Equilibrium Price Dynamics in Perishable Goods Markets: The Case of Secondary Markets for Major League Baseball Tickets

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- aim: describe equilibrium pricing patterns and test theories of equilibrium pricing behavior in perishable goods markets
- event tickets are

Revenue Management Models of Dynamic Pricing of Perishable Goods

- examples: McAfee and te Velde (2006), Gallego and van Ryzin (1994)
- basic theoretical structure:
  - seller starts with a given inventory and continuously varies price (no commitment)
  - consumers arrive randomly, purchase at once or exit
  - demand parameters constant over time
  - market ends (inventory perishes) on a ...xed date
- optimal price depends on probability that a current sale prevents a future one because of a stock-out
  - lower inventory ! higher prices
  - less time remaining ! lower prices, as future selling opportunities disappear
- a "robust prediction" (McAfee and te Velde) is that expected prices should fall over time

Empirical Evidence and Motivation for Looking at Secondary Ticket Markets

- little empirical work testing these models
- when declining price prediction has been tested (e.g., airlines by McAfee and te Velde), it has been rejected. Why?
  - consumer demand changes over time
  - commitment
- secondary event ticket markets have several nice features:
  - sellers are small and fairly anonymous, so commitment incentives should be small
 - most sellers o¤ering one unit (e.g., a pair of tix), so declining price prediction emerges unambiguously

1. shows, using data from two large markets, that list and transaction prices decline by signi…cant amounts (20-50%) as the game approaches

