How Dynamic Pricing Has Revolutionized The Live Ticketing Market: Evidence From Red Sox Ticket Sales From 2009-2012

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1 Introduction

Live event ticketing represents a very interesting market. Interestingly, tickets are considered perishable goods. Once the event occurs, whether it be a flight, concert, or baseball game, the ticket is completely worthless. Thus, proper pricing from the seller of the ticket has been the subject of much economic literature.

Dynamic pricing is a method of pricing that has been introduced in contrast to the traditional face value ticket pricing. In the past, tickets have simply been posted a face value price, unchanging before the day of the live event. This has lead to multiple issues, such as rent-seekers in the concert ticketing market seizing the fixed prices and selling for profit in the secondary market. As an example, Bhave and Budish (2023) found that when Ticketmaster utilized an auction format instead of simply selling fixed face value ticket prices, the prices in the secondary market were much closer to the primary ticketing market prices.

While the above mentioned example mainly pertains to demand based dynamic pricing, that is attempting to measure proper pricing to respond to a marginal willingness to pay of the consumer, sports events such as baseball games face a different issue. Namely, how do you price game tickets in the days leading up to the game? This paper will focus on analyzing the potential for dynamic pricing to optimize pricing specific to the issue of how to price based on the number of days remaining to the game, as opposed to specifically a demand based issue such as in live music. However, this may be tied into the issue of marginal willingness to pay, and thus will be a point of subsidiary interest as well.

This paper finds that the advent of dynamic pricing has allowed baseball teams to adjust their prices significantly in response to the days prior to the baseball game. Interestingly, the price appears to peak in the period of 151-200 days out from the baseball game, and gradually decreases from there. This is likely due to teams taking advantage of high demand for the tickets by fans who are very interested in the early frame who have a higher marginal willingness to pay, but then start lowering prices gradually to avoid the perishing of the very good they're selling.

It is likely the case that the ticket prices drop relative to the 151-200 days out period as the time gets closer and closer to the game day because the ticket sellers do not want the tickets to go to waste. Due to a fear of missing out on sales entirely, the price continues to drop, encouraging a higher quantity demanded for the goods. After taking advantage of the higher marginal willingness to pay consumers in the early phase, they now attempt to take advantage of the low marginal willingness to pay consumers by lowering prices to retrieve their quantity demanded.

2 Data

Our data spans the years of 2009-2012, which gives us data on all of the tickets sold by the Boston Red Sox. This data contains data on per ticket price, number of tickets sold, days from transaction until the game, the section the ticket is in, and more.

3 Model

In this analysis, we will be utilizing a regression that will allow us to deduce what the pricing changes are as the days to the game approaches 0. In order to do this, we construct dummy variables for each of the following day intervals: [1,5] [6,10] [11,15] [16,20] [21,30] [31,60] [61,90] [91,120] [121,150] [151,200] [201,250]. Each observation takes a 1 or 0 for each interval, the only variable taking 1 will be the one which its number of days prior to game matches the variable. Then, we will run a regression of the log ticket price on these dummy variables to compare how the percent price increase compares against the baseline of 201-250 days out from the ball game.

Our regression formula is as follows:

$$logprice_i = \alpha + \beta X_i + \epsilon_i$$

X_i is our vector of dummies for the intervals of days prior to baseball game as specified above, for ticket sale i.

ϵ_i is our error term corresponding to ticket sale i.

Because our model is a predictive one, we do not need to worry about issues of omitted variable bias, as our ϵ_i represents the forecast error instead of "all other variables". In a causal model, we would include fixed effects for seat type, month, and more.

4 Hypotheses

Our first hypothesis is that ticket prices will be high in the early phase of the market to take advantage of the high marginal willingness to pay consumers, and then once they have been seized upon, the ticket prices will start to drop relative to the early period as the game approaches due to taking advantage of the low marginal willingness to pay, who will only purchase tickets at a lower price point.

We formally denote this hypothesis: H_{DYNAMIC}

Our second hypothesis is that through the years 2009-2012, due to the further advent of dynamic pricing as a result of higher technological advancements, it should be the case that there is a widening of the price differential over the days prior to the baseball game.

