

Government Policies and the Growth of the Manufacturing Sector in Singapore*

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A number of studies have attempted to identify the factors that have contributed to rapid economic growth in four Asian economies—Hong Kong, Singapore, South Korea and Taiwan. It is well known that a single model of economic growth cannot explain the growth experiences of these countries. In addition, important differences in the role of government have been identified by a number of studies. For example, the government of Hong Kong adopted a policy of minimal intervention whereas the government of Singapore pursued a policy of maximum intervention. Accordingly, Singapore's economic system has been labeled as state directed capitalism where growth is the result of accumulation of inputs like capital and labor. Empirical studies have shown that the contribution of technological progress in Singapore from 1970-1990 is approximately zero at best. This has resulted in an increase in spending on education during the 1990s. This paper examines the impact of government policies on the growth of the manufacturing sector in Singapore and attempts to estimate the impact of foreign investment and government spending on education from 1980-2000.

INTRODUCTION

Singapore has long been identified as one of the Asian miracle economies that have enjoyed a high level of economic growth since the end of the colonial period in the late 1950s. During the British colonial rule Singapore had already developed a high level of income relative to that of its neighbors. This was in large measure the product of the role it had acquired since 1818 in the British trading and producing system in East Asia. Singapore was the major entrepot for regional trade, a service centre for British companies, a major administrative centre for the British Empire in the area, and it was the major site for British military power in Southeast Asia. In these various capacities it developed, therefore, an extensive infrastructure system which ranged from ship yards and docking facilities, through warehouses and repair yards, to some heavy industry and technically sophisticated light industry and communications, through to service facilities in the form of hospitals, schools and universities.

The population of Singapore soon became mostly immigrant including a majority of Chinese but also Indian migrants who had come to the British colonial enclave to achieve greater prosperity, mostly as wage laborers but also as minor entrepreneurs and capitalists in a

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production system dominated by British capital. By the time of independence there was a sizeable middle and professional class, educated by the British system and sometimes in Britain, ready to take over the reins of governance and produce a rapid rate of economic development and therefore a rapid rise in the standard of living.¹ Indeed, the first election manifesto of the Peoples Action Party (PAP) in 1959 was to refer to the aspiration of overtaking the then prosperous Burma—a now seemingly easily achieved goal.

In order to accomplish this objective the PAP in 1959 believed that Singapore needed to be merged with the then Federation of Malaya which achieved its independence in 1957. It was then widely believed that economic development required a substantial domestic market on which to build an industrialization program. Unification with Malaya seemed one way to achieve this. In 1963 the two states joined into the Federation of Malaysia which also incorporated Sabah and Sarawak for largely geopolitical reasons. This proved to be a difficult jurisdiction to administer and in 1965 Singapore left it and became an independent state. Under the uninterrupted rule of the PAP the Singapore economy then began a long period of rapid economic growth only seriously disrupted by (1) a short recession in the early 1980s that was caused in part by over zealous plans to become a high wage economy, (2) a 0.1% decline in GDP in 1998 attributed to the Asian financial crisis and (3) a 2% decrease in the GDP in 2001 attributed to slowdown in the US and lack of recovery in the Japanese economy.²

A number of studies have examined the sources of phenomenal growth in Singapore and other newly industrialized economies. Some of these studies have shown the importance of capital accumulation in economic growth. As indicated by Han, Kalirajan, and Singh (2002), although the financial crisis of 1997-98 has temporarily diverted attention to short-term problems, the understanding of the sources of East Asia's economic growth still remains an issue that needs to be further investigated. The focus of the present study is on Singapore. A number of studies have argued that the economic growth of Singapore can be attributed to government policies that have resulted in excellent infrastructure, productive labor, political stability and the rule of commercial law.³ In addition to these factors, a favorable location and an ambitious middle class has made Singapore one of the most prosperous economies in the region. Young (1992, 1994) and Han *et al.* (2002) have argued that Singapore's economic growth is largely driven by the accumulation of capital and little or negligible technological progress has taken place till the late 1980s. Huff (1999) has argued that Singapore's economic growth is likely to stall in the future unless steps are taken to encourage innovation.⁴ Innovation is closely linked to quality education. There has been a significant increase in Singapore's spending on education during the 1990s. In addition, despite strong competition from China, Singapore was able to attract massive foreign investment in the 1990s. At the same time, Singapore was able to use the large government induced savings to locate its own investments in other countries. Particularly important here has been investments in labor intensive inputs to Singapore located in lower wage neighboring countries, including very low wage Indonesia, which have served to assist Singapore in restraining cost increases in its own economy, including in the manufacturing sector.

