

Association for Information Systems AIS Electronic Library (AISeL)

WHICEB 2013 Proceedings

Wuhan International Conference on e-Business

Summer 5-22-2013

Dynamic pricing with the counter-conformity, conformity and non-conformity of consumer behavior

Xiao-hong CHEN

1Business school, Central South University, Changsha 410083, China

Sha CHEN

Business school, Central South University, Changsha 410083, China

Follow this and additional works at: <http://aisel.aisnet.org/whiceb2013>

Recommended Citation

CHEN, Xiao-hong and CHEN, Sha, "Dynamic pricing with the counter-conformity, conformity and non-conformity of consumer behavior" (2013). *WHICEB 2013 Proceedings*. 57.

<http://aisel.aisnet.org/whiceb2013/57>

This material is brought to you by the Wuhan International Conference on e-Business at AIS Electronic Library (AISeL). It has been accepted for inclusion in WHICEB 2013 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Dynamic pricing with the counter-conformity, conformity and non-conformity of consumer behavior

CHEN Xiao-hong¹, CHEN Sha¹

(¹Business school, Central South University, Changsha 410083, China)

Abstract: Confronted with well-informed consumers, the firms have to take everything into consideration. Through the classic game theory, pricing mechanism is discussed with different characteristics of consumer behavior. The consumer population is heterogeneous along two dimensions: they may have an inclination towards the obedience of the public and different degrees of patience. After introducing the price deviation variables, we demonstrate that heterogeneity in both inclination and patience is important because they jointly determine the structure of optimal pricing policies. The numerical example shows that the markdown degree, the expected purchasing amount of consumers and the expected profits of the firm are increasing with the increase of the proportion of counter-conformity consumers. And we also examine whether the discount rate of capital, counter-conformity consumers and myopic consumers will have an impact on the sales. In particular, when the discount rate and the proportion of the conformity customers are too high, the expected profits of the firm are increasing mildly with the increase of the proportion of myopic customers. Therefore, the discount rate and characteristics of consumer behavior should be considered together to maximize the revenue of firms.

Keywords: dynamic pricing; consumer behavior; game theory; revenue management

1. INTRODUCTION

In the field of sellers' revenue, dynamic pricing is one of the most important methods to increase the profit of sellers. Marn and Rosiello(1992) found that with typical cost structure adjusting the price of commodity by 2 or 3 percentage can contribute to more 35% of revenue^[1]. However, dynamic pricing has never been applied worldwide^[2]. With the development of internet, much less cost would make it to change the pricing strategy. In that way, the internet can provide sellers with an ideal pricing platform.

As consumers become increasingly sophisticated, pricing is most difficult for sellers. With highly transparent information updated in the internet, consumers can easily foresee the forward strategy of sellers, which would make the “ Cat-Mouse” game^[3] between sellers and consumers more complicated. Based on this, Lazear(1986) divided the consumers into two types^[4], observers instant buyers which share the same meaning of strategic consumers and impatient consumers^[5]. It's really common that consumers are becoming smarter and smarter. For instance, a large amount of consumers would rather to buy apparels out of season, so as the Americans. A research carried out by McWilliams and Zbaracki(2004) demonstrated that some strategic consumers preferred to markdowns, such as electronics and industry goods, after Christmas day^[6]^[7]. And these consumers were labeled as “devils” just as Brad Anderson(Best Buy Chief Executive Officer) said. Sellers would be compelled to use the marginal price to attract more consumers while the whole profit falls down^[8]. Assumed that the strategic consumers existed, Extant researches used two-period model to analyze the game^[9]^[10], which proved that the second period price would lower than the price without patient consumers, for patient consumers who always weighed what they got would wait enough time to win the game^[11]. Through a family of subgame perfect equilibria for the monopoly pricing game Nash equilibrium, Besanko and Winston made an conclusion that sellers should put more weight on consumer strategic behavior which had great impact on

sellers' profit^[12].

To some extent, above researches reflect the patience characteristics of consumers, but with the development of network communities, consumer behavior would be more complicated for more information filled in the internet, such as networks rating, the sales volume. Consumers in this situation may show counter-conformity, conformity or non-conformity consumption characteristics, which will really make some difference in vendor pricing and profit. Liu (2006) and Duan (2008) researched that the American movie ticket sales will go up for the number of positive comments^[13] ^[14]. Nowadays to meet consumer demand, in the presentation area of commodity information the online sellers highlighted the markdown notices, comments on quantity and sales information of products, such as Jingdong mall, Taobao. But whether this sort of measure will improve the profit of enterprise still remains to be a question. Therefore three conditions need to be taken into consideration. Firstly, non-conformity consumers make an decision free from product sales and the comments. Secondly, when product sales volume is low, conformity consumers will easily change their attitude and behavior in accordance with the public trend, reducing the firm's profit at the same time^[15]. Thirdly, with the advent of the era of personalized consumption, the non-conformity consumers who pursue high quality life, are often unique and bold to attempt distinctive things^[16], which means the sales are low, they will change their consumption behavior or attitude to distinguish them from the mass, then they buy the products increasing the sellers' profit. Even though these irrational effects can take place, the advanced information about the sellers pricing would force consumers to be more rational to wait for a discount to maximize the consumer surplus^[17].