2. describes three theories for why prices decline:
   1. RM explanation
   2. residual demand becomes more elastic over time
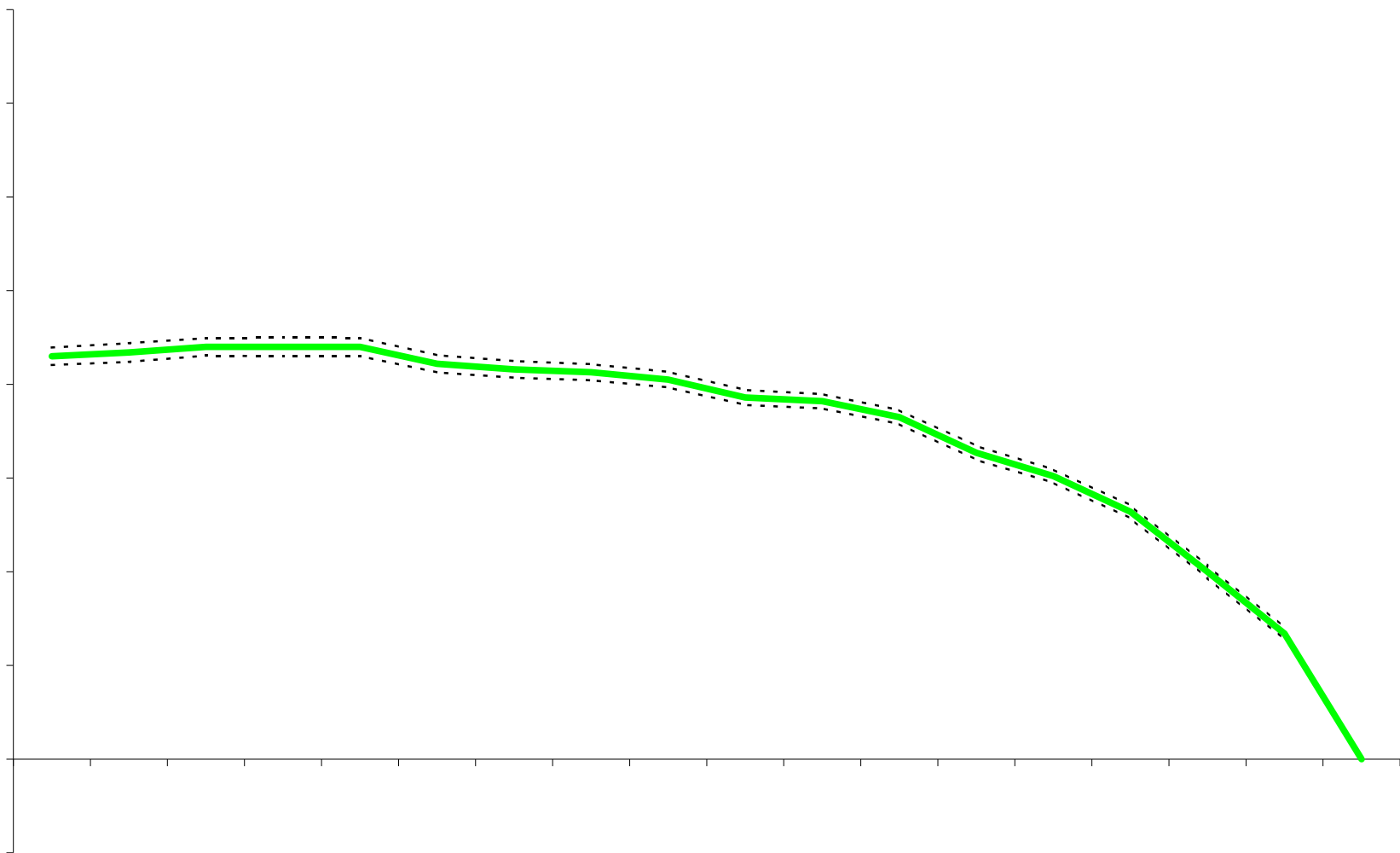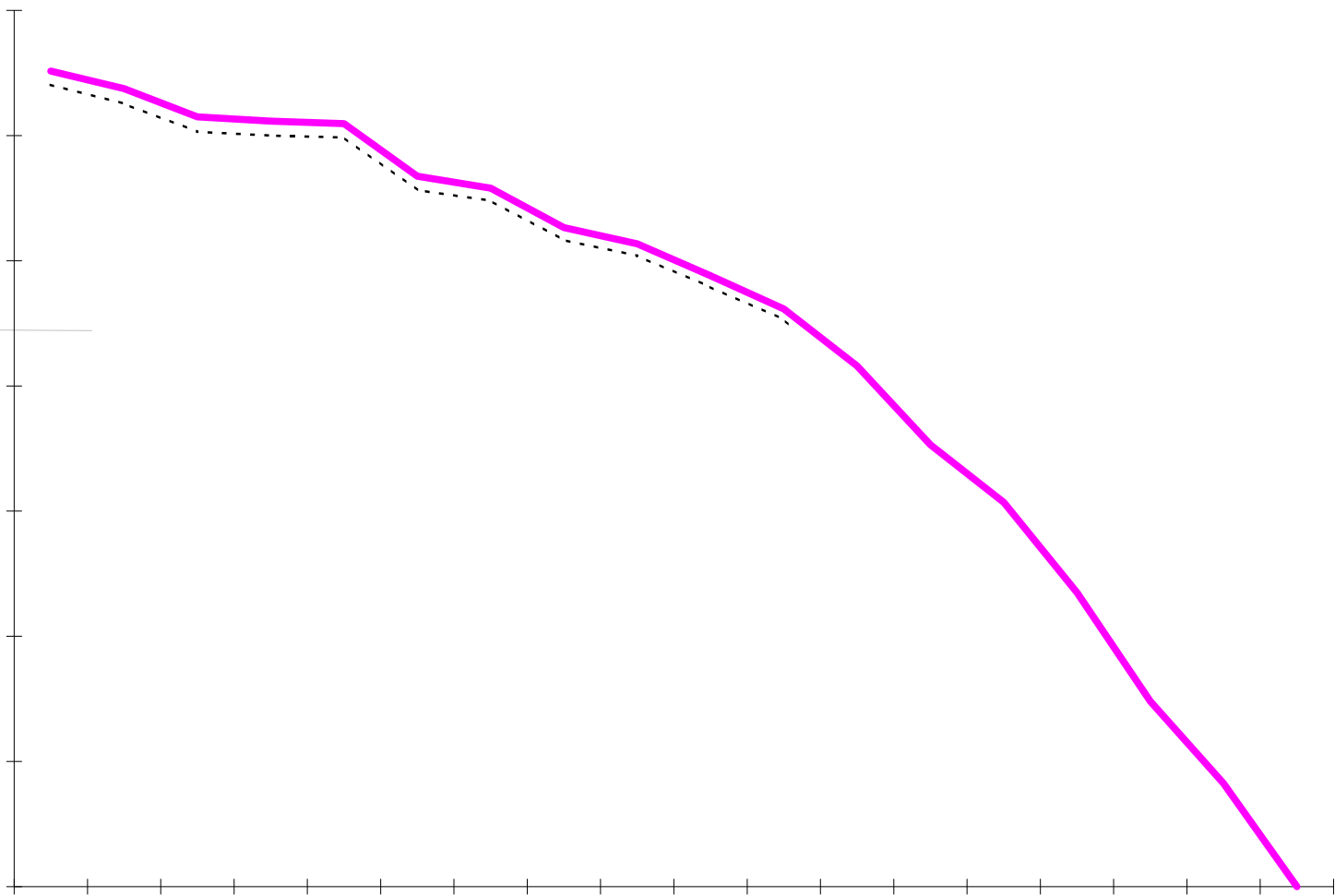   3.

