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Newly Industrializing Countries: Growing Industrial Competitors



A Research Paper

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This paper has been prepared by [redacted]
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World Issues Branch, OGI, [redacted]

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**Newly Industrializing Countries:
Growing Industrial Competitors**

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Overview

*Information available
as of 1 October 1982
was used in this report.*

The so-called newly industrializing countries (NICs)¹ are moving rapidly into head-to-head competition with the United States and its industrial allies in the market for more sophisticated manufactured products. The NICs are aggressively reshaping the structure of their industrial sectors to shed their image as low-cost producers of relatively simple, labor-intensive goods in favor of new, high-growth products. Lower labor costs and government subsidization of manufacturing will make NIC exporters tough to compete with, putting additional stress on employment and output in the industrial nations. As the NICs compete more aggressively in both OECD and Third World markets, we expect them to become more active participants in such industrial country-dominated forums as the GATT.

Based on the industrial plans and recent trends in the industrial sectors of each country, we believe that the NICs will be able to complete their shift to a more capital- and technology-intensive stage of production by the end of the decade. Specifically, we believe the NICs will:

- Strengthen their existing capital-intensive steel, shipbuilding, and automobile industries.
- Manufacture a greater share of the components used in their light-assembly industries, particularly in the electrical products sector.
- Make significant inroads into the low- and medium-technology growth industries of machine tools, telecommunication equipment, and small computers and their related peripherals.
- Expand their role as centers for financial, business, transportation, and information services.

The speed and extent to which the NICs progress into these lines of production are linked to the economic performance of OECD countries and to how quickly the NICs are able to eliminate several obstacles. We believe the more prominent of these tasks include: overcoming a growing shortage of skilled laborers; developing the marketing, spare parts, and servicing networks necessary to gain worldwide consumer acceptance for their products; and building the R&D capability to develop and design new products and innovations in production methods. The Asian NICs will probably be more successful than Brazil and Mexico in solving these problems because of their stable economies and relatively advanced industrial sectors.

¹ The countries examined are Brazil, Hong Kong, Mexico, Singapore, South Korea, and Taiwan.

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It is difficult to assess critically the NICs' progress in restructuring their industrial sectors because their strategies are so recent, and the pace has been temporarily slowed by global recession. Nonetheless, some early supporting trends in the development of the resources needed to make this transition are evident:

- Labor productivity is rising rapidly, especially in Singapore and South Korea.
- Foreign investment flows are generally growing, especially in Singapore and Mexico.
- Several NICs are establishing reputations as reliable designers and suppliers of more sophisticated products such as computer equipment (Brazil), precision engineering and electronics (Singapore), and machine tools (Taiwan).

Several aspects of the NICs' shift in industrial development strategies will directly benefit the United States. We expect some increase in demand for US manufactures of capital equipment and technology and greater opportunities for foreign investment, licensing, and credit transactions to arise from the NICs' industrial push. In addition, growing NIC incomes should stimulate demand for US-produced consumer goods.

The NICs' emergence alongside the Big Ten ² industrial countries as major competitors in manufactured goods markets and in lining up supplies of raw materials will, however, attract much more attention than any projected financial gains for the United States. The NICs' tendency is to focus on a narrow range of products that almost guarantee successful market access rather than producing a gamut of marginally competitive items. By aggressively siphoning off these profitable, highly visible niches, the NICs could very well prolong the trade tensions between the industrial and developing countries that currently take place over traditional labor-intensive products.

We believe that the Asian NICs will probably present the greatest challenges to the industrial countries. Because of their ambitious industrial plans, advanced industrial base, and efforts to improve their indigenous human resources, they have the potential to move rapidly into the market for more sophisticated manufactured products. Troublesome financial

² The Big Ten countries include Belgium-Luxembourg, Canada, France, Italy, Japan, the Netherlands, Sweden, the United Kingdom, the United States, and West Germany.

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problems, high rates of domestic inflation, large unfilled home markets, and relatively less developed industrial bases will probably constrain Mexico and Brazil to their established capital-intensive industries as the major source of export earnings.

The growing technological sophistication of production in the NICs could create the potential for them to become alternative suppliers to the Soviet Union in the event of future Western trade sanctions. While the NICs lack the broad industrial base of the United States and most European countries, they will probably be able to compete in quality and price on sales to the Soviet Union of a narrow range of goods without the security or political interests that currently constrain Western sales. Indeed, the NICs' development strategies in many ways mesh well with the needs of the USSR for such products as computer equipment and software, microelectronic products and production processes, telecommunications systems, machine tools, and even such traditional NIC products as oil exploration equipment, shipbuilding technology, and chemicals. While most of the NIC manufactures are unlikely to be as sophisticated or as sensitive as those currently on COCOM-restricted lists, for example, even the availability of standard products and established technology would save the Soviet Union time and money in R&D costs and engineering risks and result in more efficient product acquisition.



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Table 1
Newly Industrializing Countries:
Economic Growth and Income

	Average Annual Real GDP Growth Rate (<i>percent</i>)		Average Annual Real Per Capita GDP Growth Rate 1961-81 (<i>percent</i>)	Per Capita GDP 1981 (<i>US \$</i>)
	1961-73	1974-81		
Brazil	9.1	5.9	5.0	2,000
Hong Kong	9.2	8.0	5.6	4,590
Mexico	6.8	6.6	3.5	3,400
Singapore	10.0	7.9	7.0	6,000
South Korea	8.8	7.3	5.8	1,560
Taiwan	9.7	7.7	6.5	2,460
NIC average	8.3	6.6	6.5	2,430
Non-OPEC LDC average	6.3	5.2	4.1	745
United States	4.2	2.4	2.4	12,493
Japan	10.4	3.7	7.0	9,680
West Germany	4.5	2.0	3.2	11,142

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Table 2
Newly Industrializing Countries:
Indicators of Industrial Development

Percent

	Average Annual Growth in Industrial Production		Industrial Production as Share of GDP		Shares of World Industrial Production		Manufactures Exports as Share of Total Exports	
	1961-70	1971-79	1960	1979	1963	1977	1960	1980
Brazil	9.7	9.6	35	38	1.57	2.49 ^a	3.0	37.6 ^b
Hong Kong	8.2	4.3	34	31	0.08	0.21	80.0	91.1
Mexico	9.1	6.4	29	38	1.04	1.45	11.0	11.2
Singapore	12.5	8.6	18	36	0.05	0.10	26.0	46.7
South Korea	17.2	16.5	20	39	0.11	0.69	15.0	89.5
Taiwan	16.4	20.5	29	51	0.11	0.46	32.3	90.8
NIC aggregate	10.3	10.2	31	39	2.96	5.40	25.3	63.7
United States	5.2	2.7	38	34	40.25	36.90	65.0	65.7
Japan	10.9	5.6	45	42	5.48	9.14	79.0	94.5
West Germany	5.2	2.1	53	49	9.69	8.85	87.0	83.6

^a Data for 1976.^b Data for 1979.

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**Newly Industrializing Countries:
Growing Industrial Competitors**

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The NICs in the World Economy Today**Past Success**

The newly industrializing countries (NICs)—Brazil, Hong Kong, Mexico, Singapore, South Korea, and Taiwan—have often been cited as models of development for the remainder of the Third World. IMF data show that between 1961 and 1981 the NICs' average annual growth rate in real GDP was roughly 7 percent, far in excess of the 4-percent growth registered by OECD countries for the same period (table 1). As a consequence of this growth, the NICs have raised their per capita GNP to \$2,400, more than three times the average of the rest of the Third World.

Much of the surge in the NICs' growth, according to development theorists, has rested on their outward-looking or export-led growth policies. In fact, they have often been castigated for the impact that their growing manufactures exports have on the production and employment in industrial countries. The outward-looking policies used by the NICs, which contrast with the import-substitution development policies followed by many other LDCs, have typically included the following elements:

- The establishment of a more liberal trade and payments regime with relatively free trade for both exports and imports of inputs needed for export production.
- The introduction of a unified exchange rate system, often accompanied by a devaluation and other measures to maintain a competitive exchange rate.
- The use of fiscal incentives, such as accelerated depreciation allowances and tax exemptions for profits generated by exports, to aid domestic exporters and to attract foreign investment into promoted industries.

- The implementation of fairly tight fiscal and monetary policies to reduce consumer goods imports and enhance the price competitiveness of export goods.

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The NICs have each developed highly successful, labor-intensive, industrial sectors. Since 1960 the shares of industrial production as a percent of GDP in the NICs have risen to levels roughly equivalent to (and sometimes exceeding) those of the industrialized countries (table 2). These labor-intensive industries have made significant inroads into industrial country markets:

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- The leading NIC-manufactured export is apparel (clothing, textiles, and footwear). In 1980 apparel accounted for 30 percent of the NICs' total manufactured exports. NIC exports of this commodity probably also are the most sensitive trade issues in OECD-NIC relations. OECD purchases of NIC apparel products amounted to nearly one-third the total OECD imports of this product in 1980; in the United States, the share was nearly two-thirds (table 3).
- The second most important NIC-manufactured export commodity is consumer electronic and leisure goods. Exports of these products, chiefly from the East Asian NICs and, to a lesser extent, from border industries in Mexico, have grown much more rapidly than other NIC exports. Their shares of OECD imports more than doubled between 1970 and 1980.
- NICs have made significant inroads into world markets in industrial electronics. NICs now supply between one-third and one-half of US imports of telecommunication equipment and transistors; they have even made inroads into the Japanese market in this area.

