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DISCUSSION PAPERS

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Assessing Export Platforms: The Case of Singapore

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Assessing Export Platforms: The Case of Singapore

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Table of Contents

List of Abbreviations

DBS	Development Bank of Singapore
EDB	Economic Development Board
EIDA	Engineering Industry Development Agency
EPZ	Export processing zone
HP	Hewlett Packard
IMP	International Manpower Program
JTC	Jurong Town Corporation
LIUP	Local Industry Upgrading Program
MNC	Multinational corporation
PLE	Promising local enterprise
R&D	Research and development
SSIC	Singapore Standard Industrial Classification
TGTC	Tata-Government Training Center
TI	Texas Instruments

List of Tables

I. Introduction

In several ways, the export promoting strategy adopted by the Singapore government since the late 1960s can be considered successful. One is the strategy's contribution to solving the severe unemployment problem Singapore faced in the early 1960s. The unemployment rate was around 14 percent—roughly 39,000 people—in 1965. The British military withdrawal in 1968 threatened the country with an additional unemployment pool of 30,000, of which 20,000 were directly employed by the British army and 10,000 were employed in domestic service and other services related to the military presence. Losing Malaysia as its hinterland and realizing that import substitution was impossible after gaining independence in 1965, Singapore embarked on a policy of promoting labor-intensive manufactured exports via the attraction of foreign investors into the country. The average unemployment rate declined from 7.4 percent in 1966-70 to 1.9 percent in 1991-97. (See Table 1.) Accompanying the steady decline in unemployment over the past thirty years has been a steady rise in workers' real consumption wages and their standards of living, both important measures of development.

The aim of this paper is to try to understand *how* Singapore was generally successful in its export promoting strategy. Historically, Singapore experimented with an import-substituting strategy in the first half of the sixties in anticipation of forming a common market with Malaysia and also briefly after its independence in 1965. The level of protection, however, was relatively low during its import-substituting phase. A study by Tan and Ow (1982) showed that tariff and quota protection covered 21.6 percent of total manufactured output at world prices in 1967. Tariff rates were generally no higher than 25 percent. The average effective protection rate for the manufacturing sector was only 6 percent on total sales and 8 percent on domestic sales. To avoid undermining entrepot trade, which had traditionally been a mainstay of the economy, bonded warehouses were introduced to allow entrepot traders to store, process, and package imported goods for re-export without being subjected to custom duties. Duty drawbacks were also given for imported industrial inputs where there were no domestic sources of supply. The period of import-substitution was short as it quickly became clear to the government that the small domestic market of about 1.5 million people in the mid-1960s could not sustain an industrialization program developed behind protective walls. From the late 1960s onwards, tariffs and quotas were reduced and finally removed on most goods, making the use of bonded warehouses and duty drawbacks redundant. Our study will therefore focus only on export processing zones (EPZs).

Traditionally an EPZ refers to a zone within which firms can freely import inputs and machinery to produce output for export with minimal restrictions and regulations. It is also usually an industrial estate with or without standard ready-built factory buildings equipped with special infrastructure not available outside the zone. Industries located within the EPZ are offered a whole package of export and investment incentives. The entire city-state of Singapore, and not just a small part of it, however, can be considered an export processing zone. Traditionally, it has been a free port, a status it has maintained except for the brief period of import substitution. Industrialization is largely export oriented, and is undertaken by foreign investors who enjoy restriction-free trade flows, personnel movement, technology transfers, and international capital movement. Firms that are both within and outside government industrial estates face minimal bureaucratic red tape, and enjoy a high quality of support in infrastructure. Being a small country in terms of land size and population that was facing serious unemployment problem in the early 1960s, Singapore could not afford to reconfigure a small part of the country as an EPZ. Instead, it involved the whole country in the implementation of an EPZ.

II. Factors Behind Singapore's Success

Several factors contributed to the success of Singapore's early efforts to industrialize based upon the export of labor-intensive manufactures. One example is the political commitment to openness to trade in both goods and capital. When it was not a popular position, Singapore adopted a consistently liberal policy towards foreign direct investment. Over time, the country's consistency in welcoming foreign investors built for the government strong credibility as a host country. In a survey conducted by Helen Hughes of 127 firms with direct capital investment from six principal countries investing in Singapore, it is reported that, "The main factors which foreign investors claimed attracted them to Singapore were the government's welcoming attitude expressed in positive assistance mainly through the Economic Development Board and other government departments and instrumentalities, and the efficiency of the public services and utilities. Industrial estates were an added bonus." (See Hughes and You, 1969.)

The government's open policy over the years is reflected in the high exports to GDP ratio and the high imports to GDP ratio as shown in Table 2, as well as the large foreign share of total investment in the manufacturing sector as shown in Table 3. In 1996, for example, the exports to GDP ratio is 1.33, the imports to GDP ratio is 1.40 and the share of foreign net investment commitments in manufacturing is 71 percent. Under a liberal policy towards international commerce and foreign capital, the per capita GDP grew at an average rate of 10.4 percent per annum from 1961 to 1996. This is another measure of success in addition to the drastic decline in the rate of unemployment shown in Table 1.

What is the rationale behind the government's liberal policy towards foreign investors? In his Budget Statement presented to Parliament on March 9, 1970, Dr. Goh Keng Swee, widely viewed as Singapore's early economic architect, provided a review of Singapore's first decade of development. There he proffered, "We have made long and strenuous efforts to attract foreign investment into Singapore, but not because we need the money. The high level of our overseas assets shows that we have more than we can usefully spend in Singapore. We welcome foreign investors for the two things they bring with them—technology and markets." Apart from the available technology and ready markets brought by foreign investors, there is, in fact, a third benefit that the government sees in attracting foreign investors to Singapore, namely, that they provide a market signal to the authorities about what sort of manpower training is needed for industry. Thus Singapore avoids the problem of producing large numbers of university graduates who cannot find useful employment. These multinational corporations (MNCs) themselves, of course, provide employment opportunities. In the early days of industrialization, jobs were created by the MNCs for unskilled and semi-skilled workers but as the process of industrialization proceeds along, MNCs increasingly offer middle-level as well as top-level management positions to Singaporeans. In this way, foreign direct investment facilitates the upward mobility of workers in Singapore. Thus the readiness of the government to raise the level of human capital in response to the changing needs of industry is one more factor behind the success of its export promoting drive based on attracting foreign investment.

Chong (1983) provided some evidence on the transfer of managerial know-how from an MNC to local personnel. He found that the proportions of local managerial personnel employed at Esso Singapore had increased at various levels of management from 1970 to 1980. For general (top) management, there was an increase from 0 percent to 75 percent; for middle management, it was an increase from 55 percent to 75 percent. The lower management personnel were entirely local for both 1970 and 1980.

Another factor behind Singapore's ability to attract foreign direct investment, which helped alleviate the unemployment problem, was the restoration of industrial labor harmony after massive labor strikes in the early 1960s. In the same Budget Statement, Dr Goh suggested that

the political in-fighting between the Communist United Front and the People's Action Party resulted in a large number of strikes called by the Communist United Front as part of its attempt to coerce the Government. He cited figures providing the number of man-days lost in strikes in the early 1960s, rising from 152,006 in 1960 to 388,219 in 1963. The defeat of the Communist United Front in the Referendum of August 1962, followed by subsequent security action against them, he argued, restored a measure of industrial peace. Strikes accounted for a loss of only 35,908 man-days in 1964 and in 1969, the figure was 8,512. Two labor laws passed in 1968 probably contributed to industrial peace. Firstly, the Employment Act (1968) standardized the terms and conditions of employment and set limits on negotiable fringe benefits, including holidays, sick leave, overtime, retrenchment and severance terms, and a forty-four-hour work week. The Industrial Relations (Amendment) Act of 1968 excluded from collective bargaining such issues as recruitment, retrenchment, promotion, retirement, transfer, dismissal, and work assignments, placing these matters within management's prerogative. In addition, it spelled out new procedures for labor negotiation and conflict resolution, including compulsory arbitration. Foreign investors must have found the peaceful labor situation attractive; in turn, the steady inflows of foreign direct investment helped to reduce unemployment and raise real wages, which helped further to maintain industrial peace.

Table 4 clearly shows the drastic drop in the number of industrial stoppages and man-days lost. There has been no incidence of industrial stoppages since 1978 except for the year 1986 when Singapore suffered a recession. In fact, the Department of Statistics has stopped publishing such data since 1992.

Apart from the well-known fact of Singapore's fiscal prudence, the establishment of key institutions is another factor behind Singapore's success. The key institution charged with the duty of promoting the growth of industries in Singapore is the Economic Development Board (EDB), which was set up in August 1961. A key aspect underlying the operation of EDB has been its ability to respond to changes in factor prices brought about by the country's shifting comparative advantage. In the next section, we will provide an overview of structural change within the manufacturing sector from the 1960s to the 1990s. After that, we will describe and analyze the organization and functions of EDB, packages of incentives offered by EDB to promote manufactured exports, the composition of firms that are granted pioneer status, loans and equity participation of EDB, and human resource development of EDB. The analysis presented here will focus on the responses of EDB to changes in demand and supply conditions in regional and world markets.

III. Structural Change within Manufacturing

To briefly examine the structural change within manufacturing from the 1960s to the 1990s, we have extracted principal statistics of some selected industries. The Singapore Standard Industrial Classification of All Economic Activities has been changing over the years as shown in Tables 5, 6, and 7 for selected industries, thus making comparison over time a difficult task. To make the comparison over time more consistent, we have grouped the selected industrial sectors into four categories (A, B, C, and D).

- A is defined to comprise the food and beverage industries;
- B comprises textiles and textile manufactures, and wearing apparel except footwear;
- C comprises paints, pharmaceuticals, chemical products, petroleum refineries, and petroleum products; and
- D, the largest sector in 1996, includes machinery and equipment, electrical machinery and apparatus, electronic products and components, precision and optical instruments, and transport equipment.

As shown in Tables 5 to 7, each selected industry is identified by its sector code together with a number. For example, food industry is code A1.

