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Research on Two - stage Consumption Decision Based on the Social Software

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Abstract. Consumer decision-making is a hot research issue in microeconomics. However, the study of social software's consumer decision literature is very scarce. This paper is going to use two - stage consumption decision model, so as to reveal the decision - making of the social software. We divide the consumption decision into two stages. From the consumption of the second stage to prove consumption of the first stage of the decision. Finally, we made the conclusion that the two-stage consumption decision model depends on the size of the social software.

Introduction and Summary

We can often see such decision-making behavior of consumers; their decisions are not determined by a single commodity, or not just by a single commodity. Such composite decisions typically have the following characteristics. The utility of the commodity is related to its quantity. These commodities often need to complement each other. For example, the utility of a fax machine is positively related to its number. People call it as the network-scale externality of goods. There are a lot of examples like it. However, few people to explore the reasons behind it. Of course, some scholars have done some research. In the study of the telephone network, Roll Graves found that a user's utility from the communication service increases by the number of joining in the system, and this is a typical example of external economic consumption, an important role to the communications industry basic economic analysis. The study of these scholars is based on the perspective of network externality to explain. This explanation gives us a lot of inspiration. On the basis of these explanations, we will build our answers to this phenomenon. We will reveal the consume motivation of the social software.

The Processing of the Consumers' Decision

To reveal the consume motivation of the social software. We will establish a two-part model of consumer decision-making, the model of consumer spending decision-making is divided into two parts.We will use it to simulate the real environment of consumer's idea. Consumers have to make the decision between choosing and download the software. Thus, we are going to introduce a procession of the consumers' 2 stage decisions.

In the first step, consumers have to decide:

$$\text{MAX} \quad Z_{it} + z_{i0}$$

$$\text{s.t. } z_{i0} + \sum_{k=1}^{n_t-1} \rho_t . z_{ik} \le y_i - p_t \tag{1}$$

In the second step, the decision consumers have to make is:

$$\text{MAX} \quad Z_{it}$$

$$\text{s.t.} \quad \sum_{k=1}^{n_t-1} \rho_t . z_{ik} \le m \;\; y_i - p_t - z_{i0} \tag{2}$$

Let's take the backward induction to solve the consumers' decision problem. First, make the solution of the 2nd step's consumer's decision, and then, make the solution between buying the software and allocating the external commodities in the first step.

The consumer's decision in the second step

For that in the condition of the constrained given expense, solving the consumers' maximization of utility in the 2nd step is equals to solving the minimization of the consumers' expense in the condition of the given utility. So, we can take this idea to solve the problem.

Min $m=\sum_{k=1}^{n_t-1}\rho_t.z_{ik}$

s.t. $\left[\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}\right]^{\beta}=Z_{it}$

Make the Lagrangian function: $L=\sum_{k=1}^{n_t-1}\rho_t.z_{ik}+\lambda\left[Z_{it}-\left[\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}\right]^{\beta}\right]$

We can get: $\frac{\partial L}{\partial z_{ik}}=\rho_t-\lambda\left[\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}\right]^{\beta-1}.z_{ik}^{\frac{1-\beta}{\beta}}=0$ (3)

$$\frac{\partial L}{\partial \lambda}=Z_{it}-\left[\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}\right]^{\beta}=0 \quad (4)$$

Since formula（3）,we can get $\left[\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}\right]^{\beta}=\left[\frac{\rho_t}{\lambda}\right]^{\frac{\beta}{\beta-1}}.z_{ik}$， and take it into（4）we will find:

$$z_{ik}=Z_{it}.\left[\frac{\lambda}{\rho_t}\right]^{\frac{\beta}{\beta-1}} \quad (5)$$

Take formula（5）into（4）,we can get the shadow price of the network service:

$$z_{ik}^{\frac{1}{\beta}}\left(\frac{\lambda}{\rho_t}\right)^{\frac{1}{1-\beta}}=\sum_{k=1}^{n_t-1} z_{ik}^{\frac{1}{\beta}}$$

