

b. Mature products

It was previously mentioned that United States exports to the EEC/UK of mature products,¹⁴ such as certain organic chemicals, are important and are expected to be so in the future. Because this fact apparently has not been widely recognized, it is discussed in more detail below.

Results of a study indicated that over half of United States exports of the mature products covered in the study were to countries that already produced the products: much of these exports were to the EEC/UK.¹⁵ In my opinion, a major reason for such United States exports is that additional capacity for the manufacture of a chemical usually can only be added economically in large blocks.¹⁶ Consumption, however, progresses relatively smoothly, so there are alternating periods of "excess" and "shortage" (Figure 1). The United States plays an important role in providing other countries with chemicals when these other countries are experiencing shortages and are operating plants at inefficiently high levels. During this stage lower foreign tariffs enable United States exports to compete better with the high marginal costs of the marginal foreign producer and to delay the construction of new capacity. (Similarly, lower United States tariffs during this stage would enable the United States economy to obtain sufficient product without paying the high cost of keeping United States plants operating at inefficiently high levels.)

An example is the case of exports of United States styrene monomer to Germany (styrene monomer is a benzenoid intermediate). These exports were negligible for 1963 and then increased sharply to almost \$10 million yearly in 1964 and 1965 and then fell sharply in 1966 as new plant capacity came onstream in Germany. Germany started production of styrene monomer in 1931, some four years before production began in the United States.

¹⁴ In this context, a mature product is one that has reached an advanced stage of its product life cycle. Market conditions are characterized by relatively low annual percentage increases in consumption, with prices considerably lower than during the earlier years of the product life cycle. For further details see my "Chemical Marketing Research," *loc. cit.*

¹⁵ These results were presented in a talk delivered by me to a national meeting of the American Institute of Chemical Engineers, New York, November 27, 1967. The results are scheduled for publication under the tentative title, *The Product Life Cycle and International Investment*.

¹⁶ For most large-volume organic chemicals and plastics the minimum economical plant size is continually getting larger. As a result, lower or stable prices tend to result in spite of rising costs of hourly wage rates.