The purpose of this article is to (a) examine the role of government policies in the growth of Singapore's manufacturing sector and (b) empirically estimate the impact of foreign investment and government spending on education on the aggregate output of Singapore's manufacturing sector from 1980-2000.

This article argues that government policies have resulted in massive foreign investment in Singapore's manufacturing sector and government spending on education has resulted in the increased availability of skilled labor. Foreign investment and government spending on education have greatly benefited both the manufacturing and the services sectors. Government spending on education, research and development, and trade and industry, and lower taxation are some examples of direct actions taken by the government. The indirect actions of the government have included the introduction of incentives that resulted in a higher rate of saving.⁵ Government policies and incentives have also produced an environment that has been conducive to foreign investment.

The plan of the rest of this article is as follows. Section 2 deals with government policies and the growth of manufacturing sector in Singapore. Section 3 contains an empirical analysis of foreign investment and government spending on education on the growth of manufacturing sector. Section 4 contains some concluding remarks.

GOVERNMENT POLICIES AND GROWTH OF THE MANUFACTURING SECTOR IN SINGAPORE

Government policies can make a significant contribution to economic growth.⁶ It is well recognized that the government of Singapore has been attempting to direct the pace and content of industrialization (Kim & Lau, 1994; Krause, 1987; Wade, 1990). Where this has been broadly consistent with appropriate returns to factors of production, this has been a successful policy and the only major avoidable recession was that of the early 1980s. The economic growth experienced by all developed countries is driven by their respective manufacturing and services industries. Singapore has followed the trajectory of post World War II Japan in promoting manufacturing industries. The existing literature in the area of development economics and international trade appears to suggest that Japan's post World War II rapid economic growth can be at least partly attributed to government support of selected industries. It has been argued that over the years, the Japanese Ministry of International Trade and Investment (MITI) carefully targeted industries for government sponsorship. It is generally believed that Singapore has followed a similar strategy (see Johnson, 1982; Krause, 1987; Ishi, 1999). But unlike Japan, government policies also encouraged foreign investment in Singapore. The government supported the sectors that were unable to attract significant foreign investment. A large part of government savings in Singapore was used to create Singapore's excellent infrastructure including its higher education system (Asher, 1995). Government spending has also been directed towards continuously upgrading the skills of its workforce through Singapore skills development system (SSDS).⁷

Manufacturing industries in Singapore include light industries, aerospace, engineering systems, manufacturing systems and electronic systems. Light industries include printing and publishing, jewelry, furniture, food and beverages, and textiles and apparel. Engineering systems include automotive components, marine industry, and metal fabrication. Manufacturing systems include machine tools, industrial machinery, and precision systems, communication equipment, semiconductors, computer peripherals, and display devices.

Like Hong Kong, South Korea and Taiwan, Singapore has been successful in shifting rapidly from light to heavy industry. The purpose of shifting towards heavy industry is to pursue dynamic comparative advantage. This is expected to result in greater possibilities for investment and innovation in heavy industries rather than the static comparative advantage implied by labor-intensive low wage light industries (see Nee, 1993). The manufacturing and services sectors have played an important role in the economic development of Singapore. The government has actively fostered the growth of high value-added industries within the manufacturing sector by ensuring the availability of skilled labor, critical support services, quality management, automation equipment, and software (See Asher, 1994; Huff, 1994; Karuse, 1988; Lim, 1983; Rodan, 2001; Yeung, 2000).

Singapore is a small open economy with no natural resources, limited land and labor. In 1965, it left the Malaysian Federation and with it the opportunity of developing within a substantial domestic market. Because its own domestic market is very small, the growth of the Singapore economy has been highly dependent on the demand for its products in the world market. It has been forced to pursue world's best practice since 1965. Changes in the global economic environment are likely to have implications for the Singapore economy (Kam & Yuen, 1997). However, government policies have transformed the economy of Singapore from an exporter of labor intensive commodities in the early 1960s to the present high wage-high productivity state.

The Singapore government has been able to exert considerable influence over various sectors of the economy through state-linked corporations. Through spending on economic services such as housing, trade and industry, research and development and education, the government has also been able to provide an improved technological base.