Tables 8, 9, and 10 show the employment, industrial output, and remuneration of employees respectively for the period from 1961 to 1996 for the selected manufacturing industries. Summarizing, Table 11 presents the data for the four industrial sectors A, B, C, and D. Note that the increase in employment in the manufacturing sector as a whole has been significant, especially for the period from the 1960s to the 1970s. Aside from 1986, which was a recession year, sector D (electrical machinery, electronics, etc.) has been a particularly major contributor in terms of employment gains throughout the years. In contrast, employment in sector B (textiles, apparels, etc.) increased greatly from the 1960s to the 1970s, but leveled off somewhat in the 1980s and, in fact, declined in the mid-90s. The output and wages follow similar patterns as employment. Table 12 shows the shares of employment, output, and wages by selected industrial sector. Sector D has been increasing over time in terms of shares of employment, output, and wages while sector B's shares increased in the 1960s and 1970s but decreased in the 1980s and 1990s. The increasing relative importance of industrial sector D and the relative decline of industrial sector B reflect the shifting comparative advantage of the Singapore economy. As physical and human capital increased relative to the endowment of unskilled labor, a process of industrial restructuring occurred with the more labor-intensive sectors becoming less competitive and being supplanted by the more capital-intensive sectors.

Table 13 shows the output and wage per worker by selected industrial sector. Reflecting the more capital-intensive nature of production in sectors C (chemical products, petroleum products, etc.) and D (electrical machinery, electronics, etc.), the wage per worker in these sectors is higher than that in sector B (textiles, apparels, etc.). From Table 13, we can compute that from 1961 to 1996, output per worker and wage per worker in total manufacturing grew on average at 8.4 percent and 7.3 percent per annum respectively. Output per worker in sectors A, B, C, and D grew at 6.5 percent, 7.1 percent, 12.7 percent, and 9.2 percent per annum respectively. The figures for the growth rates of wages per worker are 7.3 percent, 7.2 percent, 9.3 percent, and 6.4 percent respectively. Although the wage per worker in sector B has been below the manufacturing sector's average, it has nevertheless been increasing over the years. This is partly a reflection of the shift towards higher value-added lines of garment production (producing fashionable high-end garments rather than standard wear) and the increase in mechanization in the textiles and garments industry. A textiles and garment industry training center was set up by the government in the early 1980s to train garment workers in the use of more sophisticated equipment in garment production. Notice also that the output per worker has been increasing faster than the wage per worker in sector D, reflecting the increasing relative importance of intermediates and capital costs in the electronics sector.

In summary, the Singapore economy from 1961 to 1996 exhibited major structural change in the manufacturing sector. With the economy becoming relatively more capital-abundant, the relative importance of textiles and wearing apparel has declined while machinery and equipment, electrical and electronic products, precision and optical instruments, and transport equipment have gained a greater share of employment and output in total manufacturing. The change in the structure of relative factor endowments of the economy brings about a shift in its comparative advantage. Consequently, the kinds of products that Singapore can sell in the world market must change to reflect its shifting comparative advantage. The policy responses from the Economic Development Board, as we will see, reflect these changes.

IV. The Key Institution: Economic Development Board

Economic Development Board was the main institution involved in the export promotion of Singapore. A key measure of success of EDB in solving the unemployment problem through promotion of labor-intensive manufactured exports is the rapid and steady decline in unemployment. By the late 1970s, Singapore registered negligible unemployment. Another key measure of success of EDB is the persistently high rate of return of foreign equity investment in Singapore. This can be taken as a proxy for the satisfaction of the clients of

EDB. From Table 14, we can see that the returns on foreign equity investment in manufacturing are consistently higher than the returns on local equity investment by around 10 percent for the years 1980, 1985, 1990, and 1994.

A third measure of success is the continual increase in exports of Singapore both in terms of quantity and quality. This is an important measure because the neighboring countries and other Newly Industrializing Countries are competing keenly with Singapore and an indicator of success will be its ability to move towards higher value-added products in the export of Singapore. From the analysis presented in the previous section, we know that the manufacturing sector of Singapore is undergoing a transformation to a more capital-intensive mode of production. Most of these higher value-added products produced here are exported to the rest of the world.

What are the keys to the success of EDB? Firstly, it was given a substantially larger working capital of S$ 100 million to start with in August 1961, replacing the Singapore Industrial Promotion Board which was formed in 1957 and had a meager working capital of S$ 1 million. The programs of the Singapore Industrial Promotion Board were not successful, only in part because of the small size of its working capital.

Secondly, EDB was successful because it responded quickly to changes in market forces. This is linked to the fast responses of government policies to changes in market forces and changes in the comparative advantage position of Singapore. This is illustrated by the change in a strategy of import substitution to a strategy of export promotion via foreign investment after independence in 1965 as well as the "begetting" of the Development Bank of Singapore, Jurong Town Corporation, Singapore Institute of Standards and Industrial Research, National Productivity Board, and Singapore Institute of Management. Thirdly, EDB maintained consistent policies, followed through the incentives as promised, and was clean without corruption. Fourthly, EDB was able to solve problems encountered by its clients efficiently. Related to this is the network building of EDB with its clients and other government agencies. Fifthly, EDB has contributed to the development of human resources necessary for the industrialization of Singapore, and in particular, to meet the needs of investors.

Structure of EDB

EDB was formed on August 1, 1961, with the primary function of promoting the establishment of new industries in Singapore and to accelerate the growth of existing ones. The first board members of EDB were Hon Sui Sen (chairman), Lim Kim San (deputy chairman of EDB, and chairman of housing development), Lien Ying Chow (banking), Lim Chew Swee (manufacturing), Rumme Shaw (commerce), G. Kandasamy (labor), and F.C. Yap (professional and academic). The board members were well-known figures from different sectors of the Singapore economy. Their expertise and the networks in their respective circles could be tapped to insure efficient operation of the organization.

There was a flexible wage system within EDB, with wages adjusting to market conditions: 35 percent variable allowance for the senior employees and 30 percent variable allowance for junior employees. Many of its top officers were seconded from other government departments and agencies. Many of them held positions in several departments and government agencies. This represents a quick inflow of human capital into the organization as well as a quick and deliberate establishment of network within the organization and between the organization and external agencies with whom EDB needed to work.

There were five divisions in EDB when it was first established: Promotion Division, Finance Division, Projects Division, and Technical Consultant Service, and Industrial Facilities Division. The Promotion Division concentrated on building linkages with industries through various associations as well as at firm levels. It distributed information regarding

opportunities of investment, government policies, and incentives. It also hunted for potential investors and introduced them to the Finance Division.

The Finance Division conducted personal and subjective screening of clients led by the Promotion Division. It was also in charge of the disbursement of loans and equity investment. In August 1968, its functions were taken over by the Development Bank of Singapore (DBS). After the initial screening of clients who were deemed suitable for programs of EDB, the Finance Department would then refer these clients to the Projects Division.

Projects Division and Technical Consultant Service conducted objective and economic evaluation of clients referred by the Finance Division. They provided technical assistance to the businessmen, conducted training courses, and coordinated with tertiary educational institutes and the United Nations in the training of manpower for industry.

The Industrial Facilities Division leased contracts to build roads, railway, and bridges, to fill ponds, and to develop other infrastructure in Jurong. It coordinated with various government agencies in the development of Jurong Town. Through the networking, rapport was built among the officials from different government agencies. The Industrial Facilities Division greatly reduced the transaction costs of businessmen in dealing with other government departments. This division became bigger and eventually was separated to become the Jurong Town Corporation (JTC) in 1968.

We have briefly described the various roles of the divisions of EDB. Over time, the structure of EDB has changed as some divisions or sections spring off as new organizations by themselves: DBS, JTC, National Productivity Board, and Singapore Institute of Standards and Industrial Research. Similarly, new divisions are added and old ones are eliminated or consolidated in tandem with market needs. In the earlier years, the notion of a “one-stop” business center of EDB was a helpful one in attracting foreign investors. The role played by EDB was one of a coordinator who reduced the transaction costs of foreign investors who were not familiar with the operations of the various government agencies in Singapore. Over the years as the operations of EDB became more complicated and high in volume, there was a need to specialize in the tasks it could do best, which seemed to be promotion at that point in time.

DBS took over EDB’s function of providing finance to the industry in 1968. The listing of DBS in the stock market also subjected itself to the testing of its performance in the market. JTC took over the function of the Industrial Facilities Division in 1968, focusing on the industrial estate in Jurong. Later it also managed other industrial estates in other parts of Singapore. Its functions also included the building and management of public housing in the industrial estates. There was a need for workers in the industrial estate to reside near their work places and the provision of public housing by JTC met the demand by the market.

By 1996, the organizational structure of EDB had evolved into a borderless network providing total client servicing. The board members, the International Advisory Council, and EDB committees provide strategic direction, external inputs, and advice. Currently, out of a total of nine members of the International Advisory Council, which was formed in 1995, six are CEOs of MNCs. They provide an important source of linkage of EDB to the dynamic international marketplace in terms of contributions to EDB’s evolving economic strategies and feedback on EDB’s international investment promotion strategies and operations. The management sets directions, policies, and strategies while the various corporate departments (Planning, Human Resources, Corporate Services, Information Management, and Corporate Audit) provide core organizational services and information.

EDB’s main work focus is reflected and implemented by its corporate programs (Innovation, Manufacturing, International Business Hub, Promising Local Enterprises, Regionalization,

Co-Investment, Learning Organization), business functions (Industry Development, Services Development, Enterprise Development, Economic Resource Development, EDB Investment Private Limited, EDB Consulting Group), and country programs (International Operations, International Business Development). The highlighting of various programs in its organizational structure signifies the task-oriented and pro-business approach of EDB. Officers and managers of EDB are usually interlocked in different programs and departments, creating a networked and borderless culture. EDB currently has fourteen international offices: three in North America, five in Europe, and six in Asia.