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Table 3
Newly Industrializing Countries:
Share of OECD Imports of Manufactures

Percent

	OECD							
	Total ^a		United States		European Community		Japan	
	1971	1980	1971	1980	1971	1980	1971	1980
Total	3.2	6.5	9.7	18.3	1.5	3.3	6.3	16.9
Chemicals	0.8	1.6	3.0	4.7	0.5	0.4	1.9	9.1
Semifinished goods	2.5	4.9	6.7	13.9	1.1	2.3	16.0	23.8
Machinery	1.5	4.8	9.0	18.7	0.3	1.7	2.1	10.7
Electrical machinery	5.5	12.1	29.3	37.2	0.7	4.1	10.7	25.1
Telecommunications equipment	5.2	17.1	20.7	46.1	0.5	5.8	7.5	26.4
Transistors	15.5	17.6	64.1	34.8	1.7	8.1	17.6	24.3
Transport equipment	0.2	1.0	0.5	2.1	0.1	0.6	1.1	1.4
Consumer goods	12.1	19.3	27.5	44.5	6.2	11.2	20.2	36.8
Electronic consumer goods	8.4	20.9	15.6	37.6	3.3	13.3	7.3	43.7
Apparel	22.3	29.2	42.1	65.2	12.5	16.5	56.2	52.9
Leisure products	5.6	10.6	16.6	23.6	2.9	6.6	3.5	13.0

^a Excluding Iceland, New Zealand, and Turkey.

Current Challenges

The NICs are currently confronted with several factors that threaten to restrain the future growth of their traditional, labor-intensive export base. Labor shortages have begun to appear in a number of manufacturing sectors, raising the cost of labor and reducing the price competitiveness of exported products. These labor shortages have been especially pronounced in Singapore, Taiwan, and Hong Kong. Official projections by Singapore, for example, indicate that the economy will need some 5,000 additional foreign workers per year to make up the domestic labor shortfall expected through the end of the decade. Moreover, as the NICs become more heavily industrialized, workers' heightened expectations for improved living standards will bring upward pressure on real wages. As a result of these higher labor costs, several labor-intensive industries have begun to move away from these traditional centers of production.

More importantly, however, the NICs are facing both increasing foreign competition and developed country restrictions for their traditional exports. An increasing

number of LDCs—notably India, the Philippines, Pakistan, and China—are emerging as lower cost producers of many of the products that have fueled NIC growth. Moreover, the NICs have been among those developing countries whose preferential access to developed country markets under the Generalized System of Preferences (GSP) has been most restricted.³ The OECD reports that in 1977 about 70 percent of the preferential cutoffs imposed by the EC and 96 percent in the case of the Japanese GSP fell on the NICs. In addition, Western countries have made greater use of import tariffs, orderly marketing arrangements, nontariff barriers, import quotas, and other restrictive measures to protect their domestic markets from the rapid expansion of the NICs' exports. The IMF asserts that the most severe protectionist pressures in the period since 1974 have come in

³ Under the GSP, developed countries grant on a bilateral basis duty-free entry to the exports of manufactures, semimanufactures, and selected other products from developing countries and territories.

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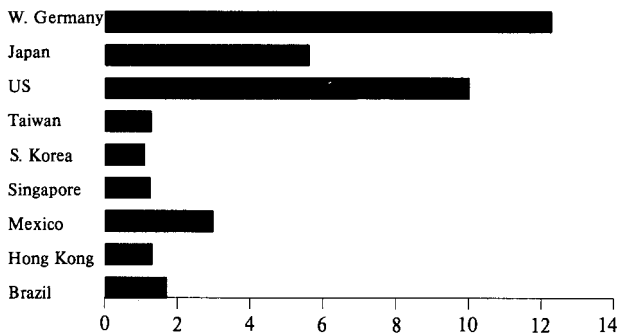
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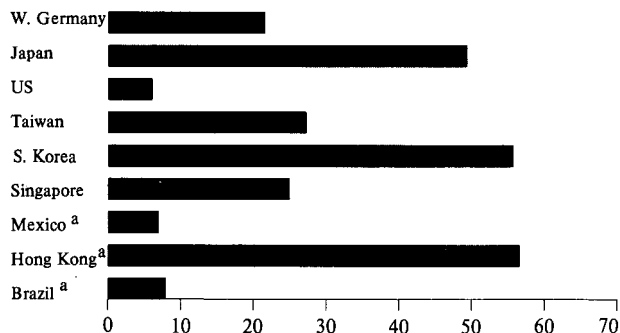
Figure 1
NICs: Some Determinants of
Industrial Performance, 1980

Note change in scale.

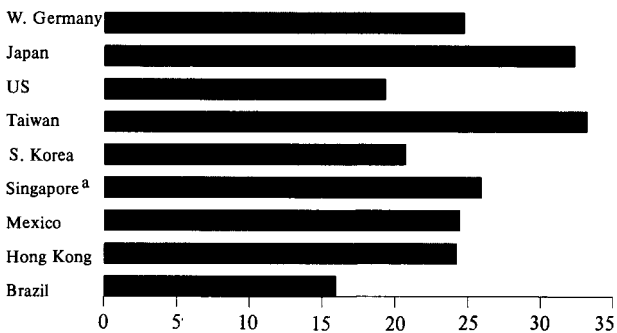
Average Hourly Compensation in Manufacturing
 US \$



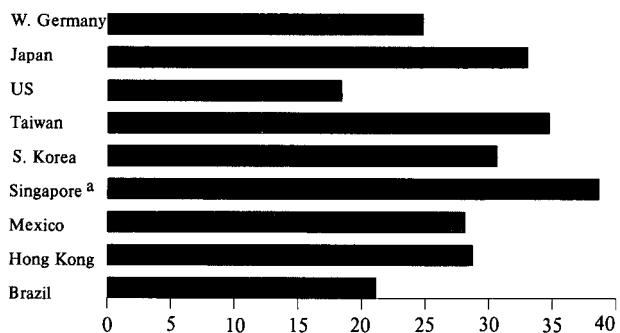
Change in Labor Productivity, 1975 to 1980
 Percent



Gross National Savings as Share of GDP
 Percent



Gross Domestic Investment as Share of GDP
 Percent



^aData for 1979.

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textiles and clothing, footwear, electronics, steel, and motor vehicles—industries in which the NICs have staged much of their past export success.

Shift in Industrial Development Strategies

The NICs' Strategy for the 1980s

In response to these rising labor shortages and mounting trade pressures, the NICs are introducing new development strategies to maintain the dynamic

growth achieved over the past decade.⁴ These strategies are spearheaded by the drive to restructure the industrial sector toward capital-, skill-, and technology-intensive industries. Our analysis of the industrial plans for each country indicates that several key industries are targeted for future development; they

⁴ A more elaborate treatment of the details of the industrial development strategy of each NIC is available in the appendix.

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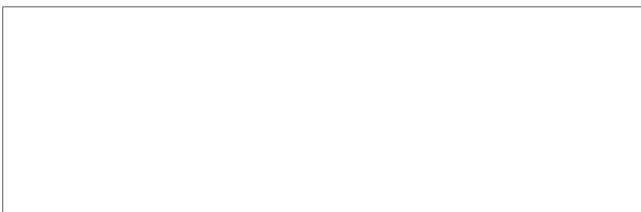
include machine tools, microelectronics, transportation equipment, telecommunications equipment, small computers, and financial and information services. In the United States these nonservice manufactures account for some 6.5 million jobs and generate output worth over \$450 billion. [redacted]

According to statements by various government sources, these industries were singled out because of their high value-added content, lower manpower requirements, and potential as major foreign exchange earners. Moreover, these officials believe that most of the resources needed to develop these industries are readily available and that, with the proper management, their local industries can become leading world manufacturers of the targeted product lines. [redacted]

Singapore, South Korea, and Taiwan have introduced the most ambitious industrial strategies.⁵ Each seeks to replace a large share of its currently labor-intensive production with capital-, skill-, and technology-intensive industries. Singapore is also striving to become a regional center for financial, medical consulting, and computer services. Brazil, Mexico, and Hong Kong are taking a less aggressive approach. Brazil's somewhat narrower aim is to achieve technological independence in a limited number of preselected industries, such as data processing and telecommunications. Mexico is emphasizing the expansion of industries producing machines and tools for the mining and power sectors and for the manufacture of consumer electronic products. Hong Kong, for its part, prefers to continue its longstanding policy of allowing the private sector to set the pace and pattern for development. [redacted]

Supporting Policy

To achieve these industrial development objectives, the NICs have adopted a more flexible package of outward-looking growth policies. Our analysis of the industrial plans described by both the press and



official reports indicates that the most significant change in these measures has occurred in the area of production policy. [redacted]

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According to statements by government officials from each country, the drive to upgrade industry will require unprecedented flows of financial capital. Such resources are beyond the ability of the NICs to generate domestically, despite their high gross domestic savings rates of roughly 20 percent of GDP. To fill this void, the NICs have taken specific steps to encourage greater foreign investment. These policies include:

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- **Tax Concessions.** The NICs offer a wide variety of attractive tax concessions to foreign investors. These include tax holidays of three to five years; lowered ceilings on corporate taxes; generous depreciation allowances, especially for expenditures on R&D; freedom to repatriate profits; and tax exemptions on dividends, interest, and earned income.

