Economists, psychologists, and marketers are interested in determining the monetary value people place on non-market goods for a variety of reasons: to carry out cost-benefit analysis, to determine the welfare effects of technological innovation or public policy, to forecast new product success, and to understand individual and consumer behavior. Unfortunately, many currently available techniques for eliciting individuals’ values suffer from a serious problem in that they involve asking individuals hypothetical questions about intended behavior. Experimental auctions circumvent this problem because they involve individuals exchanging real money for real goods in an active market. This represents a promising means for eliciting non-market values. Lusk and Shogren provide a comprehensive guide to the theory and practice of experimental auctions. It will be a valuable resource for graduate students, practitioners, and researchers concerned with the design and utilization of experimental auctions in applied economic and marketing research.

Jayson L. Lusk is Professor and Willard Sparks Endowed Chair in the Department of Agricultural Economics, Oklahoma State University.

Jason F. Shogren is Stroock Distinguished Professor of Natural Resource Conservation and Management, and Professor of Economics and Finance, University of Wyoming.
Researchers and practitioners in applied economics and business now have access to a much richer and more varied choice of data than earlier generations. *Quantitative Methods for Applied Economics and Business Research* is a new series aimed at meeting the needs of graduate students, researchers and practitioners who have a basic grounding in statistical analysis and who wish to take advantage of more sophisticated methodology in their work.

Forthcoming titles
Stewart Jones and David Hensher (eds.), *Credit Risk Modelling: A Primer*
Experimental Auctions

Methods and Applications in Economic and Marketing Research

Jayson L. Lusk and Jason F. Shogren
Acknowledgments

Participating in an auction is a collective process and so is conducting one. We have had the good fortune of learning about experimental auctions with a number of colleagues and students including: Todd Cherry, Keith Coble, Tom Crocker, Scott Daniel, Ty Feldkamp, Sean Fox, Sara Gunnersson, Dermot Hayes, Lisa House, Darren Hudson, Wally Huffman, Sara Jaeger, Jim Kliebenstein, Cannon Koo, Muhammad Koohmarai, John List, Christy Lusk, Dana Marcellino, Michael Margolis, Darrell Mark, Chris McIntosh, Bryan Melton, Jim Mintert, Melissa Moore, Burt Morrow, Bailey Norwood, Greg Parkhurst, Matt Rousu, Ted Schroeder, S.Y. Shin, Lucine Tadevosyan, Abe Tegene, Bruce Traill, Carlotta Valli, Bob Wilhelm, and Christine Wilson. Sara Jaeger provided helpful comments on a number of the chapters. Seminar participants at the Journées d’Économie Expérimentale at Bureau d’Economie Théorique et Appliquée, Université Louis Pasteur, Strasbourg provided helpful comments on the material in chapters 9 and 10.

This book is dedicated to our families their support and patience during the writing of this book.
Contents

List of figures  ix
List of tables  x

1 Introduction  1
   1.1 Introduction  1
   1.2 Why experimental auctions?  3
   1.3 What is an experimental auction?  5
   1.4 Purpose of this book and boundaries of coverage  17

2 Incentive compatible auctions: theory and evidence  19
   2.1 Introduction  19
   2.2 Theory of incentive compatible auctions  20
   2.3 Evidence from induced value auctions  27

3 Value theory  34
   3.1 Introduction  34
   3.2 Valuation under certainty  34
   3.3 Valuation under uncertainty  37
   3.4 Valuation in a dynamic environment with uncertainty, limited information, and irreversibility  43
   3.5 Summary  44

4 Conducting experimental auctions: some preliminaries  46
   4.1 Introduction  46
   4.2 Experimental design  47
   4.3 Sample size determination  55
   4.4 Experiment setting and context: field versus laboratory  57
   4.5 Conclusions  61

5 Conducting experimental auctions  62
   5.1 Introduction  62
   5.2 Training and practice  62
   5.3 Endowment versus full bidding  65
   5.4 Choosing an auction mechanism  69
   5.5 Multiple good valuation, demand reduction, and field substitutes  76
   5.6 Learning and affiliation in repeated bidding rounds  80
   5.7 Negative values  92
   5.8 Conclusions  94
# Contents

6 Data analysis 95
   6.1 Introduction 95
   6.2 Censored regressions with auction bids 95
   6.3 Quantile regression with auction bids 100
   6.4 Panel data regression with auction bids 103
   6.5 Other types of data analysis with auction bids 106
   6.6 Conclusions 112