Now we will briefly state the objectives of the eight major programs of EDB. Under the Innovation program, the Innovation Strategic Business Unit was set up in 1996 with a budget of S$ 500 million to encourage Singapore-registered companies to implement innovation projects. Innovation Development Scheme grants amounting to S$ 217 million have been awarded as of July 1997. The Manufacturing program aims to maintain manufacturing as a strong economic pillar, contributing at least 25 percent of GDP and 20 percent of employment in the medium to long term. Out of a total of S$ 8.09 billion fixed assets investments in manufacturing in 1996, S$ 5.72 billion came from foreign investors. The International Business Hub program wants to promote Singapore as the Asia-Pacific gateway linking the region to the world. It complements the Manufacturing program by developing total business capabilities in various clusters in Singapore: regional headquarters, logistics, communications and media, education, and healthcare. Total business spending amounted to S$ 1.46 billion in 1996 of which S$ 906 million came from foreign investors. The Regionalization program was launched in 1992 to enhance Singapore's competitiveness by linking the domestic economy to an external economy, and by strengthening Singapore's allure to both MNCs and local companies investing in the region. The Promising Local Enterprises (PLE) program was introduced in 1995 to nurture strong local enterprises so that they could become Asian MNCs. EDB helps the PLEs to develop new capabilities, identifies and facilitates strategic alliances, and provides growth capital to them. The Co-Investment program fortifies Singapore's risk-sharing joint ventures with MNCs and PLEs in the region, filling up critical gaps in various industrial clusters, strengthening ties with the region, and accelerating growth of PLEs. Wholly owned by EDB, EDB Investment Pte Ltd is the investment arm, managing over S$ 2 billion via various funds. Under the Economic Resource Development program, EDB analyzes emerging business trends, and develops and optimizes resources such as manpower, housing, land, and utilities to meet such trends. An example is the development of Jurong Island, where seven surrounding islands were amalgamated to form 3,000 hectares of land for the petrochemicals industry. Another is the development of the Wafer Fab parks for the infrastructure needs of the wafer fabrication industry. Under the Economic Resource Development program, the Specialist Manpower Program and the International Manpower Program facilitate the education and recruitment of technical specialists, and the recruitment and entry of international professionals into Singapore respectively. The Learning Organization program aims to strengthen EDB's teamwork and cohesive corporate culture.

EDB continues to specialize in the promotion of investment in Singapore, an activity it has excelled in. Since the late 1980s, EDB has expanded the promotion of domestic investment to regional investment, providing expertise in coordination and problem solving among government agencies to MNCs, which reduces their transaction costs in investment. This is a response to changing comparative advantage of the Singapore economy as the labor cost of Singapore increases relative to the neighboring countries. EDB has also paid more attention to nurturing local enterprises through various programs. Promotion of investment in the service sector has also gained momentum as services gain prominence in the Singapore economy.

Tax Incentives Administered by EDB

The Pioneer Industries Ordinance and the Industrial Expansion Ordinance were introduced in 1959 to promote new investments and expansions in industries and products considered

"essential" to the economy. One of the many functions of EDB, since it was formed in 1961, was to process applications of firms for pioneer and expansion status. Designated pioneer enterprises were given a five-year exemption from the 40 percent corporate income tax. Designated expansion enterprises were given tax concessions ranging from 11 to 15 percent for a period of three to five years, according to the magnitudes of their investment outlays. Both the pioneer and expansion incentives were amended in 1967 under the Economic Expansion Incentives Act to encourage investments of larger scales. The 1970 Amendments tightened the eligibility criteria for pioneer and expansion status: a minimum of S$ 1 million investment was required of a pioneer enterprise and at least an additional investment of S$ 10 million for an expansion enterprise. The 1975 Amendments allowed an extension of the pioneer status up to 10 years for skill-intensive and technology-intensive industries. The minimum investment requirement was removed to encourage the formation of supporting industries. Several new tax incentives were introduced in 1979-80 to encourage economic restructuring in manufacturing and other industries. An investment allowance, up to 50 percent tax deduction of new fixed investment, was used to encourage upgrading and mechanization of existing operations. Research and development (R & D) was also encouraged in terms of a double deduction of R & D expenditures excluding building and equipment, an accelerated depreciation over three years for all plant and machinery for R & D, an investment allowance of up to 50 percent of the capital investment in R & D, excluding items like the cost of buildings.

The package of incentives has changed over time in response to the changing market conditions. As Singapore faces stiffer competition from neighboring countries with cheaper labor, and as Singapore's comparative advantage shifts towards more skill-intensive industries, thus the package of incentives offered by EDB has been changed to provide the necessary attractions to foreign investors. The focus has been directed to promotion of higher value-added manufactures, promotion of service industries that are knowledge-intensive, promotion of regional investment and regional headquarters, and encouragement of local companies to expand and venture overseas.

A current list of tax incentives under the Economic Expansion Incentive (Relief from Income Tax) Act and another current list of tax incentives under the Income Tax Act are given in the appendix. Both lists are extracted from CCH (1997). Many of these incentives are administered by EDB. We shall now describe some of them here, especially those which were introduced in the 1990s.

Firms granted the status of pioneer enterprise enjoy tax exemption on qualifying profits for a period of five to ten years, depending on product type, investment level, skills, gestation period, and technology. Service companies—such as companies in engineering and technical services, computer-based information and other computer related services, development or production of industrial design, trading in art and antiques by auction houses, and operation of private museum—which are awarded pioneer status similarly enjoy tax exemption on qualifying profits for five to ten years with provision for extension. Exporters of services—such as technical and engineering services, consultancy and advisory services, data processing and programming, accounting and legal services, education and training—with minimum exports level of 20 percent of total revenue may qualify for a low 2.6 percent tax on qualifying export income for up to ten years with provision for extension.

Companies providing international consultancy services in connection with an approved overseas project with an expected annual revenue exceeding S$ 1 million enjoy a 50 percent exemption of tax on qualifying profits for a period of five years. Operational headquarters which are set up in Singapore to provide management and treasury services to related and associated companies outside Singapore enjoy as low as 10 percent tax on income arising from such approved services for up to ten years. Business headquarters providing business, professional, and key support services to other companies in the region may enjoy any of the

tax incentives under the Economic Expansion Incentive Act. These incentives help to promote Singapore as the regional business hub.

A Singapore-incorporated and Singapore-resident holding company which is at least 50 percent owned by Singaporean may claim losses and capital allowances for its investment in new technology companies during the first three years of its investment. The amount available is equal to the approved percentage of equity invested up to 50 percent and has to been claimed within five years after expiry of a qualifying period. With similar qualifications as the incentive for investment in new technology companies, an approved overseas enterprise which invests in approved overseas investments and projects is granted a tax exemption on qualifying income and a portion of domestic income connected to approved investments and projects for up to ten years. Both incentives encourage local firms to venture overseas and to invest in new technology.

Structural Change of Pioneer Manufacturers

Aggregate statistics on pioneer manufacturing establishments relative to all manufacturing establishments over the years reveal the changing selection and composition of pioneer firms by EDB in response to changes in market conditions. In the earlier years, the share of employment by pioneer firms out of total employment by all manufacturing establishments increased drastically, from 0.9 percent in 1961 to 47.0 percent in 1971. (See Table 15.) This reflects the efforts by EDB to solve the unemployment problem in the 1960s by encouraging investments in pioneer firms that, once started, would create new job opportunities. The share of employment dropped by a few percentage points in the late 1970s and early 1980s, and increased to 46.7 percent in 1996. Guided by the amended tax incentives introduced in the 1975 Amendments and other incentives introduced later, EDB has since focused on the promotion of investment in skill-intensive and technology-intensive industries. With the unemployment rate below 4 percent in the late 1970s and facing cheap unskilled labor supplies in neighboring countries, which began to attract foreign investors, especially in the mid- to late 1980s, Singapore had to develop and take advantage of its comparative advantage in skill-intensive and technology-intensive industries. A long-term strategy of EDB is to encourage investments in new industries by foreign investors with ready technology. The rising share of output by pioneer manufacturing firms out of all manufacturing establishments from 7.0 percent in 1961 to 69.0 percent in 1996, and the increase in value-added per worker in the pioneer manufacturing firms, reflects this underlying strategy.

Information Flow and Interaction with Industry

EDB keeps a close relationship with the industry in various ways. It has offices around the world where its officers gather information and interact with corporations in the countries which may be interested in establishing industries in Singapore. The information gathered by these field officers is transmitted quickly back to the home base in Singapore in a database which all officers of EDB can access immediately. The home base staff also disseminates relevant information to the overseas offices regularly. The information flow of EDB is fast and efficient.

Another peculiar organizational structure of EDB is the building of teams for projects where members of a team are likely to be from different departments of EDB. This helps to build rapport between officers from different departments as well as giving the officers a sense of the overall picture of a project from the viewpoint of EDB instead of from the limited viewpoint of a single department. An officer may be in several teams and involved in a few projects. This form of multitasking of the officers helps to raise the quality of human capital in the organization.

To encourage interactions with industry, junior officers are asked to accompany the senior officers to meetings with the CEOs of MNCs. Another channel through which EDB interacts with the industry is via "think-tank breakfasts" held at nice hotels. At each breakfast, approximately twelve industrial guests (with no conflicting interests) and four to six EDB people are invited. The purpose of such meetings is to discuss current interests of the industry, to get feedback on proposals of EDB, and to encourage industrial people to think about Singapore in a helpful way. EDB builds a network and exchanges information through such gatherings.

Loans and Equity Participation of EDB

Have been granted a substantial amount of working capital, EDB and its Finance Division was able to invest in and provide loans to firms that were considered to potentially contribute growth to the Singapore economy. In the first year of the operation of EDB, it invested in the National Iron and Steel Mills and had the right to appoint two directors to its board. It also financed development works in the Jurong Industrial Project Scheme.

Table 16 shows the loans and equity participation of EDB from 1961 to 1968. We see that the loans disbursed by EDB increased from a mere S$ 0.1 million in 1961 to S$ 17 million in 1965. The cumulative loans disbursed between 1961 and 1968 was over S$ 66 million. Similarly, the amount paid for equity participation increased from S$ 0.1 million in 1961 to S$ 6 million in 1965. The cumulative amount paid for equity participation from 1961 to 1968 was S$ 28 million. The total amount of cumulative loans disbursed and cumulative amount paid for equity participation till 1968 was S$ 94 million. This was a huge amount relative to size of the economy at that time. The Development Bank of Singapore, which was formed on August 1, 1968, took over the functions of the Finance Division. Table 17 shows the industrial distribution of DBS-assisted companies and financial commitments for the years 1968 to 1973, and 1976.