Based on the above theory, manufacturer's pricing strategy and sales profit will be influenced by the conformity and patience characteristics of consumers at the same time, so it would be particularly important to integrate these two characteristics into pricing model, which has rarely been studied. The customer population is heterogeneous along two dimensions: they may have an inclination towards the obedience of the public and different degrees of patience. Therefore, consumers are divided into six types, and to describe the model more clearly, the price deviation variables is introduced. Then following numerical experiment analyze the effect of the proportion of each type of consumers on the sellers' pricing strategies, sales, and profits separately in monopoly situation. And final extension is made to analyze the influence of the discount rate on the firm's profit.

2. MODEL

2.1 Symbol and assumption

Products are available through two phases at given period in monopoly environment, assumed that there is no shortage and by the end of the selling season, leftover units have zero profit. Consumers are infinitesimally small and arrive at the same time. Each consumer demands a single unit product in the case that consumer's reservation value is higher than the price. The consumer population is heterogeneous along two dimensions: they may have an inclination towards the obedience of the public and different degrees of patience. When confronted with different sales of products, consumers may change their purchasing behavior, identified to be a response for social pressure. The second dimension of heterogeneity is patience. Patient consumers with unique personalities would delay purchasing to maximize individual utility, ascribed to be a response for personal reasons. Therefore, these two dimensions have no correlation with each other. We shall refer to these six consumer types, as patient-conformity-types, impatient-conformity-types, patient-non-conformity-types, impatient-non-conformity-types, patient-counter-conformity-types, impatient-counter-conformity-types. We assume that consumer types are unobservable to the seller, and that the composition is stationary over time. Each type of consumers would have different effect on seller's pricing and profits. The main symbols and assumptions are used in the model as follows:

- (1) The reservation value of consumers is denoted by v ($0 \leq v \leq 1$), $[0,1]$ uniform distributed;
- (2) Seller's pricing strategy is denoted by $[p_1, p_2]$, separately referring to the price at first and second period, with $0 \leq p_2 \leq p_1 \leq 1$;
- (3) The products' unit cost is denoted by c ($c = 0$);
- (4) Consumer surplus $v - p_1$ is on the behalf of profit consumers will get through purchasing behavior. And capital will devalue with time pass by, so profit at second-period should be discounted at rate γ , with $0 < \gamma < 1$;
- (5) The aggregate demand of these consumers is N units, and denote the proportion of each customer type using $\lambda_1, \lambda_2, \lambda_3, \theta_1, \theta_2$, separately referring to counter-conformity consumers, conformity consumers, non-conformity consumers, patient consumers, impatient consumers, with $\lambda_1 + \lambda_2 + \lambda_3 = 1, \lambda_1 + \lambda_2 + \lambda_3 = 1$;
- (6) When informed with other's purchasing willingness or behavior, those who stay the same with others we call conformity, those who take the opposite view to others we call counter-conformity^[18], those who remain unchanged we call non-conformity^[19]. So during the selling season, the conformity, conformity consumers will change purchase strategies, leading to different reservation values. Actually, we use price deviation variable (Δ) to denote the positive or negative deviation of irrational reservation value which we can accurately predict in advance. In the first period, relatively only a few people purchase new products, but at this point counter-conformity consumers would tend to be irrational to buy products at high price with abnormal higher reservation value. On the contrary, conformity consumers would rather delay buying for keep the same pace with the majority. When it comes to the second period, these two types of consumers will do oppositely. Still, the non-conformity consumers' reservation will still stay the same till the end;
- (7) Cumulative market demand of each type of consumers during the two period selling seasons is depicted in table 1.