Foreign investment usually facilitates technology transfer from foreign to local firms. However, the experience of developing countries shows that the substantial technology gap between the local and the foreign firms often inhibits large spillovers of knowledge from the international to the local sector (Hill, 2003). The Singapore government through a heavy commitment to government spending on education and R&D has been able to reduce the technological gap between the local and the foreign firms. This policy has not only resulted in much larger spillovers of knowledge but has contributed to the growth of skilled labor force (See Chieh, 1999; Nee, 1993).

An early instance of this policy emerged in the tourism and transportation sector. Because of its location at the heart of a region with rapidly growing output and labor returns, Singapore was able to hub as a services center. In the 1970s, air travel and tourism became one of the emerging opportunities in this respect.⁸ Singapore built on its existing role as a transport hub for maritime activities and developed a commercial airline using world's best practice. It was able to articulate its growing tourism industry with the development of Singapore Airlines after it separated from Malaysian airlines to become one of the most profitable and extensive airlines in the world. This was then used to build the most advanced airport in the region, if not in the world, and use this experience to sell services to and buy into other airlines and airports, including for example Air New Zealand.

It did the same in many secondary-manufacturing sectors in the 1960s and 1970s, but as wages rose in Singapore, many of these sectors lost their competitive advantage in low wages to surrounding countries. Like some other developing countries in East Asia with rising wage levels, Singapore then invested in lower wage neighboring countries including in the 1980s the nearby Indonesian islands around Bataan. During the past few years China has emerged as the main competitor to Singapore's manufacturing sector. However, it is hoped that rapid technological advancement will preserve Singapore's comparative advantage in producing capital-intensive manufacturing products (Chieh, 1999).

The location of multinational corporations' regional headquarters in Singapore has also resulted in a significant increase in the level of spending on R&D. It should be noted that the private sector's spending on R&D in Singapore is significantly larger than government spending on R&D. The combination of its development policies has resulted in a rapid increase in private spending on R&D in Singapore. Young (1992) has argued that Singapore's economic growth can be largely attributed to the growth in factors of production such as skilled labor and capital. Young (1992, 1994) has further argued that, unlike Hong Kong, technological progress has played little or no role in Singapore's economic growth. Huff (1995, 1999) has argued that the lack of technological progress driven growth in Singapore can be attributed to government policies where public discussions and dissent are not acceptable. Huff further argues that innovation by its very nature cannot be state directed and therefore government attempts to encourage innovation through increased spending are unlikely to bear fruit. Toh and Ng (2002) have argued that this situation has improved over time and that the Singapore's experience is not very different from that of the U.S. and Japan during the early stages of economic development. They have further argued that while the Singapore government facilitates investment through the provision of infrastructure development, most of the total investment in Singapore is undertaken by market-oriented domestic and foreign enterprises.

Figure 1 shows that in the 1990s private sector spending on R&D grew much faster than the government sector. The private sector R&D spending includes the spending of Singapore based multinational corporations. This can in turn be attributed to the increase in foreign investment, which the Singapore government was able to attract in the 1970s and 1980s. Because it was the best developed city in an area of rapid economic growth, Singapore was also able to attract many regional headquarters of international corporations, in some large measure because its facilities were attractive for corporate executives, including as they did, the best schools, hospitals, universities and public infrastructure in the region.

Figure 2 shows the pattern of foreign investment from the US, Japan and Europe and indicates that the US remains the largest foreign investor in Singapore's manufacturing sector. It should be noted that after the liberal reforms of the 1980s China has been attracting a greater proportion of the region's foreign investment at the expense of countries like Indonesia, Malaysia, Philippines and Thailand.⁹ As indicated earlier, because of the availability of highly skilled labor and excellent infrastructure in Singapore, multinational corporations are continuing to use Singapore as base for product design and development. On the other hand, the main attraction in China is the availability of cheap labor. However, it is worth pointing out that recent newspaper reports suggest that foreign investment figures in China are up to 30% inflated (*South China Morning Post*, 2002). The main aim of the Singapore

