

2 How to use this book

2 A The purpose of the book

This textbook is aimed at students of economics, business and related fields, particularly those in their third or fourth year of undergraduate study. However, we believe that the book could also be beneficial to Masters and even PhD students. Many parts were written as to be comprehensible also to a second-year undergraduate student equipped with some rudimentary knowledge of game theory and basic microeconomics, not to mention a healthy dose of curiosity.

The goal of the book is to introduce students to the concepts of information economics which have developed during the so-called “information revolution” of the last thirty years (see Box 2.1). Presenting a new field is like showing a foreign visitor around one’s home town or country. Should we go by taxi, allowing us to take the visitor anywhere? Or, should we recommend the sight-seeing bus, which does not give the traveller much flexibility (except falling asleep, perhaps), but guarantees stop-offs at a few important sites?

In this book we opted for the sight-seeing approach. We try to give readers an idea of some of the central ideas behind information economics, the equivalents of the Eiffel Tower, Notre Dame, or the Louvre. Once readers are familiar with the structure of the field and its most important features, they can strike out on their own: either taking a taxi and looking at some places of private interest or embarking on the lone walk of research . . .

Box 2.1 The information revolution in economics

Economists have long been interested in the role of information in the economy. Yet, much of economic theory was developed under the assumption that individuals make their decisions based on perfect knowledge. This assumption enables us to model the economy in terms of a general equilibrium framework, known as the Arrow–Debreu model. Such a model is able to cope with uncertainty, insofar as it is of the well-behaved kind, under which all agents believe in the same probabilities for the same events.

In the second half of the twentieth century, advances in telecommunications led to a growing interest in “information theory”, first among physicists, and later among economists. Physicists and engineers tackled questions such as how information could be described or measured, often with a view to its optimal transmission through a given channel, like a cable. At the same time, mathematicians developed the basics of strategic behavior theory, better known as game theory. If one single event should symbolize this development, it would be the formulation of the equilibrium in a non-cooperative game by John Nash in 1950.

In the early 1970s a number of economists started to analyze a new type of problem, namely situations in which some agents had better information than others. George Akerlof (1970), in his famous “market for lemons” paper, showed that even slight informational asymmetries could lead to complete market failure.

This “new information economics” was very successful in explaining real world phenomena and institutions like auctions, banks, brand names, stock market bubbles, credit crunches, or incentive systems, to name but a few. The Economics Nobel Prize (Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel) was twice awarded to representatives from the field of information economics. In 1996, James A. Mirrlees and William Vickrey were honored for their fundamental contributions to the economic theory of incentives under asymmetric information. In 2001, George A. Akerlof, A. Michael Spence and Joseph E. Stiglitz received the prize for their analyses of markets with asymmetric information. In addition, several other Nobel laureates had contributed to information economics and to its game theoretic roots: Kenneth J. Arrow (1972), George J. Stigler (1982), John F. Nash (1994), as well as Robert J. Aumann and Thomas C. Schelling (2005). One of the leading figures in the “information revolution”, Jack Hirshleifer (1925–2005), did not receive a Nobel prize, although many believe that he would have been a worthy winner (Hausken, 2006).

2 B Ways of reading the book

We have tried to make this book readable and easy to use. To begin with, the sections in each chapter follow the *same structure*:

- **Introduction:** Chapter overview and how it relates to other chapters.
- **Main ideas:** A presentation of the basic ideas in an intuitive, non-technical fashion, using day-to-day language and aided by a wealth of examples.
- **Theory:** An introduction to the relevant model(s) using as little formal apparatus as possible.

- **Applications:** “Real world” examples in which the models developed in the theory sections play a role, or extensions and topics complementary to the theory section.
- **Conclusions and further reading:** A short look at what has been learnt and what questions remain unanswered.
- **Problem sets:** A selection of problems for self-training.

Second, we have placed some material in *boxes*. Boxes are “plug-ins” which differ in content from the main body of the text: (i) illustrations (example: Solomon’s judgement), (ii) repeatedly used concepts (example: The Elementary Game), (iii) background information from theory or statistics (example: The Uniform distribution). Third, at the end of each chapter we include a checklist of the concepts a reader should by then be familiar with.

And, last but not least, Alice and Bob will guide readers through the text.



Alice and Bob are two young individuals who have already met at the beginning of the book (Chapter 1) and will share several experiences, which illustrate some of the situations analyzed in the book. Their adventures highlight analytical concepts, but often illustrate the limits of a mechanical application.