Table 1 Cumulative market demand of each type of consumers

	Counter-conformity (λ_1)	conformity (λ_2)	Non-conformity (λ_3)
Impatient (θ_1)	α_{11}^k	α_{12}^k	α_{13}^k
patient (θ_2)	α_{21}^k	α_{22}^k	α_{23}^k
accumulation ($\sum_j \alpha_{ij}^k$)	α_1^k	α_2^k	α_3^k

α_{ij}^k denotes the proportion of each type of consumers' cumulative market demand during k period; v_{ij}^k is the

critical point of reservation value during κ period; $M_{\kappa} = \sum_{i=1}^2 \sum_{j=1}^3 \alpha_{ij}^{\kappa}$ denotes the whole marketing demand during κ

period. ($i, \kappa = 1, 2; j = 1, 2, 3$)

1.2 Model analysis

Definition (critical appraisal): in the consumer set who produce the purchasing behavior, there is the lowest reservation value of consumers, which we define as the critical appraisal of consumer set. According to this definition, the willingness to pay is greater than the critical appraisal of the consumers, then purchasing behavior must happen. If the distribution of certain known consumer groups' value and critical appraisal is known to us, we will be able to tell the actual consumers' quantity.

Therefore, to some extent, critical appraisal expresses the market characteristics of specific consumer set in response to enterprise pricing strategy. Based on the above assumptions and definition, all kinds of consumers' purchase plan and market demand expression is as follows:

(1) During the first period, the counter-conformity consumers would rather to produce purchasing behavior to show up personality irrationally with reservation value increased to $v + \Delta$. Therefore, if the commodity value $v + \Delta$ is equal or greater than p_1 , purchasing behavior will happen, namely critical appraisal is denoted

by $v_{11}^1 = p_1 - \Delta$, the proportion of purchasing quantity is $\alpha_{11}^1 = \theta_1 \lambda_1 (1 - p_1 + \Delta)$. However, during the second period, the willingness of the counter-conformity consumers will be weakened for plenty of people jump into the market, so the reservation value is lowered to $v - \Delta$, that is to say critical appraisal is denoted by $v_{11}^2 = p_2 + \Delta$, the expected purchasing quantities proportion is $\alpha_{11}^2 = \theta_1 \lambda_1 (p_1 - p_2 - 2\Delta)$.

(2) The conformity-impatient consumers at the first period will lower their rational reservation value to $v - \Delta$ for lack of confidence, and purchasing intention will be weakened at the same time. Therefore, critical appraisal $v_{12}^1 = p_1 + \Delta$, the proportion of expected purchasing quantities $\alpha_{12}^1 = \theta_1 \lambda_2 (1 - p_1 - \Delta)$. As the consumers accumulate at the second period, conformity-impatient consumers would add the price deviation variable to the reservation value, which can be denoted afresh by $v + \Delta$. So critical appraisal $v_{12}^2 = p_2 + \Delta$, the proportion of expected purchasing quantities $\alpha_{12}^2 = \theta_1 \lambda_2 (p_1 - p_2 + 2\Delta)$;

(3) non-conformity-impatient consumers adhere to the rational reservation value all the time, so at the first period the critical appraisal $v_{13}^1 = p_1$, the proportion of expected purchasing quantity $\alpha_{13}^1 = \theta_1 \lambda_3 (1 - p_1)$. When it comes to second period, consumers are willing to purchase if and only if the reservation value is greater than p_2 , namely critical appraisal $v_{13}^2 = p_2$, the proportion of expected purchasing quantities $\alpha_{13}^2 = \theta_1 \lambda_3 (p_1 - p_2)$;

(4) As the first point states, the counter-conformity consumers would have enough irrational motivation to purchase with reservation value increased to $v + \Delta$. With no opportunity to show up their personality at second

period, counter-conformity consumers' reservation value will be lowered to $v - \Delta$. Strategic consumers would compare the purchasing strategy back and forth to maximize their own utility. So if the condition $v - (p_1 - \Delta) \geq \gamma[v - (p_2 + \Delta)]$, $v - \Delta - p_2 > 0$ can be separately satisfied at the first and second period,

purchasing behavior would occur. In addition, critical appraisal is respectively $v_{21}^1 = \frac{p_1 - \Delta(1 + \gamma) - \gamma p_2}{1 - \gamma}$,

$v_{21}^2 = p_2 + \Delta$, the proportion of expected purchasing quantities $\alpha_{21}^1 = \theta_2 \lambda_1 [1 - \frac{p_1 - \Delta(1 + \gamma) - \gamma p_2}{1 - \gamma}]$,

$\alpha_{21}^2 = \theta_2 \lambda_1 [\frac{p_1 - \gamma p_2}{1 - \gamma} - \frac{(1 + \gamma)}{1 - \gamma} \Delta - (p_2 + \Delta)]$, respectively;

