Product Life-cycle and Geography of Innovation

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May 18, 2018

Abstract: This paper analyzes spatial sorting pattern of innovation by developing a model where heterogeneous firms choose the city to source innovation. The model captures such a basic trade-off faced by innovative firms that innovation in larger cities generates larger scale of knowledge spillover while it also exposes higher risk of information leakage to competitors. In the model, I propose that the relevance between cost and benefit of locating innovation in a certain size of city depends on two factors. One is the life-cycle length of products to produce. In industries with relatively rapid turn-over of products, firms become less sensitive to risk of information leakage as their fast product obsolescence tends to outpace adoption of leaked information by competitors, and vice versa. As a result, the model predicts a geographical sorting pattern of innovation where firms in industries with relatively long product life-cycle length choose smaller-sized cities to source innovation, while in industries with relatively short product life-cycle length, innovations are conducted in larger-sized cities. The other factor to affect innovation sourcing decision is the quality of products to produce. Since competitors find it harder to take over higher-quality products, firms manufacturing products with better quality are less sensitive to information leakage risk, which leads to within-industry spatial distribution of innovation where firms producing better quality products source innovation in larger cities. Using the US patent data along with geographical information of inventors, I provide empirical evidences that support the model's predictions.

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