Online Appendix B
"Assessing Sale Strategies in Online Markets using Matched Listings"
By Einav, Kuchler, Levin, and Sundaresan

In this appendix, we describe how we construct the marginal revenue curve in Figure 4(c).

Constructing the demand curve

We estimate the effect of different start prices on the probability of sale, the price conditional on sale and each item's revenue (normalized price of item if sold, 0 otherwise) based on the following regression equation:

$$y_{it} = a_i + f\left(s_{it}^n\right) + \varepsilon_{it}.$$

The dependent variable y is equal to either q (an indicator equal to one if the item sold), p^n (the normalized price), or R^n (the normalized revenue). The function $f\left(s_{it}^n\right)$ is a step function equal to $\sum_{k=1}^{9} \beta_k \mathbf{1}\{s_{it}^n \in S_k\}$, where $S_1, ..., S_9$ are sequential intervals covering the range of normalized start prices, where S_1 corresponds to the highest range of normalized start prices and S_9 corresponds to low start prices.

Table B1 shows the regression results based on a pooled sample of all the auctions. The results are similar to those for the separate price categories reported in the paper. From these regression results, we construct the predicted probability of sale, predicted price conditional on sale, and predicted revenue for each start price interval. The demand curve is traced out by plotting the predicted sale price (conditional on sale) against the predicted probability of sale for each range of start prices. Figure B1 shows the estimated demand curves for the four different value categories, and for the pooled sample.

Constructing the marginal revenue curve

We use the revenue regression results to construct marginal revenue. Let $k = 1, ..., 9$ denote the sequential intervals of start prices. Let R_k denote the predicted revenue for start price interval k, and similarly, let Q_k denote the predicted probability of sale for that interval. We then define $MR_k = (R_k - R_{k-1}) / (Q_k - Q_{k-1})$, where we let $R_0 = Q_0 = 0$ to obtain MR_1.

Figure B2 plots the demand curve for the pooled estimates and the marginal revenue at each estimated point. The estimated demand is of course generally downward sloping, but it has some "wiggles", in particular around $Q = 0.85$. This small unevenness is amplified in the calculation of marginal revenue: the estimated value for marginal revenue at this point lies far above the demand curve, something that cannot happen with a downward sloping demand curve.

Constructing smoothed estimates of demand and marginal revenue

We construct a smooth marginal revenue curve by making two modifications. First, we smooth our estimates of $\{Q_k, P_k, R_k\}_{k=1,...,9}$ by replacing each value with the average of that value and its two nearest neighbors (or one nearest neighbor for boundary points). Let $\{\widetilde{Q}_k, \widetilde{P}_k, \widetilde{R}_k\}$ denote the smoothed estimates. We then construct the marginal revenue curve by setting $\widetilde{MR}_k = \min\left\{\left(\widetilde{R}_k - \widetilde{R}_{k-1}\right) / \left(\widetilde{Q}_k - \widetilde{Q}_{k-1}\right), \widetilde{P}_k\right\}$, where we restrict the marginal revenue curve to be below the smoothed demand curve. Finally, we smooth the marginal revenue curve in the same way, by replacing each value with an average of that value and its neighbors.

