Pricing Strategies of Supply Chain with Dual-Channel Retailer and Information Asymmetry

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Abstract. The equilibrium pricing strategies of supply chain with dual-channel retailer and information asymmetry are studied. The results show that information sharing is always beneficial to retailers, and the value of information sharing is always non-negative. But there are conditions under which manufacturers can share information.

1. Introduction

Nowadays, under overwhelming pressures brought by the E-commerce which is under dramatically increasing, many traditional retailers have to open up the online channel to satisfy wandering customer tastes and gain new competitive advantages. Therefore, pricing strategies of supply chain with dual-channel retailers have becoming a research hotspot in the field of supply chain management. Zhang et al[1] studied retailers' decision about channel structure and pricing strategy. Xu and Chen[2] studied the pricing strategy of a supplier-dominated supply chain with retailer's dual-channel, and proposed a two-part linear contract. Chen et al[3] adopted a two-stage game model to explore the retailer's two-channel pricing strategy.

Due to interest conflicts, industry barriers and decision-making independence, information asymmetry extensively exists among supply chain members, and this always make the pricing strategies of supply chain more unpredictable and complicated. The members with sufficient information usually occupy a favorable position, while the members with poor information usually occupy an unfavorable position. Wang et al[4] studied the pricing strategies of dual-channel supply chain with risk-averse and information-asymmetric manufacturers and retailers. When the retailer's recycling cost is private information, Zhang et al[5] studied the pricing strategies of closed-loop supply chain with recycling dual-channel.

Generally speaking, a supply chain can be understood as a decentralized system composed of independent decision-makers in a common market environment. Independent decision-makers rely on the information of market demand which are not completely and fully shared among these decision-makers. Therefore, our paper studies pricing strategies of supply chain with dual-channel retailer and information asymmetry. Section 2 proposes the supply chain model. Section 3 obtains the equilibrium results. Section 4 conducts the comparative analysis on the equilibrium prices. Section 5 conducts comparative analysis on the equilibrium payoffs. Section 6 concludes our paper.

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2. Assumptions and modelling

2.1 Basic assumptions

The supply chain with dual-channel retailer and information asymmetry is shown in Figure 1. And some parameters are shown in Table 1.

The retailer buys commodities from the manufacturer and sell these commodities through the offline and online channels to the demand market. The interactions between the manufacturer and the retailer is assumed to be described as a two-stage Stackelberg game, as follows:

Stage 1. *The retailer announces prices which are paid by the demand market. The offline (traditional channel) retail price is denoted by* p_r *and the online (internet channel) retail price is denoted by* p_e.

Stage 2. *Based on dual-channel prices announced by the retailer, the manufacturer announces the wholesale price of his products. The wholesale price a unit product is denoted by* ω. *The cost of a unit product is denoted by* c.

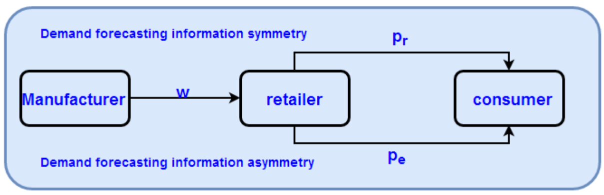

Figure 1. The retailer dual-channel supply chain model

Let a denote the product's potential market demand. And, we assume that $a=\overline{a}+\varepsilon$, where $\overline{a}$ denotes the expected value and $\varepsilon \sim N\left(0,\sigma_0^2\right)$ denotes the uncertainty. The manufacturer and the retailer independently forecast the product's potential market demand. The potential market demand forecasted by the manufacturer is denoted by a_m and by the retailer is denoted by a_r. And, the error of the manufacturer demand forecast is denoted by ε_m and by the retailer is denoted by ε_r. We assume that both are independent of $\overline{a}$. So, $a_m = \overline{a} + \varepsilon_m$ and $a_r = \overline{a} + \varepsilon_r$. And, we assume that ε_m and ε_r are correlated with each other. Then, the manufacturer's and retailer's market forecasting are subject to a bivariate normal correlation distribution with expected value $\overline{a}$ and covariance matrix $\Sigma = \begin{pmatrix} \sigma_m^2 & \rho\sigma_m\sigma_r \\ \rho\sigma_m\sigma_r & \sigma_r^2 \end{pmatrix}$.The product's market demand is assumed to decrease with its price. And the demand functions of the offline channel and the online channel are respectively described as follows:

$$D_r = \theta a - \alpha p_r + \beta(p_e - p_r)$$

$$D_e = (1-\theta)a - \alpha p_e + \beta(p_r - p_e)$$

where, θ denotes the offline channel's market share, α denotes the price elasticity of one single retail channel, β denotes the price elasticity across two retail channels ,and $0 < \beta < \alpha < 1$.

Table 1. Parameters

Parameters	Definitions
c	The unit production cost born by the manufacturer.
ω	The wholesale price charged by the manufacturer.
p_r	The off-line price paid by the customer to the retailer.
p_e	The on-line price paid by the customer to the retailer.
a	The whole potential market space.
θ	The offline channel's market share.
α	The price elasticity of one single retail channel.
β	The price elasticity across two retail channels.
D_r	The offline channel's market demand.
D_e	The online channel's market demand.

2.2 Demand forecasting information structure

According to the lemma in Li[6] and the consensus model in Winkler[7], if θ is a random variable, whose mean is μ_i and variance is σ^2. And the variance of the observed sample is σ_i^2. Therefore, it can be inferred that the information accuracy under the prediction condition is

$$k = \frac{\frac{1}{E\left[Var(\mu_i \mid \theta)\right]}}{\frac{1}{Var(\theta)}} = \frac{\frac{1}{\sigma_i^2}}{\frac{1}{\sigma^2}} = \frac{Var(\theta)}{E\left[Var(\mu_i \mid \theta)\right]} = \frac{\sigma^2}{\sigma_i^2} \tag{1}$$

Based on Equ. (1) and combined with above assumptions, it can be known that the demand forecasting accuracy of the retailer's dual-channel supply chain model is respectively

$$k_0 = 1$$

$$k_1 = \frac{\frac{1}{E\left[Var(a_m \mid a)\right]}}{\frac{1}{Var(a)}} = \frac{\sigma_0^2\left(\sigma_r^2 - \rho\sigma_m\sigma_r\right)}{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2}$$

$$k_2 = \frac{\frac{1}{E\left[Var(a_r \mid a)\right]}}{\frac{1}{Var(a)}} = \frac{\sigma_0^2\left(\sigma_m^2 - \rho\sigma_m\sigma_r\right)}{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2}$$

(I) If the manufacturer and retailer decide to share demand forecasting information, that is to say, if the information is symmetric, then the demand of each member can be modified to

$$\begin{aligned} E(a \mid a_m, a_r) &= \frac{k_0}{k_0+k_1+k_2}\overline{a} + \frac{k_1}{k_0+k_1+k_2}a_m + \frac{k_2}{k_0+k_1+k_2}a_r \\ &= \frac{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2}{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2 + \sigma^2\left(\sigma_m^2+\sigma_r^2-2\rho\sigma_m\sigma_r\right)}\bullet\overline{a} \\ &+ \frac{\sigma_0^2(\sigma_r^2-\rho\sigma_m\sigma_r)}{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2 + \sigma^2\left(\sigma_m^2+\sigma_r^2-2\rho\sigma_m\sigma_r\right)}\bullet a_m \\ &+ \frac{\sigma_0^2(\sigma_m^2-\rho\sigma_m\sigma_r)}{\left(1-\rho^2\right)\sigma_m^2\sigma_r^2 + \sigma^2\left(\sigma_m^2+\sigma_r^2-2\rho\sigma_m\sigma_r\right)}\bullet a_r \end{aligned} \tag{2}$$