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- **Financial Incentives.** The NIC governments are directly financing large, capital-intensive industries. Where needed, they offer loans at preferential rates or provide venture capital. In addition, Hong Kong and Singapore are striving to develop advanced banking systems and financial structures.

- **Government Assistance.** The governments of the NICs are widely involved in the development of a modern and efficient infrastructure, especially for export-oriented industries. This includes roads, ports, telecommunications facilities, utilities, and mass transit systems. Industrial estates are being developed that offer subsidized rents, ready-built factories, and other facilities. In addition, the governments are rapidly expanding technical and vocational training centers to upgrade worker skills.

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While the NICs strongly encourage their industrial sectors to greater foreign involvement, they are also imposing performance requirements to direct the flow and nature of foreign investment. These measures are used to not only ensure that the desired technology is acquired, but also to limit foreign ownership and to control domestic operations. [redacted]

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NICs: Industrial Development Strategies for the 1980s

<i>Country</i>	<i>Strategy</i>
<i>Brazil</i>	<p><i>The Brazilian Government has not articulated a comprehensive industrial development strategy. Nonetheless, the IMF has identified three themes that appear to be determining the current orientation of Brazil's industrial development:</i></p> <ul style="list-style-type: none"> • <i>Reducing the investment incentives for much of the overexpanded capital goods sector.</i> • <i>Using a system of special incentives to relocate industry away from Rio de Janeiro and Sao Paulo to the mineral-rich northeast regions of the country.</i> • <i>Striving to achieve technological independence in the petrochemical, data processing, merchant marine, telecommunications, petroleum extraction and refining, steel, and aircraft industries.</i>
<i>Hong Kong</i>	<p><i>The government of Hong Kong prefers not to intervene in private-sector business or trade, but assists by developing the institutions and infrastructure needed to support these sectors. According to several press reports, Hong Kong's Department of Industry has launched several programs to attract high-technology industries and encourage joint ventures with Hong Kong industrialists:</i></p> <ul style="list-style-type: none"> • <i>The focal point of the drive has been the Taipo Industrial Estate, which provides at nominal costs the basic facilities for firms manufacturing high-technology products.</i> • <i>It is opening industrial promotion offices in San Francisco, Tokyo, London, and Stuttgart.</i> • <i>A Vocational Training Council has recently been established to coordinate the technical and vocational training of workers who will man high-technology industries.</i>
<i>Mexico</i>	<p><i>Mexico's Industrial Development Plan for this decade indicates that the Mexican economy has been structurally weakened by past policies of import substitution. Embassy sources report that the plan's remedies for these weaknesses include:</i></p> <ul style="list-style-type: none"> • <i>A major expansion of steelmaking capacity.</i> • <i>Geographic decentralization of industry to underdeveloped areas of the country.</i> • <i>Expansion of the capital goods sector into mining, power equipment, and machines for the production of consumer electronics.</i> <p><i>Mexico's current severe financial crisis will probably delay but not substantially shift implementation of this strategy.</i></p>
<i>Singapore</i>	<p><i>In 1979 the government of Singapore embarked upon a program publicized as a "Second Industrial Revolution." The goal is to transform Singapore into a high-technology manufacturing sector and regional center for such sophisticated services as banking, insurance, medical consulting, and computer software by the 1990s. The program is based on a three-part package:</i></p> <ul style="list-style-type: none"> • <i>A series of government-mandated wage increases to discourage labor-intensive production and encourage increased labor productivity.</i> • <i>Investment incentives to increase the capital-intensity of production for 11 high-technology industries.</i> • <i>Vocational training and education to upgrade worker skills.</i>
<i>South Korea</i>	<p><i>South Korea's drive to broaden its industrial base began, as described in several press and Embassy reports, in 1977 when Seoul introduced its five-year plan for 1977-81. Recognizing that South Korea's low-cost, labor-intensive industries would lose their export competitiveness, the plan called for a shift to the capital- and technology-intensive industries of shipbuilding, machinery, iron and steel, automobiles, and electronics. The recently released Fifth Five-Year Plan (1982-86) seeks to further develop and expand these industries. However, rather than expanding their number, the plan seeks to upgrade the existing product processes and product technology to strengthen their export competitiveness.</i></p>
<i>Taiwan</i>	<p><i>Armed with a Ten-Year Plan for 1981-90, Taiwan has launched an ambitious program to upgrade its manufacturing sector. According to the press and several official reports, the plan centers on a shift away from labor- and energy-intensive manufacturing to more capital- and technology-intensive industries such as sophisticated electronics, telecommunications, machinery, and metals. An important element in Taiwan's industrial strategy is the Hsinchu Science-Based Industrial Park. The park is designed as a seedbed of high technology from which local industry can evolve. To ensure that technology-intensive industries are attracted to Hsinchu Park and other industrial areas, government publications indicate that Taipei offers a variety of financial and tax incentives to prospective investors.</i></p>

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The NICs have also introduced several new measures to further develop their indigenous human resources. By establishing special skill development funds to finance training, expanding the technical and vocational training programs, and increasing the number and quality of training facilities to upgrade worker skills, the NICs seek to improve labor productivity. []

Success to Date

The NICs have made some progress in attaining the goals laid out by the industrial strategies. ⁶ It is difficult to evaluate their progress critically and project future success because the strategies are so new and the pace of their industrial restructuring is slowed by the global recession. []

So far as we can determine, the greatest impact of the NICs' restructuring efforts appears to be in the development of human resources. By introducing a variety of vocational training programs to upgrade worker skills and automating production lines, several of the NICs have boosted labor productivity. In turn, this has eased some of the pressure caused by labor shortages and contributed to the competitiveness of their manufactured products. The most notable gains have occurred in South Korea and Singapore where average labor productivity growth has increased from 10.4 and 2.6 percent in 1980 to 15.0 and 5.4 percent, respectively, in 1981. Progress has been slower in the more complex economies and conservative societies of Mexico and Brazil, where the sheer magnitude of human resource programs is larger and the marginal impact of improvements harder to detect. []

Some of the NICs have also begun to attract increased flows of foreign investment. The most success has been achieved by Singapore and Mexico, which rely on the United States and Japan for a large share of their inflow. According to Embassy reports, however, foreign investment, while on the rise, has fallen short of targeted goals (table 4). []

The NICs' efforts to attract capital have been hampered by high interest rates and slowed global economic growth. These factors have caused Taiwan to

⁶ Additional details of the NICs' success to date beyond these highlights are available on a country-by-country basis in the appendix. []

Table 4
Newly Industrializing Countries:
Net Direct Foreign Investment ^a

Million US \$

	1974	1979	1980	1981
Total	2,706	4,639	4,956	6,636
Brazil	1,244	2,223	1,544	2,300
Mexico	678	1,337	1,846	2,253
Singapore	596	941	1,454	1,900
South Korea	105	16	-7	82
Taiwan	83	122	119	101

^a Data not available for Hong Kong.

delay some of its planned investment. In addition, nationalistic economic policies have reduced the attractiveness of foreign investment in Brazil, and a weakened foreign investment policy has eroded the Korean investment climate. Because foreign investment is a key to the success of their industrial development objective, we believe the NICs will probably become more energetic in their efforts to attract new investment as world economic conditions improve. []

Our analysis indicates that the NICs' shift in industrial strategies has not yet had a pronounced impact upon the structure or growth of their industrial output. This result is not surprising. When the NICs shifted from import-substitution policies to export-led policies, it took, according to several studies of the NICs' past industrial performance, roughly 10 years for the change in policies to be reflected in their industrial output. Although it is too early to assess rigorously the long-term impact of these strategies, some progress has been made in shifting the industrial orientation. []

Brazil has achieved some success in shifting its industrial orientation. Presently, Brazil is building much of the basic infrastructure needed to support the Carajas Regional Development Program, a project designed to turn the northeast corner of Brazil into a

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prosperous mining, minerals processing, and agricultural region by the end of the decade. Brazil has also made strides toward achieving technological independence in several industrial subsectors:

- Brazil is the sixth largest non-Communist producer of civil aircraft, according to the Aerospace Industry of America. As a result of Brasilia's drive for technological independence, Brazil has developed some capability to produce selected avionics; however, almost all the technologically advanced propulsion systems and more sophisticated avionics must still be imported.
- Brazil also leads the Third World in production of locally designed computer equipment. More than one-half of the \$1.7 billion in Brazilian computer equipment sales projected by industry officials for this year will accrue to Brazilian-owned firms. Brazil is also in the embryonic stages of computerizing its telecommunications system and developing a microelectronics industry.

