**Appendix A: Proofs of Main Results**

***Proof of proposition 1***

Under SE strategy, we first solve the optimal product quantity decision of online retailer 1 according to backward induction. It is easy to verify that  where . It indicates there exists a unique optimal solution. Let , we have . Then we solve the experience service level decision of the offline showroom. We can verify , which indicates there exists a unique optimal solution. Let , we have .

Through the same steps, we have  and  under SI strategy.

Comparing the expected profits of the offline showroom between SE and SI strategies, we have,

 (A1)

From equation (A1), we havewhen  and when .

***Proof of proposition 2***

Substituting equation (14) into (16), possible profits of the offline showroom ,,  and  are obtained under AI strategy, and we have,

 (A2)

 (A3)

From equation (A2), we have . It is obvious that when  i.e., , or when  and , ; when  and , . Proof of proposition 2(1) is similar to that mentioned above.

***Proof of theorem 1***

We first solve the right side of equation (17), i.e. . It is easy to verify , which indicates there exists a unique optimal solution. Let , we have . Then we have equation (17) as. Solving the above inequality, we have when , profit of  type offline showroom obtained by delivering true demand information equals to that obtained by mimicking behaviour. It indicates that online retailer  regards offline base demand as  type when . Thus the unique belief structure of online retailer  in the separating equilibrium is,

 (A4)

Where .

***Proof of theorem 2***

Under AE strategy, the offline showroom has no incentive to mimic another type. Then proof of proposition 2(1) is similar to that mentioned in proof of proposition 1.

Under AI strategy, we first solve the optimal experience service level without constraints. We can verify  where . We know  is concave in , which indicates there exists a unique optimal solution. Let , we have .

When  and ,  type offline showroom has no incentive to mimic  type offline showroom. We have,

 (A5)

From equation (A5), we know the denominator of  is bigger than 0; and the numerator of  decreases in . When , ; when , if  then , if  then . Further, we have

Case 1: when , or when  and , . It indicates that  type offline showroom has no incentive to mimic  type offline showroom, then the optimal experience service level is  for ;

Case 2: when  and , . It indicates that  type offline showroom has the incentive to mimic  type offline showroom;

Case 3: when ,  type offline showroom has the incentive to mimic  type offline showroom.

Then we analyse the optimal experience service level in mimicking region. From equation (20), we have ;  when , and  when . Then we have the optimal experience service in mimicking region as  and  . Combining with the results in case 1, we have theorem 2.

***Proof of theorem 3***

It is easy to verify that  and  when , i.e.  when . Then we only need to prove the relationship between  and  when . We have,

 (A6)

Where , .

From equation (A6), we know , and

 (A7)

Where , , .

We can verify , which indicates that equation (A7) increases in . When , ; when , , where . According to , we have when , ; when , . Then due to the nature of the quadratic equation, we have when  or , ; otherwise, . Then we have theorem 3.

***Proof of proposition 3***

When , the offline showroom chooses the optimal channel cooperation strategy between AE and AIN strategies. Comparing the expected profits of the offline showroom between these strategies, we have,

 (A8)

From equation (A8), we have  when ;  when .

When , the offline showroom chooses the optimal channel cooperation strategy between AE and AID strategies. First, it is easy to verify that  when . Then we only need to analyse the optimal channel cooperation strategy choice between AE and AID strategies when , and we have,

 (A9)

Where .

Form equation (A9), we know . If  then ; if , we need to verify the sign of , which is similar to that mentioned in theorem 3.

***Proof of proposition 4***

When AIN strategy is the optimal channel cooperation strategy of the offline showroom, the impact of competition on the existing online retailer is easy to obtain. When AID strategy is the optimal channel cooperation strategy of the offline showroom, we have

 (A10)

Where , .

It is easy to verify , then . The proof of the sign of  is similar to that mentioned in theorem 3.

***Proof of proposition 5***

It is easy to get proposition 5 by letting profits of supply chain members under asymmetric information minus these under symmetric information.

**Appendix B: Intuitive criterion and elimination of the pooling equilibrium**

We use intuitive criterion (Cho and Kreps 1987) to refine multiple equilibriums in our model. Intuitive criterion eliminates the unreasonable equilibrium by eliminating the unbelievable posterior belief of a specific off-equilibrium strategy. In our model, the offline showroom has no incentive to mimic under AE strategy, so we focus on elimination of the pooling equilibrium under AI strategy.

In the pooling equilibrium, online retailer  does not know the true base demand type of the offline showroom. Then online retailer  makes a decision based on the prior probability of offline base demand. Let  denote profit of  type offline showroom in the pooling equilibrium, then

,  (B1)

Let  denote profit of  type offline showroom when online retailer  believes the offline showroom is  type after observing experience service level  in the separating equilibrium, then

,  (B2)

Now, suppose that there exists a pooling equilibrium in which the offline showroom provides  for each base demand type. Then we can always find  which satisfies , and

 (B3)

 (B4)

Substituting  and  into  and , we have

 (B5)

 (B6)

Where  and .

From equations (B3)-(B6), we have

 (B7)

 (B8)

Due to  and , we have

 (B9)

Further, we have

 (B10)

Based on the proof mentioned above, we will always find , where  is small enough such that  type offline showroom has the incentive to deviate from  to , and  type offline showroom has no incentive to deviate from , i.e.

 (B11)

 (B12)

Therefore the pooling equilibrium cannot survive the intuitive criterion.