(II) If the manufacturer and retailer choose to hide the demand forecast information, that is to say, if the information is asymmetric, the demand of retailer can be modified to

$$E(a \mid a_r) = \frac{\sigma_r^2}{\sigma_r^2+\sigma_0^2}\overline{a} + \frac{\sigma_0^2}{\sigma_r^2+\sigma_0^2}a_r$$

Since the manufacturer makes price decision after the retailer, the retailer can only predict the manufacturer's demand based on its own demand. From the perspective of the retailer, the manufacturer's demand can be modified to

$$\begin{aligned} &E\left[a \mid E(a_m \mid a_r), a_r\right] \\ &= \frac{k_0}{k_0+k_1+k_2}\overline{a} + \frac{k_1}{k_0+k_1+k_2}\left[\frac{k_0}{k_0+k_2}\overline{a} + \frac{k_2}{k_0+k_2}a_r\right] + \frac{k_2}{k_0+k_1+k_2}a_r \\ &= \frac{\sigma^2}{\sigma^2+2\sigma_0^2}\overline{a} + \frac{\sigma_0^2}{\sigma^2+2\sigma_0^2}\left(\frac{\sigma^2}{\sigma^2+\sigma_0^2}\overline{a} + \frac{\sigma_0^2}{\sigma^2+\sigma_0^2}a_r\right) + \frac{\sigma_0^2}{\sigma^2+2\sigma_0^2}a_r \\ &= \left[\frac{\sigma^2}{\sigma^2+2\sigma_0^2} + \frac{\sigma_0^2\sigma^2}{(\sigma^2+2\sigma_0^2)(\sigma^2+\sigma_0^2)}\right]\overline{a} \\ &+ \left[\frac{\sigma_0^4}{(\sigma^2+2\sigma_0^2)(\sigma^2+\sigma_0^2)} + \frac{\sigma_0^2}{\sigma^2+2\sigma_0^2}\right]a_r \\ &= E\left[a \mid a_r\right] \end{aligned}$$

From the perspective of the manufacturer, the information leakage effect allows the manufacturer to infer the demand forecast information based on the prices announced by the retailer, and the demand of manufacturer can be modified to Equ. (2).

3. Equilibriums

We solve the two-stage Stackelberg game by the backward induction.

3.1 The information symmetry case

Under the mode of complete information sharing, the manufacturer and the retailer share the forecasting information of market demand, and both sides make price decisions based on the combination of the forecasting information. Then the expected payoffs of the manufacturer and the retailer are respectively described as follows:

$$\begin{aligned} & E\left(\Pi_m \mid a_m, a_r\right) \\ & =(\omega-c)\left(D_r+D_e\right) \\ & =(\omega-c)\left[E\left(a \mid a_m, a_r\right)-\alpha\left(p_r+p_e\right)\right] \end{aligned} \quad (3)$$

$$\begin{aligned} & E\left(\Pi_r \mid a_m, a_r\right) \\ & =\left(p_r-\omega\right)\left[\theta E\left(a \mid a_m, a_r\right)-\alpha p_r+\beta\left(p_e-p_r\right)\right] \\ & +\left(p_e-\omega\right)\left[(1-\theta) E\left(a \mid a_m, a_r\right)-\alpha p_e+\beta\left(p_r-p_e\right)\right] \end{aligned} \quad (4)$$

3.1.1 Stage 2: The Manufacturer's Decision

Considering the first order condition of Equ. (3), we get the manufacturer's optimal price reaction function:

$$\frac{\partial E\left(\Pi_m \mid a_m, a_r\right)}{\partial \omega}=E\left(a \mid a_m, a_r\right)-\alpha\left(2 \omega+\Delta\omega_r+\Delta\omega_e\right)+(\omega-c)(-2 \alpha)=0$$

$$\omega=\frac{E\left(a \mid a_m, a_r\right)}{4 \alpha}+\frac{c}{2}-\frac{\Delta\omega_r+\Delta\omega_e}{4} \quad (5)$$