Of course, one could read all Alice and Bob episodes first, like nibbling off all the icing before eating the cake. A similar strategy of cutting “horizontally” through the book would be to read the “Main Ideas” sections first, before deciding whether any of these ideas deserves more in-depth study, and thus turning to the relevant “Theory” section. Some students may find they have no time to lose and will go directly to the Theory sections. The most ambitious (but by no means an inefficient) way to learn information economics would be to start with the problem sets and go back to the theory, whenever one fails at a problem set.

Solving *only* the problem sets is a better strategy than reading everything *except* the problem sets. There is no substitute for practice, as Professor Myrna Wooders notes on her homepage,⁴ offering her students the following advice:

Watching your instructor solve problems and thinking that you are learning how to solve problems is like watching an aerobics class and thinking that you are becoming fit. Watching helps to learn the ‘moves’, mental and physical, but cannot substitute for doing the workouts yourself.

To put a more positive spin on it: Look how quickly children learn, simply because they are not afraid of making mistakes and because they do not hold back from trying again and again until they succeed. True, workouts seem hard and problems appear difficult. Yet, as economists know, difficulty, like everything else,

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is “endogenous”. As the Roman philosopher, the younger Seneca (4 BC–65 AD), put it:

It’s not because things are difficult that we dare not venture. It’s because we dare not venture that they are difficult.

(Lucius Annaeus Seneca, *Epistulae Morales*, book VII)

2 C The structure of the book

The present volume is structured into four parts. Part I gives an introduction to the basic concepts of *information as an economic good* (Chapter 3) and to its valuation (Chapter 4). It explains how much costly information an individual would optimally acquire if deciding in isolation (Chapter 5) or would produce in a strategic environment (Chapter 6). It very much focuses on the viewpoint of one sole individual (Robinson Crusoe).

Part II concerns the *aggregation of information* held by different individuals. We first show how markets aggregate information (Chapter 7). In this context we also distinguish between information about facts and information about information (Chapter 8). Functioning markets require communication among agents. When communication is imperfect, individuals may fail to coordinate actions (Chapter 9) or may try to learn by observing each others’ actions (Chapter 10). We conclude this part with some novel aspects of information acquisition and aggregation in macroeconomic contexts which have arisen in recent years (Chapter 11).

Part III deals with the problems arising under *asymmetric information*. To start with, we introduce the winner’s curse (Chapter 12) followed by its sister, adverse selection (Chapter 13). We also show how informational asymmetries can be mitigated by use of optimal contracts (Chapter 14). A helpful device to find optimal contracts is the revelation principle (Chapter 15). All these chapters discuss so-called “hidden information”. Another information asymmetry is “hidden action”, which leads to moral hazard (Chapter 16).

Part IV leads into terrain only recently discovered by economists: The use of *information within the individual* for identity building and self-management (Chapter 17).

2 D Using the book for teaching

There are several ways of using the book for teaching purposes, some of which we have tried ourselves. The following is a non-exhaustive list of suggestions:

- **Information economics:** Teaching the full book to fourth year or Masters students requires at least three hours per week. Some of the applications can be skipped or left as student assignments.
- **Asymmetric information:** A two-hour standard course would cover Chapters 3, 12, 13, followed by 7, 14, 15, 16.

- **Financial intermediation:** We suggest using the book as background reading and for a discussion of individual sections like 4 E, 6 E, 6 F, 7 E, 9 D, 14 E, 15 D, 16 D, and of complementary topics from Freixas and Rochet (1997).
- **The macroeconomics of information:** The backbone of such a course could consist of Chapters 6, particularly 6 D, 8, 9, 10, 11 and, we would recommend, 17.
- **Information in finance:** To teach finance students the informational background of problems in finance we would use Chapters 3, 12, 13, 7, 8, 10, 9 and 17.
- **Endogenous information:** This challenging subject would most likely be treated in a PhD course, based on Chapters 3, 4, 5, 6, 10, 11, rounded off by reading a few articles which have appeared in journals.
- **Economics and psychology:** The transition from *homo oeconomicus* to *homo sapiens* and research into the decision process *within* the individual have been inspired by behavioral economics, psychology and neuro-science. An introductory course, on graduate or PhD level, could be built around Chapter 17 (and some key articles cited therein), with further inputs from Chapters 3, 5, 10, 11 and 16.

2 E Solutions to problem sets and other supporting material

We have set up a website for readers of this book. The address is: <http://www.alicebob.info>. There we shall post solutions and hints to the problem sets (at least to some) and further material that may be helpful to the reader. The website will also be used to publish any errata, although we hope we shall not have to avail of this space!