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# **Imperfect Information and the Reserve Price Dynamics In Auctions**

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# Imperfect Information and the Reserve Price Dynamics In Auctions

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## Abstract

I study a hybrid bargaining model with an English auction in each state. The seller uses auctions to extract information about the bidders' values of the object on sale. The bargaining element is introduced to maximize revenue, since the winning bidder has to exceed not only the second-highest bid but also the reservation price of the seller. This model can explain the following empirical facts from Ebay auctions: multiple relisting of similar items, the use of secret reserve prices, and the convergence of sale prices to buy-it-now prices.

## Motivation

### Sequential Auctions without Commitment

McAfee and Vincent (1997): Revenue equivalence between sequential auctions with publicly observed reserve prices and static auction without publicly observed reserve price when the time between sequential auctions goes to zero

### Reserve Prices

Myerson (1981), Riley and Samuelson (1981), Xu(2010): revenue optimality of publicly observed reserve prices in independent private values environment – screening;  
 Milgrom and Weber (1982), Cai, Riley and Ye (2007): revenue optimality of publicly observed reserve prices in common value environment – signaling;

### Theoretical conclusions

Theory predicts no repeated auctions  
 Theory predicts no use of secret reserve prices

### Empirical Evidence

Existence of repeated auctions  
 Widespread use of secret reserve prices

## Data and Methods

### Empirical Evidence

The dataset of English auctions on tractors sold on Ebay between 11/17/04 and 5/30/07. The total number of observations is 39441.

### Theoretical Approach

Rubinstein bargaining model with incomplete information. Bargaining model with one-sided incomplete information: Rubinstein (1985) with an overview of the literature in Kennan and Wilson (1993). Bargaining model with two-sided incomplete information: Cramton (1992) and Satterthwaite and Shneyerov (2007).

## Empirical Evidence from Ebay dataset

Table 1. Frequency of Relistings

Tractors	Number of tractors	number of sold tractors	% of sold tractors
1 listing	23253	13251	56.99
2 listings	4031	1448	35.92
3 listings	1069	344	32.19
4 listings	404	117	28.96
5 listings	197	60	30.46
6 listings	102	30	29.41
7 listings	61	20	32.79

Table 2. Use of Secret and Public Reserve Prices

Tractors with one listing	number of listings	Percent of listings
Total number of listings	23253	100.00
listings with reserve prices	10705	46.04
listings with first bids >100	15573	66.97
listings with both reserve prices and first bids	7544	32.44

Table 3. Dynamics in Sale Prices

	# of sold with buy-it-now	% of sold listings with buy-it-now price	mean of sale price as % of BIN	stdev of sale price of % of BIN
1 listing	2556	19.29	90.57	20.40
2 listings	539	37.22	93.52	11.52
3 listings	134	38.95	95.41	7.46
4 listings	55	47.01	95.01	7.83
5 listings	23	38.33	96.22	6.56
6 listings	13	43.33	97.49	4.51
7 listings	9	45.00	96.99	3.68

## Implications of the Approach

- The bargaining model with incomplete information allows to introduce delays and multiple relistings
- Secret reserve prices are justified, since they are used to elicit information
- Convergence of sale prices to BINs can be explained by the seller's use of auctions to acquire information
- The use of BINs in later stages is justified by informed sellers
- Sellers use auctions to elicit information instead of selling – explains the low probability of sales in repeated auctions

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