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Introduction

Auction is a form of buying and selling goods, which becomes more and more popular in the recent years. Auctions are nothing new and have been met throughout the history. Babylonians auctioned their wives, Greeks auctioned mine concessions, Romans auctioned almost everything, starting from slaves and loots to debtors' properties. In 193 A.D. in Rome the Pretorian Guard after killing the Emperor Pertinax decided to sell on auction the whole Roman Empire. The auction was won by Didius Julianus who offered 25,000 sesterces per Guard member. His winning though turned out to be one of the first (and most extreme) cases of the so called winner's curse, as he was beheaded by the Pretorian Guard two months later.

In more recent times auctions have been successfully applied to sell livestock, agricultural produce, flowers, art, antiques, real estate. That is what auctions were mostly known for not so long ago. Nowadays, thanks to the wide application of Internet, on-line auctions like e-Bay or Allegro are used to sell thousands of products: from books and CDs to cars and clothes, both first- and second-hand. In 2008 a 22-year old American Natalie Dylan decided to auction… her virginity with the goal of collecting the money to finish Master studies, and later be able to start Ph.D. studies. Due to the fact that the case became a big media topic as many as 10 thousand offers from men all over the world were collected, with one Australian businessman allegedly offering 3.8 million dollars. Apparently the times of ancient Babylon are not all gone…

But the reason that economists have become so much interested in auctions is that they are used in huge financial transactions and have applications in many fields of economics. It is common now for the governments to use auctions to sell treasury bills, mineral rights (including oil leases) or emission permits. Privatizations or takeover battles also quite often take the form of an auction. Auctions have been successfully applied to sell mobile phone, or spectrum licenses. The 2000-2001 UMTS mobile services' auctions run in many European countries helped raise 100 billion dollars making it the biggest auction in history.

There are also auctions in which these are the sellers, not buyers, that compete in the auction and whoever offers the lowest price wins an auction. Such auctions are called procurement auctions. An example can be the situation when the government (or a public institution) is looking for the cheapest constructor of a bridge or a road, or procurement auctions carried out by private companies looking for the cheapest supplier of raw materials or transportation service. In 2006 it was estimated that in European Union public procurement auctions' contracts formed 16% of GDP and in the United States this number was even as high as 20%.

This textbook is by no means a complete compendium on all issues related to auctions. The approach of the book is purely economic. This means that the book

will not deal with the legal or organizational issues, resulting from the Polish or any other country's auction law. Nor will it deal with the managerial issues of how to create incentives for the employees to involve in the auction implementation process or arrange firm's structure. The book also does not present a very detailed description of the specific auction markets.

The main objective of the book is to describe the auctions from the point of view of economics, i.e. the main stress will be put on the economic efficiency of this mechanism. There is an abundance of available auction designs that an auctioneer can choose from. A design chosen depends on the auctioneer's goals. Quite often it is merely the maximization of revenues (or minimization of costs in case of procurement). Nevertheless, especially in case of public auctions, the important objectives could be the efficiency, increase of competition or transparency of transactions. The diversity of those applications and of different auction designs that can be used makes studies on auction theory crucial for any economist. The book covers both theoretical and practical aspects of auctions, explaining the main definitions and designs, and illustrating the main ideas with the real life case studies.

The book consists of 13 chapters. First chapters deal mostly with the theoretical issues, whereas the next ones discuss the more practical problems. Chapter 1 presents the basic definitions and types of auctions and defines the most important auction mechanisms. Chapters 2 and 3 deal with the problem of optimal bidder's strategy in the so called private-value auctions. Chapter 3 involves the biggest amount of mathematical analyses and those who do not feel strong in math can skip most part of it. Nevertheless it is necessary that they at least read the final conclusions at the end of the chapter. Chapter 4 analyses the theoretical and practical aspects of the reserve price, which is an important element of an auction design. Chapter 5 describes the common-value auctions and the winner's curse phenomenon. It also compares the functioning of various mechanisms in case of the existence of the common-value element.

Chapter 6 is devoted to procurement auctions. In theory the procurement auctions are nothing but reversed variants of the normal auctions. Nevertheless thanks to some specifics of this type of auctions it is worth devoting them separate analyses. Chapter 7 describes the Internet auctions and e-procurement. The aim of the chapter is to characterize the main mechanisms and phenomena met in case of such auctions.

Starting with chapter 8 the book turns to the analyses of multi-unit auctions, i.e. auctions in case of which many objects are sold at the same time. This situation creates new problems which are not observable in case of single-unit auctions. Chapter 8 presents the main definitions and describes the most important auction mechanisms that are applied in a simple case of substitutive objects. A much more complicated situation arises when there are complementarities among the objects sold. In this situation the so called combinatorial auctions have to be introduced, which are analyzed in detail in chapter 9.

The next two chapters deal with the practice of auction design. Chapter 10 discusses the main objectives and evaluation criteria of auction design. It also compares the most important auction mechanisms in light of those criteria. Chapter 11 starts with an analysis of some additional practical elements which influence the course and results of auctions. The choice of the appropriate auction rules depends on the specifics of the market situation, the type of objects purchased, the number of auction participants and so on. This chapter summarizes the most important practical issues and illustrates their importance using the case of the UMTS auctions in Europe.

Chapter 12 briefly discusses the case of double auctions which are the most difficult auctions to analyze. So far the theory of such auctions has not been very well developed. Chapter 13 presents few examples of the application of auction theory in case of other sciences.

Every chapter ends with a summary which presents the most important definitions and conclusions. There is also a list of questions and exercises which test the reader's understanding of the chapter's content and sometimes provoke him to think over the discussed issues more thoroughly.

The book is intended mainly for the students with majors in economics. It seems that due to the growing popularity of auctions as a mechanism of transactions' making, it is necessary that every economics student has at least some basic knowledge on auction theory. But it is hoped that the book turns out to be a useful summary of the main auction theory concepts also for the practitioners, both auctioneers and those who participate in the auctions as bidders.