3.1.2 Stage 1: The Retailer's Decision

By substituting Equ. (5) into the retailer's expected profit function (4), we get

$$\begin{aligned} & E\left(\Pi_r \mid a_m, a_r\right) \\ & =\Delta\omega_r\left[\theta E\left(a \mid a_m, a_r\right)-\alpha\left(\frac{E\left(a \mid a_m, a_r\right)}{4 \alpha}+\frac{c}{2}+\frac{3 \Delta\omega_r}{4}-\frac{\Delta\omega_e}{4}\right)+\beta\left(\Delta\omega_e-\Delta\omega_r\right)\right] \\ & +\Delta\omega_e\left[(1-\theta) E\left(a \mid a_m, a_r\right)-\alpha\left(\frac{E\left(a \mid a_m, a_r\right)}{4 \alpha}+\frac{c}{2}+\frac{3 \Delta\omega_e}{4}-\frac{\Delta\omega_r}{4}\right)+\beta\left(\Delta\omega_r-\Delta\omega_e\right)\right] \end{aligned}$$

Considering the first order condition of the above equation, we get equilibrium solutions:

$$\omega^*=\frac{E\left(a \mid a_m, a_r\right)}{8 \alpha}+\frac{3 c}{4} \quad (6)$$

$$p_r^*=\frac{3 E\left(a \mid a_m, a_r\right)}{8 \alpha}+\frac{(2 \theta-1) E\left(a \mid a_m, a_r\right)}{4 \alpha+8 \beta}+\frac{c}{4} \quad (7)$$

$$p_e^*=\frac{3 E\left(a \mid a_m, a_r\right)}{8 \alpha}-\frac{(2 \theta-1) E\left(a \mid a_m, a_r\right)}{4 \alpha+8 \beta}+\frac{c}{4} \quad (8)$$

$$E(\Pi_m^*)=\frac{E\left(a \mid a_m, a_r\right)^2}{32 \alpha}+\frac{c^2 \alpha}{8}-\frac{E\left(a \mid a_m, a_r\right) c}{8} \quad (9)$$

$$\begin{aligned} E(\Pi_r^*)= & \left(\frac{\theta E\left(a \mid a_m, a_r\right)}{2}-\frac{E\left(a \mid a_m, a_r\right)}{8}-\frac{c \alpha}{4}\right) \\ & \bullet\left[\frac{E\left(a \mid a_m, a_r\right)}{4 \alpha}-\frac{c}{2}+\frac{(2 \theta-1) E\left(a \mid a_m, a_r\right)}{4 \alpha+8 \beta}\right] \\ & +\left(\frac{3 E\left(a \mid a_m, a_r\right)}{8}-\frac{\theta E\left(a \mid a_m, a_r\right)}{2}-\frac{c \alpha}{4}\right) \\ & \bullet\left[\frac{E\left(a \mid a_m, a_r\right)}{4 \alpha}-\frac{c}{2}-\frac{(2 \theta-1) E\left(a \mid a_m, a_r\right)}{4 \alpha+8 \beta}\right] \end{aligned} \quad (10)$$

3.2 The information asymmetry case

In the information asymmetry case, both the manufacturer and the retailer choose not to share market demand forecasting information with each other.

Now, from the retailer's perspective, the expected payoffs of the manufacturer and the retailer are respectively described as follows:

$$\begin{aligned} & E\left(\Pi_m \mid E\left[a \mid E(a_m \mid a_r), a_r\right]\right)=E\left(\Pi_m \mid a_r\right) \\ & =(\omega-c)\left(D_r+D_e\right)=(\omega-c)\left[E\left(a \mid a_r\right)-\alpha\left(p_r+p_e\right)\right] \end{aligned} \quad (11)$$

$$\begin{aligned} & E\left(\Pi_r \mid a_r\right)=\left(p_r-\omega\right)\left[\theta E(a \mid a_r)-\alpha p_r+\beta(p_e-p_r)\right] \\ & +\left(p_e-\omega\right)\left[(1-\theta) E(a \mid a_r)-\alpha p_e+\beta(p_r-p_e)\right] \end{aligned} \quad (12)$$