From Table 17, we see that in the earlier years, textiles, wood and paper products, and electrical machinery and electronic products—all relatively labor-intensive industries in those years—together commanded a large share of the financial commitments of DBS. It was 30.1 percent in 1969. The share commanded by petroleum and petroleum refined product firms was 22.3 percent in 1969. Over the years, the industrial distribution of financial commitments have shifted towards more capital-intensive industries. For example, in 1976, financial institutions commanded a share of 11.1 percent while transport equipment, transport, and transport-related services together commanded a share of 40.5 percent. In contrast, textiles, wood and paper products, and electrical machinery and electronic products together commanded a share of only 10.0 percent. This also reflects the fact that DBS has focused its financial commitments in infrastructure such as transportation development.

By the end of the 1970s, DBS became a full commercial bank, expanding its local branch network, opening overseas offices in major international financial centers, and providing innovative financing packages. DBS is now a local leader in investment banking and treasury operations. Eleven Initial Public Offers out of the 36 companies listed on the Stock Exchange of Singapore in 1997 were lead-managed by DBS. As it aspired to be a regional bank, DBS built strategic partnerships and alliances with regional banks so as to capitalize on the opportunities that arise when the regional economies recover and grow. In terms of corporate banking, DBS continues to be a major financier. In the 1990s, it is clear that in terms of industrial distribution of DBS Group's loans and advances, manufacturing, building and construction, financial institutions and holding companies, and professionals and private individuals constitute more than a share of 70 percent. Table 18 gives the industrial breakdown from 1993 to 1997.

DBS is listed in the Stock Exchange of Singapore and competes with other commercial banks for business. Its prime lending rate is the same as the other major banks in Singapore. Sometimes DBS leads the other banks in changing the prime rate and at other times, it is a follower. DBS has grown from a development bank financing economic development to one competing in the international marketplace.

Besides administering many tax incentives, EDB also provides financing directly to enterprises under various loan programs, Industrial Development Initiatives, and Enterprise Development Initiatives. The fund for these programs comes from the Economic Development Assistance Fund which, in 1997, stands at S$ 1.57 billion. As at March 31, 1997, yet-to-be withdrawn loan commitments for loan programs amounted to approximately S$ 1.59 billion. Approved and not yet disbursed grants amounted to approximately S$ 484 million. Table 19 shows the amount of loans made under the various loan programs for 1996 and 1997.

The Local Enterprise Finance Scheme provides low-cost fixed rate loans for small- and medium-sized local enterprises to upgrade and expand their operations. Loans are repayable over a period not to exceed ten years, and are disbursed through Participating Financial Institutions, which bear a portion of the credit risk. This scheme was transferred to the Singapore Productivity and Standards Board and became effective on April 1, 1996. With similar repayment terms and credit risk sharing arrangements as the Local Enterprise Finance Scheme, the Regionalization Finance Scheme helps local enterprises to set up operations overseas. The Capital Assistance Scheme was established in 1975 with a budget of S$ 100 million. It provides long-term financing to companies with skill-intensive and technologically desirable projects. The Automation Leasing Scheme provides low-cost financing for companies to automate their operations. Such loans are disbursed through Participating Financial Institutions who bear 50 percent of the credit risk. The Entrepreneur Development Fund provides low-cost fixed rate loans for local entrepreneurs to obtain a stake in regional enterprises. Such loans are repayable over a period not exceeding ten years.

Under the Industrial Development Initiative, incentives are provided to encourage investment and manpower development in the application of new technology, and for design and development of new products, processes, and services so as to establish new capabilities within companies or industries. Local enterprises are provided with incentives under the Enterprise Development Initiative to modernize and upgrade their operations as well as to develop new businesses and markets.

We see that these loans and initiatives encourage upgrading of production technology, regionalization, and local entrepreneurship. Another feature of these loans is the risk sharing of other financial institutions. Many of these loans are long-term, similar to the long-term nature of many tax incentives administered by EDB.

Human Resource Development

A Five-Year Plan in education was introduced when Singapore attained self-government in 1959. The plan placed emphasis on the study of mathematics, science and technical subjects as well as equal treatment for the four streams of education: Malay, Chinese, Tamil, and English. A technical bias was brought into the school curriculum upon the recommendation of the 1961 Chan Chieu Kiat Commission of Inquiry into Vocational and Technical Education. From the start, it was recognized that a well-educated and equipped workforce was required to meet the needs of the industrialization of Singapore. In 1968, the Technical Education Department within the Ministry of Education was established to develop technical education in Singapore. While the Technical Education Department worked in the realm of general education for school children, EDB was more directly involved in the training of workers catered to the specific needs of the industries with which EDB had close contacts.

When the British planned to withdraw its naval base in 1968, a crash program was introduced to re-train clerks and other workers who would be unemployed upon the military withdrawal. Courses in turning and fitting, sheet metal work, plumbing, radio maintenance, and repairs were offered. A total of 1,749 attended seven sessions at elementary level. Out of those trainees who completed the elementary courses, a total of 295 attended two more sessions of upgrading training programs.

EDB had attracted technical and financial assistance from a number of foreign governments and the United Nations Development Programme in establishing six training centers by 1968. These centers trained workers by producing articles or components needed by the industry. But sales were restricted and hence reduced the value of this approach. Furthermore, management of these training and production centers was difficult as each was constrained by "rules" set by its respective donors. The Engineering Industry Development Agency (EIDA) was set up by EDB in April 1968 to supervise and control these centers. However, EIDA was inefficient. A total of 86 trained personnel graduated between 1968 and 1972 at a cost of around S$ 140,000 per trainee. To remove the strain on government subsidy, EIDA was converted to a business enterprise responsible for its own financial survival on July 1, 1973.

In 1970, there was a shortage of welders due to the increased demand of the rapidly expanding ship-repairing industry, as well as the construction of new oil refineries and the expansion of existing refineries. To cope with this crisis, facilities at the Technical Education Department were fully utilized for specific courses to train welders. Between 1970 and 1973, a total of 1,789 welders were trained in this crash program, which successfully met the industrial need.

From the experience of the crash program described above, EDB saw the need to further train workers in preparation for anticipated needs of various industries. But it is the industry that best understands the demands that may develop. The establishment of Tata-Government Training Center (TGTC) clearly illustrates this fact. The subsidiary of the Tata Group was the largest engineering firm in India manufacturing among other things trucks, locomotives, excavators, and machine tools. When it explored the possibility of promoting a precision engineering industry in Singapore, the group concluded that it was first necessary to have a training center like its own training schools in India. The discussions between EDB and the Tata Group resulted in TGTC, the first joint venture training program established with a successful MNC. The training center produced skilled tool-makers who were demanded by high precision engineering projects, including those of Tata Precision Industries Pte Ltd, a Singapore subsidiary of the Tata Group. The Singapore government provided land and building for the center, an estimated S$ 1.5 million for the purchase of machinery and equipment required by the center, and for 70 percent of its operating cost. Tata provided 30 percent of the operating costs, including the salaries and expenses of Tata instructors seconded to the center. Tata was required to train twice the number of skilled workers required for Tata precision engineering complex. The extra workers trained by Tata were to be released to the industry through EDB.

Trainees were provided stipends (which increased in stages) while pursuing industrial training at TGTC. Trainees were required to sign a bond to serve the government or as directed by the government through EDB with Tata or other companies for a period of five years after completing their courses.

Other joint training centers were established later, including the Rollei-Government Training Center in July 1973, and the Philips-Government Training center in 1975. The Rollei-Government Training Center was renamed Brown Boveri-Government Training center when Rollei-Werke, the parent company of Rollei Singapore, failed in Germany, and when a Swiss firm Brown Boveri & Cie joined in partnership with EDB in 1982. In October 1988, the

Brown Boveri-Government Training Center was transformed to the Precision Engineering Institute with the absorption of TGTC, signifying the beginning of a multiple-partnership approach. Later, several firms participated in cooperative projects with the Precision Engineering Institute.

The close relationship between EDB and the industry helped in a quick response of training courses to meet changing industrial trends. Courses can be updated and modified rapidly, unlike the case with institutions within the formal education and vocational training system. The total enrollment of EDB's training centers as August 31, 1991, was 1,024 workers, the annual output was 508 graduates, and the cumulative output was 7,298 graduates. For more on this topic, see Table 7.3 on page 251 of Soon (1993).

Interested in establishing a joint training center, the Vocational Training Bureau of Japan contacted EDB and submitted a proposal to their Ministry of Finance. But it was rejected. With a suggestion from the Vocational Training Bureau, EDB submitted a proposal to the Government of Japan through the Japan International Cooperation Agency in April 1977. This proposal argued that not only would a training center alleviate the projected skills imbalance in electronics, electrical, instrumentation, and mechanical areas, but that a mutual cooperation between two countries would have considerable impact on public relations. It would create favorable publicity for Japanese investment, and would assure Japanese investors that skilled labor required would be made available. The Japan-Singapore Government Training Center started courses in 1979 and was upgraded to a technical institute in 1983, the Japan-Singapore Technical Institute.

EDB proposed in 1979 to establish institutes of technology, which would accept trainees with A-level qualifications, which are equivalent to college entrance examinations, instead of the O-level qualifications that are comparable to high school leaving examinations. They would be established with technical and financial assistance from foreign governments, and would be tied closely to technology leaders from industry. The courses would be more intensive than those offered by polytechnics or the university engineering degree courses, and would focus on the practical aspect instead of the theoretical and academic aspects. Merit scholarships, bursaries, and study loans would be made available to trainees. The award winners would be bonded for a period of three to five years. Apart from the Japan-Singapore Technical Institute in 1983, the German-Singapore Institute commenced operations in February 1982 and the French-Singapore Institute in August 1983. The total enrollment of EDB's institutes of technology as at August 31, 1991 was 2,425 workers, the annual output was 990 graduates, and the cumulative output was 3,765 graduates. See Table 7.4 on page 259 of Soon (1993).

Because of its close relationship with industry, EDB can either determine independently or request industry data in order to appraise efficiently the manpower needs of the industry, and respond accordingly. EDB is also capable of tapping into the expertise of the industry through joint training centers with MNCs, as well as with foreign governments. From the failure of EIDA, a critical lesson EDB learned is to let the industry contribute to management expertise and the training of personnel. EDB concentrates on its areas of strength, such as coordination, building of infrastructure, providing scholarship to the trainees, and retaining the services of the trainees. EDB has not tried to compete with the formal education system but to complement it by a more flexible and industry-sensitive curriculum.

