Introduction: Innovation and Small Business

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ABSTRACT. This paper introduces the special issue of *Small Business Economics* on *Innovation*. What binds the papers together is either their focus on the effect of firm size on the causes and consequences of innovation or their focus on the role small firms play in reshaping the industrial landscape.

Perhaps the most surprising discovery to emerge in the literature on Small Business Economics is the degree to which small firms provide an engine of innovative activity. In their classic treatise, *Innovation and Small Firms*, Zoltan J. Acs and David B. Audretsch find that while large firms tend to have the innovative advantage in some industries, such as pharmaceuticals and aircraft, small enterprises are more innovative in other industries, like computers and process control instruments. And considered overall, small firms are found to contribute about as many innovations as their larger counterparts in United States manufaturing, although in terms of innovations per employee, the innovative activity of U.S. small manufaturing firms far exceeded that of large firms.

These findings emerged not just for the United States. For example, Van Dijk *et al.* (1995) find similar results for the Netherlands, as did Rothwell (1989) for the United Kingdom, and Santarelli and Sterlacchini (1990) for Italy.

While these studies were able to shed considerable light on the relationship between technological change and firm size, a paradox remained. As Cohen and Klepper (1992) point out, most industrial R&D is undertaken within the laboratories of large corporations. Where do small firms obtain the new knowledge needed to generate innovative activity?

To answer this question, The Tinbergen Institute in Rotterdam sponsered the *Third Global Conference on Small Business Economics* on August 26–27, 1995. The Tinbergen Institute is the Netherlands Research Institute and Graduate School for General and Business Economics. The Tinbergen Institute was founded by the Faculties of Economics and Econometrics of the Erasmus University in Rotterdam, the University of Amsterdam and the Free University in Amsterdam.

This special issue of *Small Business Economics* is devoted towards a carefully selected and edited group of papers from the Tinbergen Conference. They focus on the links between innovation and small business. A second group of papers from the Tinbergen Conference examining the relationships between firm size and economic performance will be published in a forthcoming issue of *Small Business Economics*.

Three of the papers in the present special issue are devoted to dealing with the link between innovation and small business in that they emphasize the effects of firm size differences. In "Firm Size and R&D Spillovers: Evidence from Italy", by David Audretsch and Marco Vivarelli it is established that while private R&D expenditures contribute more to the innovative activity of large firms, the spillovers from university research are more important for small-firm innovation than for large-firm innovation. Spillover effects often found in American studies appear to be important in the European case. This is reaffirmed by Erik Brouwer and Alfred Kleinknecht. In "Firm Size, Small Business Presence and Sales of Innovative Products: A Micro-Econometric Analysis", they

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find similar evidence of regional knowledge spillovers in the Netherlands. And Zoltan Acs and Sharon Gifford investigate whether the firm's ability to innovate is determined by its size and monopoly profits. They do so in the context of a theoretical model where the opportunity costs of engaging in innovation, being the maintenance of ongoing activities, plays an important role.

While the literature triggered by the publication of *Innovation and Small Firms* (Acs and Audretsch, 1990) focused on explaining the relative innovativeness of large and small enterprieses, *Innovation and Industry Evolution* by David B. Audretsch (1995) shifted the research question away from the issue of the impact of firm size and market structure on innovative activity to the way in which the evolution of firms and industries is shaped by innovative activity. Most important, Audretsch introduces a theory and provides evidence suggesting that it is the differences in the knowledge conditions and technology underlying each specific industry – key elements in innovation – that are the driving forces shaping the dynamics of industry evolution. Three papers included in this special issue explicitly focus on the links between innovation and industry dynamics. In "Property Rights and Entrepreneurship in Science", Paula Stephan and Sharon Levin suggest that it is the ability of individuals to privatize knowledge generated elsewhere, such as in a university laboratory, that provides a key source of knowledge. And by privatizing scientific knowledge, such individuals typically elect to start a new firm in order to appropriate the expected economic value of their knowledge. In "Differing Patterns of Industrial Dynamics: New Zealand, Ohio, and Sweden, 1978–1993", Bo Carlsson carefully documents three different models of industrial restructuring and the different roles that small and new enterprises play in each of these models. He builds upon his own long experience in investigating the causes and consequences of smallness within industries in his quest for the meaning of what is often referred to as "industry dynamics". Lastly Gavin Reid develops a framework for applied princial agent analysis to focus on risk management and information in, "Fast Growing Small Entrepreneurial Firms and their Venture Capital Backers: An Applied Principal-Agent Analysis". While doing so he also provides some insights in the UK venture capital industry.

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