1. Overview

In the last 15 years, the Asian region's production of natural science and engineering (NS&E) degrees has grown dramatically, as have its economy and investment in research and development (R&D) and its attendant need for scientists and engineers. The countries studied in this report—the People's Republic of China (China), India, Japan, Singapore, the Republic of Korea (South Korea), and the Republic of China (Taiwan)—are ancient cultures with traditions of scholarship that cannot be adequately described by examining the last 15 years of data. However, data presented in this report on their growth in degrees, R&D, and gross domestic product (GDP) are indicators of the growing significance of this region to world science. The region's production of NS&E degrees at the bachelor's level was over a half a million in 1990; the number of doctoral degrees awarded in these fields was almost 10,000.

These six countries spent $91 billion in 1987 constant purchasing power parity dollars ($PPPs)[1] in overall R&D in 1990. The combined GDP of all six countries in $PPPs surpassed that of the United States in the mid-1980s.

Several Asian countries are emulating Japan in developing their economies through increasing their capacities in high technology. Many policies are devoting resources to high technology production, processing, and distribution, including developing a science and engineering labor force.

[1] Purchasing power parity dollars ($PPPs) are used to convert a country's national currency expenditures to a common currency unit that allows *real* international quantity comparisons to be made. $PPPs are based on "market basket" pricing exercises. All dollar amounts in this report are in 1987 constant $PPPs. See section 8, Methodology and Notes on Data Series, for details on why $PPP conversions are preferable to official exchange rates.

This report concludes with implications for the United States of this Asian growth in science and technology capabilities. Some of the implications for the United States are as follows:

- These Asian countries presently depend on and will continue to use the U.S. higher education system. They cannot meet the demand for higher education fast enough nor can they staff new or expanded domestic institutions without graduate training abroad, often in the United States.

- Foreign graduate student enrollment in U.S. universities and preference for NS&E degrees will help to maintain U.S. doctoral programs' emphasis in these subjects. Doctoral programs in science and engineering fields in the U.S. have grown relatively faster than in non-science and engineering fields. Over the 16-year period 1975–90, the ratio of NS&E degrees to total doctoral degrees in the United States increased from 35 to 45 percent. Since Asian foreign graduate students come mainly for science and engineering fields, they are, and will continue to be, an integral part of U.S. universities' science and engineering strengths.

- Asian countries with high technology economies will compete with the United States for the Asian-born graduates of U.S. universities. Though Asian scientists and engineers will continue to contribute to the U.S. labor force, more will probably return to Asia.

In addition, there are obvious implications for production of high technology products, but they are not analyzed in this report. A forthcoming National Science Foundation report, *Technology Development and Competitiveness: The Asian Region*, will analyze these implications.