7 Valuation case studies 113
   7.1 Introduction 113
   7.2 Informing Policy I: beef tenderness grading system 113
   7.3 Informing Policy II: valuing safer food 121
   7.4 Informing Policy III: tolerance for genetically modified food 129
   7.5 Marketing I: forecasting market share of a new product 137
   7.6 Marketing II: preferences for fresh food with multiple quality attributes 141
   7.7 Marketing III: the value of farm financial records 149
   7.8 Controversial goods I: demand for genetically modified food in three countries 154
   7.9 Controversial goods II: irradiation 163
   7.10 Controversial goods III: food from animals treated with growth hormones 169
   7.11 Concluding comments 174

Appendices 175

8 Auction design: case studies 196
   8.1 Introduction 196
   8.2 Preference learning 196
   8.3 Willingness to pay, willingness to accept, and the auction mechanism 199
   8.4 Second price auction tournaments 209
   8.5 Preferences: fixed or fungible? 217
   8.6 Gift exchange 225
   8.7 Calibration of real and hypothetical auction bids 229
   8.8 Hybrid auctions and consequential bidding 239
   8.9 Concluding remarks 245

9 Validity of experimental auctions 247
   9.1 Introduction 247
   9.2 Auction bids and economic theory 248
   9.3 Reliability 252
   9.4 Convergent validity 255
   9.5 Anomalies 261
   9.6 Summary 267

10 The future of experimental auctions 269
   10.1 Introduction 269
   10.2 Ten questions worthy of future research 270
   10.3 Concluding remarks 278

References 279

Index 297
### Figures

1.1 Experimental auctions as a balance of control and context  

5.1 Expected cost of sub-optimal bidding for \( v_i = 3, N = 8 \), and values/prices are drawn from a uniform distribution on \([0, 10]\)  

5.2 Expected cost of sub-optimal bidding for \( v_i = 7, N = 8 \), and values/prices are drawn from a uniform distribution on \([0, 10]\)  

5.3 Second price auction bids for five beef steaks across five bidding rounds  

5.4 Bid functions and the determination of winner, loser, and market price  

6.1 Distribution of fifth price auction bids for a non-genetically modified cookie in France  

6.2 Hypothetical path model where six auction bids are represented by two latent factors  

7.1 The three types of labels used for the vegetable oil  

7.2 Distribution of round five auction bids by location  

7.3 Effect of information on bids for irradiated pork  

7.4 Average willingness to pay for “non-BST” milk in Iowa, Arkansas, Massachusetts, California (rural) and California (urban)  

B7.1 Financial records inventory sheet  

B7.2 Financial records bid sheet
Tables

1.1 Examples of experimental auctions in action page 7
2.1 Payoffs from bidding strategies 22
2.2 Payoff from bidding true value instead of under- or over-bidding 23
2.3 Results of studies testing incentive compatible mechanisms in induced value experiments 31
4.1 Four experimental treatments 48
4.2 Treatments in a $2^3$ design 49
4.3 Higher order effects in a $2^3$ design 50
4.4 A comparison of two fractional factorial designs 51
4.5 Sample size correction table for 95% level of confidence 57
5.1 Some incentive compatible auctions 69
5.2 Summary of panel data categories in List and Shogren (1999) 83
5.3 Two-way fixed effects estimation results for bid equation 84
5.4 Second price auction bids for beef steak across five bidding rounds 87
5.5 Aggregate and individual models of the effect of posted prices on bidding behavior 88
6.1 Comparison of tobit to double hurdle model 99
6.2 Conditional mean and quantile regressions 103
7.1 Summary statistics of auction bids and the value of tenderness ($n = 116$) 119
7.2 Price and probability assumptions used in welfare calculations 120
7.3 Consumer welfare changes from a tenderness grading system (all units in $ per choice occasion; $n = 116$) 120
7.4 Subjective and objective risk and a comparison of naïve and informed option price ($R^2$) of five pathogens 127
7.5 Summary statistics of tests within each additional salmonella treatment 128
7.6 Bids on non-genetically modified food with differing tolerance levels 135