From the manufacturer 's perspective ,the expected payoffs of the manufacturer and the retailer are respectively described as follow

$$\begin{aligned} & E\left(\Pi_m \mid a_m, a_r\right)=(\omega-c)\left(D_r+D_e\right) \\ & =(\omega-c)\left[E\left(a \mid a_m, a_r\right)-\alpha\left(p_r+p_e\right)\right] \end{aligned} \quad (13)$$

$$\begin{aligned} & E\left(\Pi_r \mid a_r\right)=\left(p_r-\omega\right)\left[\theta E(a \mid a_r)-\alpha p_r+\beta(p_e-p_r)\right] \\ & +\left(p_e-\omega\right)\left[(1-\theta) E(a \mid a_r)-\alpha p_e+\beta(p_r-p_e)\right] \end{aligned} \quad (14)$$

The solving process is similar as section 3.1, and the equilibrium results can be obtained as follows:

$$\omega^*=\frac{3 E\left(a \mid a_m, a_r\right)}{8 \alpha}-\frac{E\left(a \mid a_r\right)}{4 \alpha}+\frac{3}{4} c \quad (15)$$

$$p_r^*=\frac{3 E\left(a \mid a_r\right)}{8 \alpha}+\frac{(2 \theta-1) E\left(a \mid a_r\right)}{4 \alpha+8 \beta}+\frac{c}{4} \quad (16)$$

$$p_e^*=\frac{3 E\left(a \mid a_r\right)}{8 \alpha}-\frac{(2 \theta-1) E\left(a \mid a_r\right)}{4 \alpha+8 \beta}+\frac{c}{4} \quad (17)$$

$$\begin{aligned} E(\Pi_m^*)= & \frac{3 E\left(a \mid a_m, a_r\right)^2}{8 \alpha}+\frac{3 E(a \mid a_r)^2}{16 \alpha}+\frac{\alpha c^2}{8} \\ & -\frac{17 E\left(a \mid a_m, a_r\right) \bullet E\left(a \mid a_r\right)}{32 \alpha}-\frac{7 c \bullet E\left(a \mid a_m, a_r\right)}{16}+\frac{5 c E\left(a \mid a_r\right)}{16} \end{aligned} \quad (18)$$

$$\begin{aligned} E(\Pi_r^*)= & \left[\frac{5 E(a \mid a_r)}{8 \alpha}-\frac{3 E\left(a \mid a_m, a_r\right)}{8 \alpha}-\frac{c}{2}+\frac{(2 \theta-1) E(a \mid a_r)}{4(\alpha+2 \beta)}\right] \\ & \bullet\left(\frac{\theta E(a \mid a_r)}{2}-\frac{E(a \mid a_r)}{8}-\frac{c \alpha}{4}\right) \\ & +\left[\frac{5 E(a \mid a_r)}{8 \alpha}-\frac{3 E\left(a \mid a_m, a_r\right)}{8 \alpha}-\frac{c}{2}-\frac{(2 \theta-1) E(a \mid a_r)}{4(\alpha+2 \beta)}\right] \\ & \bullet\left(\frac{3 E(a \mid a_r)}{8}-\frac{\theta E(a \mid a_r)}{2}-\frac{c \alpha}{4}\right) \end{aligned} \quad (19)$$

4. Comparative analysis on the equilibrium prices

Based on Equ. (6)-(8), we get the following proposition:

Proposition 1:

$$\frac{\partial \omega^*}{\partial a_r}>0, \frac{\partial \omega^*}{\partial a_m}>0 ; \frac{\partial p_r{}^*}{\partial a_r}>0, \frac{\partial p_r{}^*}{\partial a_m}>0 ; \frac{\partial p_e{}^*}{\partial a_r}>0, \frac{\partial p_e{}^*}{\partial a_m}>0 \cdot$$

Proposition 1 shows that under the information symmetry case, the optimal wholesale price, the optimal online channel price and the optimal offline channel price increases with the increase of manufacturer's demand forecast and retailer's demand forecast. When the market demand is forecasted to increase, the increase of wholesale price is beneficial to the manufacturer, but because of the increase of price between channels, it harms the interests of consumers and will be adverse to retailers.

