

Logistic regression in sealed-bid auctions with multiple rounds: Application in Korean court auction

Cook-hwan Kim, Woojin Chang*

Department of Industrial Engineering, Seoul National University, Republic of Korea

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ABSTRACT

This paper proposes a forecasting method for court auction information system using logistic regression model with heterogeneity across the multiple round. The goal is to predict whether an individual auction item in a certain round will be sold or not. A simple linear regression and the least angle regression (LARS) containing random effect terms were used to select meaningful variables for our logit model. The link function of the proposed logit model is represented by two bundles of parameters. The former part consists of the parameters whose values do not change over rounds. The latter part has parameters whose values interact with rounds. The observed data corresponding to an appraiser price as well as an intercept term reflecting local characteristics are used without any change. Data that corresponds to all the other parameters is not directly used, but transformed based on similarities between the original item and the surrounding auction items being recommended by the court auction experts. We tested the Bayesian logistic regression by establishing different priors: Dunson's prior, Gelman's prior and Ansari's prior. Dunson's prior was found to perform the best. Little significant difference was found between the results of the other two priors. These findings indicate that logistic regression taking the heterogeneity of multi-round into account performs better than a one-layered neural network over all time periods.

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1. Introduction

Real estate auction market is one of the important markets in the capitalistic system. Despite of its importance, little research has been conducted on Korean court auction compared to researches on financial markets. Before 31 May 1993, Korean court auction had been operated in such a way that bidding applicants compete each other by orally asking their desired prices. As the oral based auction method was changed into the one that people should write a bidding price, more people started to show their interest in court auction. After Korean government seeking the IMF rescue package due to the foreign exchange crisis, overall price of real estate declined heavily and a number of Korean firms entered bankruptcy. As a consequence, the number of real properties took over by court auction was rapidly increased. On the contrary, increasing number of people accumulated wealth by taking advantage of it.

Due to chronic housing shortage, people took consistent participation in purchasing residential housing through court auction paying more competitive price. However, few auction participants have applied scientific approaches except professional auction dealers up until now. Even in academic area, few scholars employ

quantitative research methods on real estate auction. Assuming additional cost for the risk betided after a successful bid follows a certain type of probability distribution, Yang and Oh (2002) aimed to improve court auction system in the way that it maximizes a bidder's profit. Oh (2006) proposed the predictive model for average winning price of items in the same group, call it as "average winning price for overall apartment", by combining moving average (MA) and exponential smoothing (ES) commonly used in time series analysis. Since this model does not give us an individual price for each of the auction items, predicting an individual winning price with the overall average price of the group that it belongs to can be very demanding on auction participants. Oh's incisive idea to segment items by its usage is deserving of so much praise. However, his assumption that individual winning price follows its group average cannot be generalized. If there are two identical apartments located at different places, their actual sale prices can be quite different. Thus, it is needed to develop a predictive model to forecast an individual winning price corresponding to each auction item instead of the overall average winning price.

1.1. Sealed bid auction

Korean court real estate auction adopts sealed bid auction, in which bidders submit bids without knowledge of the amount bid by other participants. Usually the highest bidder is declared the

* Corresponding author. Tel.: +822 883 8336.
E-mail address: changw@snu.ac.kr (W. Chang).

winner. In the case that there is no bidder, Court passes the no-bid auction to the next round to proceed until at least one bidder appears to buy by bidding higher or equal amount than the minimum bidding price which is set to be 80% of the previous minimum bidding price as shown in Fig. 1. Another difference from English auction is that the past information of no bids is cumulated so that new bidders will be affected by this information on the next new auction.

1.2. Court auction procedure

There are two ways, a forced auction and a voluntary auction, in the Korean Court Auction Procedure. In case of executing a forced auction, a debtor has the right to retain revenue generated from real property until it is sold in the court auction. A forced auction contains the procedure that forcibly realizes creditor's judicatory right of claim stated on schuldtitle by the government power. A voluntary auction is generally said to be the realization of creditor's security right. The fundamental difference between these two auctioning methods is a forced auction requires the schuldtitle whereas a voluntary auction does not.