V. Overview of Selected Industries and Interview of Firms

We now turn to provide an overview of selected industries in manufacturing in terms of cost structure and extent of export orientation. Table 20 shows the principal statistics of manufacturing in 1996. Manufacturers that are wholly and majority foreign-owned contribute to a larger share of total output, employment, and exports than local manufacturers. In the manufacturing sector as a whole, materials contribute to a very large share of the total cost,

making up nearly 74 percent; remuneration makes up nearly 11 percent and other operating costs slightly over 15 percent. Direct exports make up nearly 61 percent of total manufacturing sales. In fact, the share of total sales by wholly foreign-owned manufacturers going into direct exports is even higher, at over 69 percent in 1996.

Table 21 shows the principal statistics of selected industries in manufacturing. These include Refined Petroleum Products (code 23), Chemicals & Chemical Products (code 24) (which consists of Petrochemicals & Petrochemical Products, Pharmaceutical Products, Other Chemicals & Chemical Products), Machinery & Equipment (code 29), Electronic Products & Components (code 31), and Transport Equipment (code 33). From Table 21, we see that Refined Petroleum Products is highly capital-intensive and material-intensive. In fact, its share of material cost is 90.8 percent of the total costs. Direct exports constitute 33.9 percent of total sales. Chemicals & Chemical Products is an industry being promoted by EDB. Its share of material cost is 68.4 percent of the total costs. Remuneration constitutes a share of 13.2 percent and other operating costs, 18.3 percent. Out of its total sales, 74.5 percent is direct exports. The shares of material costs, remuneration, and other operating costs in total cost of the Machinery & Equipment industry are 54.2 percent, 20.1 percent, and 25.7 percent, respectively. Its direct exports constitute a share of 55.9 percent in total sales. Electronic Products & Components is one of the most important export-oriented industries in manufacturing. Its share of direct exports in total sales is 77.1 percent. The breakdown of its costs follows: 81.9 percent is material cost, 6.8 percent is remuneration, and 11.3 percent is operating cost. For Transport Equipment, 50.6 percent of its total sales is direct export. The shares of material cost, remuneration, and other operating costs are 31.8 percent, 26.9 percent, and 41.4 percent, respectively.

The dominance of intermediate inputs in total cost in the key industries in manufacturing is borne out in the survey of three firms we interviewed. In one wholly foreign-owned firm that hired 1,750 employees to produce cathode ray tubes, intermediate inputs make up over 60 percent of total cost. Nine percent of total cost goes to cover transportation. Out of total transportation cost, port costs are a mere 1 percent and international shipping costs make up 45 percent. Its three largest foreign markets make up 55 percent of its total sales and container trucks are used to deliver the product. Another wholly-foreign owned firm that we interviewed hires 120 workers and produces oil and gas process and production skid packages, gas compression packages, and pressure vessels for the oil, gas, and petrochemical industries. Intermediate inputs make up nearly 60 percent of total costs and transportation amounts to 10 percent of total costs. Sea shipment is the main form of transportation to its two main foreign markets, which is responsible for half of its total sales. Both firms cite the provision of good infrastructure as being a very important consideration in the decision to locate production in Singapore. The third firm we interviewed is a local firm that hires 800 workers, which began operation in 1991. It produces printers and assembles computer related printer circuit boards. Intermediate inputs make up 90 percent of its total costs and it relies on ocean freight to deliver its products to foreign markets. Given the importance of shipping as a component of total cost, it is useful to provide some facts about the port in Singapore.

The Port of Singapore Authority (PSA) was formed in April 1964 to handle primarily break-bulk cargoes for manufacturers and traders. With foresight in the late 1960s, it planned for a container terminal, and in 1972, Singapore became the first port in Southeast Asia to have a purpose-built container handling facility. By the late 1980s, PSA became the world leader in container terminal operations and has maintained leadership since then. PSA has also pioneered the hub-and-spoke concept of container shipping in the region, creating a dense network of main-haul and feeder shipping connections found nowhere else in the world. With powerful operating systems and advanced IT processes, PSA provides world-class port services. For example, an average of 88 containers an hour can be handled for third generation container vessels, or 229 containers an hour on one of the largest container vessels. PSA can turn around a ship which requires 2,000 container “moves”—to load or unload—in

less than 10 hours. PSA also boasts a wide network of connections to 600 ports in 130 countries. In summary, PSA has provided the efficient and reliable infrastructure required for the needs of trade and thus has encouraged foreign investment.

It should be pointed out that it is not only an efficient port that is an important component of good infrastructure. All three of the firms we interviewed indicate that the existence of domestic suppliers is an important consideration in the decision to locate in Singapore. In one firm, 80 percent of the intermediate inputs come from domestic suppliers; in the other two, the corresponding percentages are 60 percent and 30 percent, respectively. Because road transportation is used for delivery of intermediate inputs, the government provision of good roads and relatively easy flow of traffic provide further incentive for firms to bring their business to Singapore.

As Singapore enters the 21st century, two industrial clusters have been specifically picked by EDB for further development: the chemical industry (C2000) and the electronics industry (E2000). These two programs, along with other strategies of EDB, are described in a book published by EDB entitled *Singapore Unlimited*. The key sectors in the chemical cluster are petroleum; petrochemicals; specialty and industrial chemicals; pharmaceutical and healthcare products and materials; and non-metallic materials. To support partners in the chemical cluster, Singapore invests in infrastructure development as in the S$ 6 billion project of Jurong Island Chemical Complex. Many joint R & D programs with MNCs are funded. The Local Industry Upgrading Program (LIUP), tailored courses at various Institutes of Education, and the International Manpower Program (IMP) are examples of manpower and capability development. Under LIUP, six large petrol and petrochemical companies have developed and strengthened the cooperation within the group, so as to upgrade the capabilities of their subcontractors in engineering and maintenance services. Under IMP, overseas offices of EDB have been attracting people with critical skills and facilitate the immigration of successful candidates. MNCs are encouraged to set up their operational headquarters in Singapore to coordinate and manage the activities of their subsidiaries in the region. Environmental care is not ignored. The Singapore Chemical Industry Council, which is comprised of the world's leading chemical companies, is committed to the safety and health of the general public and to the conservation of the environment. For example, the East Asia Response Private Limited was set up by the council in early 1994 to respond promptly and efficiently to oil spills in the region.

The major segments in the electronics cluster are data storage, computer systems, semiconductors, consumer electronics, office automation, passive components, PCBs and display devices, telecommunications, and contract manufacturing. Under the E2000 program, strategic partnerships are formed. Examples of high-level partnerships are a S$ 500 million TECH Semiconductor joint venture by Texas Instruments, EDB, Canon, and Hewlett-Packard, and a S$ 1 billion Chartered Semiconductor Manufacturing's Fab II expansion project with Rockwell, Broktree, and Actel for the fabrication of sub-micron ASICs on 8-inch wafers. Under LIUP, 35 MNCs and large local companies are upgrading and expanding Singapore's supporting industry. The construction of regional industrial and technological parks by Singapore allows MNCs to become regional partners and tap into the expanding regional markets. Manpower training grants under the Initiatives in New Technologies Scheme, or INTECH, are awarded to partially offset the cost of training engineers and technicians for project set up and R & D in Singapore. Under IMP, recruiting and hiring of overseas professionals are aided by EDB. The Institute of Microelectronics, Center for Wireless Communications, Magnetics Technology Center, and GINTIC Institute of Manufacturing are set up to provide collaborative research with industrial partners apart from research done in universities and polytechnics. MNCs themselves have also extended their own R & D activities. Examples are Matsushita's Applied Research Center, Motorola Electronics' Advanced Printed Circuit Board Test Laboratory, Hewlett-Packard's Worldwide Product Charters, Sony precision Engineering Center, and Siemens Components' Mixed

Signal IC Design Center. MNCs are encouraged to set up regional headquarters here so as to extend their manufacturing activities to management support. Sony International Singapore, Motorola Electronics, Asia Matsushita Electric, Hewlett-Packard, and SGS-Thomson have taken up the opportunities.

In summary, the efforts to develop these two clusters are focused on infrastructure investment, R & D, upgrading of supporting local companies, capability and manpower development, and regionalization. In almost all programs, the involvement of MNCs is extensive.

VI. Case Studies of MNCs

We have attempted to paint a broad picture of EDB as an institution that has played a critical role in attracting foreign investors to Singapore. It is useful now to give a brief report of how MNCs perceive the role of EDB. For this purpose, we refer to a study commissioned by EDB Society to look at EDB's thirty-five year experience. For this study, Edgar H. Schein (1996) of the MIT Sloan School of Management interviewed a number of firms to obtain their feedback on doing business in Singapore. We summarize the responses of some of these firms here.

Mobil

In 1893, Mobil started business in Singapore as the Vacuum Oil Company. EDB contacted Mobil in 1962 to explore a possibility of investing in petroleum facilities. A year later Mobil decided to invest S$39 million in a refinery. The reasons given include: Mobil's need for a regional center; political instability elsewhere; good site in Jurong; very good tax relief; low-interest loans; exemption from import duties; and availability of foreign exchange through EDB pioneer program. The refinery started operation in 1966. Its construction provided many jobs for a number of years. In 1973, Mobil further invested S$ 150 million to expand its capacity.

There was not enough local labor to complete a construction project. Foreign workers were required. EDB helped Mobil to work through various government agencies and the National Trade Union Congress for foreign workers and extra housing. According to A. V. Liventals, the local manager of Mobil for much of the 1980s, access to EDB was easy, EDB's efficiency was impressive, and EDB worked like a business rather than a bureaucracy.

DuPont Corporation

In 1973, DuPont established a sales office in Singapore for the distribution of explosives. In 1978, Berg Electronics, a division of DuPont, started to explore manufacturing possibility in Singapore. This project was promoted intensively by EDB. This subsidiary was set up and it grew over time. DuPont took up additional projects later. In 1991, a Delrin compounding plant, a regional distribution center, and a Corporate Data Center at the Singapore Science Park were opened. In 1992, a Lycra polymerization plant was opened. According to Edgar Woolard, Chairman of DuPont, DuPont wanted a location near the customers of the future and needed local facilities which were highly efficient, a strong ingredients base, land, staff, reasonable costs, and a stable customer base. Singapore offered the best mix of resources. DuPont found that EDB was the most knowledgeable government people with whom they had done business, EDB kept its promises, and that there were no under-the-table payoffs. It was emphasized repeatedly that EDB understood what is important for Singapore and for business. Taking a long-range view, DuPont has explored further the possibilities for research in Singapore by hiring scholars from India and China.