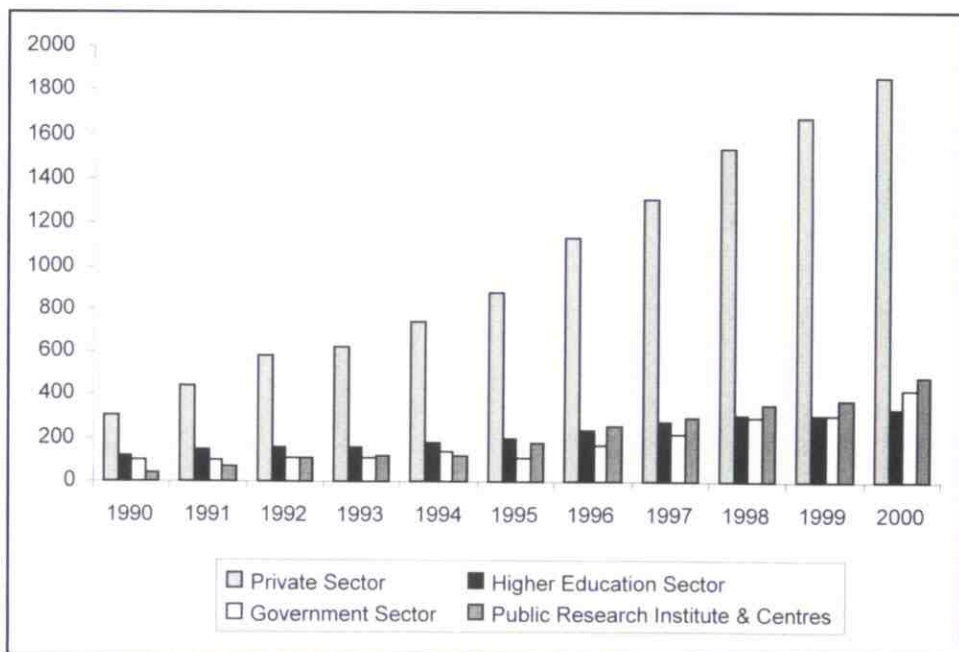


Figure 1. R&D Spending by Sector (\$millions). Source: National Science and Technology Board (2000).

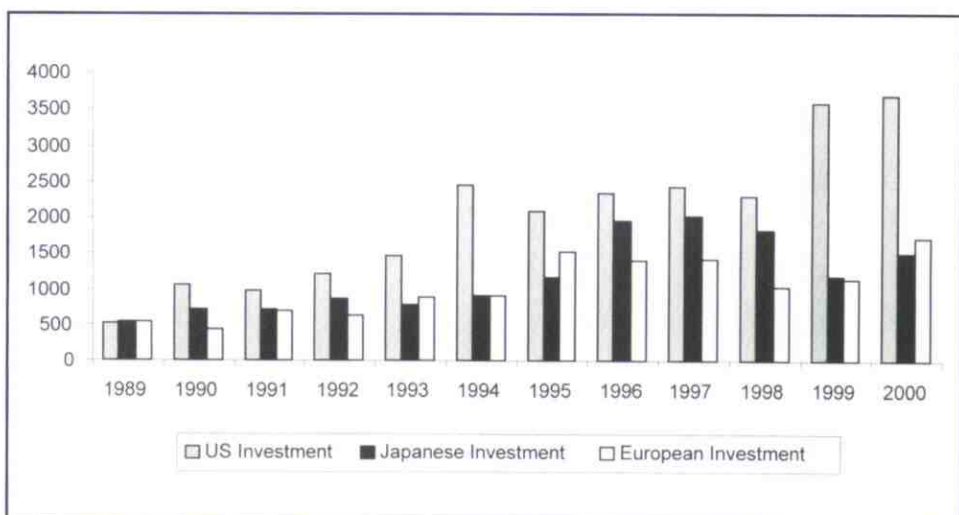


Figure 2. Foreign Investment in Singapore 1989 – 2000 (\$million). Source: Yearbook of Statistics Singapore (1995, 2000, 2002).

government is to increase the proportion of skilled workers in manufacturing and move towards the production of higher value-added products. An increase in foreign investment and government spending on education can be attributed to the availability of skilled labor in Singapore. Huff (1999) argues that Singapore government concentrated in reputation building that led to rapid inflow of foreign investment.

Recently, the incorporation of Hong Kong into China as a Special Administrative Zone in 1997 has led to diminution in the reputation of the former British colony as a suitable location for region headquarters for multi-national companies and as the region's leading capital market. The Singapore government has tried to lure some of this potential investment to the city-state with some success. On the other hand, it is facing increased competition for investment from Taiwan where, after the KMT was defeated in the Presidential election of 2000, restrictions on economic integration with China have been reduced, increasing their combined attractiveness with the combination of technological sophistication and cheap labor. Nonetheless, continuing strategic concerns about the future status of the Republic of China, and the potential for military competition, involving even the USA, may well enable Singapore to continue to successfully compete for foreign investment with the two Chinas.

