Empirical Studies on the Sources of Agglomeration Economies

Kenta Ikeuchi

Abstract

This thesis addresses the issues concerning the sources, or mechanisms, of agglomeration economies. It is well known that economic activities are spatially concentrated or clustered in certain areas and such agglomerated areas generate relatively higher economic growth than less agglomerated areas do. The sources of agglomeration economies, mainly the three factors proposed by Alfred Marshall, have been investigated and formalized by many subsequent scholars: input sharing, knowledge spillovers, and labor pooling. In this thesis, each of these sources of agglomeration economies is examined empirically. The structure and contents of the chapters are described below.

Chapter 1

Previous Studies on the Sources of Agglomeration Economies and Overview of the Thesis

Chapter 1 summarizes the related literature and provides an overview of the following chapters of the thesis. First, the motivations of this thesis are pointed out through literature surveys. Several pieces of empirical evidence regarding the geographic agglomeration of economic activities are discussed and then several main empirical and theoretical works related to the topic of agglomeration economies are also explained. Second, Marshall's (1920) three sources of agglomeration economies (cited by many previous studies) are introduced: input sharing, knowledge spillovers, and labor pooling. Finally, the structure of this thesis is summarized. The contents and aims of the following chapters are briefly introduced.

Chapter 2

Transportation Costs and Regional Productivity Difference in Japan: An Empirical Study of the New Economic Geography Theory

In Chapter 2, the effects of transportation costs on an agglomeration economy and the dynamics of industrial location are examined empirically. Combining a spatial demand function derived in the theoretical new economic geography (NEG) literature with a production function, a revenue production function is proposed, which captures the effects of transportation costs on a firm's revenue. The suggested revenue production function makes it possible to relate the

geographic agglomeration economy with the transportation costs, which has not been done in previous empirical studies. It performs an empirical examination of the model with regional panel data of the manufacturing sector in Japan. A city level panel data constructed mainly from the Census of Manufacturers for the 1996−2006 is used for empirical analysis. The revenue function including parameters for the transportation costs of each industry is estimated. The results support the existence of positive transportation costs, and show the estimated transportation costs for the manufacturing sector are higher than those for the primary sector and lower than those for the service sector.

Chapter 3

Plant Productivity Dynamics and Private and Public R&D Spillovers: Technological, Geographic and Relational Proximity

Chapter 3 investigates the knowledge spillovers and examines the effects of R&D spillovers on total factor productivity (TFP) with a large panel of Japanese manufacturing plants matched with R&D survey data (1987–2007). This chapter simultaneously examines the role of public (university and research institutions) and private (firm) R&D spillovers, and the different effects due to technological, geographic, and relational (buyer-supplier) proximity. Estimating dynamic long difference models and allowing for a gradual convergence in TFP and geographic decay in spillover effects, the results show that technologically proximate private R&D stocks positively affect TFP growth, which decay with distance and become negligible at around 500 kilometers. In addition to knowledge spillovers from technologically proximate R&D stocks, 'relational' spillovers from buyer and supplier R&D stocks exert positive effects on TFP growth that are similar in magnitude. The elasticity of TFP is highest for public R&D (corrected for industrial relevance), in particular for plants operated by R&D-conducting firms. This chapter does not find evidence of geographic decay in the impact of public and relational spillovers. Over time, declining R&D spillovers appear to be responsible for a substantial part of the decline in the rate of TFP growth. The exit of proximate plants operated by R&D-intensive firms plays a notable role in this process and is an important phenomenon in major industrial agglomerations such as Tokyo, Osaka, and Kanagawa.

Chapter 4

Effects of Regional Human Capital Structure on Business Entry: a Comparison of Independent Startups and New Subsidiaries in Different Industries

Chapter 4 and Chapter 5 examine the effects of labor pooling. Chapter 4 aims to investigate the regional determinants of entry with special attention to the effects of regional human capital, using prefecture-level data from Japan. On the basis of some recent studies in the field, this

chapter investigates the effects of several regional factors on business entry, distinguishing between independent startups and new subsidiaries of existing firms on the one hand and comparing different sectors on the other. Using pooled regional data at the prefecture level for the period between 1996 and 2006, it is simultaneously estimated the impact of various regional factors, including human capital structure, on the number of independent startups and new subsidiaries for each industry sector. Estimation results demonstrate considerable differences between independent startups and subsidiaries as well as among different industry sectors with regard to the impact of regional human capital structure on business entry. Considering the possible implications, the results suggest that the regional policy to activate business startups should focus more on the differences between encouraging local entrepreneurship and attracting new subsidiaries, and recognize that these differences may vary even within the service sector, depending on what type of human capital is required.

Chapter 5

R&D, Innovation, and Business Performance of Japanese Startups: A Comparison with Established Firms

Despite the importance of innovation activities in business startups, few studies have comprehensively compared these undertakings to equivalent ones in established firms. Therefore, Chapter 5 compares the determinants of R&D intensity, innovation, and firm performance in start-ups and established firms with a three-stage model, using comparable datasets in Japan. Data on start-ups is obtained from an original questionnaire survey series for Japanese start-ups that were carried out annually from 2008 to 2011 and comprises 894 firms less than 2 years of age at time of the initial survey in 2008. Comparable data of established firms were obtained from the Japanese National Innovation Survey 2009 conducted in 2009 by the National Institute of Science and Technology Policy (NISTEP), as official statistics carried out according to the Oslo Manual and the Community Innovation Survey 2010 in the EU and comprise more than 1000 firms. The empirical results suggest that 1) the local labor pooling of research-relevant workforces (professional and technical occupations) positively relates to the R&D intensity of the firms located in the neighborhood, 2) the effects of public financial support on R&D intensity are generally positive but smaller for startups, 3) the effects of research cooperation with business partners or universities on innovation are generally positive but larger for startups, and 4) the effects of product and process innovation on labor productivity (level and growth) are positive both for startups and established firms.