

# Product Life-cycle and Geography of Innovation

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**Abstract:** This paper analyzes spatial sorting pattern of innovative activities by developing a model of heterogeneous firms that choose innovation sourcing sites. The model captures a basic trade-off for firms where 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. On the other hand, in longer life-cycle industry, firms highly evaluate risk of information leakage as leaked information retains long-lasting market value. As a result, the model predicts a geographical sorting pattern of innovation where firms producing longer life-cycle length products choose smaller-sized cities to source innovation, and vice versa. The other factor to affect firms' innovation sourcing decision is the quality of products to produce. Since competitors find it harder to take over higher-quality products, firms manufacturing better quality of products are less sensitive to information leakage risk, and hence source innovation in larger-sized cities. Using the US patent data along with geographical information of inventors, I provide empirical evidence that supports the model's predictions.

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