Since it separated from Malaysia, the government of Singapore has taken steps to improve the productivity of the manufacturing sector. Indeed, after 1965 it was clear that no sector of Singapore's economy could develop within a large domestic market. At first this appeared to be a major impediment to Singapore's development. It soon became clear that, instead, it forced on Singapore a model of development that was later to become more widespread. In order to develop Singapore had to achieve world's best practice in economic activity and find markets in the global and not its domestic economy. As it learnt how to succeed in achieving its objectives, not only did its economy prosper, but it in turn became a new model for other developing economies. It was one of the first economies to become truly global in orientation. This was also true of its manufacturing sector (see Mosuyama, Vanderbrink, & Caia, 1999).

But it has not been equally true of all sectors of manufacturing. The traditional sectors of heavy industry including machinery and equipment, which comprise the capital goods sector; electronic machinery and apparatus; and transport equipment, have not grown quickly during the last decade or so. Most of the growth of output has been in the light industry and consumer goods sector, which appears in the following figure as electronic products and components. In fact a significant proportion of this output was for the export market, with Singapore producing for the global market on which it has learned to compete since 1965. In this it has been assisted by its training of a skilled labor force.

Figure 3 shows the trend in the manufacturing output from 1989 to 2000. It is clear that the financial crisis of 1997-1998 did not significantly affect the growth of the manufacturing sector, particularly the export oriented consumer goods sector. This is in large part because of the diversification of Singapore's markets, which left it able to continue to market into economies that had not experienced the Asian Crisis. Nonetheless, it was at the same time able to enjoy the low costs of production which may even have been lowered by the extensive recession experienced by neighboring economies, for which is operated as *entrepot*, including particularly Indonesia and, to a lesser extent, Malaysia.

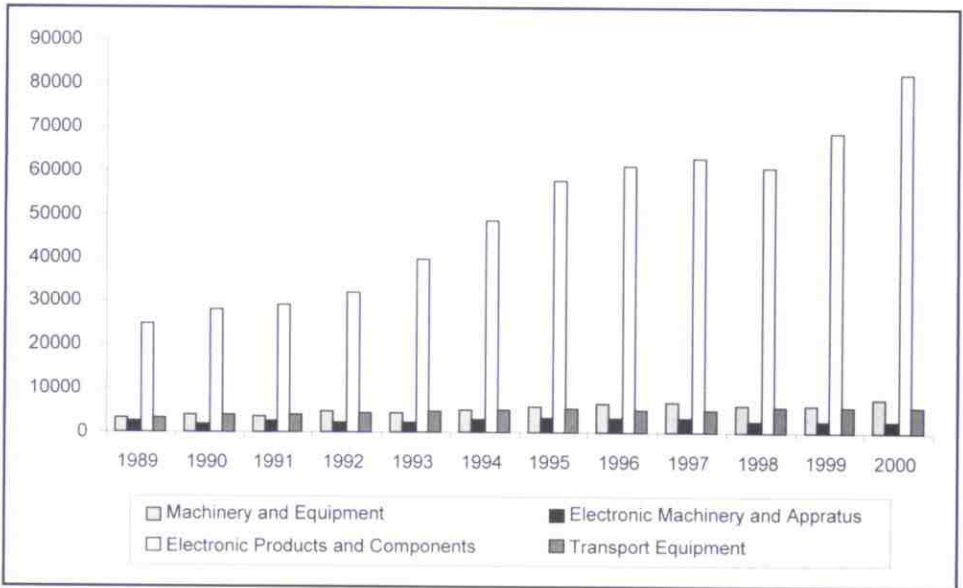


Figure 3. Manufacturing output in Singapore 1989 – 2000 (\$million). Source: Yearbook of Statistics Singapore (1995, 2000, 2002).

The Electronic Products and Components industry is the largest within the manufacturing sector. This is the sector where one might expect a concentration of globally alert skilled labor, since Singapore has found it progressively harder to compete in manufacturing sectors dependent on cheap unskilled labor where it has progressively lost its comparative advantage to neighboring countries including Indonesia and more recently, China and Vietnam. Indeed, Singapore companies have been themselves shifting their investments into these low wage economies to establish lower cost platforms for production for third country markets.

The growth of the manufacturing sector in Singapore has occurred at a time of a significant increase in per-capita national income. However, the wages in the manufacturing sector itself have not grown in such a spectacular fashion. Figure 4 shows that wages in manufacturing have not increased significantly. In fact the financial crisis of 1997-1998 resulted in a decline in the level of wages. The introduction of a Goods and Services Tax in the 1990s has not reduced the purchasing power significantly and the income tax in Singapore remains low.

