a. New products

This expectation of growth of United States exports of newer products is consistent with various recent studies. These recent studies indicate that new-product-oriented research and development efforts attracted by a large domestic market have a more important effect on exports than do unit wage rates. The plants to produce new products are built in a country with a large market, presumably in order to minimize the problem of communications between the market and the production facility, and to reduce the risk inherent in crossing national boundaries with a large percentage of the plant output.

As the home market expands, larger plants are built and lower unit costs of production result.[6] Also, production costs are lowered because the operations are made more efficient as the firm gains experience.[7] Thus, a large-market country initially producing a product can have a trade advantage in this product for a considerable period of time.

As the domestic market [8] of the United States is more than five times as large as that of the largest-market country in the EEC and about 1½ times as large as the domestic markets of all EEC countries combined, it is reasonable to expect that the United States will be a major exporter of new products. The lower tariffs in the EEC/UK, especially in the "basket" or "all other" categories, which would result from adoption of the ASP Package would increase United States exports of newer products by delaying the construction of manufacturing plants abroad.

Because of the importance of this idea that large domestic markets with resultant research and development is much more important in determining international trade than are unit wage rates, the results of five recent studies are reviewed. Two of these are studies of trade in plastics. Hufbauer shows that the combination of large market and early date of initial production played the major role in explaining exports of plastics; wages were not found to be an important explanatory variable.[9] Freeman shows that technical progress explained exports in plastics, and that the major exporting countries did not have input-cost advantages over other countries.[10]

Two studies of organic chemicals lend further support to this view. Results of one study suggest that exports of United States chemicals are continually shifting to new products [11] (although exports of older, large-volume products continue to be important on an absolute basis, as will be discussed below. Results of another study indicate that countries with large markets began production of individual products before countries with small markets. Unit wage rates were found not to be an important variable in explaining when countries began production of a product.[12]

A fifth study that presents results consistent with this view is the study by Gruber, Mehta, and Vernon.[13] This study shows that the five United States industries that account for the United States trade surplus spend relatively more on research and development than do the fourteen other major United States industries. The chemical industry is one of these five "export industries," and ranked second among all industries in net trade balance in 1966. Further details of this study are presented in Appendix C along with further indications that the size of a country's domestic market rather than low unit wage rates is an important determinant of exports in chemicals.

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[6] A well-known rule in the chemical industry is the "0.6 rule" which indicates that a plant of twice the output of a smaller plant will cost only $(2)^{0.6}$ or about 1.5 times as much to build. The drop in costs as industry output increases is discussed in my "Why Do Prices Drop?" *Chemical Engineering Progress,* December 1964, pp. 13–17. This article gives illustrations of a number of price drops in individual chemicals.

[7] W. B. Hirschmann, "Profit From the Learning Curve," *Harvard Business Review,* Vol 42, January–February 1964, p. 125.

[8] Measured in terms of Gross National Product, see Table C–2.

[9] G. C. Hufbauer, *Synthetic Materials and the Theory of International Trade,* Cambridge Harvard University Press, 1966.

[10] C. Freeman, "The Plastics Industry, A Comparative Study of Research and Innovation," *National Institute Economic Review,* No. 26 (November 1965), pp. 40–91.

[11] See my "Systematic Bias and the Terms of Trade," *The Review of Economics and Statistics,* XLIX (November 1967), p. 617.

[12] Results of this research by me are scheduled for publication under the tentative title, *The Product Life Cycle and International Investment.*

[13] William Gruber, Dileep Mehta, and Raymond Vernon, "The R & D Factor in International Trade and International Investment of United States Industries," *Journal of Political Economy,* LXXV, February 1967, pp. 20–37.