Preface

This volume is a handbook that presents old and new theoretical, methodological and empirical insights into perspectives on and explorations of entropy, complexity and spatial dynamics. As such, it is a reference work intended to provide readers with facts and guidance on the state of the art of what we consider to be the most essential and possibly fruitful approach to studying urban and regional spatial phenomena.

The volume presents new advances, including novel modelling and empirical insights using new data at different sectoral, spatial and temporal scales. A central and cross-cutting theme of the handbook is the role of entropy both as a measure of spatial complexity and as a process involved in the dynamic and emergent behaviour of spatial socioeconomic systems.

In a complex system, entropy generally refers to the amount of uncertainty and dispersion, conceived in a positive connotation as an order parameter – that is, the most probable state or distribution – emerging from micro-meso elements and evolving over time.

The conception of the economy as a self-organising emergent system might be traced back to Adam Smith's treatment of increasing returns in *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776). Unfortunately, until some four decades ago, Smith's original ideas were obscured by a lack of accepted methods of analysis and, as a result, of study of conditions needed to bring spatial economic systems into states of equilibrium.

In this volume, we pick up the long-dormant ideas awakened by the early interest of some natural scientists in socioeconomic spatial phenomena, bringing entropy into the fore as a force and outcome in complex, evolutionary systems.

The volume comprises contributions by the leading experts in the field. It presents investigations by scholars from various disciplines of the potential for revitalising the theoretical underpinnings of spatial economic science and the use of big data. Over the years we organised and participated in special sessions at various academic meetings to facilitate scholarly discussions on entropy, complexity and spatial dynamics. We were encouraged by colleagues to publish the proceedings of these sessions as special issues of journals. We have long thought that contributions to the understanding of entropy, complexity and spatial dynamics had reached maturity, calling for mapping and sorting out of the extant knowledge. In particular, we wanted to explore whether entropy is a universal principle that enables us to join probabilistic approaches with behavioural approaches to understand, model and predict spatial economic systems, considering uncertainties and discontinuities in their evolution – that is, complexity. We were fortunate to be able to recruit many of the leading scholars to this endeavour. The contributions varied from a historical recounting of the evolution of concepts to theoretical proposals to recent empirical applications. The result is a volume that introduces both the novice approaching the field and the expert to novel tactics and methods.

Our idea was enthusiastically supported by Alan Sturmer (Edward Elgar, USA), and we would like to thank him for his professional and kind cooperation. We are also grateful to Elizabeth Clack for her continuous assistance during the handbook's publication process.

During the early stages of preparing the volume, we were encouraged by Roger R. Stough. Indeed, he intended to contribute a chapter examining the complex dynamics of resistance,

acceptance and propagation of novel concepts and ideas. The contribution was to incorporate concepts from Shannon's information entropy, thermodynamic entropy and Gibb's entropic models based on statistical mechanics. Alas, shortly after the start of this project, Roger passed away.

Roger R. Stough's scientific and professional achievements were remarkable. Throughout his career, he made substantial contributions to many fields and disciplines, including regional science, transportation planning, science and technology, public policy, spatial economics and complexity science. In these areas, he authored and co authored countless manuscripts, including books, articles and reports. Roger regularly travelled the world, participating in scientific meetings and seminars to engage in intellectual dialogues but also to network with his many connections from every corner of the globe. Roger R. Stough was open to new and emerging ideas – to frontier topics, as he called them – and he encouraged all of us to push the limits of our respective fields. He was an exceptional mentor, inspiring and helping students (and even faculty) to reach greater heights. Lastly, Roger had a keen appreciation for cross-, inter- and transdisciplinary research, much like that contained in this handbook.

For these reasons we dedicate the handbook to Roger R. Stough – a great scholar, trailblazer, mentor, colleague and friend.

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