Reports from a variety of sources indicate that Brazil's overall progress has been limited by: the reluctance of foreign firms to transfer their best technology, a shortage of skilled laborers, and austere government policies that were needed to cool Brazil's dangerously overheated economy. We believe that over the next several years, industrial growth will continue to be led by its proven motor vehicle, steel, machinery, shipbuilding, and petrochemical industries. [redacted]

With the exception of the electronics subsector, *Hong Kong's* industrial sector has been slow to move up the technological ladder. Earlier this year Hong Kong joined Japan, South Korea, and Taiwan as the principal Asian producers of integrated circuits. Although these are low-capacity devices for consumer goods, press and official reports indicate that there is growing fear among industrial countries that Hong Kong may become a funnel for uncontrolled technology transfer to China. We believe that the small-scale private enterprises, which are the foundation of Hong Kong's economy, lack the financial capital to develop

a viable high-technology sector. Thus, it is our judgment that most of the future economic growth of Hong Kong will be in its traditional role as subcontractor, a center for financial and other services, and entrepot port, particularly for China. [redacted]

We believe *Mexico* has probably made the least progress to date in shifting the orientation of its industrial sector. The most visible success has been limited to the already well-developed power equipment industry, which benefits from close association with large multinational firms such as General Electric Co. and Colt Industries. Embassy sources report that the other targeted industries such as steel are hobbled by high costs, poor quality control, and inefficient state-owned production. In addition, Mexico's current financial problems will slow the pace of industrialization by reducing the availability of investment funds. Although Mexico will not soon emerge as a major international industrial competitor, we believe that, over time, it will probably be able to overcome serious bottlenecks and lay much of the foundation in capital goods production that it needs for continued industrialization. [redacted] 25X1

Singapore's drive to restructure its economy has yielded impressive results. The manufactures' share of GNP is growing relative to the traditional services sector, with gains in electronics especially pronounced. Labor productivity gains of more than 5 percent last year compared favorably with those of Japan (2.1 percent) and the United States (0.9 percent). Recent foreign capital inflows have been concentrated in the high-technology enterprises targeted by the government's wage-boosting policies. Singapore is carving out a small but important niche in precision engineering products and high-grade consumer and industrial electronics, as well as in such traditional industries as chemicals, machinery, and transport equipment. Nonetheless, we expect Singapore's small size and tight labor market to limit industrial expansion and leave the services sector dominant in both size and rate of growth. [redacted] 25X1

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The effects of *South Korea's* Fifth Five-Year Plan are still nascent, Seoul having only announced this plan earlier this year. According to several Embassy and press reports, Seoul has found it difficult to quickly shift its emphasis to new high-technology lines because of the sheer size of earlier investments in such primary industries as steel, petrochemicals, automobiles, and textiles. Moreover, like Singapore, South Korea has a critical shortage of skilled workers. Our analysis of the industrial sector suggests that the higher technology products that emerge will probably be directly related to South Korea's traditional rather than wholly new industries. For example, the shipbuilding industry will probably begin to produce more specialty vessels and the electronics industry will move into the top range of consumer products and into such industrial products as office machines and telecommunications equipment. [redacted]

Taiwan is well on the way toward development of the electronic and machine tool industries. According to Embassy and press reports:

- Its exports of electronic products have increased by nearly 50 percent since 1979, and at that rate we calculate that electronics will replace textiles as Taiwan's dominant export either in 1982 or 1983.
- In only two years Taiwan grew from the world's 18th largest machine tool exporter to the 11th largest and is the dominant producer of several types of tools. Taiwan is responding rapidly to the increased demand for more sophisticated kinds of machine tools.
- Finally, investment by electronics, information processing, and machinery enterprises in the keystone Hsinchu Industrial Park is well ahead of schedule. [redacted]

Long-Term Prospects

In our judgment, the NICs will be able to progress to a more capital- and technology-intensive stage of production during the 1980s. [redacted] recent advances in manufacturing techniques have provided a growing number of mature, technologically stable industries that are suitable for transfer to the NICs. The most notable advances

have occurred in the steel, transport equipment, petrochemical, and precision equipment industries. Moreover, each has a relatively low-cost labor force; an adequately developed industrial base and supporting infrastructure; strong backing from their respective governments; reasonably good access to external financing; a stable political system; and access to the requisite technology, be it by direct purchase, joint venture, licensing arrangement, or outright piracy. [redacted]

The NICs' advance into these higher stages of production will probably develop along four lines:

- There will be a strengthening of the existing capital-intensive industries of shipbuilding, steel, and automobiles as the NICs attempt to modernize and expand their productive capacity.
- More of the components used in their established light-assembly industries, particularly in the electrical and electronic sectors, will be manufactured locally.
- Significant inroads will be made into the low- and medium-technology growth industries of machine tools, telecommunications equipment, and small computers and their related peripherals.
- The NICs will expand their roles as centers for financial, business, transportation, and information services.

Whereas the Asian NICs will probably concentrate their industrial development in light industry using low and medium technology and in services, we believe that much of the industrial development in Brazil and Mexico will be focused in the existing capital-intensive industries and be oriented in large measure to these countries' substantial internal markets. [redacted]

The speed and extent to which the NICs successfully develop these lines of production will be closely linked to the economic performance of OECD countries and to how quickly the NICs are able to overcome several internal obstacles. A sustained period of OECD growth would not only stimulate the demand for the types of products the NICs seek to export but also lower the cost of capital and encourage greater foreign participation in the development of the NICs' industrial sectors. [redacted]

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**NICs: Potential Lines of
Major Export Competition**

Product	Comment
Computer software	Singapore is rapidly emerging as a regional purveyor of software with the potential to expand into other industrial and Third World markets.
Machine tools	Taiwan, Singapore, South Korea, and Brazil currently manufacture a broad range of noncomputerized machine tools, including conventional lathes, drilling machines, and machining centers. Each intends to be a strong contender for shares of the Asian market, which has been a Japanese stronghold.
Small computers	Brazil, Taiwan, South Korea, Hong Kong, and Singapore have developed the capability to manufacture minicomputers and microcomputers. Future production will probably include cheap imitations of proven systems such as the Apple computer and special application minicomputers.
Computer terminals	Brazil, Taiwan, South Korea, and Hong Kong currently manufacture a wide variety of cathode-ray tube (CRT) terminals and seek to expand into such special-purpose equipment as Chinese-language computer terminals.
Related computer equipment	Brazil, Taiwan, South Korea, and Hong Kong are also beginning to specialize in the production of disc and magnetic tape drives, data entry equipment, modems, printers, and character readers.
Semiconductors	Taiwan, South Korea, and Hong Kong have developed the capacity to manufacture integrated circuits on a small-scale basis. Each country plans to purchase the requisite technology to further expand production and progress beyond the video games and watches for which these are currently used.
Marine industry	South Korea and Brazil are currently recognized among the world's major shipbuilders. They, as well as Singapore, are also expanding into the oil rig construction and ship repair sectors.
Shipping services	As regional trade centers, Hong Kong and Singapore are expanding their shipping fleets to capture a greater share of the charter service. South Korea, Brazil, and Taiwan also seek to expand their role.
Consumer electronics	Singapore, South Korea, Taiwan, and Hong Kong are rapidly moving into the top range of such consumer electronics products as videotape players and recorders, audio equipment, and electronic household appliances.
Industrial electronics	Taiwan, Singapore, and South Korea will probably continue their marked growth in the production of electronic switching equipment, sophisticated telephone instruments, electrical instrumentation, and office machines.
Precision equipment	Singapore and Taiwan have the capacity to manufacture precision engineering products. These would include optical instruments, medical supplies and equipment, measuring devices, photographic equipment, and high-grade electronic components.
Transport equipment	South Korea, Taiwan, Brazil, and Mexico presently manufacture a wide range of transport equipment and parts. Recent investments, by Taiwan and Brazil in particular, will probably allow them to expand their exports into Third World markets.
Heavy industrial equipment	Mexico, South Korea, and Taiwan will probably expand their production of steam generators, turbogenerators, and high-capacity pumps.

