

TABLE 10.—A COMPARISON OF ESTIMATES OF RELATIVE PRODUCTIVITY OF UNITED STATES AND FOREIGN CHEMICAL WORKERS FOR SIMILAR PLANTS

SOURCE OF YEARLY STUDY

	Kastens ¹ (Union Carbide) 1962	Grosselfinger ² (Hoechst-Uhde) 1962	Arthur D. Little, ³ 1962	I.C.I., ⁴ 1966	United Kingdom, ⁵ 1967
United States.....	100	100	100	100	100
United Kingdom.....	50	65	75	67	60
Germany.....	55	75	75		
France.....	50	65	75		
Italy.....	40	75	75		
Japan.....	30	65	50		

¹ Productivity Factor Critical, summary of paper by M. C. Kastens reported in Chemical Engineering Progress, February 1962, p. 22.

² Capital Costs versus Sales Price, summary of paper by F. B. Grosselfinger reported in Chemical Engineering Progress, op. cit., p. 24.

³ Arthur D. Little, Inc. The Impact of Proposed U.S. Tariff Changes on Organic Chemical Imports, May 1962; revised data in May 1965 did not indicate any change in relative productivity.

⁴ Imperial Chemical Industries Ltd., Productivity Studies—Visits to Canada and the United States, May/June 1966, p. 1. I.C.I.'s estimates indicate that after allowing for the effects of the larger American markets, the larger size of individual orders for products, and the use of contractors, efficiency in the use of manpower in the North American chemical companies was about 1½ times I.C.I.'s in the United Kingdom.

⁵ Author's calculation based on statements in National Economic Development Office, Manpower in the Chemical Industries, London, Her Majesty's Stationary Office, 1967, p. 4. Statements indicate American output per head in the chemical industry is perhaps 3 times the corresponding figure for Britain, but scale of operations appeared to account for ⅔ of this difference. Thus, difference accounted for by factors other than scale of operations = ⅓ (3-1) = ⅔; hence, apparent relative productivity is 1½ more in United States than in United Kingdom, or 60 percent as much in United Kingdom as in United States. This study gave the list of products studied and such products included both batch and continuous processes. The study found that "it was in the labor intensive processes involving considerable amounts of material handling that the Americans appeared to achieve their greatest manpower saving" (p. 14).

of 30% provides sufficient protection to enable a United States dye manufacturer to compete cost-wise with imported dyes.

However, because all operations are not "average," the United States imported \$26 million of dyes in 1966, compared with \$350 million of U.S. dye production and \$25 million of U.S. dye exports.⁶ About ⅔ of the value of total dye imports were of "non-competitive" dyes, i.e., they did not compete with dyes made in the United States. It is believed that many of these "non-competitive" imports were based on superiority in technology or "know-how" rather than on differences in hourly wage rates. There is evidence to support the contention that the foreign dye industry enjoys a relatively stronger technological position than do foreign companies in other segments of the chemical industry.

First, in the chemical industry direct investment is often a result of technical know-how owned by the investor,⁷ and investment by foreign chemical companies in the United States is much higher in dye manufacturing than in other areas.¹ Second, in the fast-growing area of fiber-reactive dyes, production in the United States is dominated by ICI (British), Toms River Chemical (Swiss), and American Hoechst (German). Of the 75 individual dyes and categories of dyes listed as being fiber-reactive in the latest Tariff Commission Report (1965), only eight were produced by American-owned companies. Production of fiber-reactive dyes has grown at the rate of 40% yearly since 1960 as opposed to a 6% growth rate for the production of all dyes.⁸ The weight of this evidence suggests that the European competitive strength in dye manufacture is based on research and development rather than on low labor cost.

⁶ Production value estimated from United States Tariff Commission, *Synthetic Organic Chemicals, United States Production and Sales*; imports from Table 7; exports from Bureau of Census, *U.S. Exports, Commodity by Country, FY410*.

⁷ Also, Gruber, Mehta, and Vernon, *op. cit.*, pp. 30-31, discuss and present data on the point that the U.S. investment level abroad is higher in the research-oriented industries than in other industries.

⁸ Approximately 40% to 50% of foreign investments in the U.S. chemical industry is owned by Swiss companies (Jules Backman, *Foreign Competition in Chemicals and Allied Products*, Washington: Manufacturing Chemists' Association, Inc., 1965). Much of this investment, along with much of the British and German chemical investments in the United States, is in dye manufacturing facilities.

⁹ Fiber-reactive production up from 291,000 pounds to 1,586,000 pounds; total dye production up from 155,896,000 pounds to 207,193,000 pounds. However, because of higher unit values, fiber-reactive dyes accounted for 2.3% of total dye sales in 1965 (\$6,744,000 out of \$292,294,000).