(5) At the first period the conformity-patient consumers will lower their rational reservation value to $v - \Delta$, but increase it irrationally to $v + \Delta$ at the second period. So purchasing behavior would occur when $v - (p_1 + \Delta) \geq \gamma[v - (p_2 - \Delta)]$, $v + \Delta - p_2 > 0$ separately at the first and second period. Namely critical

appraisal $v_{22}^1 = \frac{p_1 + \Delta(1 + \gamma) - \gamma p_2}{1 - \gamma}$, $v_{22}^2 = p_2 - \Delta$, the proportion of expected purchasing

quantities $\alpha_{22}^1 = \theta_2 \lambda_2 [1 - \frac{p_1 + \Delta(1 + \gamma) - \gamma p_2}{1 - \gamma}]$, $\alpha_{22}^2 = \theta_2 \lambda_2 [\frac{p_1 - \gamma p_2}{1 - \gamma} + \frac{(1 + \gamma)}{1 - \gamma} \Delta - (p_2 - \Delta)]$

respectively;

(6) To maximize their utility, non-conformity-patient consumers with the ability to predict the pricing strategy make rational purchasing plan, so non-conformity-patient consumers at the first and second stage should meet the requirements respectively: $v - p_1 \geq \gamma(v - p_2)$, $v - p_2 > 0$, namely reservation value

$v_{23}^1 = \frac{p_1 - \gamma p_2}{1 - \gamma}$, $v_{23}^2 = p_2$ respectively. So the proportion of expected purchasing quantities of

non-conformity-patient consumers $\alpha_{23}^1 = \theta_2 \lambda_3 (1 - \frac{p_1 - \gamma p_2}{1 - \gamma})$, $\alpha_{23}^2 = \theta_2 \lambda_3 (\frac{p_1 - \gamma p_2}{1 - \gamma} - p_2)$.

3. OPTIMAL POLICY

Consumers' purchasing behavior will always be influenced by the rational and irrational factors simultaneously, so in order to maximize the profit sellers should consider these factors thoroughly. This section is mainly to solve the basic model, so we can get the sellers' optimal pricing strategy.

According to expected purchase quantities of various types of consumers, the sales at the first and second period

$$M_1 = N \sum_{i=1}^2 \sum_{j=1}^3 \alpha_{ij}^1, \quad M_2 = N \sum_{i=1}^2 \sum_{j=1}^3 \alpha_{ij}^2 \quad (1)$$

Pricing strategy (p_1, p_2) at the first period will contribute to the maximum of profit Z . But when the condition of the first stage is given, sellers should change their pricing strategy p_2 to maximize the second stage's profit Z_2 .

When the pricing strategy (p_1, p_2) at the first period has been worked out, the expected profit can be denoted by

$$Z = M_1 p_1 + \gamma M_2 p_2 \quad (2)$$

The expected profit at the second period can be denoted by

$$Z_2 = \gamma M_2 p_2 \quad (3)$$

We all know that wise sellers would make the pricing strategy again to maximize the whole profit during the selling season after the first period goes to the end. Naturally, at this point the terms p_1, α_{ij}^1 are known, so with the adjusted reservation value v_{ij}^1 with $i=1,2; j=1,2,3$. To acquire the optimal pricing strategy, we should compute the differential of formula (2), (3), as follows:

$$\frac{\partial M_1}{\partial p_1} p_1 + M_1 + \frac{\partial M_2}{\partial p_1} \gamma p_2 = 0 \quad (4)$$

$$\gamma M_2 + \frac{\partial M_2}{\partial p_2} \gamma p_2 = 0 \quad (5)$$

The cumulative sales at the first period:

$$M_1 = N\theta_1 \left[1 - p_1 + \Delta(\lambda_1 - \lambda_2) \right] + N\theta_2 \left[1 - \frac{p_1 - \gamma p_2}{1 - \gamma} + \frac{(1 + \gamma)}{1 - \gamma} \Delta(\lambda_1 - \lambda_2) \right] \quad (6)$$

The cumulative sales at the second period:

$$M_2 = N\theta_1 \left[p_1 - p_2 - 2\Delta(\lambda_1 - \lambda_2) \right] + N\theta_2 \left[\frac{p_1 - \gamma p_2}{1 - \gamma} - p_2 - \frac{2}{1 - \gamma} \Delta(\lambda_1 - \lambda_2) \right] \quad (7)$$