We formally denote this hypothesis: $H_{\text{DYNAMIC OVER TIME}}$

5 Results

H_{DYNAMIC}

Table 1: Regression Results

	Dependent variable:
	Log Price
1-5 Days	0.273***
	(0.004)
6-10 Days	0.394***
	(0.005)
11-15 Days	0.467***
	(0.005)
16-20 Days	0.519***
	(0.006)
21-30 Days	0.516***
	(0.005)
31-60 Days	0.577***
	(0.004)
61-90 Days	0.653***
	(0.005)
91-120 Days	0.651***
	(0.006)
121-150 Days	0.700***
	(0.007)
151-200 Days	0.778***
	(0.009)
Constant	3.775***
	(0.003)
Observations	453,171
R^2	0.070
Adjusted R^2	0.070
Note:	*p<0.1; **p<0.05; ***p<0.01

The results of the regression indicate that the prices for the tickets are priced at their lowest during the period of 201-250 days, as consumers are not likely as interested in purchasing at that point. However, it peaks in the 151-200 days period, where fans who have a high marginal willingness to pay are expected to fully engage into purchasing the ticket. The ticket prices relative to the base period continue to fall, where the prices drop to their lowest compared to the base period in the 1-5 days prior to the baseball game.

This indicates that after the ticket seller has taken advantage of the fans who have the

highest marginal willingness to pay, they continue to drop relative prices, as they are attempting to ensure they can actually sell the tickets. Once the 151-200 days period has concluded, the main ability to take advantage of the high marginal willingness to pay consumers has largely dissipated, and they must start to lower relative prices.

In the final period, as the game approaches, dynamic pricing allows baseball teams to lower ticket prices for tickets that may go to waste. Additionally, for any seats that are low demand, they can adjust their prices to be lower so that they may end up being sold, as they are otherwise worthless.

This can also be viewed visually, where we can see that the ticket price peaks in the advantage period over the high marginal willingness to pay consumers, and from there it gradually starts to decline, with a sharp nose dive as the days get really close to the baseball game. The lowest price point time is the days 201-250 out from the game.

