逆向拍卖保留价建模及数值分析

徐雅卿1, 魏轶华2, 胡奇英2

(1. 西安电子科技大学 经济管理学院，陕西 西安 710071;2. 上海大学 国际工商与管理学院，上海 201800)

摘要　　以著名逆向拍卖网站Priceline为背景，研究在顾客到达为时依强度的泊松过程的条件下，卖方如何动态调整其保留价使其期望收益最大．利用逆向拍卖和收益管理的相似性及逆向拍卖的交易价格是顾客报价的特性，对卖方期望收益建立了最优控制模型，得到如下最优策略的性质：1）最大期望收益函数的单调性及凹性;2）边际期望收益函数的单调性;3）最优价格的凹性．数值分析结果验证了理论分析的正确性，且表明相对于收益管理，顾客报价越接近估价，Priceline的优势越明显．

关键词　　网上拍卖　逆向拍卖　最优控制　收益管理　Priceline

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Modeling and numerical analysis on the reserve price of reverse auction

XU Ya-qing1,WEI Yi-hua2,HU Qi-ying2

(1. School of Economics & Management, Xidian Univ., Xi'an 710071， China; 2. College of Business & Management, Shanghai Univ., Shanghai 201800， China)

Abstract

Based on the famous reverse auction website Priceline, this paper studies a problem of how to dynamically set reserve prices for some goods of the seller in a period of continuous time when customers arrive at Priceline one after another according to a non-stationary Poisson process, so that the seller can gain a maximal expected revenue. With the comparability of both revenue management and reverse auction, and the uniqueness of reverse auction, the optimal control model of the expected revenue for sellers is set up, and the following properties are obtained: 1) the concavity and monotonicity of the maximal expected revenue function, 2) the monotonicity of the marginal expected revenue function, and 3) the concavity of the optimal price. The results of numerical analysis are consistent with theoretical ones. It is also illustrated that the closer the bidding price is to the valuation, the more dominant Priceline will be to revenue management.

Key words　on-line auctions　reverse auctions　optimal control　revenue management　Priceline

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