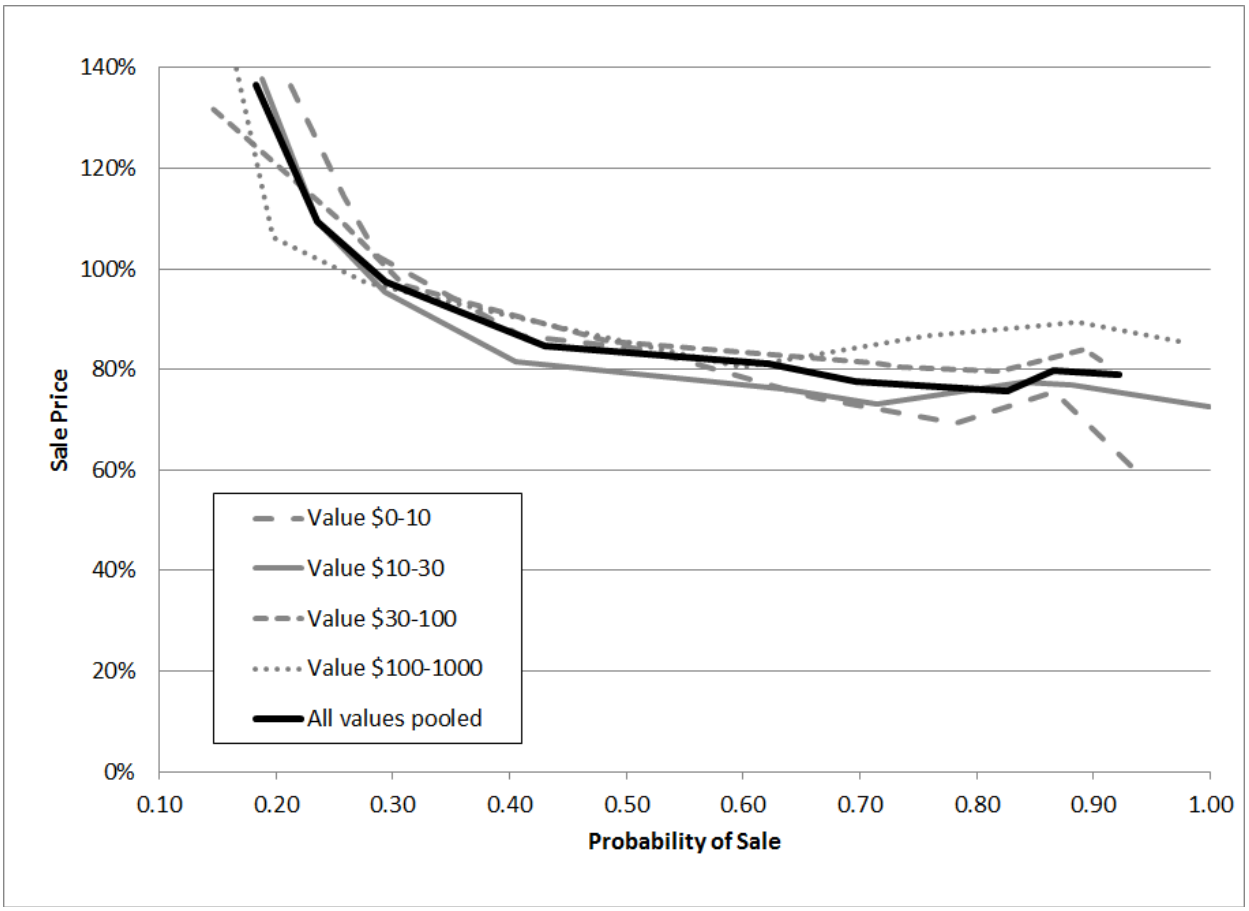
Figure B3 shows the original and the smoothed demand curves – where the original demand curve plots $\{Q_k, P_k\}$ and the smoothed curve plots $\{\widetilde{Q}_k, \widetilde{P}_k\}$ – and the original and smoothed marginal revenue curve. Smoothing the demand curve has a minimal effect, but the smoothed marginal revenue curve is, by design, much smoother and more clearly reflects the pricing incentive for sellers that is implied by all of the demand curve estimates.

Table B1: Regression Results

	Dependent Variable					
	Sale Indicator		Sale Price (conditional on sale)		Revenue	
Start/value ratio indicator:						
0.05-0.15	-0.057	(0.006)	0.009	(0.008)	-0.037	(0.008)
0.15-0.30	-0.096	(0.007)	-0.033	(0.010)	-0.099	(0.009)
0.30-0.45	-0.225	(0.007)	-0.014	(0.010)	-0.154	(0.009)
0.45-0.60	-0.301	(0.006)	0.020	(0.008)	-0.190	(0.007)
0.60-0.85	-0.492	(0.004)	0.058	(0.006)	-0.316	(0.005)
0.85-1.00	-0.629	(0.004)	0.185	(0.006)	-0.397	(0.004)
1.00-1.20	-0.687	(0.004)	0.304	(0.008)	-0.433	(0.005)
> 1.20	-0.739	(0.005)	0.576	(0.012)	-0.458	(0.006)
Constant	0.922	(0.003)	0.790	(0.003)	0.691	(0.004)
Number of listings	494,170		213,901		494,170	
Number of matched sets	19,777		15,492		19,777	