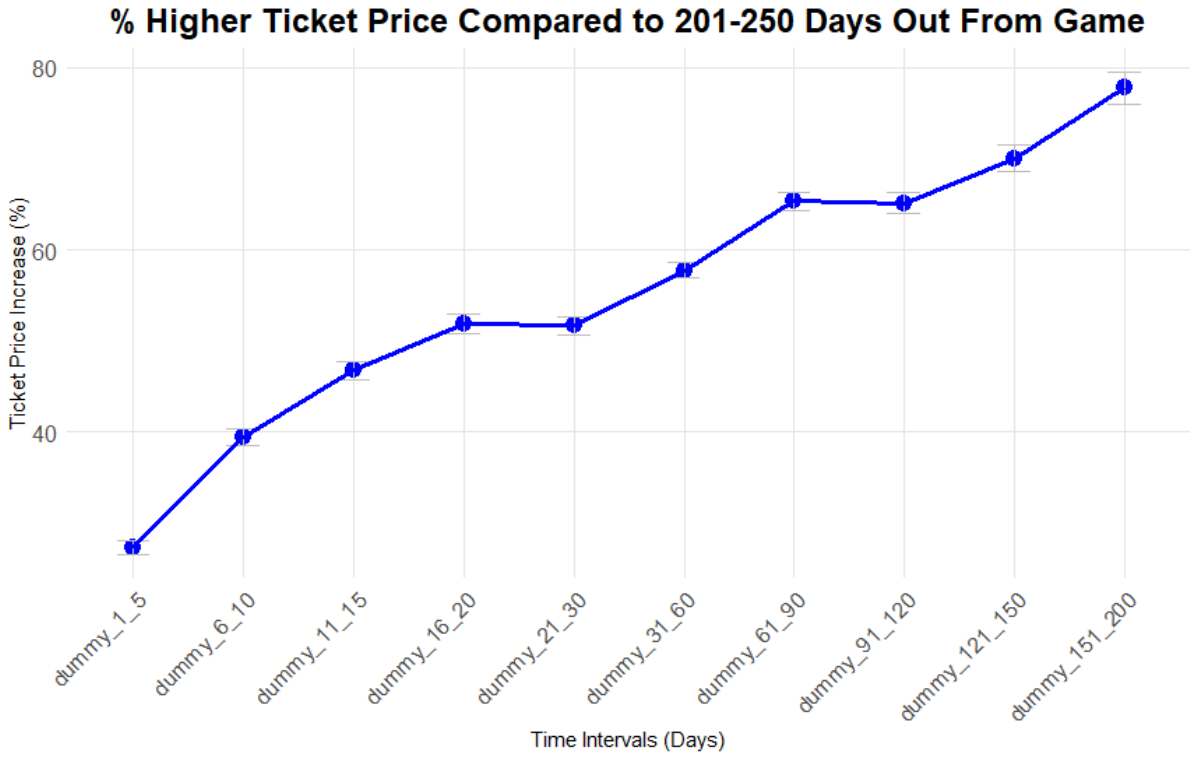

Figure 1: Ticket Price Relative To 201-250 Days Out Over Time

Table 2: Regression Results by Year

	Dependent variable:			
	Log Price			
	2009	2010	2011	2012
1-5 Days	0.205***	0.308***	0.239***	0.289***
	(0.008)	(0.008)	(0.006)	(0.011)
6-10 Days	0.227***	0.386***	0.370***	0.528***
	(0.009)	(0.009)	(0.008)	(0.013)
11-15 Days	0.255***	0.428***	0.470***	0.621***
	(0.009)	(0.010)	(0.009)	(0.015)
16-20 Days	0.254***	0.494***	0.532***	0.741***
	(0.010)	(0.011)	(0.009)	(0.016)
21-30 Days	0.248***	0.479***	0.521***	0.812***
	(0.009)	(0.010)	(0.008)	(0.014)
31-60 Days	0.258***	0.577***	0.542***	0.975***
	(0.008)	(0.009)	(0.007)	(0.011)
61-90 Days	0.277***	0.676***	0.612***	1.112***
	(0.009)	(0.010)	(0.009)	(0.012)
91-120 Days	0.290***	0.718***	0.606***	1.046***
	(0.011)	(0.012)	(0.011)	(0.014)
121-150 Days	0.296***	0.807***	0.601***	1.162***
	(0.013)	(0.015)	(0.013)	(0.018)
151-200 Days	0.305***	0.807***	0.736***	1.324***
	(0.016)	(0.017)	(0.016)	(0.021)
Constant	4.131***	3.714***	3.847***	3.348***
	(0.007)	(0.007)	(0.005)	(0.009)
Observations	105,673	118,895	152,525	76,078
R^2	0.013	0.069	0.071	0.186
Adjusted R^2	0.013	0.069	0.071	0.186
Note:				*p<0.1; **p<0.05; ***p<0.01

The regression results indicate a clear widening of the pricing intervals as dynamic pricing grows over time due to technological advancements that allow dynamic pricing strategies. The wideness of the pricing interval in 2009 is relatively small, the ticket price 1-5 days out is only 10% lower than the ticket price 151-200 days out. In the following year, it soars to a 50% differential. It stays roughly the same in year 2011, and in year 2012 it drops by over 100%. This indicates an increase in the widening of ticket pricing by the usage of dynamic pricing.

The ticket pricing is taking advantage of higher marginal willingness to pay consumers by setting higher prices in the early phase, the phase after the earliest phase of 201-250

days. The seller is able to set ticket prices higher in this phase because these fans who would purchase in this time frame have the highest interest and are the biggest fans. Then, as the time approaches to game day, the ticket prices continue to drop gradually. The widening of the interval shows the increase in time based discrimination.

Additionally, it is notably that there is a stark increase in the R^2 for the 2012 pricing model compared to the 2009 model. The R^2 increases by 1323%, indicating that the days before the game offers much more explanatory power in the pricing of tickets. This provides further evidence of dynamic pricing being used by the ticket seller.

This can again be viewed visually, where the line of percent price differentials are almost the same in year 2009, and it begins to increase in how much the ticket price increase drops as we approach game day. The difference between the line of 2012 and 2009 is truly remarkable, as it showcases how much it separates entirely.