It has been argued that Singapore is an example of state directed capitalism (Hill, 2003). Unlike Hong Kong, South Korea and Taiwan, the government has tight control over most economic and non-economic activities. Huff (1999) and Rodan (2001) have argued that government control in the case of Singapore is closely associated with its objective of reputation building. It can be argued that through reputation building and the rule of commercial law, the government has been able to maintain the inflow of capital into Singapore.

The share of foreign residents and foreign companies in Singapore is very high. For example in 2001, 41.28% of Singaporean GDP went as payments to resident foreigners and foreign companies. Previous studies have suggested that on the average foreign firms earn a much higher return on investment than the domestically owned companies.

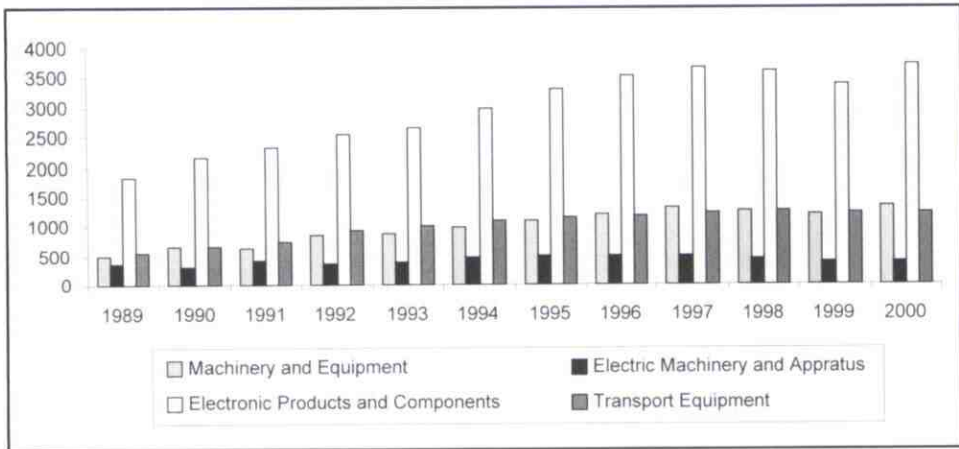


Figure 4. Wages in the Manufacturing Sector 1989-2000 (\$million). Source: Yearbook of Statistics Singapore (1995, 2000, 2002).

SPENDING ON EDUCATION, FOREIGN INVESTMENT AND THE MANUFACTURING SECTOR

There is no doubt that foreign investment has played an important role in the growth of Singapore’s manufacturing sector and government spending on education has contributed to the availability of highly productive labor. The share of government spending on education as a proportion to total operating expenditure was 24.25% in 1991 and 24.47% in 2001 whereas the share of government spending on education as a proportion to total development expenditure was 10.54% in 1991 and 16.43% in 2001 (Yearbook of Statistics Singapore, 2002). The purpose of this section is to empirically estimate the impact of government spending on education and foreign investment in the manufacturing sector on the output of the manufacturing sector in Singapore. The empirical analysis is conducted by means of the following linear and log-linear regression equations that represent the population relationship.¹⁰

$$Q_m = \delta_0 + \delta_1 FI_m + \delta_2 ED + \epsilon$$

$$\text{Log}(Q_m) = \gamma_0 + \gamma_1 \text{log}(FI_m) + \gamma_2 \text{Log}(ED) + \mu$$

Where Q_m is the real output of the manufacturing sector, FI_m is the real foreign investment in the manufacturing sector, ED is the real government spending on education. $\delta_0, \delta_1, \delta_2, \gamma_0, \gamma_1,$ and γ_2 are population regression coefficients whereas ϵ and μ are the random variables that captures the effect of all relevant variables that are not explicitly included on the right hand side of the above regression equations.¹¹

Foreign investment and government spending on education is expected to be positively related to the manufacturing output.¹² In other words, the population regression coefficients (i.e., δ_s and γ_s) are likely to be positive. The above equation was estimated by using SHAZAM version 8 for the period 1980-2000. The estimated coefficients after correcting for first order linear autocorrelation are reported in Table 1.¹³

TABLE 1
Estimated Linear and Log Linear Models

	Estimated Coefficient of Real Foreign Investment	Estimated Coefficient of Government Spending on Education	Adjusted R ²	Durbin-Watson Statistic
Linear Functional Form	13.324 <i>p</i> -value: 0.000	10.062 <i>p</i> -value: 0.002	0.9785	1.8198
Log Linear Functional Form	0.50393 <i>p</i> -value: 0.000	0.25853 <i>p</i> -value: 0.001	0.9658	1.8455

