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Steven Brakman, Harry Garretsen, and Charles van Marrewijk

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## The New Introduction to Geographical Economics

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Geographical economics starts from the observation that, clearly, economic activity is not randomly distributed across space. This revised and updated introduction to geographical economics uses the modern tools of economic theory to explain the who, why, and where of the location of economic activity.

Key features:

- Provides an integrated, first-principles introduction to geographical economics for advanced undergraduate students and first-year graduate students
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- Presents a truly global analysis of issues in geographical economics using case studies from all over the world, including North America, Europe, Africa, and Australasia
- Contains many computer simulations and end-of chapter exercises to encourage learning and understanding through application

A companion website is available at [www.cambridge.org/geog-econ](http://www.cambridge.org/geog-econ).

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# Symbols and Parameters

## Symbols

<i>Indices</i>	$r,s$ for regions $i,j$ for varieties
$B$	break point
$S$	sustain point or stable equilibrium
$U$	utility
$L$	labor force
$K$	(human) capital stock
$C$	consumption
$H$	housing stock
$HI$	Herfindahl index
$H(N)$	cost of living curve
$T$	transport costs; units to be shipped to ensure one unit arrives
$T_{rs}$	transport costs; units to be shipped from region $r$ to ensure one unit arrives in region $s$
$t$	time index or iteration index
$l_{ir}$	labor required to produce variety $i$ in region $r$
$R$	number of regions or rank
$N$	number of varieties or labor force
$N_r, n_r$	number of varieties of manufactures produced in region $r$
$x_{ir}$	amount of variety $i$ produced in region $r$
$x_r$	total production of manufactures of a representative producer in region $r$
$P_r$	locally charged price for a variety of manufactures in region $r$
$W_r$	nominal wage in region $r$
$w_r$	real wage in region $r$
$r_s$	reward to (human) capital in region $s$

**xix**      **List of Symbols and Parameters**

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$\overline{w}$	average real wage
$Y$	income
$y$	real income
$q$	slope of rank size rule
$F$	food
$M$	manufactures
$I$	exact price index of manufactures
$c_i$	consumption of manufacturing variety $i$
$E_{rs}$	expenditures in region $r$ on goods from region $s$
$D_{rs}$	distance from region $r$ to region $s$
$D_J$	intermediate good for sector $J = A, B$

---

**Parameters**

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$a$	fixed cost or econometric coefficient
$\beta$	marginal cost or econometric coefficient
$\gamma$	share of labor force in manufactures or econometric coefficient, Cobb–Douglas parameter
$\varepsilon$	elasticity of substitution = $1/(1-\rho)$
$\delta$	share of income spent on manufactured goods or stable equilibrium
$\lambda_r$	share of manufacturing labor force working in region $r$
$\sigma$	threshold value for real wage differences in simulations
$\tau$	congestion parameter
$\phi_r$	fraction of food labor in region $r$
$\varphi$	freeness of trade = $T^{1-\varepsilon}$
$\theta$	miscellaneous parameter
$\eta$	speed of adjustment, intersectoral labor mobility, or elasticity of labor supply
$\rho$	substitution parameter (love-of-variety), relative indirect utility, or shock persistence
$\pi$	extent of comparative advantage or profits
$\kappa$	miscellaneous parameter (for econometric equations and knowledge spillovers)
$\mu$	intermediate input share or capital intensity of sector A (factor abundance)
$\Omega$	initial city size

# Preface to the new edition

## Positioning of the book

The purpose of this book is to offer an *introduction* to an important field in economics, entitled *geographical economics*, which sets out to explain the distribution of economic activity across space. In doing so, it endeavors to bring together and apply insights from various fields of economics. The book will therefore be of interest to students and scholars from international economics and business, as well as from economic geography, regional economics, and urban economics. The fact that we offer an “introduction” does not mean that we avoid models or shy away from difficult concepts; it indicates that we have attempted to write a book that is accessible to readers and students who are new to the field of geographical economics.

Although we introduce and discuss various modeling approaches, we keep the required technicalities to a minimum. Whenever possible we draw attention to important concepts and applications in *special interest boxes*, making ample use of examples and diagrams to explain the workings of the models. Chapter 3, which explains the structure of the core model of geographical economics, gives background derivations in *technical notes*. Throughout the book the required level of mathematical competence required does not go beyond simple optimization techniques that should be familiar to upper-level undergraduate and first-year graduate students, both in economics and in other fields of social sciences. The target audience of our book is not limited to these students, however, but includes professionals working at government agencies, banks, international organizations, and private research firms, as well as students and scholars of international business and economic geography. The latter category may find the book of interest if only to get to know what they disagree with when it comes to the analysis of the location of economic activity!