Texas Instruments

Texas Instruments (TI) started their integrated circuit assembly in 1969. Their test factory was constructed and made operational in fifty days, which came to be known as the fifty-day miracle. The basic drawing for the manufacturing layout was done by an EDB officer who was TI's liaison officer. The Mass Rapid Transit was pile driving near the site of and during the building of a wafer fabrication facility and the vibrations would disturb the fabrication unit when it was in operation. But EDB managed to hasten the construction work of the Mass Rapid Transit so that it was completed before the fabrication unit became operational. In another incident, EDB worked efficiently with JTC to arrange for a plot of land to be leased to TI, and cleared other administrative requirements, saving TI 4-5 years of time if TI were to do all the work itself or through a local lawyer.

Hewlett-Packard

Hewlett-Packard (HP) began operations in 1970 with the assembly of core memories. In 1972, HP proposed they manufacture their new mini-calculators for the world market, the proposal was accepted, and pioneer status was granted. HP continued to invest in various manufacturing projects, in an integrated circuit design center, an Information Network R & D Center, and in a joint venture with TI, Canon, and EDB to manufacture advanced semiconductors. The long-range growth philosophy of HP is well matched with Singapore's need to grow technologically.

The case studies extracted from Schein (1996) show that many of the MNCs started labor-intensive operations in Singapore and over time have upgraded to more technology-intensive manufacturing and even R & D. They usually have a long-range view of investment. They also benefited from the coordination and efficient problem solving of the resourceful EDB. EDB was noted to be very knowledgeable in terms of relevant industries and companies. This is particularly important. EDB has a network of worldwide offices which gather valuable information. EDB interacts actively with the various industries to exchange information. An example is the "think tank breakfast." The efficiency and the absence of corruption in EDB also contribute to an attractive investment environment.

Schein (1996, Table 9.1, pp. 154-155) presents a master list of pro-Singapore factors by MNCs. The factors are grouped into eight categories: geographic location; cultural factors; government strategies and attitudes; general economic factors; EDB characteristics; land and facilities; infrastructure; and labor.

VII. Conclusion

In conclusion, we argue that the government of Singapore, and EDB in particular, have been able to achieve success in their export drive for the following reasons. First, Singapore remains committed to an open liberal policy towards international commerce and capital over many years, and it has built up a reputation as a reliable host country to foreign investors. This has the effect of lowering the discount rate that potential foreign investors apply in their cost-benefit analyses when deciding whether they should to locate in Singapore. The generally harmonious industrial labor relations in Singapore also work to strengthen that reputation. Second, by committing itself to act as a one-stop center for foreign investors, EDB has helped to lower the transaction cost of doing business in Singapore. This factor is fortified in a generally corruption-free business environment. The three firms we interviewed indicated that they do not need to make "extra payments" to encourage efficiency and reliability in the bureaucratic process. Third, although the government and EDB have been pro-active in the functioning of the economy as a whole, they have been responsive to market signals. As we alluded to earlier, one benefit the government sees in attracting foreign investors to Singapore

is that they provide a market signal to the government about the sort of manpower training that is needed in industry. In this way, it avoids the problem of producing large numbers of graduates who cannot find employment in their field.

EDB is also sensitive to the shifting comparative advantage position of the economy and through its international network of foreign offices, and seeks to woo increasingly skill-intensive and knowledge-based industries to Singapore. It also maintains a continuing dialogue with business leaders in the private sector and therefore can respond quickly to perceived industry needs. Finally, the government puts emphasis on and devotes substantial resources to the development of good infrastructure. This translates into cost savings for firms located in Singapore and is an important factor for the three firms we interviewed. No less important, a comprehensive and transparent legal infrastructure in Singapore has contributed to the efficient functioning of the market mechanism and economic development of Singapore.

Appendix

This appendix provides a list of legislative acts which have contributed to the economic development of Singapore.

Employment Act

The Employment Act sets out the basic rights and duties of employers and employees. An employer or employee may have other rights and duties contained in a contract of service or a collective agreement, so long as such rights and duties are not contrary to the provisions of the Employment Act.

Industrial Relations Act

The Industrial Relations Act establishes the rights and duties between employers and their employees who are, or who can be, represented by trade unions. It is also designed to prevent and settle trade disputes by collective bargaining, conciliation and arbitration. In reaching a decision, the Industrial Arbitration Court, which is constituted under the Industrial Relations Act, will take into consideration not only the interests of the union or workers or employers, but also those of the community as a whole, as well as Singapore's economic condition.

Trade Unions Act

The Trade Unions Act provides for the registration and supervision of trade unions. A trade union of employees can order its members either to stop work completely, as in a strike, or to reduce their rate of working as in an industrial action. A strike or an industrial action cannot be ordered by a trade union unless the union has first conducted a secret ballot among its affected members and the majority supports such action.

Trade Dispute Act

The Trade Dispute Act controls trade disputes and any strikes, lock-outs, and picketings which may result therefrom.

Criminal Law (Temporary Provisions) Acts

The Criminal Law (temporary provisions) Act makes temporary provisions for the maintenance of public order, and the prevention of strikes and lock-outs in essential service.

Economic Expansion Incentives (Relief from Income Tax) Act

This is an act relating to incentives for the establishment of pioneer industries and for economic expansion generally, by way of providing relief from income tax. The first version of the act was legislated in 1967. It shall be construed as one and the same as the Income Tax Act. A number of current incentives under the Economic Expansion Incentives (Relief from Income Tax) Act follow:

- Pioneer industries
- Pioneer service companies
- Post-pioneer companies
- Development and expansion incentives
- Expansion of established enterprises
- Expanding service companies
- Production for exports

- Export of services
- International trade incentives
- Foreign loans for productive equipment
- Royalties, fees and development contributions
- Investment allowances
- Warehousing and servicing incentives
- International consultancy services
- Investments in new technology companies
- Overseas investment and venture capital incentives
- Overseas enterprise incentive

Income Tax Act

The Income Tax Act imposes a tax upon incomes and regulates the collection thereof. The first version of the act was legislated as an ordinance in 1948. A number of current incentives under the Income Tax Act follows:

- Various relief for research and development expenditure
- Reduced tax liability for operational and business headquarters
- Exemption of income of approved venture company
- Tax relief for non-resident investors' income arising from funds managed in Singapore
- Reduced tax liability for oil trading company
- Reduced tax liability for approved international trading companies
- Reduced tax liability for art and antique dealers
- Exemption of income of Approved International Shipping Enterprises

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Table 1. Rate of unemployment from 1966-97.

Year	Percent
1966	8.9
1967	8.1
1968	7.3
1969	6.7
1970	6
1971	4.8
1972	4.7
1973	4.5
1974	4
1975	4.5
1976	4.5
1977	3.9
1978	3.6
1979	3.4
1980	3.5
1981	2.9
1982	2.6
1983	3.2
1984	2.7
1985	4.1
1986	6.5
1987	4.7
1988	3.3
1989	2.2
1990	2
1991	1.9
1992	2.1
1993	2
1994	1.9
1995	1.9
1996	2.1
1997	1.7

Source: *Yearbook of Statistics*, various years, Singapore.

Table 2. GDP, population, exports, and imports, 1961-96.

Year	GDP S$m	Pop '000	GDP/Pop S$	Exports S$m	Imports S$m	Ex/GDP	Im/GDP
1961	2329.1	1702.4	1368.13	3308.5	3963.3	1.42	1.70
1966	3330.7	1934.4	1721.83	3373.6	4065.7	1.01	1.22
1971	6823.3	2112.9	3229.35	5371.3	8664	0.79	1.27
1976	14575.2	2293.3	6355.56	16265.9	22404.5	1.12	1.54
1981	28369	2443.3	11610.9	44290.8	58248	1.56	2.05
1986	38653.5	2586.2	14946.1	48985.5	55545.4	1.27	1.44
1991	75320.9	2762.7	27263.5	101880	114195	1.35	1.52
1996	132629	3044.3	43566.4	176272	185183	1.33	1.40

Note: Pop = Population; Ex = Exports; Im = Imports.
Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 3. Net investment commitments in manufacturing, 1972-96.

Year	Total S$m	Local S$m	Foreign S$m	Share of Foreign
1972	194.5	38.2	156.3	80%
1976	303.3	42.8	260.5	86%
1981	1928.8	599.1	1329.7	69%
1986	1450	259.4	1190.6	82%
1991	2934	472.9	2461.1	84%
1996	8085.1	2368.9	5716.2	71%

Source: *Yearbook of Statistics*, various years, Singapore.

Table 4. Industrial stoppages, 1960-91.

Year	Number	Workers	Man-days Lost
1960	45	5939	152006
1961	116	43584	410891
1962	88	6606	164936
1963	47	33001	388219
1964	39	2535	35908
1965	31	3374	45800
1966	14	1288	44762
1967	10	4518	41324
1968	4	172	11447
1969	0	0	8512
1970	5	1749	2514
1971	2	1380	5449
1972	10	3168	18233
1973	5	1312	2295
1974	10	1901	5380
1975	7	1865	4853
1976	4	1576	3193
1977	1	406	1011
1978	0	0	0
1979	0	0	0
1980	0	0	0
1981	0	0	0
1982	0	0	0
1983	0	0	0
1984	0	0	0
1985	0	0	0
1986	1	61	122
1987	0	0	0
1988	0	0	0
1989	0	0	0
1990	0	0	0
1991	0	0	0

Source: *Yearbook of Statistics*, various years, Singapore.

Table 5. 1969 Singapore Standard Industrial Classification of all economic activities.
(used for years 1986, 1991, and 1996 for selected industries)

SSIC		Code
311/2	Food	A1
313	Beverage	A2
321	Textiles & textile manufacturers	B1
322	Wearing apparel except footwear	B2
351	Industrial chemicals & gases	C1
352	Paints, pharmaceutical & other chemical products	C2
353/4	Petroleum refineries & petroleum products	C3
382	Calculators, refrigerators, air-conditioners & industrial machinery	D1
383	Radios, televisions, semi-conductors & other electrical machinery	D2
384	Transport equipment & oil rigs	D3

Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore.