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We believe the most prominent obstacles to the NICs' shift upmarket include: a growing shortage of skilled laborers, gaining worldwide consumer acceptance for their products, and building a sufficient R&D capability:

- Although the NICs have undertaken measures to upgrade the skills of their labor force, we do not believe that the future increase in supply will quickly match the growth in demand for these skilled laborers except in Taiwan.
- The new- or medium-technology goods to which the NICs are shifting are highly differentiated; sales will be dependent on price as well as product quality, design, and marketing. It is our belief that if the NICs are to establish a reputation as dependable producers of these goods, they will have to develop an advanced marketing system to identify consumer wants, establish brand identity, and construct a worldwide spare parts network. Until they establish this infrastructure the NICs will probably concentrate on locating small market niches that can be quickly exploited by their local firms or produce under contract for established Western enterprises.
- The current NICs will face strong competition both in their waning traditional lines of production and in their new product areas from both industrial countries and such potential NICs as India, Colombia, Thailand, and Malaysia. To maintain their export growth, the NICs will need a much greater R&D capability to develop new products, improve product quality, and innovate production methods.

purchasing agreements, and direct loans to the electronics, machine tool, electrical equipment, and transportation equipment industries that draw strong NIC government support.

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Moreover, we believe US and other industrial country exporters will probably find export prospects particularly good for investment goods. The best prospects include industrial raw materials; industrial and office products that increase labor productivity, such as computers and word processors and control process equipment; and most products that can be used in the automation of electronics, raw materials processing, and warehousing and cargo handling. Rising NIC incomes also pose opportunities for consumer goods and food exports.

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We also believe, however, that the NICs' shift away from their traditional lines of production could create potential problems. As the NICs move upmarket, they will probably emerge alongside the Big Ten countries as major competitors for export markets and supplies of raw materials. We believe that the Asian NICs, because of their relatively advanced industrial sectors, ambitious industrial planning, and major efforts to develop their indigenous human resources, will probably present the greatest challenges. They have already established a reputation as leading exporters of textiles, apparel, and consumer leisure goods and have the potential to move rapidly into specialty electronics and machinery products. Brazil and Mexico will be slower to emerge as major forces in international trade. While they strive to stabilize their domestic economies, resolve their troublesome financial problems, and further strengthen their industrial base, they will rely upon their proven capital-intensive industries as the primary source of manufactures export earnings.

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Implications of the NICs' Industrialization Drive

Industrial Countries

In our judgment, the industrial restructuring effort and the factors that gave rise to it will create both benefits and potential problems for the United States and its industrial allies in Europe and Japan. On the benefit side, the NICs' shift upmarket will probably result in greater industrial country involvement in the development of the NICs' manufacturing sectors. This will entail greater opportunities for foreign direct investment, licensing arrangements, management and

In export markets, the NICs almost certainly will not compete in the broad range of high-technology products that sell on the basis of quality, taste, and product reputation. Rather, the NICs will locate market niches in the capital- and medium-technology goods that can be exploited on the basis of price. The fallout of this is that the NICs, especially the Asian

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NICs, will be successful in entering these new markets and that many of the trade tensions and adjustment problems that presently exist between the United States, Europe, Japan, and the NICs over labor-intensive goods will shift to new products. [redacted]

North-South

The NICs' industrial restructuring will probably affect the way these LDCs act in international forums. As they develop over the 1980s, their interests in trade and financial issues should more closely coincide with those of the United States and its industrial allies. Hence, these LDCs are likely to become more active participants in such bodies as the GATT.⁷ Similar to the industrial countries, the NICs will probably try to use GATT rules to: preserve existing markets for traditional commodities as long as possible, even though production of these products is being deemphasized; assure favorable—or at least nondiscriminatory—tariff and nontariff barrier treatment for new product lines; and protect their own domestic markets from encroachment by lower tier LDCs. [redacted]

In the World Bank, Mexico and Brazil will find it increasingly difficult to avoid "graduation" from multilateral concessional aid programs (the other NICs have already passed that mark). Moreover, as the NICs' development widens the gap between them and the rest of the Third World, we expect the NICs to downplay even further their currently ambivalent role (except that of Brazil) in supporting "southern" issues in favor of protecting useful international systems. Indeed, the 1980s could see the emergence of tensions over trade access between the NICs and other LDC markets. [redacted]

East-West

The emergence of some NICs as reliable producers of more sophisticated manufactured goods may make it more difficult for the United States to restrict Soviet access to strategically useful commodities and technologies, especially in the event of trade sanctions imposed on the Soviets. By any measure, the NICs' products are currently less advanced in design, quality, and production volume compared with industrial

⁷ South Korea, Brazil, and Singapore currently belong to the GATT and Taiwan reportedly is seeking membership. Mexico has long held observer status at GATT meetings. [redacted]

country goods and are well below the threshold of sensitivity for COCOM-restricted items. The NICs are making headway, however, and within the next three to five years when they will probably be capable of manufacturing higher technology products they may not be easily swayed to voluntarily limit lucrative export sales to the Communists as COCOM nonmembers Sweden, Switzerland, and Austria historically have done. [redacted]

Even without reaching the technological levels embodied in COCOM-type goods, however, the NICs will be producing goods extremely useful to the USSR. In many ways, the NICs' industrial plans mesh well with Soviet bottlenecks. We know, for example, from past experience that the Soviets are in the market for such commodities as computer memories and disk drives, semiconductor devices and the processes to manufacture them, computer software, telecommunications equipment, process controls, machine tools, and sophisticated metallurgical techniques. All of these areas figure highly in the NICs' new industrial drives. In addition, such traditional NIC industries as oil exploration and production equipment, chemical processes, and shipbuilding technology are in demand by the USSR. The ability to purchase manufactured goods and production techniques from NIC markets or even to pirate technology from both NIC firms and Western affiliates in the NICs (as the Soviets do currently from firms in Europe) would not tip any strategic balance. It would, nonetheless, certainly enable the Soviets to save on R&D costs, shorten leadtimes, reduce engineering risks, and result in more economical product acquisition. [redacted]

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Thus far, the NICs have shown little desire for substantial manufactures trade with the Soviet Bloc. Political differences and longstanding export strategies, which concentrate manufactures exports in a few lucrative markets, have limited this trade. The NICs have demonstrated, however, that they will seek out alternative markets, such as the OPEC countries, to maintain export growth when OECD markets slump. If the NICs were to perceive that the Soviet Bloc was lucrative, there is little that would prohibit them from expanding their manufactures trade with the Soviet Bloc. [redacted]

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Brazil

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Appendix

A Detailed Survey of the NICs' Industrial Goals and Performance

Brazil

According to the IMF, the current orientation of Brazil's industrial development tends to fall along three broad lines. First, Brasilia is seeking to reduce the investment incentives for much of the capital goods industry, which is considered by local planners to have excess capacity. Steel, aluminum and alumina, cement, and petrochemicals are excluded from this initiative. Second, using a system of special incentives, Brasilia is attempting to relocate industry away from Rio de Janeiro and Sao Paulo to the mineral-rich regions in the northeast part of the country. Third, Brasilia is striving to achieve technological independence in a limited number of industrial sectors. These include the petrochemical, data processing, merchant marine, telecommunications, petroleum extraction and refining, steel, and aircraft industries. This is accomplished by government policies toward transnationals that strike a balance between inducing foreign holders of technology to transfer it to Brazil, controlling the type and cost of the technology purchased, and reserving the most dynamic sectors for local manufacturers. [redacted]

A focal point of Brasilia's industrial relocation effort is the Carajas Regional Development Program, which is being undertaken in the northern states of Para, Maranhao, and Goias. The objective of the program is to turn this neglected corner of Brazil into a prosperous industrial and agricultural region by the end of the decade. The drawing card is the largest known cache of mineral wealth in the world. According to press and official reports, this region's resources include iron ore, copper, manganese, bauxite, nickel, tin, and gold. In addition, gold is being mined at a nearby site in Serra Pelada. [redacted]

Presently, much of the basic infrastructure needed to support the mining, minerals processing, and agricultural projects to be developed under the Carajas Project is being built. Some \$3.8 billion has been lined up for the construction of pilot plants, roads, communications, port facilities, and hydroelectric plants.

