Agglomeration and Industrial Upgrading in Cities

Ji Wang

Graduate School of Economics Ritsumeikan University

This paper aims to theoretically and empirically investigate how urban industrial structures (as reflected in the allocation of employments across the high-tech and low-tech industrial clusters defined in this paper) change with the size of cities (as reflected in the total employments in cities).

Consider the major channels of agglomeration economies (as reflected in total employment) are labor pooling, knowledge spillovers, and sharing in specialized services, and that the production of high-tech goods uses skilled labor, R&D, specialized services more intensively than low-tech goods, then the production of high-tech goods should rely more intensively on such agglomeration economies. Hence, this paper presented a systems-of-cities model with two industries associating with different degrees of local agglomeration economies, i.e., high-tech industry benefits more from local agglomeration economies. Under the Armington (1969) assumption, this model showed the large cities which have large agglomeration economies will have a comparative advantage and relatively specialize in the production of high-tech goods. Conversely, the small cities will relatively specialize in low-tech goods.

In the empirical section, it first developed a high-tech index to reflect the intensity on agglomeration economies, which is aggregated by (a) the input coefficient of R&D (reflecting knowledge spillovers); (b) the input coefficient of specialized services (reflecting sharing of specialized services) and (c) the employment share of engineers and Administrative & managerial workers (reflecting labor pooling). Based on the index, it identified four 2-digit high-tech (low-tech) Manufacturing industries and four 2-digit high-tech (low-tech) Services industries which have largest (smallest) high-tech indices. With the identified high-tech and low-tech industries at hand, it then confirmed the positive (negative) relationship between total employment and employment shares of high-tech (low-tech) Manufacturing industries, Service industries as well as eight high-tech (low-tech) industries in total employment of Manufacturing, Service as well as whole industry respectively. The coefficients of total employment in all the three regressions have the predicted sigh and are significant. The controlled factors include employment density, firm quantity, firm density, average land price, specialization degree, major city accessibility, international airport accessibility, major port accessibility, existence of shinkansen et, al.