Table 1 shows that real foreign investment and real government spending on education are positively related to the real output of the manufacturing sector. The estimated coefficients of the linear regression equation show that a one million dollar increase in real foreign investment increases the manufacturing output by 13.324 million. The impact of an increase in government spending on education is also significant. Specifically, a one million dollar increase in spending on education contributes a 10.062 million dollar increase in the aggregate manufacturing output. The estimated *p*-value associated with both independent variables is small which indicates that the relationship between the population values of each independent variable and the dependent variable is significant. Specifically, one can be almost 99.999% (99.998%) confident that an increase in foreign investment (government spending on education) increases the manufacturing output. The value of the adjusted R² shows that 97.85% of the variation in the manufacturing output is due to variation in foreign investment and government spending on education which suggests that the estimated regression equation is highly reliable. The estimated value of the Durbin-Watson statistic is close to 2, indicating the absence of significant autocorrelation.

Table 1 also shows the estimated coefficients of the log-linear regression equation which is an alternative to the linear regression equation that is commonly used for business and economic analysis. Given that the *p*-values of the estimated coefficients pertaining to both linear and log-linear models are similar, it is difficult to argue that either of the two alternative regression equations is econometrically superior. The estimated coefficient pertaining to the log-linear equation show that a one percent increase in foreign investment in Singapore increases the output of the manufacturing sector by 0.50393 percent. Furthermore, a one percent increase in government spending on education increases the output of the manufacturing sector by 0.25853 percent. It should be kept in mind that changes in government spending on education are likely to affect a number of sectors with the Singaporean economy.

It is well-known that Singapore's economic growth is state directed. It has also been argued that Singapore has concentrated more on factor accumulation than on technological innovation. For example, massive foreign invest and forced domestic saving ensured the

availability of capital, and government spending on education and immigration policies ensured the availability of skilled labor (Amsden, 2001; Chng, Low, & Heng, 1988). However, until the late 1980s not much attention was paid to investment in developing new technologies. An increase in government spending on R&D starting from the late 1980s and indicates a shift in government policy whereby an attempt was made to encourage the development of domestic technology through innovation. Prior to this the focus has been on learning through the importation of foreign technologies.

Finally, it is perhaps worth mentioning that events such as the continued weakness in the Japanese economy, recession in the US and the outbreak of the SARS virus are likely to have, at least in the short-term, a significant adverse affect on the economies of Singapore and its neighbors including Hong Kong, Malaysia and Taiwan. It would be interesting to see how Singapore government adjusts to these challenges.

CONCLUDING REMARKS

A number of studies have attempted to identify the factors that have contributed to rapid economic growth in four Asian economies—Hong Kong, Singapore, South Korea and Taiwan. It is well-known that a single model of economic growth cannot explain the growth experiences of these countries. In addition, important differences in the role of government have been identified by a number of studies. For example, the government of Hong Kong adopted a policy of minimal intervention whereas the government of Singapore pursued a policy of maximum intervention. Accordingly, Singapore's economic system has been labeled as state directed capitalism where growth is the result of accumulation of inputs like capital and labor. Empirical studies have shown that the contribution of technological progress in Singapore from 1970-1990 was approximately zero at best. This resulted in an increase in spending on education during the 1990s. This paper examines the impact of government policies on the growth of manufacturing sector in Singapore and attempts to estimate the impact of foreign investment and government spending on education from 1980-2000.

It is argued that government policies have been successful in creating an environment that is conducive to foreign investment in Singapore. Spending on education represents investment in human capital which improves the productivity of local workforce. Earlier studies had suggested the absence of technical progress based growth in Singapore. However, increased spending on R&D in the 1990s is likely to have encouraged innovation. The empirical analysis conducted by means of a linear and a log-linear regression equation shows that both foreign investment and government spending on education have made a significant contribution to the growth of Singapore's manufacturing sector. The estimated regression equations indicate that foreign investment has a larger effect on manufacturing output. Although increased spending on education can be linked to higher levels of manufacturing output, there remains a need for loosening of government control over activities that encourage innovation. In addition, the education system needs to focus more on promoting independent thought.