Progress on the project has been good. The facilities are in place for alumina processing, which, according to several analysts, will be among the world's largest within the decade, and iron ore production is scheduled to begin in 1985 with an initial production level of 15 million tons of sinter-feed ore. Industry officials estimate that iron ore production will reach 35 million tons per year by 1987. [redacted] 25X1

Brasilia has also achieved some success in attaining its goal of technological independence in several preselected industrial subsectors. Industry studies indicate that the transfer of technology has been especially successful in the aircraft industry. Starting from a base of virtually no aircraft production, Brazil has rapidly expanded its aviation sector. [redacted] 25X1

[redacted] Brazil is currently the sixth-largest non-Communist, aircraft-producing nation in the world. As a result of the drive to achieve technological independence, industry studies indicate that Brazil is developing the technology to manufacture selected avionics. These studies, however, also indicate that the aviation sector is still highly dependent upon foreign manufacturers for technologically advanced propulsion systems and avionics equipment, which can account for as much as two-thirds of the value of an assembled aircraft. [redacted] 25X1

The technology transfer strategy has also been successfully used to develop the electronic data processing industry. By regulating the imports and direct manufacturing by multinationals to reserve the micro- and mini-computer market for local manufacturers and combining foreign technology obtained through licensing arrangements with its own product development, Brazil has established an industry that leads the Third World in the production of locally designed computer equipment. More than half of the \$1.7 billion in Brazilian computer equipment sales projected by industry officials for this year will accrue to

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Brazilian-owned firms. The industry currently offers a wide range of products, including video display units, data entry equipment, word processors, microcomputers, and minicomputers. [redacted]

Brazil has negotiated agreements for the transfer of technology to the telecommunications and petrochemical industries. Under the telecommunications agreement described by industry officials, three foreign firms—Ericsson, Nippon Electric, and Siemens—have agreed to supply the technology and material to replace the country's existing crossbar telephone exchange with a storage program-controlled exchange. Once these systems are installed in Brazil's major cities, these industry officials expect that Brazil will sell this technology to other Latin American countries. [redacted]

Brazil is developing an indigenous microelectronic manufacturing capability. [redacted] two Brazilian firms, Itau Technologia SA (Itautec) and Electronics Brasileira SA (Elebra), have been granted the sole right to manufacture and sell semiconductor devices in Brazil. These firms are contacting leading semiconductor manufacturers worldwide to assess the interest and feasibility of setting up technology transfer agreements. The goal is to establish a complete wafer fabrication facility capable of producing and testing bipolar and metal oxide semiconductors within two to four years. [redacted]

In our judgment, Brazil will continue to progress in achieving its goals of expanding the mining sector and attaining technological independence in the telecommunications, petroleum extraction and refining, and electronic data processing industries. However, it is unlikely that this will result in a rapid improvement in these industries' international competitiveness. Reports from a variety of sources indicate that the process of transferring technology has in the past been slow. Foreign firms have been reluctant to transfer their best or most up-to-date technology and there exists a shortage of qualified Brazilian technicians who are capable of carrying out these development plans. Moreover, recent cutbacks in government public investment and state-owned company expenditures will probably slow the growth and development of these industries. We believe that over the next three to five years, Brazil will probably continue to rely upon its proven agricultural and capital-intensive transportation, steel, and industrial machinery industries as the primary source of export earnings. [redacted]

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Hong Kong

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Hong Kong

The government of Hong Kong prefers not to intervene in private-sector business or trade but assists by developing institutions and infrastructure needed to support these sectors. Hong Kong's Department of Industry has launched several programs to attract high-technology industries and encourage joint ventures with Hong Kong industrialists. According to several press reports, the focal point of the drive has been the Taipo Industrial Estate, which at little cost to entrepreneurs provides basic facilities for firms manufacturing high-technology products. In addition, it is opening industrial promotion offices in San Francisco, Tokyo, London, and Stuttgart. A Vocational Training Council has recently been established to coordinate the technical and vocational training of workers who will man high-technology industries. [redacted]

Our analysis indicates that Hong Kong's manufacturing sector has been slow to move upmarket. This is evident from the 50-percent vacancy rate at the Taipo Industrial Estate, which was specifically developed by the government to attract high-technology industries. Five years after the estate was set up, only 35 enterprises have signed contracts to locate there and of these only 17 are currently in operation. [redacted]

What progress has been made by the high-technology industries located at the industrial estate has come in electronics. Earlier this year two local firms began test production of integrated circuits, joining Japan, Taiwan, and South Korea as the principal Asian producers of integrated circuits. According to press reports, RCL Semiconductors, Ltd. manufactures complimentary metal oxide silicon, or CMOS, chips to be used in watches. The company's planned monthly fabrication rate is 12,000 three- or four-inch wafers; however, production started at the 8,000-wafer level. Elcap Electronics, Ltd. started test-running a 4K static random access memory (RAM) chip, a 32K read only memory (ROM) chip, and a 64K ROM chip, which are to be used in small computers and such consumer products as video games. [redacted]

The RCL and Elcap move into the fabrication of integrated circuits may result in the transfer of technology to China. Although company spokesmen

**Table 5
Hong Kong as an Entrepot for China**

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	Reexports to China (million US \$)	Share of Total Reexports (percent)	Reexports of Chinese Origin (million US \$)	Reexports of Chinese Origin as Share of Total Reexports (percent)
1979	265	6.6	1,142	28.3
1980	932	15.4	1,686	27.9
1981	1,439	19.3	2,296	30.7

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deny having any intentions of being a technology-transfer bridge, industry insiders agree that these companies are either funded by or otherwise connected with mainland interests and plan to provide China with either the technology or training to fabricate integrated circuits.* [redacted]

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It is our judgment that Hong Kong will not become a major manufacturer of high-technology products in the near term. Hong Kong now has neither the domestic base nor the system of government economic incentives to offset the costs or to support the development of a viable high-technology industrial sector. Hong Kong's industrial reputation has been developed around its ability to identify a growth market, to quickly jump in, and to get out before competition follows suit. This flexibility has derived in large measure from the colony's free trade, free enterprise philosophy, which has allowed small enterprises with nominal amounts of capital to enter a market and turn a profit in five years or less. However, according to industry experts, the development of high-technology industries would require vast sums of capital and may take as many as five years to develop a successful product, let alone to show a profit. [redacted]

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* A third company, Hua Ko Electronics, is also trying to start production of integrated circuits. However, its plans have been at least temporarily stalled by the US Government, which has denied it the export license for advanced electronic equipment because of fears that the company will reexport the technology to China. [redacted]

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We believe the most dynamic growth that will occur in Hong Kong's industrial sector is in its role as a service center and entrepot. Hong Kong's international financial center ranks third after New York and London, according to many bankers. Hong Kong is also reemerging as a major reexport center. Between 1978 and 1981, the reexport share of total exports increased from one-fourth to more than one-third and now totals \$7.5 billion. The impetus to this surge is the expansion of China's international trade and Hong Kong's growing economic link with China. We believe Hong Kong's value as a reexport center for China will continue well into the next century, in large measure because China's own transportation facilities—road, rail, and port—are likely to remain inadequate for some time.

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Mexico

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Mexico

Mexico's Industrial Development Plan for this decade indicates that the Mexican economy has been structurally weakened by past policies of import substitution. According to government officials, Mexico's advanced manufacturing sector is overwhelmingly geared to the domestic market rather than export and lacks a broadly based capital goods sector. [redacted]

Embassy sources report that the plan's remedies for these weaknesses include a major expansion of steel-making capacity, geographic decentralization of industry to underdeveloped areas of the country, and expansion of the capital goods sector into mining, power equipment, and machines for the production of consumer electronics. Tax incentives, subsidized energy, loans at preferential rates, new sources of capital, and a coordinated procurement program in the public sector are used in support of these objectives. [redacted]

Although Mexico has considerable production potential in these targeted industries, our analysis of the government policies, past trends in the Mexican economy, and current financial problems suggest that it will be well into this decade before most of these industries meet the production targets outlined by the Industrial Development Plan. The devaluation, budget cuts, and other measures that Mexico is taking—or will have to take—to solve its serious financial crisis will probably result in social and labor unrest, capital flight, and accelerating inflation. These conditions will stymie production, decrease the funding for industrial development programs, and counter the effect of lower export prices. Consequently, we project a longer time frame for the development of a viable capital goods sector, as well as slower growth in areas where Mexico potentially has a comparative advantage. [redacted]

Embassy reports indicate that Mexico has invested heavily in the power equipment industry to develop its viability and competitiveness. Mexican firms currently produce a variety of electrical equipment, as well as steam generators, turbogenerators, and high-capacity pumps. Because most Mexican manufacturers of power equipment are subsidiaries or licensees of large international corporations such as General Electric

Co. and Colt Industries and because of the large size of the domestic market, we believe that the industry will meet its projected 12- to 15-percent average annual increase in production over the next several years. However, we expect that the industry will not quickly establish much export volume because domestic demand will probably outpace production through the 1980s. [redacted]

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The published Industrial Development Plan projects an average annual growth rate of at least 14 percent for the electronics industry over the next four years; however, we believe this goal cannot be reached. The industry is presently geared toward manufacturing consumer goods containing low and medium technology. In August 1981 the government announced a program to stimulate the production of microcomputers and minicomputers, integrated circuits, and related peripherals. However, of the four major areas of the computer industry—computers, terminals, peripheral equipment, and semiconductors— [redacted]

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[redacted] Mexico has developed a local manufacturing capability only in peripherals. In our judgment, the problems posed by stringent foreign investment requirements, the high cost of assembly operations compared with the Asian NICs, a growing shortage of skilled workers, and import substitution policies will impede foreign investors from rapidly developing the industry. These problems are also likely to reduce the quality of Mexican products. [redacted]

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We believe that government ownership and protection from import competition will keep Mexico's key steel industry from reaching planners targets for production and efficiency. The state controls some 75 percent of steel production, according to Embassy reporting. Steel facilities are presently being expanded and upgraded. When completed, production capacity is scheduled to swell from its current level of 7 million tons to a peak of 24 million tons by 1990. According to Embassy sources, Mexican planners expect that high domestic demand will absorb most of the industry's production capacity through at least 1985. After this period, we believe that Mexico will begin to

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export steel products, but will not be competitive with newly emerging LDC producers, such as South Korea, Brazil, and India.