Based on Equ. (15)-(17), we get the following proposition:

Proposition 2: $\frac{\partial \omega^*}{\partial a_m} > 0$; $\frac{\partial \omega^*}{\partial a_r} > 0$; $\frac{\partial p_r^*}{\partial a_r} > 0$; $\frac{\partial p_e^*}{\partial a_r} > 0$.

From Proposition 2, we can discover that under the information asymmetry case, the optimal wholesale price will increase with the increase of manufacturer's demand forecast and retailer's demand forecast, and retailer's price will increase with the increase of the retailer's demand forecast. When the market demand forecast is increasing, corresponding price will be higher.

Based on Proposition 1 and Proposition 2, we focus on comparing the pricing strategies under information symmetry and asymmetry case. Since the basic assumptions and profit functions under the above model are the same, the only different factor among them is the market demand forecast information of their own. Obviously, the influence of demand information asymmetry often lead to the manufacturer and the retailer to make different pricing decisions. From the model, we can know that the retailer will leak information firstly, so the manufacturer have benefited from that. With comparative analysis, we get the following propositions.

Proposition 3: *Under the information symmetry case, the optimal price of manufacturer and retailer is only affected by the demand forecast adjusted by both parties. Under the information* asymmetry *case, the price strategy is affected not only by the forecast adjusted by both parties, but also by the retailer's own modified demand forecast*.

Proposition 4: *It is beneficial for the retailer to share effective information between the retailer and the manufacturer, and the value of information sharing that the retailer obtains is always non-negative*.

Proposition 5: *The manufacturer is willing to share information with which only satisfies*

$$\left[E(a \mid a_m, a_r) - E(a \mid a_r)\right] \bullet \left\{\frac{1}{32\alpha}\left[11E(a \mid a_m, a_r) - 6E(a \mid a_r)\right] - \frac{5c}{16}\right\} < 0$$

5. Comparative analysis on the equilibrium payoffs

In this section, we conduct comparative analysis on the equilibrium payoffs of the manufacturer and the retailer. Because the profit function contains many parameters and the direct analysis is very complex, this section decides to use MATLAB software to carry out numerical simulation analysis on the above model, so as to more intuitively analyze the variation tendency of equilibrium payoffs under the influence of related parameters from the figure

Based on the requirement of rationality, the parameters assigned in this section are as follows :

$$\alpha = 0.6, \beta = 0.2, \theta = 0.8, \rho = 0.2, c = 10, \bar{a} = 100,$$
$$\sigma_0^2 = 4, a_m = 180, \sigma_m^2 = 64, \ a_r = 150, \sigma_r^2 = 16$$

5.1 The impact of manufacturer's forecasting error on equilibrium payoffs

Assuming the manufacturer's demand forecasting error is $\sigma_m \in (5,25)$, figure 2 and figure 3 can be obtained, respectively representing the impact of the manufacturer's demand forecasting error on the equilibrium payoffs of the retailer and manufacturer.