Table 6. 1978 Singapore Standard Industrial Classification of all economic activities.
(used for years 1986, 1991, and 1996 for selected industries)

SSIC		Code
311/2	Food	A1
313	Beverage	A2
321	Textiles & textile manufactures	B1
322	Wearing apparel except footwear	B2
351	Industrial chemicals & gases	C1
352	Paints, pharmaceutical & other chemical products	C2
353/4	Petroleum refineries & petroleum products	C3
382	Machinery except electrical & electronic	D4
383	Electrical machinery, apparatus, appliances & supplies	D5
384	Electronic products & components	D6
385	Transport equipment	D7
386	Instrumentation equipment, photographic & optical goods	D8

Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore.

Table 7. 1996 Singapore Standard Industrial Classification of all economic activities.
(used for years 1986, 1991, and 1996 for selected industries)

SSIC		Code
15	Food & beverage	A3
17	Textiles & textile manufactures	B1
18	Wearing apparel except footwear	B2
23	Refined petroleum products	C4
24	Chemicals & chemical products	C5
29	Machinery & equipment	D9
30	Electrical machinery & apparatus	D10
31	Electronic products & components	D6
32	Medical, precision & optical instruments, watches & clocks	D11
33	Transport equipment	D7

Source: *Yearbook of Statistics*, various years, Singapore.

Table 8. Workers engaged in industrial production by selected industry, 1961-96.

Code	1961 number	1966 number	1971 number	1976 number	1981 number	1986 number	1991 number	1996 number
A1	4112	5855	9705	8567	10075			
A2	1572	1992	2354	2639	2744			
A3						11733	13390	12446
B1	102	1223	8850	11620	7906	2662	3343	1981
B2	583	4917	13389	20673	27870	24812	25915	10705
C1	225	318	1094	1554	2058			
C2	829	1556	3027	3484	4291			
C3	27	610	2526	3167	3511			
C4						3254	3550	3663
C5						7558	10413	13099
D1	1542	1791						
D2	1300	1611						
D3	1128	3474						
D4			6624	15927	23963			
D5			6659	13644	16141			
D6			11847	35756	69358	68763	122839	128033
D7			18529	24299	28491	17087	30091	35631
D8			1288	7382	5419			
D9						23412	29483	33792
D10						11771	16465	16950
D11						5587	9133	9472
Total	26481	51066	140552	207234	281675	246682	358274	365856

Note: Blank means not applicable; Total = Total manufacturing.
Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 9. Industrial output by selected industry, 1961-96.

Code	1961 S$m	1966 S$m	1971 S$m	1976 S$m	1981 S$m	1986 S$m	1991 S$m	1996 S$m
A1	123.4	235.6	577.6	938	1692.5			
A2	44.2	56.6	70.1	150.7	327.2			
A3						2536.9	2579.9	3355.1
B1	0.7	12.6	128.5	359.9	422.1	239.2	401.7	278.8
B2	4.7	27.7	122.6	406.1	924.7	1241.3	1739.1	811.1
C1	4.3	5.9	50.8	210.1	363.7			
C2	13.2	32.6	88.1	311.9	663.4			
C3	1.3	263.3	1553.5	6118.8	14453.8			
C4						6945.9	11226.5	12198.6
C5						2847.4	5451.4	6970.8
D1	18.6	25.7						
D2	17.8	33.4						
D3	26.9	64.4						
D4			137.8	676.9	2484.2			
D5			118.1	531.8	1050.3			
D6			278.3	1722.6	5728.5	11182.8	28827.2	62768.8
D7			384.7	1117.6	2223.8	1805.6	4050.4	4667.4
D8			25.6	193.2	290.6			
D9						2293.7	4356.7	6422.4
D10						976.2	2113	3291.4
D11						418.2	914.1	1497.4
Total	510.8	1310.8	4699.2	15317.4	36787.1	37258.7	74575	119503

Note: Blank means not applicable; Total = Total manufacturing.
Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 10. Remuneration of employees by selected industry, 1961-96.

Code	1961 S$m	1966 S$m	1971 S$m	1976 S$m	1981 S$m	1986 S$m	1991 S$m	1996 S$m
A1	9.1	13.6	30	51.8	103.4			
A2	4.4	7.1	11.1	22.9	40			
A3						187	303.6	350.5
B1	0.1	2	19.7	56	68.8	32.9	60.4	47.8
B2	1	5.6	22.2	69.8	179.3	225.5	322	186.2
C1	0.8	2	6.4	14.1	33.4			
C2	1.9	3.7	10.7	30	62.4			
C3	0.1	5.6	42.2	67.2	114.7			
C4						146.5	237.3	293.8
C5						192.7	396.2	673.1
D1	4.8	5.9						
D2	4.6	5.6						
D3	4.1	15.2						
D4			25.8	125.8	323.8			
D5			20.8	73.8	154.5			
D6			33.5	186.8	577	976	2313.1	3604.9
D7			103.2	223	433.2	338	738.4	1195
D8			4.5	39.2	47.3			
D9						402.1	732.9	1160.3
D10						163.7	331.8	555.8
D11						72.5	192.6	282.9
Total	69.2	145.4	503.2	1309.8	2938.1	3769.1	7655.9	11327.1

Note: Blank means not applicable; Total = Total manufacturing.
Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 11. Employment, output, and wages by selected industrial sector, 1961-96.

Workers, number	1961	1966	1971	1976	1981	1986	1991	1996
A	5684	7847	12059	11206	12819	11733	13390	12446
B	685	6140	22239	32293	35776	27474	29258	12686
C	1081	2484	6647	8205	9860	10812	13963	16762
D	3970	6876	44947	97008	143372	126620	208011	223878
Total	26481	51066	140552	207234	281675	246682	358274	365856
Output, S$m								
A	167.6	292.2	647.7	1088.7	2019.7	2536.9	2579.9	3355.1
B	5.4	40.3	251.1	766	1346.8	1480.5	2140.8	1089.9
C	18.8	301.8	1692.4	6640.8	15480.9	9793.3	16677.9	19169.4
D	63.3	123.5	944.5	4242.1	11777.4	16676.5	40261.4	78647.4
Total	510.8	1310.8	4699.2	15317.4	36787.1	37258.7	74575	119503
Wages, S$m								
A	13.5	20.7	41.1	74.7	143.4	187	303.6	350.5
B	1.1	7.6	41.9	125.8	248.1	258.4	382.4	234
C	2.8	11.3	59.3	111.3	210.5	339.2	633.5	966.9
D	13.5	26.7	187.8	648.6	1535.8	1952.3	4308.8	6798.9
Total	69.2	145.4	503.2	1309.8	2938.1	3769.1	7655.9	11327.1

Notes: A = A1+ A2 + A3;
B = B1 + B2;
C = C1 + C2 + C3 + C4 + C5;
D = D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + D9 + D10 + D11;
Values for A's, B's, C's are taken from Tables 8, 9, 10;
Total = Total manufacturing.

Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 12. Shares of employment, output, and wages by selected industrial sector, 1961-96.

	1961	1966	1971	1976	1981	1986	1991	1996
Industrial share of workers								
A	21.5%	15.4%	8.6%	5.4%	4.6%	4.8%	3.7%	3.4%
B	2.6%	12.0%	15.8%	15.6%	12.7%	11.1%	8.2%	3.5%
C	4.1%	4.9%	4.7%	4.0%	3.5%	4.4%	3.9%	4.6%
D	15.0%	13.5%	32.0%	46.8%	50.9%	51.3%	58.1%	61.2%
Industrial share of output								
A	32.8%	22.3%	13.8%	7.1%	5.5%	6.8%	3.5%	2.8%
B	1.1%	3.1%	5.3%	5.0%	3.7%	4.0%	2.9%	0.9%
C	3.7%	23.0%	36.0%	43.4%	42.1%	26.3%	22.4%	16.0%
D	12.4%	9.4%	20.1%	27.7%	32.0%	44.8%	54.0%	65.8%
Industrial share of wages								
A	19.5%	14.2%	8.2%	5.7%	4.9%	5.0%	4.0%	3.1%
B	1.6%	5.2%	8.3%	9.6%	8.4%	6.9%	5.0%	2.1%
C	4.0%	7.8%	11.8%	8.5%	7.2%	9.0%	8.3%	8.5%
D	19.5%	18.4%	37.3%	49.5%	52.3%	51.8%	56.3%	60.0%

Notes: A = A1+ A2 + A3;
B = B1 + B2;
C = C1 + C2 + C3 + C4 + C5;
D = D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + D9 + D10 + D11;
Values for A's, B's, C's are taken from Tables 8, 9, 10;
Total = Total manufacturing.

Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 13. Output and wage per worker by selected industrial sector, 1961-96.

	1961	1966	1971	1976	1981	1986	1991	1996
Output per worker, S$								
A	29486	37237	53711	97153	157555	216219	192674	269573
B	7883	6564	11291	23720	37645	53887	73170	85914
C	17391	121498	254611	809360	1570071	905781	1194435	1143622
D	15945	17961	21014	43729	82146	131705	193554	351296
Total	19289	25669	33434	73914	130601	151039	208151	326639
Wage per worker, S$								
A	2375	2638	3408	6666	11187	15938	22674	28162
B	1606	1238	1884	3896	6935	9405	13070	18446
C	2590	4549	8921	13565	21349	31373	45370	57684
D	3401	3883	4178	6686	10712	15419	20714	30369
Total	2613	2847	3580	6320	10431	15279	21369	30961
Output per worker in sector divided by output per worker in total manufacturing								
A	1.53	1.45	1.61	1.31	1.21	1.43	0.93	0.83
B	0.41	0.26	0.34	0.32	0.29	0.36	0.35	0.26
C	0.90	4.73	7.62	10.95	12.02	6.00	5.74	3.50
D	0.83	0.70	0.63	0.59	0.63	0.87	0.93	1.08
Total	1	1	1	1	1	1	1	1
Wage per worker in sector divided by wage per worker in total manufacturing								
A	0.91	0.93	0.95	1.05	1.07	1.04	1.06	0.91
B	0.61	0.43	0.53	0.62	0.66	0.62	0.61	0.60
C	0.99	1.60	2.49	2.15	2.05	2.05	2.12	1.86
D	1.30	1.36	1.17	1.06	1.03	1.01	0.97	0.98
Total	1	1	1	1	1	1	1	1

Notes: A = A1+ A2 + A3;
B = B1 + B2;
C = C1 + C2 + C3 + C4 + C5;
D = D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + D9 + D10 + D11;
Values for A's, B's, C's are taken from Tables 8, 9, 10;
Total = Total manufacturing.

