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ABSTRACT

India has experimented with liberalized economic policies since 1980-81 with a special emphasis on its electronics sector. This investigation focuses on the largest component of the Indian electronics sector, specifically the television manufacturing industry, and offers empirical evidence of increased economic growth rates during the period of liberalization. It also shows that liberalization does not necessarily undermine social objectives such as employment generation and preservation of small industrial ventures. More importantly, a new role for state institutions is suggested which builds on supportive networks that mitigate the disadvantages of scale and creates conditions for all scales of operation to survive and grow.

I. INTRODUCTION

Of late, the issue of economic liberalization has received much attention in development literature. Most of the arguments continue to be embroiled in the age-old "free market vs. state control" debate. This issue has special relevance for a country like India which is slowly attempting to move away from its centrally controlled, top-down, economic policies and is providing more economic decision-making space to the private sector. Although stripping away public functions does not necessarily lead to a more efficient and productive private sector, experimentation for discovering the correct mix of private and public functions will have to continue. Often, theoretical conjectures have replaced micro-level empirical analysis in assessing the results of policy changes.¹ This study attempts to redress this shortcoming through detailed empirical evaluation of the efforts to liberalize the television manufacturing industry in India. The importance of both the market institution and the supportive state institutions are highlighted in the final analysis.

Perhaps the most illuminating research on the role of markets and the state has come from the studies analyzing the growth of the newly industrialized economies in Southeast Asia. These studies have shown that state institutions have played a major and dominant role in developing the industrial base of the respective countries. As a result there is increasing consensus among development scholars that a supportive state is necessary in mitigating the irregularities of market forces, especially in the early stages of development. Both markets and state regulations are known to fail in certain respects, but working together they can be mutually reinforcing. Thus, development theorists are now more concerned about the nature and quality of intervention rather than debating its extent over the private domain.²

India's experimentation with liberalized policies is symbolized by the dramatic policy changes affecting the electronics sector since 1980. The evolution of electronics policy in India can, therefore, be broadly categorized into two policy regimes. The first, which lasted till 1980, was characterized by a high degree of regulation, and by pro-public, pro-small-scale sector, anti-large-business, anti-foreign investment bias. The Sixth Plan period (1980-85) ushered in a new policy structure aimed at general liberalization of licensing and production quotas, removal of most entry restrictions, and an overhaul of the tariff structure. The easing of import restrictions for electronic components and kits during this phase of liberalization led to a kit assembly boom in consumer electronic products. The television industry emerged in the forefront of this boom, raising its share in the gross value of consumer electronics production from 32 percent in 1980-81 to 72 percent in 1988-89. Production of television receivers registered an impressive 44 percent compound annual growth during the period between 1980 and 1988.

This study examines the evolution of the television industry during the two policy regimes mentioned earlier. A statistical analysis is then undertaken to show that liberalized policies were followed by significantly higher rates of economic growth in the electronics sector. A survey of entrepreneurs from a wide range of firms of different sizes and organizational characteristics engaged in television manufacturing is also provided. This offers a detailed account of the strategies of market penetration and shows that all scales of operation were able to survive in this industry even during some difficult periods. The study finds that an innovative state program for pooling the resources of small firms has generated vigorous small-scale sector activity in spite of intense competition from large industries. Therefore, it concludes that liberalization, together with innovative state institutions, can achieve the twin objectives of growth and equity.

II. INITIAL STAGES OF DEVELOPMENT

Although television broadcasts started in India from New Delhi in September 1959, it was not until 13 years later that television manufacturing could claim the status of an industry. The Fourth Plan (1969-74) proposed extending TV coverage to six other metropolitan regions, including two stations with relay transmitters to two additional cities. However, only four centers were commissioned by the end of the Fourth Plan in the metropolitan areas of Bombay, Calcutta, Madras, and Lucknow. The expanded television coverage necessitated the development of a domestic television manufacturing industry which began in the spirit of the general commitments toward import substitution and self-sufficiency.

The television manufacturing industry evolved within a highly regulated policy framework which clearly favored the public sector and small-scale enterprises.³ Foreign collaboration was disallowed since home-grown technology, developed by Central Engineering & Electronics Research Institute, Pilani, was available. The first licences were issued to four manufacturing units, of which two were large industry houses and two others were small-scale.⁴ However, in a later development, the two larger manufacturers were pushed out of the market due to several factors, which included a higher cost of operation exacerbated by a substandard technology. The small-scale firms managed to survive by targeting local markets that could be serviced easily and by employing mostly unskilled or semi-skilled labor trained on the factory premises. The early success of the small manufacturing units in this industry led to a reaffirmation of the policy bias toward the small-scale sector.