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Of great importance to the US-Mexican border regions is the in-bond industry. Semifinished goods are shipped to Mexico for processing and assembly and then reexported to the United States under special tariff arrangements. The most important in-bond operations include the manufacture of electrical and electronic products, clothing, furniture, and automobile accessories. The lower export prices resulting from the recent devaluation of the peso will probably have an expansionary impact on this sector and help to reduce Mexico's substantial balance-of-payments deficit with the United States. We also expect that these conditions will contribute to a moderate growth in both the number and output of these industries throughout the 1980s.

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Singapore

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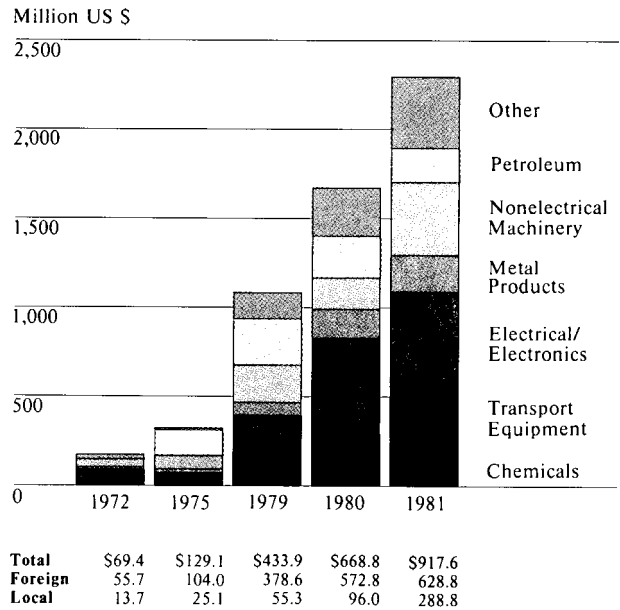
In 1979 the government of Singapore embarked upon an ambitious program to restructure the industrial sector of its economy. Publicized as Singapore's "Second Industrial Revolution," the program emphasizes a move toward increased capital- and skill-intensive production of higher value-added industries and services. The goal is to transform Singapore into a high-technology manufacturing sector and a regional center for such sophisticated services as banking, insurance, medical consulting, and computer software by the 1990s.

The drive to restructure the industrial sector is based on a three-part package, according to a variety of sources:

- A series of government-mandated wage increases—more than 20 percent annually in 1979 and 1980 and about 16 percent in 1981—were implemented to discourage labor-intensive production and encourage increased labor productivity.
- Eleven high-technology industries have been targeted to receive investment incentives to increase the capital intensity of production. They include specialty chemicals and pharmaceuticals, machine tools and machinery, automotive and aircraft components, medical and surgical instruments, and computers and computer peripherals.
- Vocational training and education to upgrade worker skills is being emphasized. Employers can tap a Skills Development Fund to finance approved in-house training schemes. The fund also encourages the use of highly skilled workers since it is financed by employers who pay a 4-percent tax on the salaries of workers who earn less than \$375 per month.

Although Singapore is still far from being a significant competitor in the world market for high-technology manufactures, its drive to restructure the industrial sector has yielded impressive results over the past two years. Embassy reports indicate that despite the global economic slump, Singapore achieved nearly a 10-percent gain in real economic growth in 1981. This

Figure 2
Singapore: Net Investment Commitments in Manufacturing



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was aided by a labor productivity gain of 5.4 percent in 1981, more than double the performance of 1980, and an 81-percent increase in the real value added per worker over 1979. Moreover, since 1979, manufacturers have been investing in machinery and equipment at much higher rates than in the past. Contrary to the original fear that foreigners would be hesitant to invest in Singapore because of higher wages, national data indicate that since 1979 foreign investment continues to flow into Singapore, though at a reduced rate. More importantly, recent capital inflows have been concentrated in the technology-intensive and high value-added industries needed to improve the competitiveness of exports (see figure 2).

The industrial-restructuring campaign is beginning to show signs of having an impact upon the composition of industrial output. Singapore's economy historically has been services oriented; however, between 1978

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and 1981, manufacturing's share of gross domestic output increased from 26 to 29 percent. This growth was led by the electronics and transport equipment industries. It is our belief that the manufacturing sector will continue to grow throughout this decade. Those sectors that have the greatest potential for future expansion include: the chemical processing industries (petrochemicals, pharmaceuticals, and chemicals); the metal engineering and machinery industries (office equipment, medical supplies and equipment, optical and photographic equipment, industrial machinery, precision engineering products, and machine tools); and the electrical and electronic industries (power-generating equipment, consumer electrical and electronic products, industrial electrical and electronic equipment, and high-grade electronic components). [redacted]

Although our analysis shows that the advance of the manufactures will make inroads into the growth of the services, the service sector will continue to dominate the economy. We believe the sectors with the greatest potential for future growth include the financial and the business services sector and the transport and communications sectors. In 1981 the financial and business sector grew by 18 percent in real terms, faster than any other sector in the economy; it now accounts for 17 percent of gross domestic product, compared with 14 percent in 1979. Its future growth will probably be spurred by the highly advanced financial sector, which is composed of a domestic banking component dominated by four local banks with numerous foreign and local participants, an offshore or Eurocurrency market, a foreign exchange market, a stock market, and a gold exchange. The growing role of the transport and communications sector will derive in large measure from the activities of the government-owned Singapore Airlines. The government claims, according to press reports, that the recently concluded bilateral airworthiness agreement with the United States puts the aerospace industry one leg up in becoming a regional leader in providing aerospace services. [redacted]

Over the next few years, we believe the most significant problem that Singapore will have to overcome is the extremely tight labor market, which has characterized Singapore's economy for nearly a decade. According to information from a variety of sources, economic planners have begun the process of overcoming the labor constraint to growth through training and capital investments that reduce labor input requirements. [redacted]

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South Korea

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South Korea

South Korea's drive to broaden its industrial base began, as described in several press and Embassy reports, in 1977 when Seoul introduced its Fourth Five-Year Plan for 1977-81. Recognizing that South Korea's low-cost, labor-intensive industries would lose their export competitiveness, the government pushed for a shift to capital- and technology-intensive industries. By using a mix of financial incentives and newly constructed industrial parks, Seoul attracted massive investments in such capital-intensive industries as shipbuilding, machinery, iron and steel, automobiles, and electronics. IMF data show that between 1977 and 1981 real fixed investment rose by almost 30 percent. [redacted]

South Korea's recently released Fifth Five-Year Plan (1982-86) seeks to further develop and expand this industrial base. However, rather than expanding the number of capital-intensive industries, the plan seeks to upgrade existing product processes and product technology to strengthen their export competitiveness. To attract advanced technologies, Seoul has liberalized the rules governing foreign direct investment, which for the last 20 years has constituted less than 10 percent of total foreign capital. Eleven industries have been targeted for further expansion over the next five years. These include lead, steel, shipbuilding, automobiles, electronics, petrochemicals, tires, footwear, paper products, ceramics, and textiles. [redacted]

Although the plan has targeted these industries for future development, Seoul has been cautious about the rate at which several will be expanded. For example, a variety of Embassy and press reports indicate that massive investments in the petrochemical industry during the previous five-year plan have created an overcapacity problem, which has necessitated that it be expanded only as fast as warranted by domestic demand. The established footwear and textiles industries will also be expanded but, as reported by the five-year plan, only to maintain export earnings until higher technology products can be introduced for export. Of the remaining traditional industries, the higher technology products will be developed in the

shipbuilding and the electronics and electrical subsectors of the machinery industry, which has been described by the plan as the backbone of the industrial sector's future growth. [redacted] 25X1

Korean statistics indicate that up to now, the Korean electronic and electrical industry has emphasized assembling products with relatively low domestic value added and high labor content. The current five-year plan seeks to move the industry into the top range of consumer products, for example, videotape recorders and players, and into such industrial products as telecommunications equipment, office machines, electronic switching boards, and small computers. In addition, it wants to further expand its fledgling microelectronic sector. By focusing on the production of the more mature, medium-technology products, Seoul intends to roughly quadruple the industry's production by 1986. [redacted] 25X1

South Korea's shipbuilding industry ranks second in terms of total production only to Japan. The industry's success has derived from its ability to make deliveries ahead of schedule, undercut the competition's price, and offer attractive financing packages. 25X1
The Association of West European Shipbuilders has calculated that, on average, South Korean shipbuilding prices are at least 15 percent lower than in Japan and Europe. In addition, [redacted] 25X1
[redacted] the Koreans provide loans for as much as 80 percent of construction costs and at terms well below the market rate. [redacted] 25X1

The shipbuilding industry is expected to become more competitive in the future. Under the five-year plan, the industry's capacity is to be expanded by almost 60 percent to 6.5 million gross tons by 1986. Moreover, Korean shipbuilders have purchased the latest technology from around the world to upgrade existing facilities and diversify shipbuilding operations into the construction of such specialty vessels as chemicals tankers, membrane-type LNG carriers, and roll-on/roll-off ships and such nonvessels as offshore drilling rigs, steel structures, and industrial plants. If successful, we believe that South Korea's expansion into 25X1

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drilling rig construction would pose a real threat to US producers, whose share of the total number of rigs ordered in the world has steadily declined from 62 percent in 1977 to 31 percent in 1980.