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ENDNOTES

- ¹ At 1990 market prices, the per-capita GNP of Singapore was S\$24,021 in 1991, S\$40,051 in 2000 and S\$37,433 in 2001 [Yearbook of Statistics Singapore (2002)].
- ² After a 1.5% contraction in the first quarter of 2002, Singapore's economy grew by 3.9% in the second and the third quarters of 2002 (Economic Survey of Singapore, 2002).
- ³ These studies include Cotton (2000), Huff (1995, 1999), Han et al., (2002), Hughes (1995), Krause (1987), Low (1998), Yeung (2000) and Young (1992, 1994, 1995).
- ⁴ It is worth pointing out that Krugman (1994) has linked the collapse of Soviet Union to the lack of sustained growth.
- ⁵ Fry (1991) has indicated that the fast growing Asian countries have generally higher saving rates as compared to most other countries. For example, Asian savings ratios of 27.5% over 1982-1990 can be compared to the saving ratio of 17.7% in Africa and 25.3% in Europe. Baharumshah, Thanoon, and Rashid (2002) have empirically examined the link between the saving and economic growth in Singapore, South Korea, Malaysia, Thailand and the Philippines. They have shown that the causal link between savings and economic growth is weak in all the sample countries except for Singapore.
- ⁶ See Grant (1989), Evans (1994), Mundle (1999), and Munnell (1992).
- ⁷ Although Kuruvilla, Erickson, and Hwang (2002) have argued that the Singapore skills development system has the potential to further improve the skills of workers, they question the long-term sustainability of the system. They have also argued that the program may not be suitable for other developing countries.
- ⁸ The number of visitors arriving in Singapore has been steadily rising. For example 7,522.2 thousand visitors arrived in Singapore in 2001 up from 5,414.7 thousand in 1991 (Department of Statistics, Yearbook of Statistics, 2002).
- ⁹ The policies adopted by Singapore have been extremely successful in attracting foreign investment into Singapore. For example, during 1960-65 the annual average inflow of foreign investment was only S\$30 million which increased to S\$73 during 1966-67. In 1972, it reached S\$708, see Young (1992). Taylor (1998) has argued that Asian countries received more foreign capital as compared to Latin American countries because of they were considered to be more outward-looking.

- ¹⁰ For an excellent treatment of regression analysis refer to Gujarati (2002) and Griffiths, Hill, and Judge (1997).
- ¹¹ The real values refer to inflation-adjusted figures. Data used in the present study is provided in the appendix.
- ¹² Chamarbagwala, Ramaswamy, and Runnava (2000) have examined the link between foreign capital and domestic manufacturing in some Asian countries.
- ¹³ *p*-value refers to the minimum value of the level of significance that could lead to the rejection of the hypothesis that is being tested against the alternative hypothesis, see Gujarati (2002).

APPENDIX

The data in Table A1 are taken from various issues of the Year Book of Statistics (Singapore) and International Financial Statistics (2002).

TABLE 1A
Data from the Year Book of Statistics

Year	OutM	ForI	Edu	Def
1980	32805.80	1189.10	564.40	65.00
1981	37694.00	1221.40	631.60	69.30
1982	37141.10	1162.50	866.70	72.20
1983	37888.30	1269.80	1115.10	75.10
1984	41704.10	1334.70	1282.00	75.60
1985	38495.00	888.00	1361.90	74.40
1986	37502.90	1190.60	1349.00	73.60
1987	46084.00	1448.00	1348.10	75.00
1988	56470.00	1657.80	1504.50	79.30
1989	63924.10	1625.40	1629.70	83.00
1990	71333.00	2217.90	1742.30	87.00
1991	74575.00	2461.10	1892.70	90.30
1992	77276.00	2733.00	2461.50	91.70
1993	87639.00	3177.10	2171.30	94.70
1994	100622.00	4327.40	2422.80	97.40
1995	113358.00	4852.40	2677.70	100.00
1996	119869.00	5791.80	2848.40	101.30
1997	126531.00	5963.80	3352.60	111.00
1998	121433.00	5213.60	3327.40	100.10
1999	133577.00	6257.10	2967.20	97.10
2000	158770.00	7235.30	3901.90	98.90

- OutM Nominal Value of the Manufacturing Output in Singapore in millions of Singapore dollars
 ForI Total Foreign Investment in Singapore's Manufacturing Sector in millions of Singapore dollars
 Edu Government Spending on Education in million of Singapore dollars
 Def Singapore's Gross Domestic Product deflator with 1995 as the base year.

Note: Where $Q_m = (OutM/Def)*100$; $F_{Im} = (ForI/Def)*100$; $ED = (Edu/Def)*100$