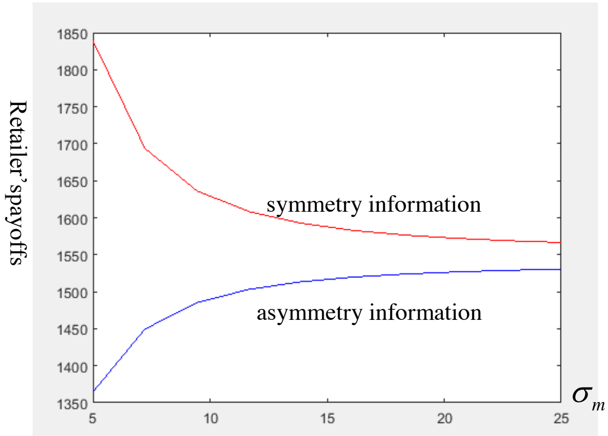

Figure 2. The impact of σ_m on retailer's equilibrium payoffs

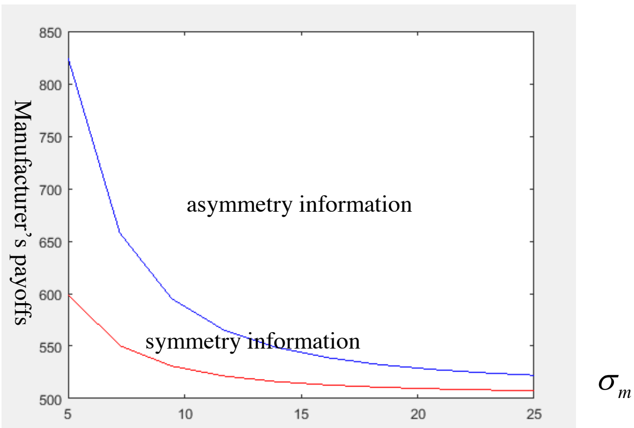

Figure 3. The impact of σ_m on manufacturer's equilibrium payoffs

It can be clearly observed from figure 2 that when the demand information is symmetry, the equilibrium payoffs of the retailer is always greater than that when the demand information is asymmetry, which also indicates that the information sharing is always a favorable behavior for the retailer. In the information symmetry case, with the increase of σ_m ,the retailer's equilibrium payoffs is getting smaller and smaller. In the information asymmetry case, the retailer's equilibrium payoffs increases with the increase of σ_m .When the manufacturer do not agree to share information, the retailer should be advised to choose the manufacturer with low predictive ability to cooperate.

Figure 3 illustrates that it is conditional for the manufacturer to share demand information. That is to say, the manufacturer may not benefit from sharing demand information with the retailer. According to the parameters assumed in this section, it is found that the equilibrium payoffs under the information asymmetry case is always greater than that under the information symmetry case. Meanwhile, it is indicated that improving the prediction ability and improving the prediction accuracy is the best way to improve the payoffs.

5.2 The impact of retailer's forecasting error on equilibrium payoffs

Assuming the manufacturer's demand forecasting error at this time is $\sigma_r \in (5,25)$, figure 4 and figure 5 can be obtained, respectively representing the impact of the retailer 's demand forecasting error on the equilibrium payoffs of the retailer and manufacturer.