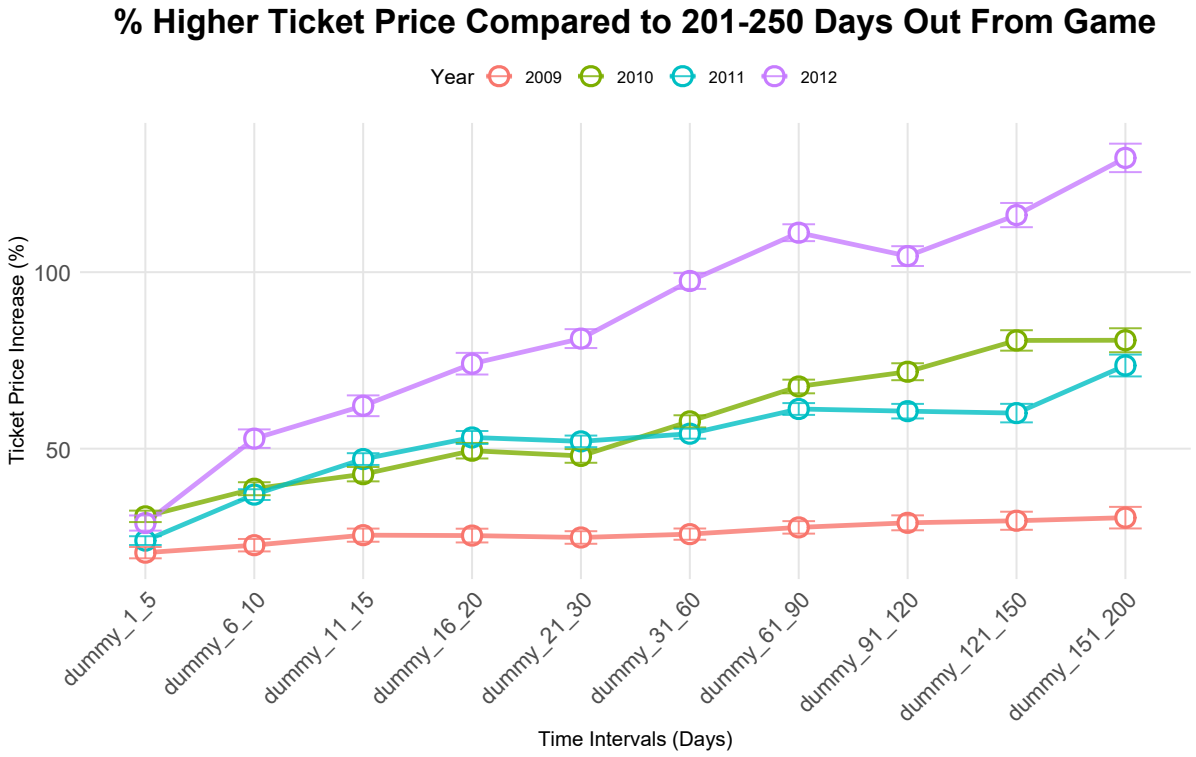

Figure 2: Ticket Price Relative To 201-250 Days Out Over Time (By Year)

Table 3: Regression Results for Dugout Box (2009 & 2012)

	Dependent variable:	
	Log Price	
	DUGOUTBOX 2009	DUGOUTBOX 2012
1-5 Days	0.210***	0.491***
	(0.079)	(0.070)
6-10 Days	0.060	0.899***
	(0.085)	(0.092)
11-15 Days	0.145	0.763***
	(0.099)	(0.119)
16-20 Days	0.085	1.024***
	(0.112)	(0.141)
21-30 Days	0.067	0.821***
	(0.091)	(0.101)
31-60 Days	0.262***	1.142***
	(0.095)	(0.090)
61-90 Days	0.337***	1.331***
	(0.103)	(0.089)
91-120 Days	0.270**	1.287***
	(0.125)	(0.132)
121-150 Days	0.380	1.443***
	(0.233)	(0.125)
151-200 Days	0.461	1.605***
	(0.281)	(0.193)
Constant	5.916***	5.026***
	(0.065)	(0.052)
Observations	310	381
R^2	0.073	0.531
Adjusted R^2	0.042	0.518
Note:		*p<0.1; **p<0.05; ***p<0.01

The dugout box seats are considered to be one of the best, which makes the pricing of this ticket of interest for this study. The results are truly remarkable. The difference in pricing based on day is so stark in just three years, showing clear evidence of the advent of dynamic pricing, which is especially targeted towards these higher demand seats. Many of the coefficients in the regression in 2009 for the dugoutbox seats are not even statistically significant. It only carries an R^2 of .073. In 2012 when dynamic pricing has emerged, there is an over 100% ticket price difference compared to baseline from the 151-200 to 1-5 days period. In the first regression it is only 25%. Futher, it boasts an R^2 of .531, a 1133.33% increase.

The price has gone up so much relative to the baseline period for the 2012 year because

they are taking advantage of the higher marginal willingness to pay that is exhibited by consumers in the earlier period, where fans who are more interested and are more willing to pay will accept these higher prices. The lower price discrimination by time period had caused a lot of opportunity cost for the ticket seller, and this fixes the issue. The combination of higher ticket prices in the early period and lower in the days leading up to the baseball game offers an ability to take advantage of both groups of marginal willingness to pay: high and low.

6 Conclusion

This paper finds conclusive evidence that relative to the earliest period of 201-250 days from the baseball games, the ticket price continues to drop until game day. Further, the advent of dynamic pricing has lead to baseball ticket sellers to widen the ticket prices based on the time before the game. Notably, in 2012 we see that the difference in the ticket price increase of the 151-200 days compared to the baseline period of 201-250 days goes up significantly, but the 1-5 day difference is similar to the other years. Thus, this creates a much larger interval of prices, indicating that the sellers are using dynamic pricing to take advantage of higher maginal willingness to pay consumer in the early period, and then take advantage of the lower marginal willingness to pay consumers by dropping prices to allow them to purchase the ticket. Notably, if the seller does not sell the ticket, it will perish and be completely worthless. This leads to the best possible outcome of the ticket seller.