In the next round of approvals, television manufacturing licences were issued almost exclusively to the small-scale sector. At the end of 1972-73, there were 77 licensed manufacturers of television sets, of which 87 percent belonged in the small-scale sector, the rest being public-sector enterprises.⁵ The manufacturing process consisted of the manual assembly of mostly imported

components, of which the picture tube itself accounted for about 40 percent of the ex-factory price. High import content, fragmented capacities, and low technologies resulted in high prices for the products. Thus, although the annual demand for TV sets during the Fourth Plan (1969-74) was estimated at 0.2 million, actual record of TV licences (since abolished) show that there were only 0.35 million households with television sets at the end of the five-year-plan period.⁶ The limited television coverage in only two metropolitan areas prior to 1975 was also responsible for lower than estimated demand for TV sets.⁷

An additional complication which nagged the industry was the cumbersome and unpredictable nature of the home-grown circuit. The failure rate for the sets was high, and most producers were unable to cope with servicing demands. The circuit was especially sensitive to changes in the environment (temperature, humidity, and so on). Although several attempts were made to improve the design, most manufacturers later found it to their advantage to copy circuits of foreign brands through reverse technology (as foreign collaborations were banned.) Thus, instead of a standardized technology, the industry acquired a number of different technologies, which increased its reliance on imports.⁸

In the meantime, the government was expanding its control over the electronics industry with the formation of several promotional and regulatory agencies. The Department of Electronics (DOE) was formed in June 1970, which functioned like a separate ministry. This was followed by the formation of another high-power agency, namely the Electronics Commission, in February 1971. The Electronics Commission, in turn, established the Information Planning & Analysis Group to perform the function of organizing, collecting, and disseminating information on all aspects of the domestic electronics industry. Several other technical panels were also formed to determine the status of a number of electronic components and products and to propose policy directions. However, there was no substantial change in the policy structure until 1980.

Despite higher prices and substandard technology in the initial stages, the demand for television sets in India registered impressive growth after 1975 due to expanded coverage of broadcasts. The growing importance of television manufacturing industry with respect to total production of consumer electronic items during the Fourth and Fifth Plan periods can be observed from the production data presented in Table 2.1. Television production was outpacing the overall growth in consumer electronics by almost 2.5 times. In the process, it also claimed over 62 percent of the consumer electronics market in 1981. Figure 2.1 shows the trajectory of TV set production between 1971 and 1981. Another important aspect of this growth is the increasing involvement of the small-scale sector, as illustrated in Figure 2.2. The share of small-scale production in consumer electronics increased from 38.4 percent in 1971 to 60.7 percent in 1981 due to the near complete

Table 2.1

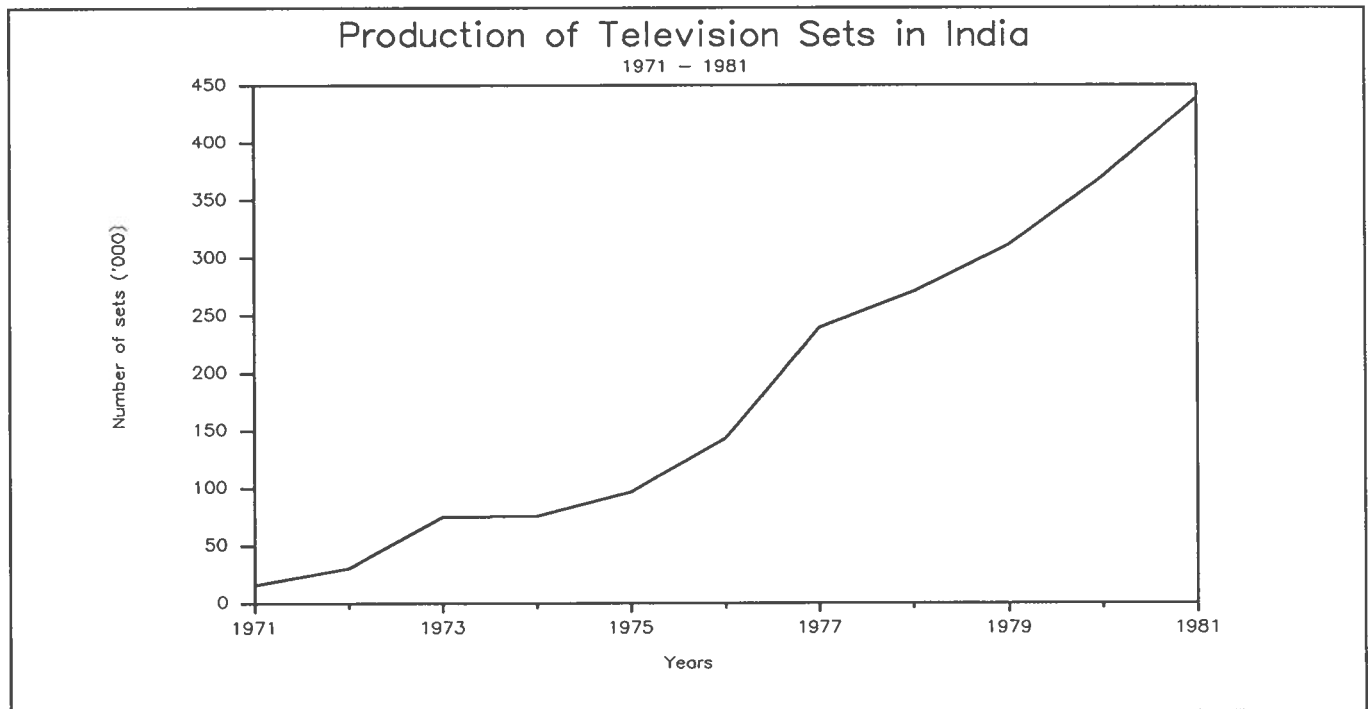
The Growing Importance of Television Manufacturing in India: 1971-1981