We will find： $\lambda=\rho_t\left(n_t-1\right)^{1-\beta}$ (6)

And from formula（5）、（6）, we can find：

$$\sum_{k=1}^{n_t-1}\rho_t.z_{ik}=\lambda\cdot Z_{it}=m \quad (7)$$

According to Roy's Identity, we can get the demand function of the network service：

$$z_{ik}=-\frac{\partial Z_{it}/\partial\rho_t}{\partial Z_{it}/\partial m}=\frac{-\frac{m}{\lambda^2}.(n_t-1)^{1-\beta}}{\frac{1}{\lambda}}=\frac{m}{\rho_t} \quad (8)$$

Consumers' decision in the 1st step [6]

Take formula (7) into the place, the decision problem will change to the following formulas:

Max $Z_{it}+z_{i0}$

s.t. $z_{i0}+\lambda\cdot Z_{it}\le y_i-P_t$

Obviously, the extremum in the constraint condition will be the result of the angular point：

When we satisfy $\frac{y_i-P_t}{\lambda}<y_i-P_t$， which means $\lambda=\rho_t(n_t-1)^{1-\beta}<1$, the consumers' decision in the 2nd step will not cost any network service, and all the income will be spent on the external products. This time, network t won't be formed, because of the formula $\frac{\rho_t}{(n_t-1)^{\beta-1}}>1$, so when ρ_t is higher than a certain extent, or the number of the users is less to a certain extent, the consumers will not buy any network services. And then, the network will be died out.

When we satisfy $\frac{y_i - P_t}{\lambda} > y_i - P_t$, which means $\lambda = \rho_t (n_t - 1)^{1-\beta} > 1$, consumers will spend all the income to the cost of network service this time. Similarly, as $\frac{\rho_t}{(n_t - 1)^{\beta-1}} < 1$, when ρ_t is small to a certain extent or the number of the users is over to a certain extent, the network will be formed. And then, consumers will spend all the income to buy network services.

When we satisfy the formula $\frac{y_i - P_t}{\lambda} = y_i - P_t$, which means $\lambda = \rho_t (n_t - 1)^{1-\beta} = 1$.There's no difference for consumers to make a choice in this kind of constraint condition. In other words, when ρ_t comes to a certain extent, the market will come to a critical capacity. The increasing number of the consumers will satisfy the condition of the formula $\rho_t (n_t - 1)^{1-\beta} > 1$. And then, the industry forms to a network, and develops well. Oppositely, the decreasing number of the users will satisfy the condition of the formula $\rho_t (n_t - 1)^{1-\beta} < 1$, and finally deducts to zero which will die out the industry. As only when the condition of the formula $\frac{\rho_t}{(n_t - 1)^{\beta-1}} < 1$ is set up, the industry can develop well. And thus, we can get the formula $m = y_i - p_t$

Let's take it into the formula (8):

$$z_{ik} = \frac{y_i - P_t}{\rho_t},$$

$$Z_{it} = \left[\sum_{k=1}^{n_t - 1} z_{ik}^{\frac{1}{\beta}} \right]^{\beta} = \frac{y_i - P_t}{\rho_t} (n_t - 1)^{\beta}$$

Finally, we can get the indirect utility function of the consumer:

$$u_{it} = \theta_{it} + \frac{y_i - P_t}{\rho_t} (n_t - 1)^{\beta} \tag{9}$$

Anyway, this utility function is an increasing function of the number of users. Therefore, if the number of social software users is higher, the utility standard will also higher. And this will also get us the real network externalities of the commodity. So far, we prove the network externality is externality of the commodity.

Conclusions and Suggestions

The social software market is large, but many software companies are not able to share the market. This of course has its own reasons. However, we cannot ignore the special nature of social software products. Consumer choice of social software is not based on one-time consumption decisions. Their consumption decisions are based on long-term utility. We prove the social soft has externality. Therefore, soft companies should attach importance to the promotion in the initial. Only when the user reaches a certain level of scale, the number of social software will be explosive growth.

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