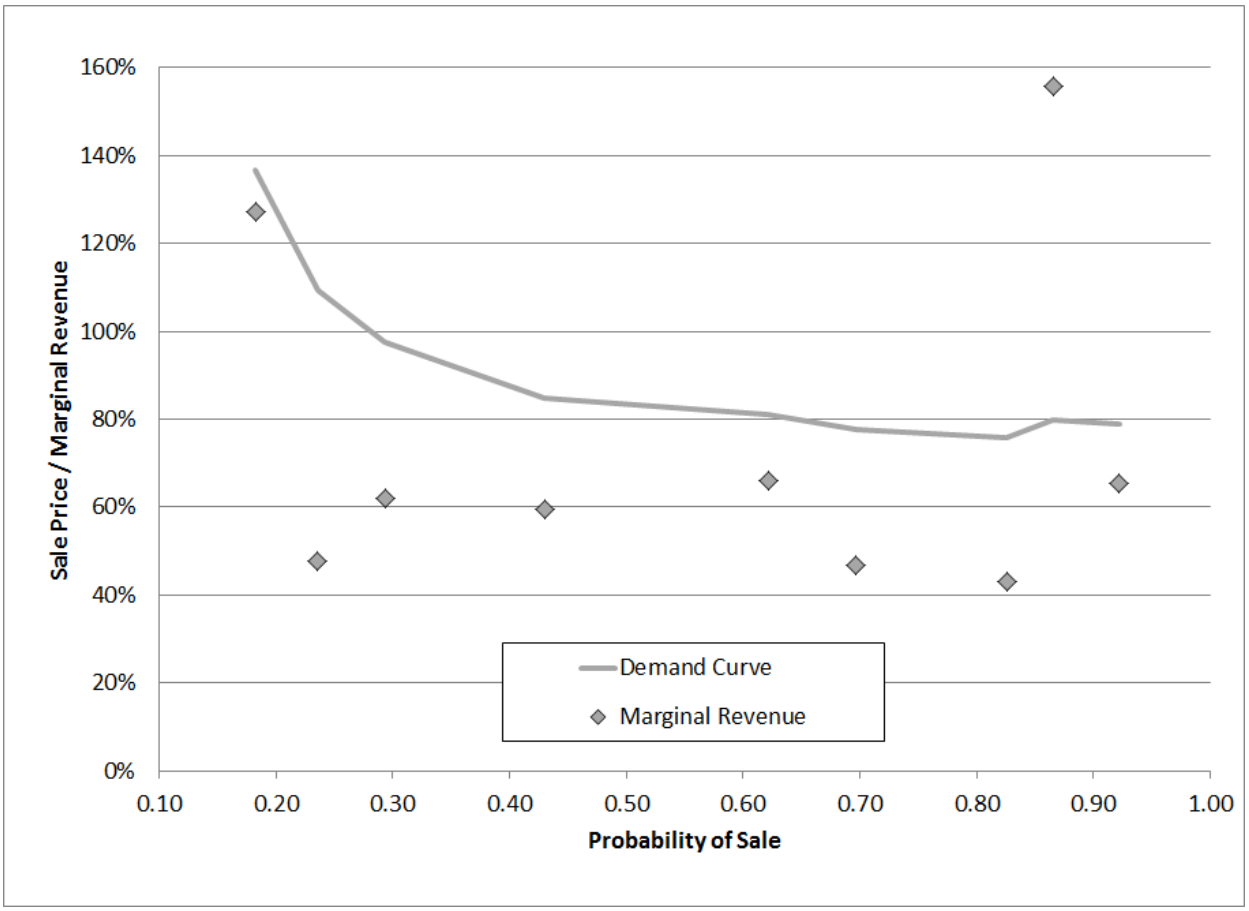
The table presents regression results of listing outcomes on (normalized) starting price, using matched set fixed effects. The regressions in the first two columns are the same as those reported in Table 6 of the main text, except that we pool observations across all item value categories. In the third column we report a similar regression to that of the second column, except that the sample is all listings (rather than only sales) with the revenue of unsold items being zero.