Combining formula (4),(5),(6),(7) with the case $\theta_2 = 1 - \theta_1$ replacing other unknown parameters, finally we get the optimal pricing strategy:

$$p_1^* = \frac{(-\theta_1 - 2)\gamma^2 + (5 + \theta_1)\gamma + (2\theta_1^2\gamma^3 - 9\theta_1\gamma^2 + 2\gamma^2 + 5\theta_1\gamma + 3\gamma - 3)\Delta(\lambda_1 - \lambda_2)}{(\theta_1\gamma - 1)(\theta_1\gamma^2 - \theta_1\gamma - 6\gamma + 6)} \quad (8)$$

$$p_2^* = \frac{1 - \gamma + (\theta_1\gamma + \gamma - 3)\Delta(\lambda_1 - \lambda_2)}{(\theta_1\gamma^2 - \theta_1\gamma - 6\gamma + 6)} \quad (9)$$

Due to the fact that the pricing strategy (p_1, p_2) play the dominate role in the purchasing strategy of

consumers, the pricing strategy can be an effective trigger to the consumers' response. And we can easily find out the profit of sellers is influenced by the proportion of various consumers.

4. NUMERICAL SIMULATION

The following simulation is made to analyze the effect of the proportion of counter-conformity consumers and conformity consumers on the pricing strategy, sales and profits. In this section, non-conformity consumers are so rational that we set their proportion as the constant.

With $\theta_1 = 0.5$, $\gamma = 0.7$, $\lambda_3 = 0.5$, $\Delta = 0.1$, $N = 1000$, figure1-3 shows:

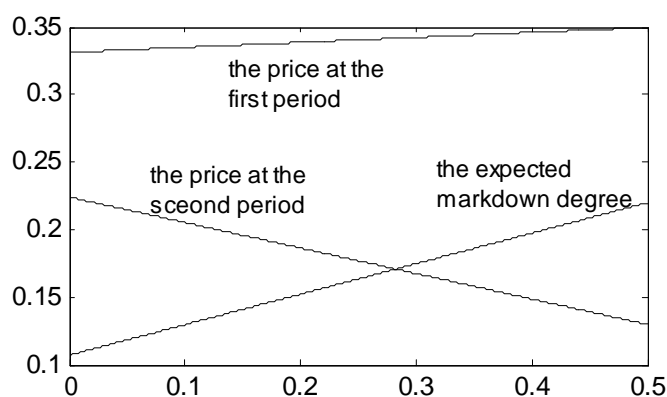


Figure 1 the expected price against λ_1

1) The expected price against the proportion of counter-conformity consumers λ_1

Figure 1 shows that, with the increase of the proportion of counter-conformity, the price at first phase is expected to rise mildly, while the price at the second phase is expected to fall rapidly. In the first stage, the counter-conformity consumers who advocate the personality of consumption will enhance myopia consumers' willingness to purchase, and transform the attitude of strategic consumers who may wait for promotion. Still, some strategic consumers may delay buying hoping more welfare. So if sellers are eager to maximize revenue, they should raise the price a bit to stimulate the intention to purchase at the first period. At the beginning of the second selling season, sellers should greatly reduce the market price, which will cause the purchasing behavior of the majority—counter-conformity consumers, to ensure that the gross profit is the largest. The conclusion of the research is different from the extant researches. The extant researches only consider the patience of consumers, in which case, the price at the second period of grows continually, the markdown reduces. But the conformity characteristic does exist, and have great influence on consumers' purchasing decisions, which the sellers should not ignore.

2) Various types of expected purchasing quantity against the proportion of counter-conformity consumers λ_1

The proportion of counter-conformity consumers will affect the whole sales and the cumulative sales of counter-conformity, conformity consumers to different extent. From the figure 2 we can see, with the increase of λ_1 , the expected purchasing quantities of non-conformity consumers increase gradually, while conformity consumers' purchasing quantities continuously reduce, and the total expected sales is declined faintly. In fact,