(At current prices Rs. Million)

Years	Total Sales		Television as % of Consumer Electronics
	Consumer Electronics	Television Sets	
1971	525.0	56.0	10.67%
1972	625.0	107.5	17.19%
1973	640.0	262.9	41.07%
1974	780.0	265.0	33.97%
1975	845.0	339.2	40.14%
1976	1,030.0	502.3	48.76%
1977	1,305.0	836.5	64.10%
1978	1,585.0	945.0	59.62%
1979	1,790.0	1,088.5	60.81%
1980	2,140.0	1,295.0	60.51%
1981	2,460.0	1,533.0	62.32%
Compound annual growth rate	16.6%	39%	

Sources: 1. Center for Monitoring the Indian Economy, "Electronic Industry in India," September 1984.
2. Bureau of Industrial Costs and Prices, "Report on Electronics," December 1987.

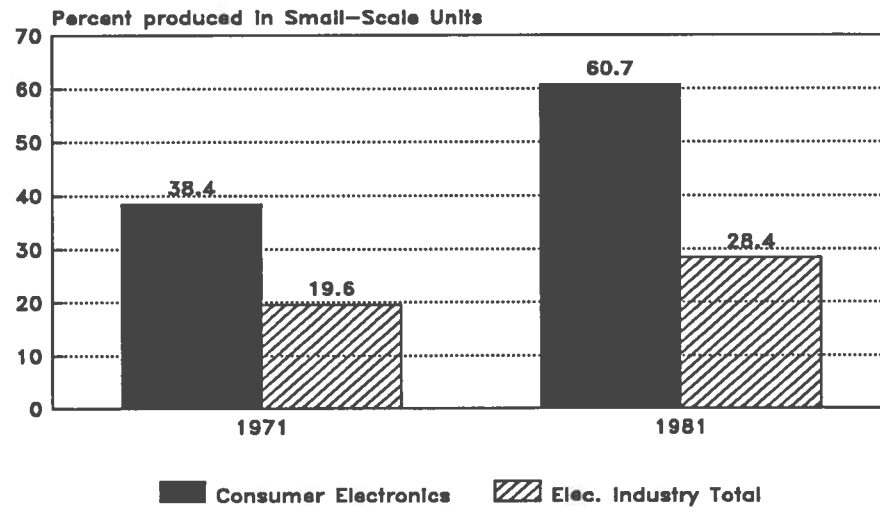
Figure 2.1



Source: Indian Television Manufacturers Association, 1990.

Figure 2.2

**Growing Share of the Small-Scale Sector
In Consumer Electronics: 1971 - 1981**



Center for Monitoring Indian Economy,
Electronic Industry in India, Sept. 1984

elimination of larger producers by restricting their entry in the manufacture of radio and television receivers. The implications of this change in composition of the consumer electronic industry is discussed in Section IV of this article with the help of data from Annual Survey of Industry.

III. THE DECADE OF LIBERALIZATION FOR ELECTRONICS

The year 1980 heralded a new beginning both for the policy regime in general and for electronics policy in particular. The changes in electronics policy can be attributed to the recommendations of the Sondhi Committee, which were published by Department of Electronics in 1979.⁹ The committee felt that restrictions on investment and capacity, and an emphasis on the regulatory mechanism, had restrained development in the electronics sector. Its recommendations included a promotional tariff structure, selective deregulation for certain items for MRTP/FERA companies,¹⁰ and unrestricted technical collaboration/imports for items or processes whose indigenous supply is nonexistent or inadequate.