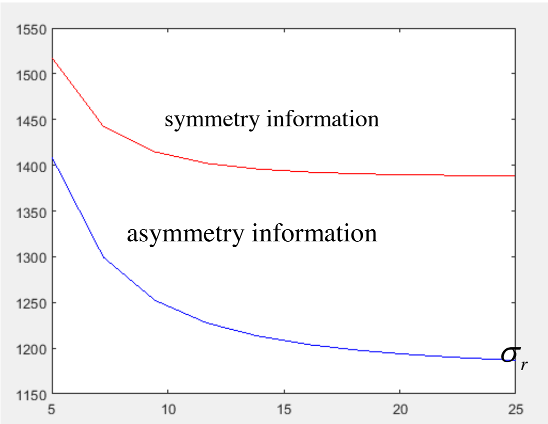

Figure 4. The impact of σ_r on retailer's equilibrium payoffs

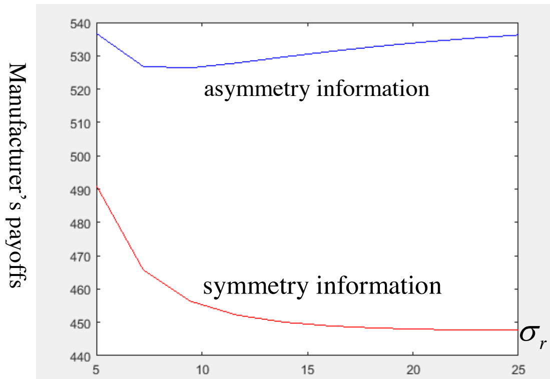

Figure 5. The impact of σ_r on manufacturer's equilibrium payoffs

Figure 4 shows that for the retailer, information sharing behavior is always beneficial. Under the information symmetry case and the information asymmetry case, the equilibrium payoffs of the retailer decreases with the increase of σ_r .That is to say, the greater the prediction error is, the lower the equilibrium payoffs of the retailer will be. This also highlights the importance of prediction ability.

Figure 5 still reflects that it is conditional for the manufacturer to share demand information it is conditional for the manufacturer to share demand information. When the condition of conclusion 5 is not met, the manufacturer's equilibrium payoffs will always be higher when the information is non-sharing.

5.3 The impact of correlation coefficient on equilibrium payoffs

As the data collected between the manufacturer and the retailer and the methods adopted are similar, the prediction information of the two have some overlaps, so there is a certain positive correlation. Assume $\rho \in (0,0.4)$, figure 6 and figure 7 can be obtained, respectively representing the impact of correlation coefficient on the equilibrium payoffs of the retailer and manufacturer.

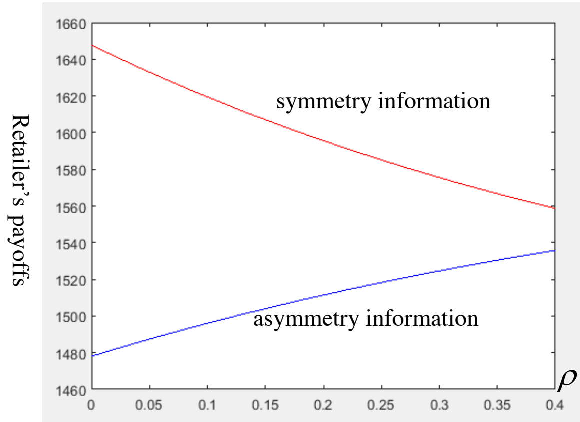

Figure 6. The impact of ρ on retailer's equilibrium payoffs

From figure 6 and figure 7, we can discover that under the information symmetry case, the stronger correlation between the manufacturer and the retailer's demand forecasting information is, the smaller the retailer's equilibrium payoffs will be, and the smaller the manufacturer's equilibrium payoffs will be. It can be shown that under the information asymmetry case, the stronger correlation makes the retailer's equilibrium payoffs increase.

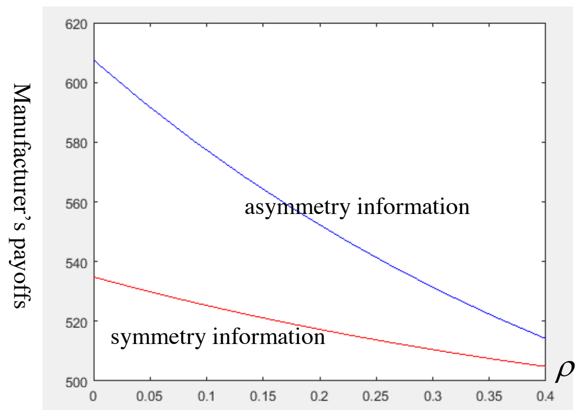

Figure 7. The impact of ρ on manufacturer's equilibrium payoffs

6. Conclusion

This paper studies the impact of information symmetry and asymmetry of demand forecasting on the pricing strategy of the two-channel supply chain with the retailer dominated. The results show that information sharing is always beneficial, and the value of information sharing is always non-negative for the retailer. But there is a condition whether the manufacturer is willing to share information. At the same time, on the basis of this research, this paper can continue to expand the scope of information asymmetry and further explore the angle of supply chain coordination.

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