To help the reader in developing his or her intuition for different aspects important in determining the interaction between location decisions and economic performance, and to get a better feel for the modeling structure and empirical relevance of geographical economics, we include discussions of many real-world examples, and present and evaluate the currently available empirical evidence. In addition, we explain in detail an important but often neglected aspect of the geographical economics approach: *computer simulations*. We discuss their advantages and disadvantages, what is needed to actually perform such simulations, and give the reader access to a few user-friendly simple simulations (see below). The emphasis on examples, diagrams, and empirical evidence, together with the introductory nature of the book, the limited technical requirements in our analysis, and our concern to include explanatory simulation exercises, sets our book clearly apart from, and makes it a suitable introduction to, *The Spatial Economy*, the seminal contribution of Masahisa Fujita, Paul Krugman, and Anthony Venables (1999) that was the first major book to appear on geographical economics and that caters to the needs of the academic world (PhD students and fellow researchers).

There is a special *website* available for our book, for several reasons. First, it gives brief general background information on the structure of the book. Second, it deals with some aspects of the exercises to be found in the *problem set* at the end of every chapter. Not only do the exercises test the reader's knowledge of the contents of the chapter but they are also used to introduce some additional material. Third, the website provides illustrations and data material on economic location. Fourth, it provides some simple and user-friendly simulation models, which can familiarize the reader with this aspect of the geographical economics approach. Fifth, for the interested reader the website provides some additional derivations of technical details not dealt with in the book itself, as well as some more advanced (working) papers. Sixth, the website is a source of information for links to relevant researchers and institutions. Finally, it provides some background information on the authors.

### Geographical economics: what's in a name?

In our view, the approach in this book is best characterized as an attempt to put more geography into economics. It is the main reason for us to prefer the term “geographical economics” rather than alternatives, such as “new

regional science” or the widely used term; “*new economic geography*.” Not only does the label “new” inevitably wear off after some time, but the latter term also has the disadvantage that it suggests that the theory was developed by economic geographers. This is not the case. Instead, geographical economics has its roots firmly in international economics, and modern international trade and economic growth theory. It adds the location of economic activity to these theories.

In the end a label is just a label, and what really matters, of course, are the topics covered in geographical economics. In 1933 the Swedish economist Bertil Ohlin published a book called *Interregional and International Trade*, in which he strongly advocated a closer collaboration between what is now called international economics and regional economics, as they share, in Ohlin’s view, the same research objective. To a large extent, geographical economics can be looked upon as a (somewhat belated) reply to Ohlin’s call, originating from within international economics. As Krugman puts it (1991b: 7), it is an attempt “to resurrect economic geography as a major field within economics.” An attempt in which the modern tools of mainstream economic theory are used to explain the *who, why, and where* of the location of economic activity. As to the scientific recognition of geographical economics, the Nobel Prize in economics was awarded to Paul Krugman for his work on international trade and economic geography on October 13, 2008.

Geographical economics takes as its starting point the empirical fact that economic activity is, clearly, not distributed randomly across space. A quick look at any map suffices to show that the clustering of people and firms is the rule and not the exception. Geographical economics seeks to give a microeconomic foundation for this fact using a general equilibrium framework. Geographical economics models are often hard to solve analytically, such that the approach relies to a large extent on *computer simulations* to determine the distribution of economic activity across space and build intuition for the strength of the powers involved. Throughout our book we will also often use computer simulations.

Given the target audience, a considerable part of our book explains in detail the structure and main results of the so-called core models of geographical economics in chapters 3 and 4 of the book, after an introduction to the topic in chapter 1 and a discussion of the antecedents of geographical economics in chapter 2. Chapters 3 and 4, together with chapters 5 and 6 on empirical research and evidence, constitute the heart of the book. Chapters 7–10 deal with a variety of extensions to and modified empirical

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applications of the core model. In our selection of these extensions we deliberately chose applications requiring only relatively small modifications of the core model. Topics covered by chapters 7–10 are urban economics and city-size distributions, foreign direct investment (FDI) and multinationals, the theory and empirics of international trade, and dynamics and economic growth. The final two chapters deal with policy implications (chapter 11) and an evaluation of geographical economics (chapter 12).