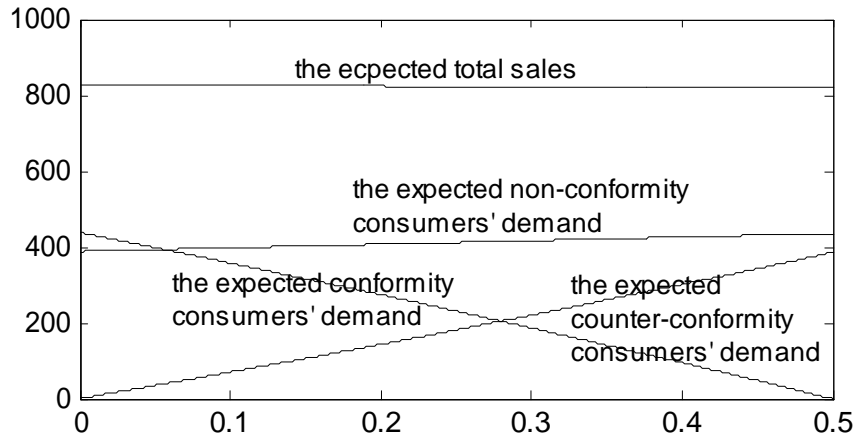


Figure 2 the expected sales against λ_1

non-conformity consumers' purchasing quantities shows ascendant trend. For the purchasing quantities of non-conformity consumers is merely determined by the price p_2 , non-conformity consumers who have the ability to pay will increase with the decline of the price at the second period. Figure 1 shows that, the bigger λ_1 is, the smaller p_2 is. Therefore non-conformity consumers' purchasing quantities will increase gradually with the increase of λ_1 . The conclusion of our research is different from the extant researches. Extant researches only consider the patience of consumers, in which case, the overall expected sales greatly reduce with the accumulation of strategic consumers. However, the counter-conformity characteristic will offset part of the rationality of strategic consumers so as to improve the sales.

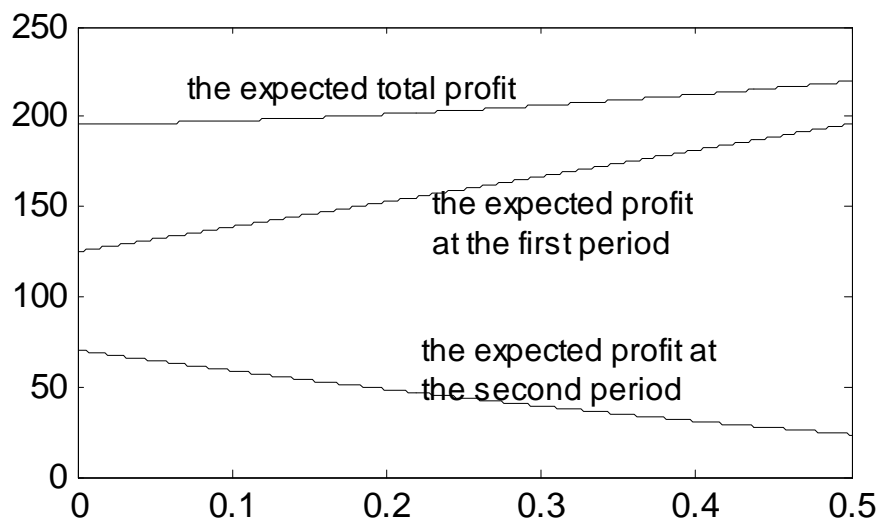


Figure 3 the total expected profit against λ_1

3) The expected profit against the proportion of counter-conformity consumers λ_1

Seller's profits are influenced by the proportion of counter-conformity consumers all the time period, as shown in figure 3. Counter-conformity consumers in order to satisfy the needs of the individual character will purchase even though the price is beyond the rational reservation value. Due to the increase of this kind of consumers, the gross profit and profit at the first period will increase as well. In the second stage, the whole consumers who stay in the market is less than before, and unique consumption idea makes counter-conformity consumption consumers give up buying opportunities irrationally. So the second stage's profit will greatly decline with the proportion of counter-conformity consumers increasing. Therefore, consumers' conformity characteristic will greatly affect the sales and profit, while the extant researches keep the view that the gross profit will decrease gradually. Through the conclusion we make, sellers may not maximize their profit without considering conformity characteristic, which inevitably causes the market prediction deviate from the actual situation to a certain extent.

5. MODEL EXTENSION

Pricing strategy is always influenced by several parameters, including the proportion of strategic consumers and discount rate, which have mutual effect with other parameters. We set $\lambda_3 = 0.5, \Delta = 0.1, N = 1000$ to analyze the effect of the discount rate, the proportion of conformity consumers and impatient consumers on the total profit:

