

KNOWLEDGE SPILLOVERS IN A NORTH-SOUTH ANALYSIS OF THE U.S. CHEMICAL INDUSTRY

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ABSTRACT

We use U.S. patent data to investigate how the growth of chemical manufacturing in South economies affects the number of patents obtained by chemical manufacturers in the U.S., and how it has altered international knowledge spillovers from South manufacturers to their counterparts in the U.S. We find that increased competition from chemical manufacturers in the South has pushed U.S. chemical firms to increase their patenting, but that U.S. manufacturers are not learning more from the innovators in the South.

Keywords: Patents, Spillovers, Innovation, Chemical.

1. INTRODUCTION

Globalization has altered the landscape for businesses. The growth in recent decades in international trade reshaped the organization of production around the world, as companies in high income countries searched for reliable, low-cost suppliers. Increases in global demand, advances in technology, and government policies have combined to encourage firms to move more of their production base to lower income countries.

The chemical products market in the U.S. has changed significantly over the last few decades. Data from the U.S. International Trade Commission (ITC) shows that chemical manufactured goods imported into the U.S. from high-income countries increased by just under 300% from 1997-2017, while imports from low- and middle-income countries increased by just over 700%. Over the same time period, domestic production increased by 96%. The share of chemical manufactured imports from low- and middle-income countries rose from 11.4% in 1997 to 21% in 2017.

How have these changes in the chemical industry affected innovation? Is the increase in manufacturing by firms in low- and middle-income countries viewed by U.S. firms as a benign shift or as threat to their competitiveness? Does it spur U.S. manufacturers to increase their innovative efforts? Does it encourage them to try and learn more from these new competitors in low- and middle-income countries? These questions are the focus of our study.

2. LITERATURE REVIEW

There is an extensive literature looking at innovation in a world populated by firms in high income, developed “North” economies and low income, less developed “South” economies. Much of the literature is based on the “quality ladder” approach developed in Grossman and Helpman (1991a, 1991b, 1991c). These models assume that manufacturers in high income countries pursue innovative activities while manufacturers in low-income countries copy the products from high income countries without being innovative in their own right. The viewpoint that meaningful innovation occur in high-income economies and not in low-income economies no longer reflects the reality of the global economy, as least as evidenced by the growing number of patents originating in low- and middle-income countries.

There is a large body of literature that uses patents and patent citations to measure innovation and information flows. Of particular relevance to the geographic issues reflected in our study are patent analyses that investigate the country of origin of the patent citations or “prior art”. For example, Jaffe and Trajtenberg (1999) find a geographic bias in that prior art is more likely to be from the same country as the patent’s