(Descriptive) Evidence of Price Declines

- estimating equation:

  Price or Log(Price) DTG^{DTG} $X^{LIST} {}^{LIST}$

  $\quad\quad\quad\quad\quad\quad\quad\quad X^{SLR} {}^{SLR}$ $X^{FORM} {}^{FORM}$ FEs

- measure of price:
  - buyer, seller
  - transaction, list
  - log, levels or relative to face value
- de...nition of ...xed e¤ects, important to control for quality:
  -
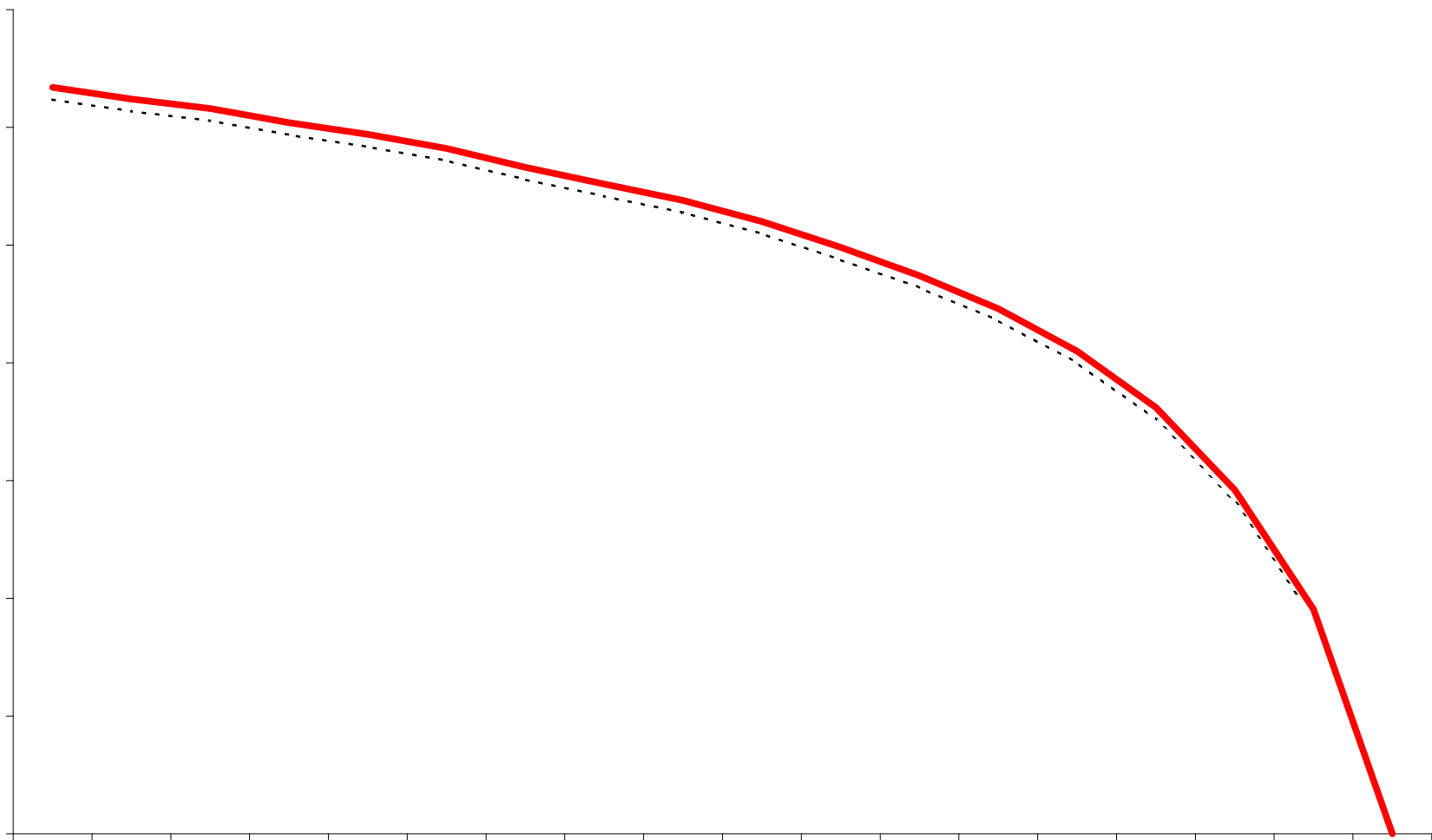
- whenever a seller lists a ticket he is solving

$$\max_{p_{st}} p_{st} Q_{st}(p_{st}) + o_{st}(1 - Q_{st}(p_{st}))$$

where Q_{st} is the probability of sale and o_{st} is the opportunity cost of selling. If SOCs satisfied

$$p_{st} = o_{st} - \frac{Q_{st}(p_{st})}{\frac{\partial Q_{st}}{\partial p_{st}}}$$

$$\widehat{o_{st}} = p_{st} + \frac{\widehat{Q_{st}(p_{st})}}{\frac{\partial Q_{st}}{\partial p_{st}}}$$

- estimate a parameterized probability of sale function (with varying elasticities)
- instrument (control function) for prices using factors a¤ecting opportunity costs (e.g., seller distance)

