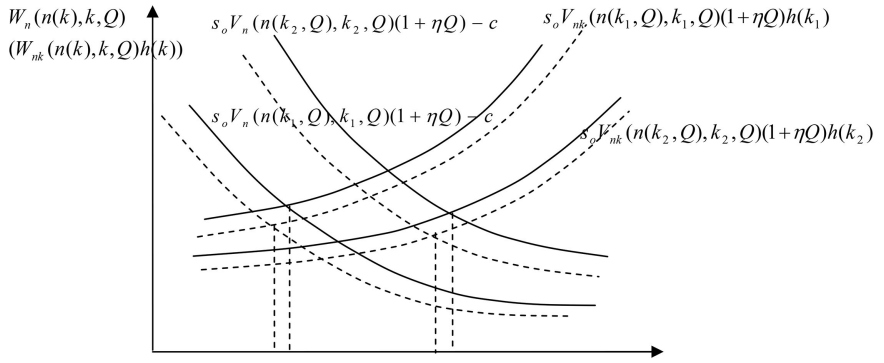

Figure 1. Adjustment of optimal customized bundle pricing of monopoly enterprise under positive externality.

According to the nature of $V\left(n\left(k\right),k\right)$ we know $V_{nk}\left(n\left(k\right),k\right)>0$, and get $n^{*}\left(k\right)>n^{NE}\left(k\right)$. Besides the type $\underline{k}$ consumers' remaining unchanged, therefore, all other consumer surplus has been improved. Overall, positive externalities do improve overall social well-being. Products usage with positive externalities existing-allows monopolies assigning value obtained by consumers for society as a whole through developing optimal realizable expected customized bundle contract, and making monopoly profits and consumer surplus (in addition to the low-end consumer) improved, achieving Pareto improvement of the society.

4. Experience Data

The products' customized bundle optimal pricing policies that the paper studies--mixing customized bundle contract pricing is not purely a logic optimal strategy of economic theory, in today's rapidly evolving information on the Internet economy, there are many companies adopting the pricing strategies in information merchandise sales. Therefore, for example of information goods in Europe and America, the paper gives their empirical data concerning positive externalities product customized bundle pricing. Due to there is a regional disparity in network economic development, developed countries especially in Europe and America, their online companies that sell information goods will more frequently and earlier use this policy than Chinese companies. For example, the famous online song sales site MusicMaker allows users choosing their own favorite songs from their own database of 30,000 different songs, to form a self customized bundles or CD (each customized CD has 15 tracks). The minimum song bundle order of MusicMaker is 5 songs, priced at $9.95, and charge an extra $1 for each additional song. Therefore each user can buy a bundled up to 15 of one's favorite songs into a CD from MusicMaker for less than $20. This makes MusicMaker being more favored by users than a single song pricing or tied CD sites or companies. MusicMaker also sells complete works of famous singers, band, or a combination of the binding, such as MLTR (Michael rock) band, the Backstreet Boys, as well as complete works of Mariah Carey's album, and the

price is not more expensive than the price of a single CD so much. This is one of the reasons that will appeal to a wide range of user groups, and partly as a result of the pricing strategy, MusicMaker has maintained a high profit from sales. View complete collection of songs as pure bundle in this paper's model, more than 5 songs bundled for the same singer or a combination or corresponding CD as a number of songs based on network songs' quantity-price pair menu's incentive compatible customized bundles, what MusicMaker undoubtedly used for selling songs are mixed customized bundle contract pricing policies.

Another typical example is the Reuters (Reuters) online news services. The greatest feature of Reuters while offering news service is, to provide news bundle by industry in accordance with industry background or interest demand of consumers. Such as computer companies or computer enthusiasts who want to understand the recent trends in hardware and software development of the computer industry and a valuable industry news, Reuters can provide a list of computer industry news for the user to select and bind the news selected by the user, into a single bundle computer industry news, and after charging the right price, Reuters sent them to the users via E-mail or other distribution. Of course, the previously mentioned computer companies or PC enthusiasts can also purchase industry news package composed by Reuters all recent computer industry news, their prices are generally no too much higher than recent industry average news bundle prices.

Clearly, the Reuters news service from viewpoint of industry has also seemed to be the classic mix of customized bundle. More unexpected is that Pointcast network newsvendors who in cooperation with Reuters has also proceeded on customized bundle advertising. Because a considerable portion of the users only want to tap the advertising content that they care about, in response to this market demand, Pointcast provides users with two options: one is the purchase of all recently provided advertisings; another is self choice of advertising type and quantity, so that Pointcast form customized advertising packages for users. Of course, in order to sell advertising—which is such information timeliness and strong commodity-as soon as possible, Pointcast's bundled pricing of all advertising are not too high, thereby also attracts a lot of users to make a purchase, so that Pointcast's ad sales also uses the mixed bundling contract pricing policies.

5. Conclusions

The paper introduced consumer utility function in order to portray utility features while consumers customized buying utility products bundles. Improved traditional value modeling methods to enable value depends not only on the total consumption of the product but also on the total utility consumption that different types of consumers gained when consuming products. Through a combination of classical contract theory, realizable expected analysis method of externalities and so on, the focus of this article examines that—when there are positive externalities—monopoly's utilities product bundle pricing policies, to serve

as the reference for China's public utilities enterprises' pricing policy. Price relates to the economic interests of enterprises, which is important issue that all profit-oriented production enterprises must pay attention to. With the pervasiveness of market economic system, utility product manufacturing enterprises and the like have positive externalities enterprises (such as electricity, public transport, horticulture, such as telecoms and portals); authorities must take into account the question of how to motivate, so as to effectively control the positive externalities of its products. So the product pricing of utilities enterprise and the like—are the entry points of solving management authorities' positive externalities controlling. Product bundle pricing policies posed by this paper, have the potential to offer references to effectively stimulate to positive externalities generated enterprise for the authorities.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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