SOME PATTERNS IN THE TRANSFER OF TECHNOLOGY WITHIN MULTINATIONAL CORPORATIONS

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Abstract. This article reports on an exploratory field study on manufacturing technology transfers within MNCs. A research design was developed that differentiates among MNCs according to their maturity with respect to international involvement. Trends in technology transfers were analyzed using number of countries with manufacturing subsidiaries and years of involvement in international business as predictor variables. We analyzed total technology exports and imports, new technologies transferred, and the level at which these transfers took place.

INTRODUCTION

One of the major issues in the controversy surrounding MNCs relates to the transfer of technology among countries. Several studies have found MNCs to be the principal vehicle of technology transfer from the United States to developing countries. Despite this, little effort has been undertaken to actually measure the flows of technology.

Past efforts have usually been limited to measuring the impact of technology transfers on the international trade position of the United States, mostly as a function of royalties, licensing fees, and service charges. Boretsky, based on an analysis of United States' receipts and payments for licensing agreements, found a significant erosion of the United States' technological advantage during the ten-year period from 1962 to 1972 due to its manufacturing industry selling technology faster than producing new technology.

Studies based on licensing fees and royalty payments make the assumption that these transactions represent the principal mode of technology transfer. In his study, Boretsky admitted that such fees and payments probably underestimate the true volume of the technology exports because many companies transfer technology in exchange for equity participation. Quinn, who introduced the concept of a technological balance of payments, added similar qualifications in his research.

Within the next few years the United States—as well as many foreign governments—is likely to make policy decisions regarding MNCs and the desirability of technology transfers. Yet, based on present data, the extent of such technology transfers cannot be substantiated. This article suggests a research methodology to study technology transfers within MNCs and present the findings of a pilot study, still of exploratory nature.

RESEARCH QUESTIONS

This research was guided by five broad research topics:

1. Amount of individual technological transactions?
   What trends can be detected within MNCs? Are the amounts of individual transactions on the increase?

2. Amount of technologies transferred?
   Are MNCs transferring new technologies in increasing amounts?

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3. Level of sophistication of technological transactions—
   Is there a trend toward higher levels of sophistication among technology transferred?

4. Direction of transfers⁹—
   What is the relative growth of exports of technology versus imports?

5. Impact of the extent of a company’s multinationality on technology transfers—
   Are there any differences among MNCs with respect to technology transfer patterns as a result of differing levels of involvement in international business?

To test the five research questions, a preliminary model of technology transfers within MNCs was developed. Technology transfers (individual transactions, technologies transferred, level of sophistication of transfers, and direction of transfers) was designated as dependent variable with the extent of multinationality as independent variable.

Technology, often defined as “the application of science to the solving of well-defined problems,” was restricted to include the technology of production and manufacturing processes only.¹⁰ Such manufacturing technology was further defined as consisting of three major elements: Research (R), Development (D), and Engineering (E).¹¹ Following from the above definitions, technology transfer was defined as any element or combination of R, D, and E transferred across national borders.¹²

With the use of the concept of multinationality as an independent variable, an attempt was made to distinguish among MNCs. This variable was operationalized by using (a) the number of countries where a MNC maintains manufacturing facilities and (b) the number of years passed since the establishment of the first such facility abroad.¹³

Since the study required a close cooperation on the part of the participating MNCs, a convenience sample of 14 New England-based MNCs was chosen. The 14 companies were selected to allow for the representation of different industries and MNCs at various stages of multinational involvement.¹⁴ Table 1 contains a description of the sample. Data were collected for periods starting in 1973 and reaching back as far as possible, but at least five years. For some MNCs, data were made available covering the full time period of the MNC’s international activities.¹⁵

A combination of the cross-sectional and time-series analysis was chosen for our experimental design.¹⁶ This design was selected because it allowed us to combine the limited time series of the 14 MNCs into a single series. The data collected were separately combined across all 14 MNCs along the two dimensions used to operationalize multinationality: TIME (for years passed since first manufacturing subsidiary abroad) and COUNTRIES (for number of countries with manufacturing subsidiaries).¹⁷ The PEARSON CORR program of the SPSS package was used to analyze the time series.¹⁸

Due to the limitations of the sample, results cannot really be generalized beyond the MNCs investigated. Nevertheless, the research shows some interesting trends among these MNCs.

Here, interest centered on all transactions—exports and imports combined. Results are contained in Table 2. Total transactions (198 observations) were not significantly correlated with either independent variable. This suggests that, at least within our sample, the intensity of technology transfers appears to be relatively stable over the develop-