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**The  
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**Where is Potential for Growth the Greatest?**

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## **The Global Computer Market: Where is Potential for Growth the Greatest?**

The globalization of computing use merits special attention by industry executives and government policy makers for at least two reasons. First, computer-based information systems have profound effects on all sectors of the economy. Access to the latest computer technology is central to competitive success in nearly all industries, and government policies which deliberately or inadvertently advance or retard technological progress in the use of information systems has important economic effects. Second, computing is a high-technology industry with significant potential for stimulating economic growth and jobs in the electronics sector.

The world market for computing has grown dramatically between 1985-1990, and is expected to continue its growth despite the current worldwide economic slowdown. For example, McKinsey and Company document the following growth patterns for major world regions for computer hardware, software and services:

	Computer market 1985 (\$ billions)	Computer market 1990 (\$ billions)	Compound annual growth rate
North America	90.2	119.0	6%
Europe	45.9	109.8	19%
Asia Pacific & Other	27.9	76.2	22%
<b>Totals</b>	<b>164.0</b>	<b>305.0</b>	<b>13%</b>

Source: McKinsey & Company, *The 1991 Report on the Computer Industry*

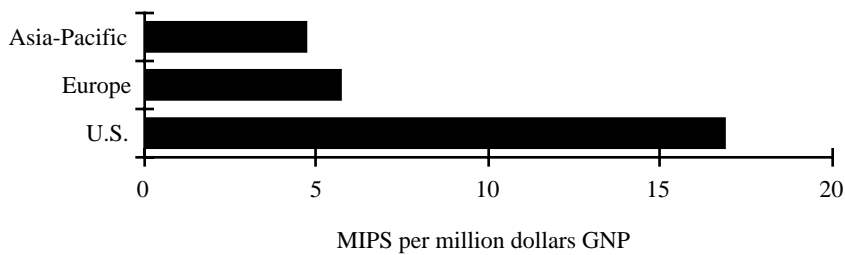
But, where are the future growth markets for computer hardware and software? This is a critical question for the computer industry, as well as for government policy makers concerned with issues such as ensuring market access for U.S. industry.

### **U.S. Leads World in Computer Use**

The United States is the world's heaviest user of computers, in absolute terms and with relation to population or gross national product (GNP). There are 61 million computers in use in the U.S., compared to 32 million in all of Europe and just 10 million in Japan. What is more important, the U.S. is the biggest user with relation to the size of its economy (Figure 1).



**Figure 1. Intensity of Computer Use in Major Economic Regions**



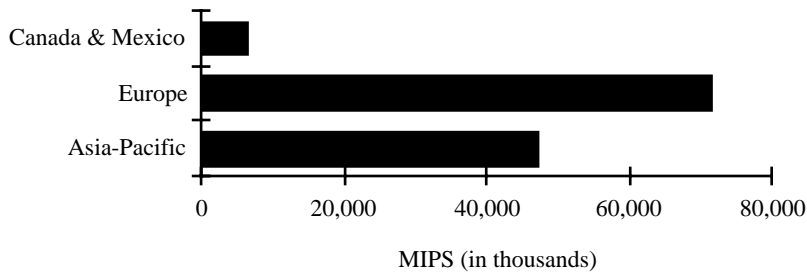
The figure shows the degree to which computers have spread throughout the U.S. Using installed MIPS (millions of instructions per second) per million dollars GNP,<sup>1</sup> the U.S. has approximately three times the relative computing power of either Europe or Asia-Pacific. This is an excellent measure of computing diffusion or "spread" because its basis is the size of the economy, rather than just population. The level of economic activity determines the potential demand for computing as well as the resources available for investment.

### Measuring Market Potential

Given that the U.S. is the largest user of computers in the world, it provides a useful yardstick for examining the potential market in other countries and regions. If the other developed countries eventually match or come close to the level of computerization in the U.S., then there is tremendous growth potential in Europe and the Asia-Pacific region.

The potential for market growth is measured here by calculating the number of MIPS a country or region would have to install to match the U.S. level of computerization. For example, the U.S. has 88.5 million installed MIPS, or 16.9 per million dollars of GNP, while Europe has 36.7 million MIPS, or 5.7 per million dollars of GNP. If Europe, with a GNP of \$6,423 billion, were to match the U.S. level of computerization, it would have 108.5 million MIPS. This would require the installation of 71.8 million MIPS. By comparison, the Asia-Pacific countries would have to install over 45 million MIPS, while Canada and Mexico would only have to install about 7 million to reach the level of computerization of the U.S. (Figure 2).

**Figure 2. Potential Computer Market in Major Regions**

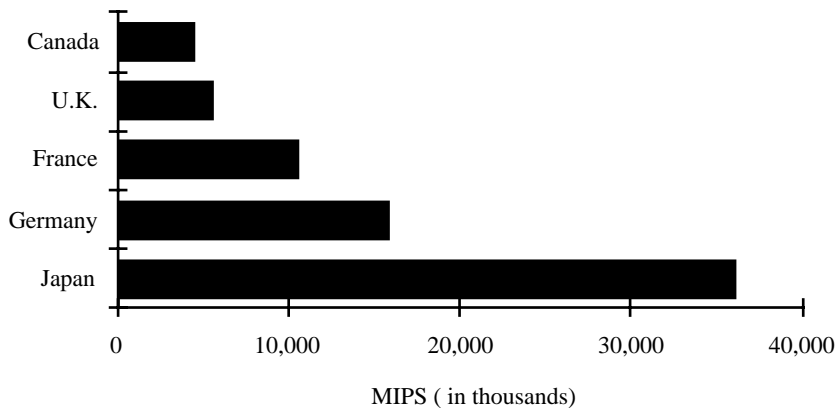


### Japanese Market Has Largest Growth Potential

When the figures are broken down by country within regions, an interesting and unexpected result appears. Figure 3 shows that Japan is the largest potential market, with more than double the potential demand of the next highest country, Germany. And Japan's potential is 3-7 times larger than France, the United Kingdom, or Canada.