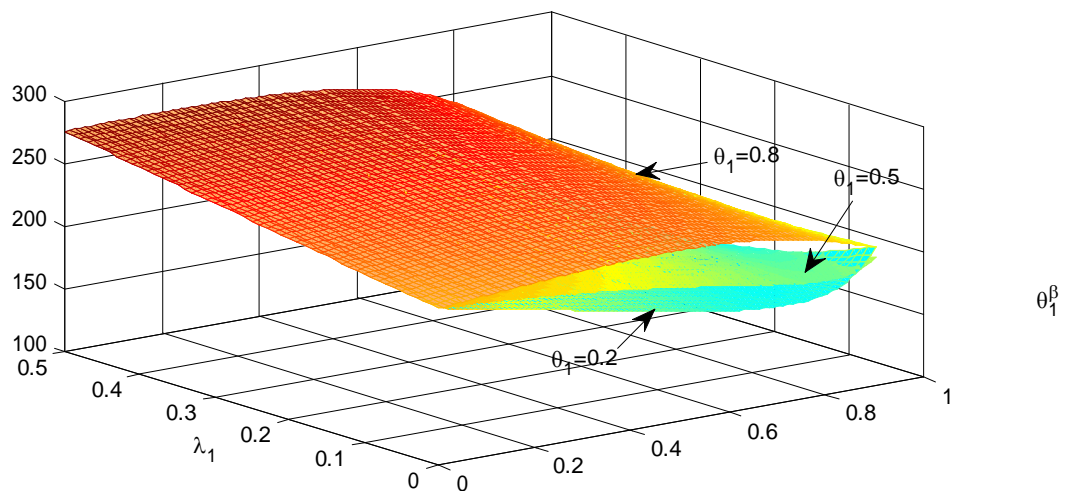


Figure 4 the total profit against parameters θ_1 , γ and λ_1

Figure 4 displays the proportion of impatient consumers, the discount rate and the proportion of counter-conformity consumers will work together to affect the total sales. As we can see from the graph, when the discount rate is not very high, the increase of the proportion of impatient consumers and counter-conformity consumers will result in the increase of total sales. Generally speaking, impatient consumers who only consider the current profits, unable to predict the price trend, would immediately buy goods that can produce consumer surplus. With the increase of the proportion of the counter-conformity consumers, more products at high price will be consumed and profit goes up. When the strategic consumers take up the market, they may delay

purchasing behavior for maximize their utility. If the discount rate is high enough, waiting is an effective strategy for consumers with less risk, which will lead to a lower profit for sellers. However, from the figure 4 we can also see the profit will increase at certain extent when the proportion of impatient consumers decreases and the proportion of conformity consumers increases. The reason why this condition occurs is that the willingness of purchasing is enhanced for more conformity consumers converge on the second period. Meanwhile, sellers have no intention to reduce the price at the second period, which lets a fraction of consumers to flow into the first period. Though the profit declines at the first period, total profit increases for the profit at the second period offset the previous loss, which we can see from the figure 5. As for extant studies, consumers' waiting characteristics influence consumers' behavior and the profit in a single direction. In fact, due to many factors existing in the process of work out purchasing strategy, including conformity and patience characteristic, the profit is not just fall or rise in such a simple way. Therefore, the manufacturer must consider the characteristics of the consumers in a deep-going way, so as to make more reasonable pricing strategy and improve total profit.

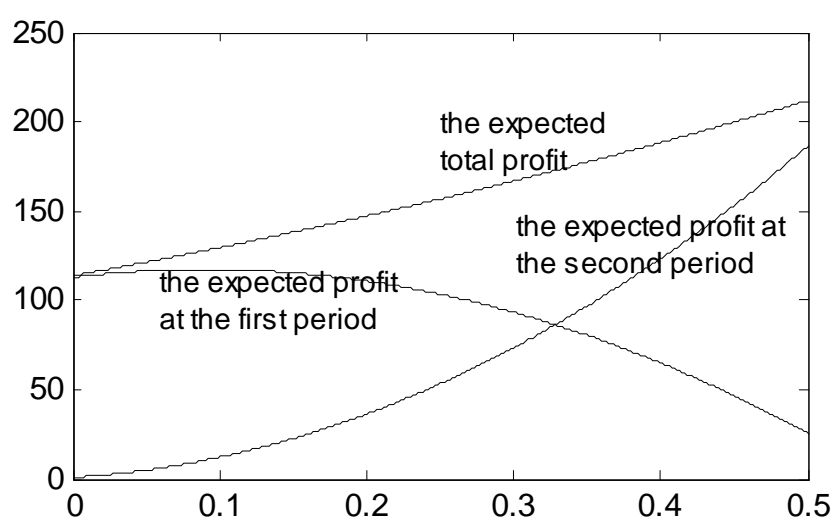


Figure 5 total sales against λ_2

6. CONCLUSION

Network platform provides the ideal pricing condition for sellers, and offers more information about the commodities for consumers timely. However, more irrational factors will affect the sellers' pricing strategy and profitability, making dynamic pricing even more complicated. So it is urgent to actualize the abstract irrational factors. This paper divides the consumer population into six types along two dimensions: they may have an inclination towards the obedience of the public and different degrees of patience. After introducing price deviation variable referring to the deviation of consumers' rational behavior, this paper suggests that the markdown degree, the expected purchasing amount of consumers and the expected profits of the firm are increasing with the increase of the proportion of counter-conformity consumers. And we also examine whether the discount rate of capital, counter-conformity consumers and myopic consumers will have an impact on the sales. In particular, when the discount rate and the proportion of the conformity consumers are too high, the expected profits of the firm are increasing mildly with the increase of the proportion of myopic consumers. Therefore, the discount rate and characteristics of consumer behavior should be considered together to maximize the revenue of firms. The conclusions may have certain significance for pricing, and to maximize the profit,

sellers should take the rational and irrational characteristics into consideration together.

