Innovative Behaviour, Agglomeration Economies and R&D Infrastructure

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Summary: The present paper aims at analyzing two important conditions that — according to conventional wisdom — are assumed to act as driving forces for innovative behaviour of firms. The first condition is reflected in the so-called urban size hypothesis, which presupposes a close relationship between agglomeration size and innovative behaviour. The second condition incorporates the R&D infrastructure hypothesis, which assumes a positive impact of the presence of a research and knowledge infrastructure on innovative behaviour. Both hypotheses are tested on the basis of Dutch micro data on entrepreneurial innovations. In this framework, this paper also designs and employs a new and detailed measure for spatial agglomeration economies.

It is concluded that the first hypothesis is in general difficult to validate, because in the Netherlands central cities are not in general more innovative. In this context, a third factor has been introduced, viz. the industrial composition effect. It is asserted (and demonstrated by means of loglinear modelling) that this factor — in combination with agglomeration economies — is a major determinant of the geographical distribution of innovations. As far as the second hypothesis is concerned, the results — based on Kendall's concordance coefficient — do not indicate the existence of a close correlation between R&D infrastructure and the spatial dispersion of innovations either.

1 Introduction

The economic stagnation and the call for economic revival have evoked increased interest in technological change and innovation. Following Schumpeter's arguments, most economists share the view that industrial innovation is a prerequisite for an "upswing" phase in a long-term Kondratieff cycle, irrespective of the question whether a "technology-push" or a "demand-trigger" view on economic dynamics is advocated. In the context of the present paper, an innovation will be interpreted as the design,
construction and successful introduction of new (or improved) commodities, services, production processes or distribution processes. The commercial implementation and acceptance of innovations distinguishes in general innovations from inventions.

In recent studies much attention has been devoted to conditions that are favourable for innovations, like knowledge intensity, communication infrastructure, capital intensity, accessibility, and so forth. The blend of all such conditions is sometimes also denoted by the generic term innovation (or R&D) infrastructure (see among others Freeman et al. 1982; Marshall 1987; Nelson and Winter 1982; OECD 1982; Rothwell and Zegveld 1979; and Thwaites 1978).

As the necessary conditions for innovation generation are not equally dispersed over space, it may be assumed that innovations have a clear geographical component, not only because of a sectoral and locational variation among these conditions, but also because of spatially discriminating public policies (like for instance an urban incubation policy, or a regional science park policy). Consequently, it is an interesting endeavour to analyse in more detail the geographical aspects of innovative activities (see also Bruder 1983; Clark et al. 1986; Ewers and Wettmann 1980; Gillespie 1983; Goddard 1981; Keeble and Wever 1986; Malecki 1983; Nijkamp 1986; and Thwaites and Oakey 1985).

The relevance of studying the geography of innovation may be illustrated by means of the successful development of the Greater Boston Area, and especially the impact of Route 128. The offspring of many advanced technological activities in this area is not only caused by its favourable locational and infrastructural conditions, but also — and to a large extent — by the integrated seedbed function of the whole area (including the production environment, the scientific climate, the institutional and political willingness etc.). Thus the innovative industrial climate and the creative academic climate induced here many spinoff processes (inter alia high-tech and computer activities) (cf. Markusen et al. 1986).

This example suggests at least two lines of geographical research, viz. (1) an analysis of the spatial pattern of innovations in relation to the production environment of the agglomeration concerned, and (2) an analysis of the spatial pattern of innovations in relation to the available regional R&D infrastructure.

The first question has been a source of intensive discussion in the literature. Conventional urban economics takes for granted that large agglomerations induce innovative ability (cf. Carlino 1977). In recent years, however, it has been demonstrated that large cities lose their innovative potential in favour of medium-size towns (see Malecki 1983), partly because of bottleneck factors and diseconomies in large cities that hamper a further expansion of innovative activities, and partly because the locational requirements of an innovative firm may change after a new product has reached the executive phase in a product life cycle (cf. Davelaar and Nijkamp 1988). Thus the actual geographical pattern of innovations is worth further exploration.

The second question concerns the specific regional impact of R&D infrastructure (such as university research institutes, R&D centres of private companies etc.) on in-