© Cambridge University Press
www.cambridge.org
List of tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.7</td>
<td>Comparison of bids for non-GM foods with and without GM tolerance levels</td>
<td>136</td>
</tr>
<tr>
<td>7.8</td>
<td>T-test on null hypothesis that consumers value foods with a 1% tolerance the same as for a 5% tolerance</td>
<td>137</td>
</tr>
<tr>
<td>7.9</td>
<td>Market share simulations ( n = 119 )</td>
<td>140</td>
</tr>
<tr>
<td>7.10</td>
<td>Means of subjective evaluation scores of pork chop characteristics and auction bids by presentation format ( \text{scale} = 1 \text{ to } 100 )</td>
<td>147</td>
</tr>
<tr>
<td>7.11</td>
<td>Ordinary least squares regressions: effect of pork chop characteristics on market prices and bids in three evaluation formats</td>
<td>148</td>
</tr>
<tr>
<td>7.12</td>
<td>Distribution of bids for farm records and characteristics of farmers in four bid ranges</td>
<td>153</td>
</tr>
<tr>
<td>7.13</td>
<td>Summary statistics of willingness to accept distribution by location and auction round</td>
<td>158</td>
</tr>
<tr>
<td>7.14</td>
<td>Effect of attitudes and nationality on willingness to accept: median regression estimates</td>
<td>160</td>
</tr>
<tr>
<td>7.15</td>
<td>Effect of information on relative safety assessments</td>
<td>166</td>
</tr>
<tr>
<td>7.16</td>
<td>Effect of new information</td>
<td>168</td>
</tr>
<tr>
<td>7.17</td>
<td>Frequency distribution of bids at trial 20</td>
<td>173</td>
</tr>
<tr>
<td>8.1</td>
<td>Fixed-effects estimation results of bid function</td>
<td>198</td>
</tr>
<tr>
<td>8.2</td>
<td>Summary of experimental design parameters</td>
<td>202</td>
</tr>
<tr>
<td>8.3</td>
<td>Summary statistics of the Becker-DeGroot-Marschak Mechanism</td>
<td>204</td>
</tr>
<tr>
<td>8.4</td>
<td>Summary statistics of the second price auction</td>
<td>205</td>
</tr>
<tr>
<td>8.5</td>
<td>Summary statistics of the random ( n \text{th} ) price auction</td>
<td>208</td>
</tr>
<tr>
<td>8.6</td>
<td>Descriptive statistics (all rounds)</td>
<td>211</td>
</tr>
<tr>
<td>8.7</td>
<td>Panel data estimation results (two-way)</td>
<td>212</td>
</tr>
<tr>
<td>8.8</td>
<td>On margin/off margin panel data estimation results (two-way)</td>
<td>214</td>
</tr>
<tr>
<td>8.9</td>
<td>Efficiency in the tournament and standard second price auction</td>
<td>215</td>
</tr>
<tr>
<td>8.10</td>
<td>The impact of arbitrage on preference reversal rates (%)</td>
<td>221</td>
</tr>
<tr>
<td>8.11</td>
<td>Random-effects estimates for treatment 1 (Real arbitrage/real no-arbitrage)</td>
<td>222</td>
</tr>
<tr>
<td>8.12</td>
<td>Random-effects estimates for treatment 2 (Real arbitrage/real no-arbitrage)</td>
<td>223</td>
</tr>
<tr>
<td>8.13</td>
<td>Random-effects estimates for treatment 3 (Real arbitrage/hypothetical no-arbitrage)</td>
<td>224</td>
</tr>
<tr>
<td>8.14</td>
<td>Experimental design</td>
<td>226</td>
</tr>
<tr>
<td>8.15</td>
<td>Experimental results</td>
<td>228</td>
</tr>
<tr>
<td>8.16</td>
<td>Experimental results – across gifts</td>
<td>230</td>
</tr>
<tr>
<td>xii List of tables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>8.17 Selected characteristics of auction participants</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>8.18 Top two hypothetical and auction bids</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>8.19 Calibration functions</td>
<td>236</td>
<td></td>
</tr>
<tr>
<td>8.20 Summary of experimental design</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>8.21 Descriptive statistics (all rounds)</td>
<td>242</td>
<td></td>
</tr>
<tr>
<td>8.22 Panel data estimation results (7 outliers excluded)</td>
<td>242</td>
<td></td>
</tr>
<tr>
<td>8.23 Wald test results</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>8.24 Winners and price-setters in second price auction treatments</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>9.1 Correlation coefficients between auction bids for Certified Angus Beef steaks across five bidding rounds ((n = 70))</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>9.2 Correlation coefficients between mean bids for five beef steaks across four auction institutions ((n = 5))</td>
<td>255</td>
<td></td>
</tr>
</tbody>
</table>