Figure B1: Estimated Auction Demand Curves



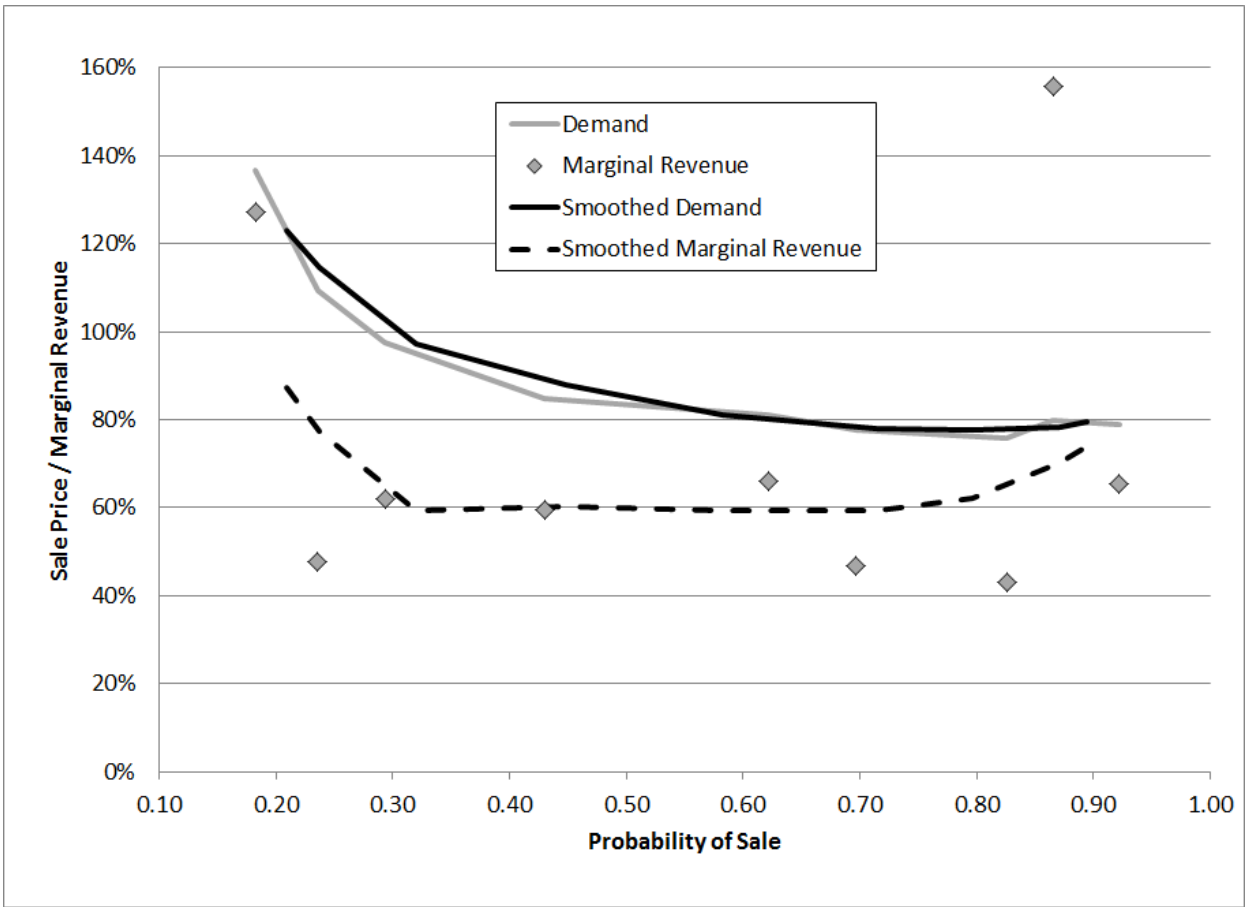
The figure presents estimated auction demand curves for each value category, and a pooled version for all values. A point on the demand curve is constructed by matching the predicted sale probability and the predicted sale price (conditional on sale) for each range of start prices, as described in the main text.

Figure B2: Demand and MR Curves (Prior to Smoothing)



The figure presents the estimated (pooled) demand curve from Figure B1 and the corresponding marginal revenue curve (prior to smoothing). In Appendix B we describe how the marginal revenue curve is constructed.

Figure B3: Smoothed Demand and MR Curves



The figure presents the smoothed demand and MR curves, after following the procedure described in Appendix B.