Source: *Economic and Social Statistics, Singapore 1960-1982*, Singapore; *Yearbook of Statistics*, various years, Singapore.

Table 14. Returns on equity investment: local and foreign, 1980-94.

	1980		1985		1990		1994	
	Local %	Foreign %	Local %	Foreign %	Local %	Foreign %	Local %	Foreign %
Food	13.3	5.7	5	5.4	10	19.1	8.9	14.8
Textile	-1.7	4.2	-14	-10.9	6.9	0.3	-13.5	-11.6
Wood	-5.8	-2.9	-31.7	-20	11.7	-16.9	18.2	-2.6
Paper	17.6	7.6	6.8	26.9	22.2	45.7	5.6	63.1
Chemical	12.2	20.8	-4.1	20.1	10.2	30.2	17.6	24.6
Petrol	0.1	26.9	6.4	6.8	0.5	26.7	6.6	17
Rubber	10.8	4.5	-1.1	3.7	9.3	10.4	29.2	36.9
Metals	19	48.5	2.6	10.7	9.5	-2	-0.7	86.3
Fab Metal	1.7	15.2	-4.6	4.9	5.4	13.9	7.6	15.7
Mach	12.2	28.7	-10.8	8.6	9.9	12.4	8.7	10.7
Electr	-1.7	29.5	5.4	23.2	2.7	22	19.7	19.7
Transp	23.2	35	-18.8	23	13.8	10.7	6.6	10.1
Instrum	10.7	4.8	-1.5	31.4	-12.7	13	-1.7	23.2
Others	16.4	17.3	-11.4	-2.4	8.6	5.6	9.3	22.5
Total	14.2	24.5	-5.2	14.6	10.6	21.6	10.2	19.9

Note: Food = Food,
Beverages & Tobacco;
Textile = Textiles, Wearing Apparel & Leather;
Wood = Wood & Wood Products including Furniture;
Paper = Paper & Paper Products, Printing & Publishing;
Chemical = Chemical & Chemical Products;
Petrol = Petroleum & Petroleum Products;
Rubber = Rubber & Plastic Products;
Metals = Basic Metals;
Fab Metal = Fabricated Metal Products;
Mach = Machinery;
Electr = Electronic Products & Components;
Transp = Transport Equipment;
Instrum = Instrumentation, Photographic & Optical Goods;
Total = Total Manufacturing.

Source: *Foreign Equity Investment in Singapore, 1980-1989*, Singapore; *Foreign Equity Investment in Singapore, 1987-1994*, Singapore.

Table 15. Pioneer manufacturing establishments, 1961-96.

Year	Number of Establishments	Number of workers	Output S$m	Share of Output	
1961	7	241	36	0.9%	7.0%
1966	165	11102	490	21.7%	37.4%
1971	291	66124	2403	47.0%	51.1%
1976	293	87405	8921	42.2%	58.2%
1981	432	116907	22857	41.5%	62.1%
1986	427	115951	22351	47.0%	60.0%
1991	432	170584	46077	47.6%	61.8%
1996	397	170780	82418	46.7%	69.0%

Source: *Yearbook of Statistics*, Singapore, various years.

Table 16. EDB Loans and Equity Participation, 1961-68.

Year	Loans Disbursed S$'000	Equity Participation Amt. Paid S$'000
1961	117	125
1962	2057	1160
1963	7178	1862
1964	9274	4238
1965	17443	6264
1966	8433	5636
1967	10791	645
1968	11031	8550

Source: *Economic Development Board Annual Report*, various years, Singapore..

Table 17. Industrial distribution of DBS-assisted companies and financial commitments, 1968-73, and 1976.

	Textile	Wood	Petrol	Metal	Electr	Tran Eqp	Transport	Fin Insti
31/12/68								
number	9	6		4	2	3	3	1
$'000	17625	6943		6836	213	16770	1068	3739
%	16.5	6.5		6.4	0.2	15.7	1	3.5
31/12/69								
number	16	9	1	5	7	10	6	1
$'000	22488	16668	58999	8202	40479	16932	2117	8466
%	8.5	6.3	22.3	3.1	15.3	6.4	0.8	3.2
31/12/70								
number	19	10	1	7	9	13	10	3
$'000	37828	31317	59000	14012	53721	33553	6379	10514
%	11.1	9.2	17.4	4.1	15.8	9.9	1.9	3.1
31/12/71								
number	17	13	1	9	13	15	12	4
$'000	36693	39581	74490	25232	62486	45879	51357	12014
%	7.6	8.2	15.4	5.2	12.9	9.5	10.6	2.5
31/12/72								
number	15	16	2	13	16	17	16	9
$'000	32922	39184	84342	49560	65284	64324	95041	45200
%	5	5.9	12.8	7.5	9.9	9.7	14.4	6.8
31/12/73								
number	17	25	2	14	16	20	26	13
$'000	36102	49787	88886	73932	60990	177178	176836	69669
%	3.5	4.9	8.7	7.2	6	17.3	17.3	6.8
31/12/76								
number	17	27	2	25	24	28	41	26
$'000	42138	62011	107719	90644	88826	507210	286050	216849
%	2.2	3.2	5.5	4.6	4.6	25.9	14.6	11.1

Notes: Textile = Textile, Texile Products & Footwear;
Wood = Wood & Paper Products;
Petrol = Petroleum & Petroleum Products;
Metal = Metal & Metal Products;
Electr = Electrical machinery & Electronic Products;
Tran Eqp = Transport Equipment;
Transport = Transport & Transport-related Services
Fin Insti = Financial Institutions;
% is percentage out of total industrial financial commitments;
Blank means not applicable.

Source: *Development Bank of Singapore Annual Report*, various years, Singapore.

Table 18. Industrial distribution of DBS Group's loans and advances, 1993-97.
(including bills financing)

Industrial Sector	31/12/97 (%)	31/12/96 (%)	31/12/95 (%)	31/12/94 (%)	31/12/93 (%)
Manufacturing	14.3	12.8	14.3	15.4	17.7
Building & Construction	19.3	18.5	17.2	18.5	18.9
General Commerce	7.5	7.7	8.6	8.7	7.6
Transport, Storage & Communications	8.5	7.9	8	8	4.7
Financial Institutions & Holding Companies	16.9	17.2	18.1	16.2	17.4
Professionals & Private Individuals	25.2	27.8	25.4	24.2	22.1
Others	8.3	8.1	8.4	9	11.6
Total	100	100	100	100	100
Total (S$m)	40134.7	31012.7	26171.8	22055.3	18257.4

Source: *Development Bank of Singapore Annual Report*, various years, Singapore.

Table 19. Loan programs of EDB, 1996-97.

Loan Programs	1997 S$m	1996 S$m
Local Enterprise Finance Scheme		850.3
Regionalization Finance Scheme	29.5	37.1
Capital Assistance Scheme	200.2	47.4
Automation Leasing Scheme	173.4	127.9
Entrepreneur Development Fund	7.1	
Total	410.1	1062.7

Note: Blank means not applicable.
Source: *Economic Development Board Annual Report*, 1997, Singapore.

Table 20. Principal statistics of manufacturing by capital structure, 1996.

	Capital Structure				
	wholly loc.	>.5 local	<.5 local	wholly for.	Total
Establishment, number	2928	290	207	643	4068
Worker, number	130624	40032	23965	173434	368055
Output, S$m	19139.7	9427.4	8732.9	82569	119867
Materials, S$m	10151.2	4463.1	6094.1	55317.8	76026.2
Remuneration, S$m	3535.2	1416.1	794.9	5506.6	11252.8
Operating Cost, S$m	3947.2	2092.2	1086.9	8502.5	15628.7
Value Added, S$m	5041.4	2872.1	1551.9	18748.7	28214.1
Sales, S$m	19209.5	9739.8	8713.6	82494.7	120158
Direct Exports, S$m	5323.2	4879.2	5702.9	57058.7	72964
Net Fixed Assets, S$m	6495	4906	1866.3	15831.9	29099.2
Shares of Costs:					
Materials	57.6%	56.0%	76.4%	79.8%	73.9%
Remuneration	20.0%	17.8%	10.0%	7.9%	10.9%
Operating Cost	22.4%	26.2%	13.6%	12.3%	15.2%
Share of Direct Exports in Sales	27.7%	50.1%	65.4%	69.2%	60.7%

Notes: Wholly loc. = Wholly local-owned;
>.5 loc. = Majority local-owned, but not wholly local-owned;
<.5 loc. = Majority foreign-owned, but not wholly foreign-owned;
Wholly for. = Wholly foreign-owned.
Source: *Report on the Census of Industrial Production 1996*, Singapore.

Table 21. Principal statistics of selected industries, 1996.

	Industrial Code				
	23	24	29	31	33
Establishment, number	18	195	565	238	307
Worker, number	3531	13621	35145	128455	34892
Output, S$m	13746.5	7163.1	6452.2	60912.8	4828
Materials, S$m	11283.5	3495.1	3187	42379.4	1378.1
Remuneration, S$m	301.8	676.2	1183.7	3522.5	1164.9
Operating Cost, S$m	839.2	937	1511.5	5861.3	1794.5
Value Added, S$m	1623.8	2731.1	1753.7	12672.2	1655.4
Sales, S$m	13586.5	7099.2	6555.3	60948.2	5047.1
Direct Exports, S$m	4603.9	5287.9	3667.6	46969.8	2555.5
Net Fixed Assets, S$m	4635.7	3078.8	1781.1	8296.3	2031.6
Share of Costs:					
Materials	90.8%	68.4%	54.2%	81.9%	31.8%
Remuneration	2.4%	13.2%	20.1%	6.8%	26.9%
Operating Cost	6.8%	18.3%	25.7%	11.3%	41.4%
Share of Direct Exports in Sales	33.9%	74.5%	55.9%	77.1%	50.6%

Note: Code 23: Refined Petroleum Products;
Code 24: Chemicals & Chemical Products;
Code 29: Machinery & Equipment;
Code 31: Electronic Products & Components;
Code 33: Transport Equipment.

Source: *Report on the Census of Industrial Production 1996*, Singapore.