A court auction, in general, seizes an objective property provisionally and then converts it into money to pay back to its creditor. This procedure is processed by the following sequence of steps:

- Step 1: Claim for auction and determination of opening auction.
- Step 2: A public notice of termination date for apportionment request.
- Step 3: Preparation for auction (appraisal value = minimum bidding price for initial auction).
- Step 4: Announcement of assigned date and method for auction.
- Step 5: Execution of auction (go to Step 4 if there's no bid: new auction).
- Step 6: Determining auction sale (go to Step 4 if not permitted: repeated auction).
- Step 7: Payment of sale price.
- Step 8: Procedure of apportionment.
- Step 9: Entrustment of ownership movement registration, a decree of turning over real property.

In order to fill up the expected dividend allocation formula, it is necessary to analyze dividend, protection law of mortgage release, preemptive and extinctive prescripts. The following content

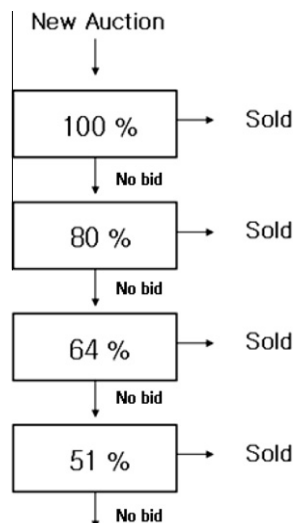


Fig. 1. Multiple rounds of court auction.

contains common facts that help your understanding about the specific procedure of court real property auction.

First, once a certain auction item is determined to be sold by a winning bid, paying a dividend is operated. At this point, creditor's debt is discharged by the money that a winning bidder pays for the item. And if there's any remaining money, it will be handed over to a debtor. However, since the amount from a winning bidder's payment cannot satisfy all of the creditors connected to the same debtor for the most cases, court allocate its dividends to each of the creditors according to the share priority in Table 1 based on the civil law.

Second, the protection law of housing lease is the compulsory law to protect people who do not possess their own house so that they have right to get paid a part of the small sum lease security deposit prior to preemptive mortgagees according to the small sum lease regulation in Table 2.

Third, in case that a targeted real property receives a successful bid in court auction, a winning bidder will have two opposite rights: vanished rights and undertaken rights in Table 3. Based on the rights vanished by the Civil Proceedings Act right, the base extinctive rights, a winning bidder cannot take rights that has been set up prior to the base extinctive rights and will undertake rights made up after the base extinctive rights.

Table 1
Order of quota.

Priority	Right
1	Certain amount of small sum lease security deposit, bond such as a wage for 3 months
2	Tax bond, right to receive tax from someone who did not pay his/her tax, or additional charges for a default
3	Mortgage backed bond or lease bond having a cut-off date
4	Wage bond for more than 3 months
5	Public tax whose legal deadline is later than the deadline of a collateral security
6	Various taxes including medical insurance, pension insurance, industrial disaster insurance
7	General bond

Table 2
Small sum lease regulation.

Period (initial date of contracting a collateral security)	Seoul, metropolitan cities	Other areas
01/01/1984–11/30/1987	A: less than 3 million won	A: less than 3 million won
12/01/1987–02/18/1990	A: less than 5 million won	B: less than 4 million won
02/19/1990–10/18/1995	A: 7 million won limit B: less than 20 million won	A: 5 million won limit B: less than 15 million won
10/19/1995–09/14/2001	A: 12 million won limit B: less than 30 million won	A: 8 million won limit B: less than 20 million won
09/15/2001–Now	The national capital region A: 16 million won limit B: less than 40 million won	A: 12 million won limit B: less than 30 million won
	The other metropolitan cities (except for In-Cheon city) A: 14 million won limit B: less than 35 million won	

A: Amount/sum of preferential reimbursement.
B: Amount of security deposit.

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