### What's new?

The first edition of this book, called *An Introduction to Geographical Economics*, was published in December 2001. At that time the only other book around on geographical economics was the *The Spatial Economy* by Fujita, Krugman, and Venables (1999). Since the turn of the century research in geographical economics has boomed, and this has resulted not only in many important new papers but also in a number of books and surveys that bring together and summarize the latest developments and insights. In particular, three additional books on geographical economics should be mentioned here: *Economics of Agglomeration*, by Fujita and Jacques-François Thisse (2002); *Economic Geography and Public Policy*, by Richard Baldwin, Richard Forslid, Philippe Martin, Gianmarco Ottaviano, and Frederic Robert-Nicoud (2003); and *Economic Geography*, by Pierre-Philippe Combes, Thierry Mayer, and Thisse (2006, 2008). Besides these new books, there are also very good (and critical) surveys of geographical economics available (such as that by Peter Neary, 2001), and, last but not least, in *The Handbook of Regional and Urban Economics*, vol. IV (Vernon Henderson and Thisse, 2004), geographical economics is the central topic. Various chapters in this handbook (e.g. Gilles Duranton and Diego Puga, 2004, Ottaviano and Thisse, 2004, and Keith Head and Mayer, 2004a) do a great job in summarizing and synthesizing this field of research. All the same, just as with the first edition of our book, we still feel that there is a clear need for a book that can serve as an introduction to geographical economics.

Based on the feedback and encouragement we received for the first edition from fellow researchers and students, and inspired by the many developments that have taken place in the literature since 2001, we started to work on a second edition of the book. The initial idea was to merely update and expand the previous version, but as we sat down to work on the new edition it quickly became clear that a more substantial revision was

called for in order to do justice to the latest developments in the field. In the end, and while still sticking to the basic set-up of the first edition, the present edition covers a lot of new ground, and the slight change in the title of the book signals these changes.

So, what are the main changes? Besides updating the empirical material throughout the book, adjusting references (about 50 percent of the references postdate the first edition of the book), making numerous smaller changes, and the like, the most important changes are:

- The discussion and set-up of the core model of geographical economics (Krugman, 1991a) is now concentrated in a single chapter, chapter 3, whereas chapter 4 is largely new and discusses three other core models at length: an intermediate goods model, a model that may give rise to the so-called bell-shaped curve, and a solvable model.
- Given the surge of empirical research in geographical economics in the first decade of the twenty-first century, the empirical evidence is now discussed in two chapters (chapters 5 and 6) instead of a single chapter. Inspired by Head and Mayer's (2004a) list of five testable hypotheses, the second part of chapter 5 has been rewritten, and chapter 6 is wholly new.
- In the first edition of the book, the discussion of urban economics in chapter 7 focused rather strongly on city-size distributions and Zipf's Law. Interesting though this is, we have decided this time to trim down this part of the analysis and instead include more material on the main ingredients of modern urban economics. Based on the paper by Combes, Duranton, and Henry Overman (2005), this chapter now also uses a diagrammatic (non-formal) analysis of the core urban and geographical economics models, as initially developed by Henderson (1974) and Krugman (1991a) respectively.
- In international economics two burgeoning fields of research have been those on FDI (and firm heterogeneity) and gravity models. In chapters 8 and 9 we have included some of these new insights in order to illustrate their relevance for geographical economics.
- Chapter 10 still deals with dynamics and growth. Apart from a wholly new section on stylized facts, the main change considers the inclusion of a new section on the role of (first-nature) geography and institutions, as well as a discussion on the importance of (both first-nature and second-nature) geography and institutions as the "deep" determinants of economic development.
- Chapter 11 in the first edition discussed policy implications and provided a critical evaluation of the contributions of geographical economics.

In the new edition, these issues are separated in a largely extended discussion. Inspired by the Baldwin *et al.* (2003) book, the new Chapter 11 analyzes the policy implications of geographical economics. Chapter 12 evaluates the contributions of geographical economics and deals simultaneously with the critical remarks raised by, for example, economic geographers.

The *website of the book* (at [www.cambridge.org/geog-econ](http://www.cambridge.org/geog-econ)) has been extensively updated and provides a lot of new material. Some supporting material that was part of the first edition but for which we did not have enough space in the second edition is also posted on the website.

As building blocks for the revisions and extensions, we not only made use of the new books and papers (see above), but also included our own research efforts, when appropriate. Our main consideration in this respect was always whether or not our own research was a fair representation of a wider body of work (it does not signal a preference for our own research relative to related research!).



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