Figure 3
Implied Opportunity Costs
Pure Fixed Price Listings
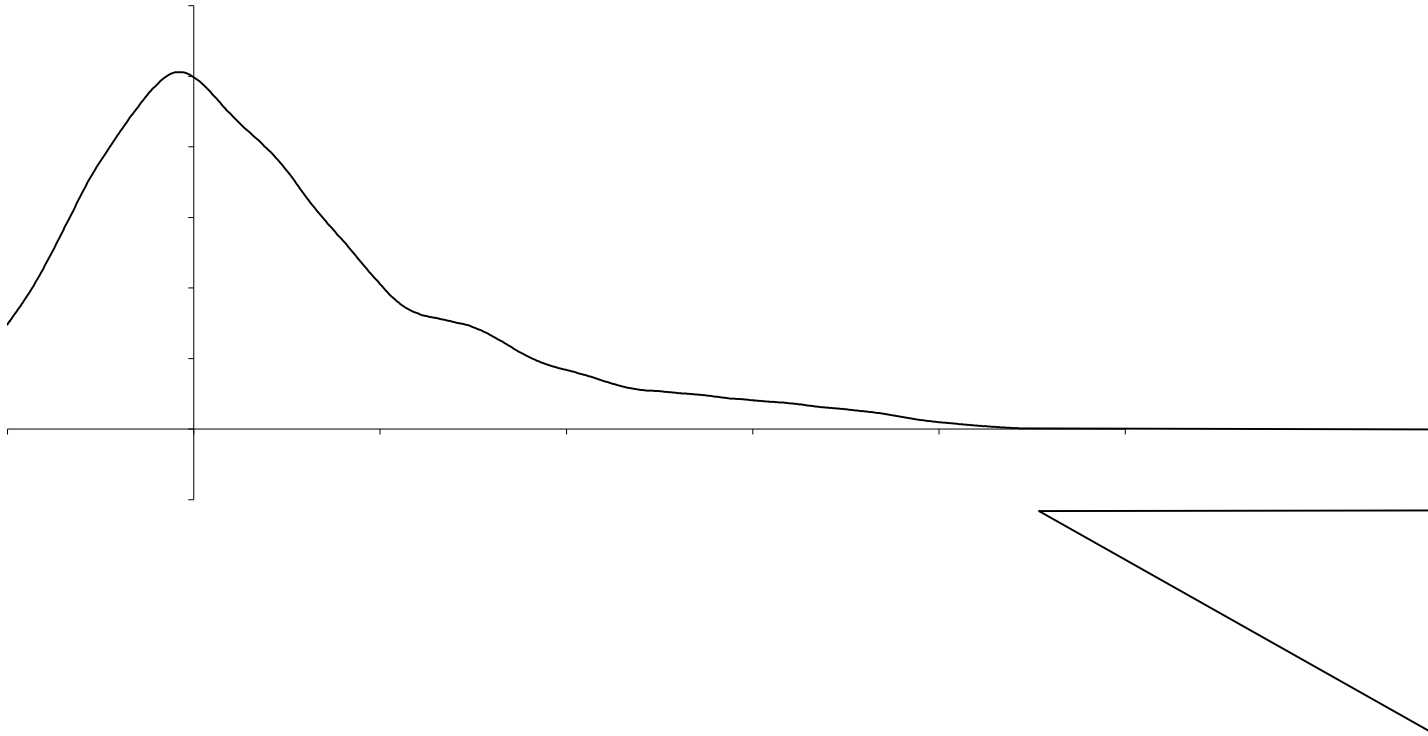
(a) Counterfactuals for Fixed Price Model
Relative Price Model

	Days Prior to Game			
	1-10	**11-20**	**21-40**	**41 plus**
<u>Actual</u>				
Mean Price	53.58	60.93	65.81	69.44
Median Price	40.63	49.50	54.20	58.50

<u>Counterfactual:</u> demand parameters same as 11-14 days prior to game
competition variables same as average 11-20 days before game

	1-10	**11-20**	**21-40**	**41 plus**
Mean Price	50.26	59.41	65.66	68.99
Median Price	39.78	49.35	55.13	59.40

(b) Counterfactuals for Fixed Price Model
Log Price Model

	Days Prior to Game			
	1-10	**11-20**	**21-40**	**41 plus**
<u>Actual</u>				
Mean Price	53.58	60.93	65.81	69.44
Median Price	40.63	49.50	54.20	58.50

<u>Counterfactual:</u> demand parameters same as 11-14 days prior to game
competition variables same as average 11-20 days before game

	1-10	**11-20**	**21-40**	**41 plus**
Mean Price	50.58	58.39	64.33	69.40
Median Price	40.95	49.38	54.95	59.89

Conclusion and Future Research Directions

- robust evidence that prices tend to decline in secondary ticket markets
- strong initial evidence that sellers cut prices because opportunity costs of selling decline as future selling opportunities disappear (because of perishability)
- early buying rational given product di¤erentiation, plausible levels of search costs & risk aversion
- outstanding questions: