International Studies in Entrepreneurship

David B. Audretsch
Albert N. Link *Editors*

Essays in Public Sector Entrepreneurship

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David B. Audretsch is a distinguished professor and Ameritech chair of Economic Development at Indiana University, where he also serves as director of the Institute for Development Strategies. He also is an honorary professor of industrial economics and entrepreneurship at the WHU-Otto Beisheim School of Management in Germany and a research fellow of the Centre for Economic Policy Research in London.

Audretsch's research has focused on the links between entrepreneurship, government policy, innovation, economic development and global competitiveness. His recent books include *Everything in Its Place: The Strategic Management of Cities, Regions and States* with Oxford University Press, and *The Handbook of Local Competitiveness*, also with Oxford University Press. He is co-founder and co-editor of *Small Business Economics: An Entrepreneurship Journal*. He was awarded the 2001 Global Award for Entrepreneurship Research by the Swedish Foundation for Small Business Research. In 2008 he received an honorary doctorate degree from

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Pontus Braunerhjelm is professor in economics since 2005 and since 2012 head of the Department of Industrial Economics and Management at the Royal Institute of Technology, Stockholm. He is also research director at the Swedish Entrepreneurship Forum where he served as managing director between 2008 and 2014. Braunerhjelm earned his Ph.D. at the Graduate Institute of International Studies, Geneva, Switzerland, in 1994. His research focuses on the intersection between innovation, entrepreneurship, industrial dynamics and growth, covering both theoretical and empirical aspects. He has published extensively in that area, both in scientific outlets and outlets geared towards a wider audience. Institutions and their policy implications is a central theme in most of his academic work, and he has also been engaged in several policy-oriented projects of a more applied nature for the Swedish Government as well as internationally.

Between 2007 and 2009 he was general secretary of the Swedish Globalisation Council set up by the Swedish government. The objective of the Globalisation Council was to suggest economic policy reforms that enabled exploitation of the potential welfare effects associated with increasing globalisation and to broaden the national debate on issues related to globalisation. In May 2014 he was asked to serve as chairman of the Government Committee on Entrepreneurship Policy. The committee will present their results in October 2016. Braunerhjelm is also a member of the Royal Swedish Academy of Engineering Sciences (IVA) and a number of other boards and scientific committees.

James A. Cunningham is professor of strategic management at Newcastle Business School, United Kingdom. His research intersects the fields of strategic management, innovation and entrepreneurship. His research focuses on strategy issues with respect to principal investigators as scientific entrepreneurs and market shapers, university technology transfer commercialisation, academic and technology entrepreneurship, entrepreneurial universities and public sector entrepreneurship. His has papers published in leading international journals such as *Research Policy*, *Long Range Planning*, *Journal of Technology Transfer*, *International Entrepreneurship and Management Journal*, *International Journal of Technology Management* and the *Journal of Intellectual Capital*. He has published seven books on the themes strategy, entrepreneurship, technology transfer and technology entrepreneurship with leading publishers such as Oxford University Press and Palgrave MacMillan. He is currently a member of the editorial boards of the *Journal of Technology*

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Magnus Henrekson is president of the Research Institute of Industrial Economics (IFN). Until 2009, he was Jacob Wallenberg professor at the Department of Economics at the Stockholm School of Economics. In 1990, he earned his doctoral degree (writing on the topic of public sector growth) at the University of Gothenburg. During the 1990s, his research mainly focused on empirical explanations of economic growth. He has written several acclaimed papers on why Sweden's growth has lagged behind comparable countries. In recent years, his research has focused primarily on entrepreneurship economics with a particular emphasis on the institutional determinants of the business climate.

In 2011–2014, he was a commissioned expert on the Swedish Government Committee on Business Taxation, and in 2015, he became a commissioned expert on the Government Committee on Entrepreneurship Policy. He has also written a number of books, studies and articles within the framework of Swedish policy discussions. He has experience in international banking and has served as an advisor in both the public and private sectors. Henrekson is a member of the Royal Swedish Academy of Engineering Sciences (IVA), and he has been a board member of two public companies, one high-tech start-up and the Swedish public service broadcasting company.

Albert N. Link is the Virginia Batte Phillips distinguished professor at the University of North Carolina at Greensboro. He holds a B.S. degree in mathematics (Phi Beta Kappa) from the University of Richmond and a Ph.D. in economics from Tulane University. Over the past several decades, he has distinguished himself as a leading scholar in fields related to entrepreneurship, technology and innovation policy, technology transfer and programme evaluation. He is editor in chief of the *Journal of Technology Transfer*, and he is a noted advisor to US and international government agencies. Most recently, he has consulted for the US Department of Energy, NASA and the National Institute of Standards and Technology, as well as for the National Academy of Sciences, the Canadian government, and The World Bank.

Link's publications in these areas are numerous. He has published in such academic journals as the *American Economic Review*, the *Journal of Political Economy*, the *Review of Economics and Statistics*, *Economica*, the *European Economic Review* and *Research Policy*. His recent books include *The Oxford Handbook of Local Competitiveness* (Oxford University Press), *The Chicago Handbook on University Technology Transfer* (University of Chicago Press), *Public Sector Entrepreneurship* (Oxford University Press), *Battery Technology for Electric Vehicles: Public Science and Private Innovation* (Routledge) and *Bending the Arc of Innovation: Public Support of R&D in Small, Entrepreneurial Firms* (Palgrave-Macmillan).

Vincent Mangematin is professor of strategic management and management of innovation and associate dean for research at Grenoble Ecole de Management, France. His research focuses on emerging processes (research, innovation, business

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Paul O'Reilly is head of research in the College of Business at Dublin Institute of Technology. His research activities are primarily on the role of PIs in public research systems. He was PI on the IRCHSS-funded project "An Appraisal of the Role of the Principal Investigator in their Delivery of Publicly Funded Research" and co-PI on the Food Institutional Research Measure project's "Development of a Technology Commercialisation Toolbox for Publicly Funded Food Research".

He has undertaken related consultancy assignments for Enterprise Ireland, European Commission, Forfas, Royal Irish Academy and Teagasc (Irish State agriculture and food research agency). He has served in an advisory capacity for the Irish Department of Agriculture on issues relating to technology transfer and is an external project evaluator for Teagasc. He has papers published in *Long Range Planning*, *Journal of Technology Transfer*, the *International Journal of Technology Management* and *Irish Journal of Management*.

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Chapter 1
Introduction

David B. Audretsch and Albert N. Link

Public sector entrepreneurship has been defined as the promulgation of innovative public policy initiatives that generate greater economic prosperity by transforming a status quo economic environment into one that is more conducive to economic units engaging in creative activities in the face of uncertainty (Leyden and Link, 2015). In today's economy, public sector entrepreneurship affects that transformation primarily by increasing the effectiveness of knowledge networks, that is, by increasing the heterogeneity of experiential ties among economic units and the ability of those same economic units to exploit such diversity. Through policy initiatives that are characterized by public sector entrepreneurship, there will be more development of new technology and hence more innovation throughout the economy.

We have assembled in this volume four essays that deal broadly with public sector entrepreneurship. Because innovation is the driver of economic growth and development, we believe that future policy initiatives that build on this premise will be cast within a public sector entrepreneurship framework. Thus, the following four essays may well represent the pillars on which future policies are developed.

In Chap. 2, Richardson, Audretsch, and Aldridge explore how US federal institutions influence innovation in the knowledge economy in an effort to ask if any US agencies or particular policies could be replicated in other countries. Three key US agencies are identified as having significantly contributed to innovation and growth: the Small Business Innovation Research (SBIR) program, the Advanced Technology Program (ATP), and the Defense Advanced Research Projects Agency (DARPA).

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Richardson et al. offer a view for understanding why and how search and development does not necessarily lead to innovation and economic activity. To become a successful innovation, ideas must first pass through a knowledge filter. The use of a knowledge filter, which may impede the development of potential innovations, implies that the evolution from ideas to innovations is neither linear nor does it imply that innovations will be successful. Therefore, government agencies are needed to help firms pass through the filter, or perhaps even through the valley of death, if the transformation from ideas to successful innovations is to be realized. Richardson et al. conclude that the SBIR program is the one US program that could conceivably be replicated in other countries to assist in the idea to innovation transformation.

In Chap. 3, Cunningham, O'Reilly, O'Kane, and Mangematin argue convincingly that publicly funded principal investigators (PIs) are core actors in knowledge-intensive economies. PIs are lead scientists responsible for delivering transformative publicly funded scientific programs. Becoming a publicly funded PI is a career enabler for scientists and carries significant peer prestige. However, the role and expected impact of PIs have grown substantially beyond traditional scientific activities. Publicly funded PIs must be adept in the areas such as technology transfer, strategy, management, entrepreneurship, brokering, negotiation, and mediation. They must engage with a broader range of stakeholders including scientific peers, technology transfer offices, industry, policy makers, nongovernmental organizations (NGOs), and regulators.

Publicly funded PIs, according to Cunningham et al., are critical agents in the delivery of transformative public sector entrepreneurship through the creation of scientific networks responding to broad opportunities directed by government scientific programs and associated publicly funding bodies. In the implementation of publicly funded scientific programs, PIs either directly or indirectly create technology transfer and commercial opportunities that can ultimately be exploited by third parties. The activities of publicly funded PIs can thus create transformative social scientific networks that can respond effectively to public sector entrepreneurship initiatives as well as contribute to creating economic activity and prosperity. Given the importance of the scientists as publicly funded PIs, Cunningham et al. contend that it is surprising that their roles and activities have received little empirical attention. Accordingly, the authors use Irish data of publicly funded PIs to focus on four themes with respect to publicly funded PIs. Their roles are as public sector entrepreneurship linchpins, as research strategists, as managers, and as agents of technology and knowledge transfer. The authors conclude with some practical implications and reflections with respect to future research agendas that seek to integrate the emerging literature on public sector entrepreneurship and that of publicly funded PIs.

In Chap. 4, Braunerhjelm and Henrekson build on the widely accepted premise that innovation has increasingly been acknowledged as a key factor in raising prosperity and securing sustainable long-term growth. They examine policy measures that foster the creation of innovations with high inherent potential and that simultaneously provide the right incentives for individuals to create and expand firms building on such innovations.

Previous research thus suggests that to facilitate and further enhance the role of entrepreneurs in the innovation process, policies should be expanded to areas other than education and R&D outlays. Despite these new insights, the links between microeconomic dynamics and macroeconomic growth are still neither well conceptualized nor adequately modeled. Mapping this analytically fragmented terrain in a comprehensive framework for growth and combining a dispersed and diverse microeconomic setting with the macroeconomic outcome basically remain uncharted territory.

Policies to boost innovation have thus primarily centered on R&D, whereas entrepreneurial processes, where existing (or new) knowledge is combined with individual abilities in the search for new market opportunities, tend to have been neglected. However, a policy discussion focusing on a limited set of instruments or areas is inadequate. A far more fruitful policy question, according to the authors, is the following: What policy measures (1) foster the creation of innovations with high inherent potential *and*, simultaneously, (2) provide the right incentives for individuals to create and expand firms that disseminate such innovations in the form of highly valued products?

Braunerhjelm and Henrekson propose an answer to this two-pronged question. They stress that recognizing the importance of diffusing and exploiting knowledge investments opens a complementary policy field related to entrepreneurs, the expansion of firms, and the competence structure of supporting agents (e.g., financial market actors in different phases of the life cycle of the firm, legal advisors, and management specialists).

Specifically, the authors suggest an innovation policy framework based on two complementary pillars:

- *The accumulation, investment, and upgrading of knowledge*. The policy areas involved in this pillar relate to the institutions that are needed to encourage high-quality education at all levels, to prompt internationally leading universities and their research, to establish links between academia and the commercial sector, and to fund universities.
- *The implementation of mechanisms that enable knowledge to be exploited such that growth and societal prosperity is encouraged*. These mechanisms involve a completely different set of institutions, such as tax policies, the regulatory burden, competition, and the formation of clusters. These mechanisms also include policies that create environments and incentives for individuals to undertake entrepreneurial efforts, innovations, and firm expansion.

Braunerhjelm and Henrekson go on to demonstrate what is required to integrate these two interdependent pillars in a coherent innovation policy framework. Without the accumulation, investment, and upgrading of knowledge, the second set of policies is likely to generate less value. Without the implementation of mechanisms that enable knowledge to be exploited, knowledge investments can be expected to yield little, if any, growth. Successful exploitation of knowledge and new ideas depends on many complementary agents and institutions. Thus, they argue that a coherent innovation policy framework must include tax policy, labor market regulation,

savings channeling, competition policy, housing market regulation, and infrastructure to foster growth and future prosperity.

This collection of essays concludes with a Chap. 5 by Richardson, Audretsch, Aldridge, and Nadella. These authors note that there have been many studies measuring and analyzing technology transfer and knowledge spillovers from universities using data collected by the universities on the activities of the Technology Transfer Office (TTO). This chapter represents a methodological step forward. The authors examine university entrepreneurial activity by directly asking scientists in six fields of study, about their entrepreneurial involvement. While data from TTOs suggest that new firm start-ups from university research is an infrequent occurrence, this Richardson et al. study finds exactly the opposite. Furthermore, the authors report patterns with levels of entrepreneurial startups based on the scientific field, age, gender, and experience of the university scientists. Their evidence suggests that entrepreneurship is more prevalent among a broad spectrum of university scientists than had previously been identified in other studies that relied on TTO-provided data. The results from this pioneering effort suggest that knowledge spillovers from universities for commercialization, for innovation, and ultimately for economic growth, employment creation, and global competitiveness are substantially more robust than had previously been thought.

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