While the European Community (EC) is becoming more of a single market, Japan alone might match the EC in computing market potential, given its wealth and economic dynamism. To match the U.S. level of computerization, Japan would have to install over 36 million MIPS. At the estimated price of roughly \$1,000 per MIP, this would mean an investment of \$36 billion.

**Figure 3. Potential Computer Markets in Major Countries**

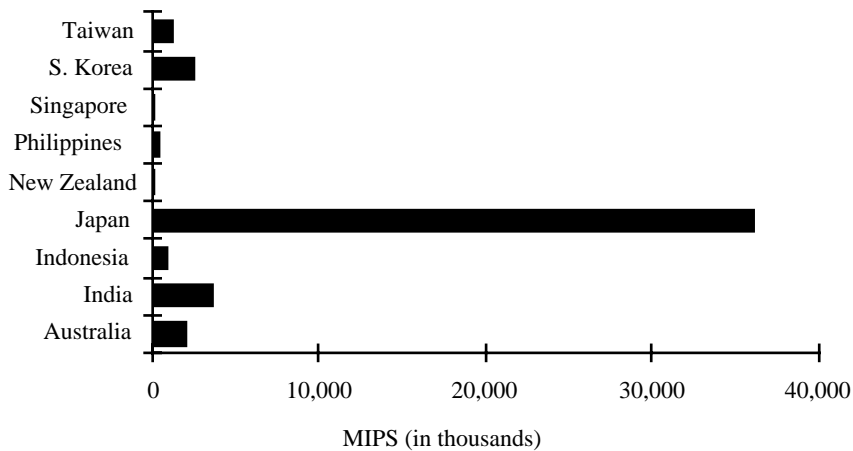


Certainly, the U.S. market will continue to grow, especially as newer technologies such as pen-based computers and multimedia enter the market, and the development of more advanced data networks. However, a repeat of the sizzling growth rates that the U.S. experienced in the 1980s is unlikely in the future. The countries showing the highest growths over the 1985-1990 period are the Asia-Pacific countries, with Europe second. This pattern is likely to continue until those regions move closer to the U.S. level of computerization.

### **Japan Leads in Asia-Pacific Markets**

Figure 4 further highlights the dominance of Japan's market potential over other countries in the region. Japan's market is three times that of the other countries in the region combined, and ten times that of the next largest market.

**Figure 4. Potential Computer Markets in Asia-Pacific Countries**



### Implications for Computer Industry

An issue for computer industry executives should be how to take advantage of the large latent demand for computing. Industry executives must increasingly focus their companies on Asia-Pacific and Europe in their product development and marketing efforts. The industry leaders are already global players, with much of their recent growth coming outside the United States. However, U.S. companies are underrepresented in many Asia-Pacific markets, especially Japan. In the words of a leading industry executive, *"Any computer company that wants to be a leader by the end of the century has to have an important business in Japan."* The computer industry must look to Japan for its huge market potential, for its technological capabilities, and as the home of major competitors in the U.S. market, and develop a *Japan strategy*, along with broader international strategies.

Of course, the message for Japanese computer manufacturers is that they might do well to look closer at their home markets for future growth prospects.

### Implications for U.S. Government

Government must also play a role in ensuring access for American computers in the Japanese market. Unlike the relatively open European markets, the highly protected Japanese computer market has only opened up slowly, and under continued pressure from the U.S. government. Fortunately, the efforts to gain access for American computers has been less acrimonious and more fruitful than negotiations in areas such as the auto industry. For example, in December 1991, U.S. computer makers quickly negotiated increased access to Japan's government procurement process, while the highly publicized demands of the U.S. auto industry stirred resentment and gained little benefit.



Still, American companies, which control well over half the European market, have a much smaller share in Japan. NEC dominates the PC market in Japan, while Fujitsu, Hitachi, NEC, IBM and DEC share the mainframe and minicomputer markets. If the U.S. industry is going to take advantage of the likely rapid growth of the Japanese market, both the industry and the U.S. government are going to have to do a much better job than has been done in other sectors. Otherwise, the powerful Japanese industry will continue to prosper at home, and use that strength to assault the position of the American industry both in the U.S. and in Europe.

### **Implications for California Government**

California can help its computer industry by assisting companies that want to get into Japan and other Asian markets. The state government has opened offices in Japan and Hong Kong to help California businesses, but further effort is needed to ensure that California's computer firms are aware of business opportunities in both the public and private sector in Japan. Government assistance can be especially valuable to smaller companies that do not have the presence in Japan that the large computer companies do. Given California's receptivity to Japanese firms in its home markets, there should be a strong case for reciprocity.

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<sup>1</sup> This measure was first developed by Kenneth Flamm (1990) in an analysis for the Organization for Economic Cooperation and Development (OECD).

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