Though the pricing model we build is well-considered about the counter-conformity, non-conformity and conformity of consumers, other irrational factors will still affect the sellers' pricing strategy, and the most difficult question is how to qualify the abstract factors, which can be a further research. We assumed that the consumers arrive at the same time, the aggregate consumers during the selling season remain unchanged with amply supplement. Further researches can relax the conditions, for instance, the arrival of consumers can be a continuous process (the Poisson distribution), and the supply is limited, products may be out of stock in the second stage.

ACKNOWLEDGEMENT

This research was supported by the National Natural Science Foundation of China under Grant 71210003, 70921001 and the key project of China in philosophy and social science of Education Department 10JZD0020. The author thanks Liu Yongmei, Zhou Yanju and Yang Li for several helpful discussions. The author also thanks the innovative group participants at Central South University for their thoughtful comments.

REFERENCES

- [1] M V Marn, R L Rosiello.(1992). Managing price, gaining profit[J]. Harvard Business Review, 70(5): 84~93
- [2] W L Baker et al.(2001). Getting prices right on the Web[J]. The McKinsey Quarterly\, Special Edition 2:54~63
- [3] Kadet, Anne.(2004). The price is right[J]. Smart Money, 13(12): 90~94
- [4] Lazear, E P.(1986) Retail pricing and clearance sales[J]. American Economics Review, 76(1): 14~32
- [5] Su Xuanming. (2007)Intertemporal pricing with strategic customer behavior[J]. Management Science,53(5): 726~741
- [6] McWilliams, Gary. (2004). Analyzing customers, best buy decides not all are welcome[J]. Wall Street Journal, 244(91):1~8
- [7] Mark J Zbaracki et al.(2004) Managerial and customer costs of price adjustment: Direct evidence from industrial markets[J]. The Review of Economics and Statistics, 86 (2): 514~533
- [8] Coase R H. (1972).Durability and monopoly[J]. Journal of Law and Economics, 15(1):143~149
- [9] Yang Hui, Zhou Jing, Song Huaming.(2010).A Dynamic Pricing Model with Strategic and Myopic Consumers[J]. Journal of Industrial Engineering and Engineering Management, 24(4): 133~137 (In Chinese)
- [10] Liu Xiaofeng, Xu Xianhao. (2011). The Study of Pricing Mechanism For Short Life Cycle Product Under Strategic Consumer Behavior[J]. Chinese Journal of Management Science,,19(4): 152~158 (In Chinese)
- [11] Moorthy K. (1988) Consumer expectations and the pricing of durables [M]. Lexington: Lexington Books, 15~23
- [12] Bensanko D,Winston W L. (1990). Optimal price skimming by a monopolist facing rational consumers[J]. Management Science, 36(5): 555~567
- [13] Liu Y. (2006). Word of mouth for movies: Its dynamics and impact on box office revenue[J]. Journal of Marketing, 70(3): 74~89
- [14] W Duan, B Gu, A B Whinston. (2008). The dynamics of online word-of-mouth and product sales—An empirical investigation of the movie industry[J]. Journal of Retailing, 84(2): 233~242
- [15]Baron R A, Byrne D. (2004). Social Psychology (the Tenth Edition)[M],Shanghai: Huangdong Normal School Press , 445~495 (In Chinese)
- [16] Dai Qi, Hu Pei, Zhou Tingrui. (2007). Empirical study of non-conformity and counter-conformity of consumer behavior

influenced by references groups[J]. *Consumer Economics*,23(6):80~85.(In Chinese)

[17] Silverstein M J, Butman J, Klara R. (2006).A Field Guide to the New Consumer[J]. *Brandweek*, 47(18): 28~30

[18] Lascu, D N, Zinkhan, G.(1999). Consumer Confority: Review and Applications for Marketing Theory and Practise[J]. *Journal of Marketing theory and practice*, 7(3):1~12

[19] Hornsey M J, Majkut L, Terry DJ, McKimmie BM. (2003). On being loud and proud: non-conformity and counter-conformity to group norms[J]. *British Journal of Social Psychology*, 42(3): 319~335