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Besides manufacturing industries, South Korea's important overseas construction industry is also at a crossroad. In 1981, total overseas contracts amounted to \$13.7 billion. In comparison, South Korea's total merchandise exports for the year totaled \$21.3 billion. Roughly 90 percent of these contracts were with the Middle East, the majority of which were with Saudi Arabia. Yet, because South Korean contractors are snapping up as many infrastructure projects as possible before the Saudi market dries up, the industry is unable to move into such technology-intensive projects as building plants on a turnkey basis.

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South Korea, like Singapore, is confronted with the critical problem of an inadequately trained work force. For example, projections by the Ministry of Science and Technology show that by 1991 there will be a demand for 83,000 scientists with M.A. and Ph.D. degrees. However, based on current capabilities, the Ministry expects that there will be a shortfall of some 30,000 scientists.

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Taiwan

Armed with a 10-Year Plan for 1981-90, Taiwan has launched an ambitious program to upgrade its manufacturing sector. According to the press and several official reports, the plan centers on a shift away from labor- and energy-intensive manufacturing to more capital- and technology-intensive enterprises. Four sectors specifically earmarked for development are sophisticated electronics, telecommunications, machinery, and metals. [redacted]

An important element in Taiwan's industrial strategy is the Hsinchu Science-Based Industrial Park, patterned after such American models as the Stanford Industrial Park and surrounding Silicon Valley in California. According to government officials, the park is designed as a seedbed of high technology from which local industry can evolve. The park spans more than 2,000 hectares and offers two universities, a research center, housing and medical facilities, schools for foreign children, and a computer center. Also nearby is the government-backed Industrial Technology Research Institute (ITRI), which specializes in transferring technology to private industry. [redacted]

To ensure that technology-intensive industries are attracted to Hsinchu Park and other industrial areas, government publications indicate that Taipei has offered a number of financial and tax incentives to prospective investors. For foreign investors, these include subsidized rents, special financing arrangements, duty-free imports, tax holidays, freedom to repatriate profits, and, in some cases, up to 49-percent government funding of venture capital. For local manufacturers, the primary incentive is tax relief for expanding local operations and for new efforts abroad to obtain secure sources of raw materials. [redacted]

Taiwan has entered a transition stage that economic planners hope will bring it to the elite ranks of developed countries by the end of the century. According to government statistics, Hsinchu Industrial Park has already attracted some 35 local and foreign firms since it opened in 1979 and is well in advance of

the five years estimated by planners to bring in the 30 to 40 firms needed to complete the first phase of development. Press reports indicate that park officials plan to attract 150 companies by the end of 1990. To date, most of the park's investors are either new enterprises or smaller established firms. Investment has been concentrated in the electronics, information processing, precision instrument, and machinery industries. The park has not yet drawn companies working in the high-technology material sciences, energy sciences, and aeronautical engineering and genetic engineering industries sought by Taipei. [redacted]

Signs of the incipient change in Taiwan's electronic industry are already cropping up. According to Embassy and press reports:

- In 1981 Taiwan's exports of electronic goods totaled roughly \$4.5 billion, an increase of 49 percent over 1979. We estimate, given current growth rates, that electronics will probably replace textiles as Taiwan's primary foreign exchange earner either this year or next. 25X1

- Taiwan opened its first domestically owned integrated circuit factory in April. Its current capacity is 30,000 8.14 centimeter circular wafers a month, and company officials expect to expand its capacity to 42,000 wafers a month within two to three years. The chips are for calculators, watches, and telephone sets. 25X1

- Exports of microcomputers have steadily increased, and one industry study forecasts total computer exports of \$360 million by 1985. [redacted] 25X1

Taiwan's machine tool industry has also begun to make impressive showings in recent years. Based on national and UN trade data, worldwide sales of \$178 million in 1980 made Taiwan the world's 14th largest exporter of machine tools. Taiwan is now the leading LDC producer and exporter of lathes and drilling machines. In response to the changing international demand, Taiwan has begun to expand its production

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Taiwan: Companies in Hsinchu Industrial Park

	Source of Capital	Date Approved	Products
In operation			
Wang Computer, Taiwan Ltd.	Taiwan	September 1979	Minicomputers.
	United States		
Kuang Yi Co., Ltd.	United States	October 1979	Laser optical lenses and laser systems.
United Microelectronics Co., Ltd.	Taiwan	December 1979	Integrated circuits.
Sigma Delta, Ltd.	Taiwan	December 1979	Microcomputers.
	Hong Kong		
Microtek International Corp.	Taiwan	July 1980	Microcomputer-based products.
	United States		
Quartz Frequency Technology, Ltd.	Taiwan	July 1980	Precision crystals and high-precision oscillators for communications.
	United States		
Sino-American Silicon Products, Inc.	Taiwan	August 1980	Silicon bars, the raw materials for semiconductors.
	Hong Kong		
Flow Fareast Co., Ltd.	Taiwan	August 1980	High-pressure water pumps, jets, and cutting systems.
	United States		
Tecom Co., Ltd.	Taiwan	August 1980	Communications equipment.
Advanced Device Technology, Inc.	Taiwan	November 1980	Semiconductors and integrated circuits.
	United Kingdom		
	United States		
Multitech Industrial Corp.	Taiwan	November 1980	Chinese-language computer terminals.
Southern Telecommunications, Inc.	Taiwan	November 1980	Computer equipment.
Comtec Taiwan, Ltd.	United States	January 1981	Temperature testing devices.
Algol Technology, Inc.	Taiwan	April 1981	Computer peripherals and terminals.
	United States		
Electronic Memories and Magnetics Taiwan Design Center	Taiwan	May 1981	Design of magnetic memories and development of special processes.
Hsin Yuan Electronics Co., Inc.	Taiwan	July 1981	Power-switching devices.
Mitac Corp.	Taiwan	October 1981	Chinese microcomputer systems.
Southern Information System, Inc.	Taiwan	October 1981	Digital switchboards and other data communications equipment.
	United States		
Wyse Technology (Taiwan), Ltd.	Taiwan	December 1981	Minicomputers and microcomputers.
	United States		
Becoming operational			
Numertek Computer Control, Ltd.	Taiwan	January 1981	Computerized numerical controllers for machine tools.
	United States		
China Fiber Optic Telecommunications, Inc.	Taiwan	October 1981	Optical fiber for telecommunications equipment.

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Taiwan: Companies in Hsinchu Industrial Park (continued)

	Source of Capital	Date Approved	Products
Control Data Corp. Service Center	Taiwan United States	October 1981	Software research.
Kest Systems & Service, Ltd.	United States Hong Kong Singapore	October 1981	Semiconductors.
Oxlex Corp. (Taiwan), Ltd.	Taiwan United States	December 1981	High-quality medical equipment.
Precision Founders (Taiwan), Inc.	Taiwan	December 1981	Machine tools.
Unison System Co.	Taiwan United States	December 1981	Computer software.
China Star Information Systems, Inc.	Taiwan United States	February 1982	Numerically controlled equipment.
Yang Electronic Systems, Inc.	Taiwan United States	February 1982	Sound wave tracing equipment and minicomputer systems.
Kinford Information System, Inc.	Taiwan	April 1982	Chinese/English telex intelligence terminals, personal and home computers, and message and packet switches.
Applied Mechtronics Co., Ltd.	Taiwan United States	April 1982	Microprocessors to control industrial machines.
Approved for operation			
General Microsystem Co., Ltd.	Taiwan	October 1979	Integrated circuits.
Warner Electric Taiwan, Ltd.	United States	February 1981	Ball bearings.
Primages, Inc.	United States	February 1981	Computer printers.
Domore Industries, Inc.	United States	April 1981	Vacuum deposition controllers.
Advanced Materials Technology, Inc.	Taiwan	April 1981	Laser rods necessary to manufacture laser rangefinders.

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of precision and heavy-duty machines as well as numerically controlled models. The Industrial Technology Research Institute, a government-established institute that is designed to provide research and services to industry, projects that by 1987 Taiwan's machine tool industry will probably manufacture \$2.4 billion worth of goods, or roughly 5 percent of world production, and rank among the top 10 of the world's 33 major machine-producing countries.

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