The new policy package was first announced in 1981. More specific policy statements followed during the period between 1981 and 1987. The several policy initiatives during this period included the following:

1. An overhaul of the duty structure and relaxation of capacity limits. Most restrictions on entry were removed and many large private-sector enterprises were allowed to compete with small-scale and public-sector concerns.
2. The introduction of color TV transmission and provision of licences for assembling imported color TV kits.
3. Deregulation of subscriber-end telecommunication equipment for the private sector.
4. Preference for fiscal control as opposed to physical controls.
5. Import of technology was allowed subject to a "phased manufacturing program" for quick indigenization.
6. Most electronic components for which substantial indigenous capacity was not developed were allowed to be imported freely.

Besides these measures, specific policies were formulated for certain "high-profile" products like color TVs, computers, and computer software. In all cases, the policy package included substantial deregulation and delicensing.

The brand of liberalization adopted was not a complete turnaround, opening the borders for free trade; rather, it was selective and cautious. For example, no import of consumer electronic items were allowed except as personal baggage with a 240 percent duty. Permission for component imports was given according to the status of indigenous manufacturing capability for the particular

item. However, for those components that were not available indigenously or were available in limited quantities, imports were almost automatically approved. Import duties on these components varied between 75 and 150 percent of c.i.f.¹¹ Although imports of technology were permitted freely, repeated importing was discouraged. Table 3.1 provides a comparison between domestic and international production costs and estimates of the effective rates of protection.

Notwithstanding the continued protection of the domestic electronics industry, the post-liberalization period allowed all Indian companies, regardless of size, including those with foreign equity participation of 40 percent or less, to operate in any field of electronics. Companies that had over 40 percent foreign equity were permitted to set up manufacturing facilities for electronic components and sophisticated "high-tech" instruments. Especially in areas where the country had not been able to invest sufficiently in developing technological capacity, foreign equity participation was actively solicited. The presence of nearly all large international computer manufacturers in India, excluding IBM,¹² is a result of this active policy.

The television manufacturing industry received further inducement by two related developments. The 1982 Asian Games hosted by India at New Delhi ushered in the era of color television to the country. To meet the immediate demand for the color television receivers, the government allowed extensive import of color TV kits for assembly by small-scale manufacturers. The import of kits was supposed to be phased out gradually as indigenous manufacturing capability was developed. The policy assumed that an increased demand for the consumer end products, built on imported components, would induce indigenous component manufacturers to begin production.

It was soon discovered that the television industry was unable to invest substantial amounts for component manufacture as most of the units were small-scale, controlling a very small share of the total market. With the subsequent expansion of demand and increase in production levels of consumer electronics, certain local manufacturers began production of some passive and electro-mechanical components.¹³ The production of these items was also carried out in mostly small-scale units with uneconomic levels of operation when compared to international standards. With indigenous production of these items, the government proceeded to protect these manufacturers from imports. Consequently, costs of consumer end products such as television receivers remained higher than international levels, and manufacturers were unable to seek markets in other countries. The development of the electronics sector depended completely on the expansion of local demand.

The television industry and the related component industry in the early 1980s was undergoing a phase of rapid expansion fuelled by unlimited kit imports and the advent of color television broadcasts. Industry profits were high, which made an export orientation unnecessary. During the Seventh Plan (1985-90), production of television receivers exceeded every projection of the Depart

Table 3.1**International Competitiveness and Rates of Protection: 1987**

<u>Items</u>	<u>Values at Current Rupees</u>				<u>EPR³</u>
	<u>Inter-</u>	<u>Value</u>	<u>Domestic²</u>	<u>Value</u>	
	<u>national</u>	<u>added at</u>	<u>Price</u>	<u>added at</u>	
	<u>Price¹</u>	<u>Int. price</u>	<u>Price</u>	<u>Dom. price</u>	
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
14" black-&-white TV set	800.00	185.66	1,482.00	472.90	1.55
20" black-&-white TV set	1,250.00	341.71	2,090.00	535.05	0.57
20" color TV set	4,000.00	2,722.45	4,314.00	2,823.13	0.04
Color TV Crystal	4.55	2.70	9.00	6.31	1.34
Black-&-white picture tube	195.00	-31.20	427.00	99.70	-4.2
ICs (per 1,000 pieces)	20,158.35	18,530.35	25,000.00	22,555.00	0.22

- Notes:**
1. International prices were derived from a trading house in UK; Exchange rate used is 1 pound = Rs.20.15835, Reserve Bank of India purchase rate for three months ending May 1987.
 2. Average ex-factory price.
 3. EPR = Effective rate of protection calculated from: (column D - column B) / column B.

Source: Bureau of Industrial Costs and Prices, "Report on Electronics," December 1987.

ment of Electronics. Even with the decline in production levels between 1988-89, the actual production remained higher than projected.¹⁴ This prompted DOE to scale up their projections for the eighth plan period. However, according to a study of the television market undertaken by the National Institute of Science, Technology, and Development Studies, these projections now seem too optimistic.¹⁵ A severely constrained local market has forced manufacturers to seek other strategies of production and marketing, which include the search for global markets.

In spite of uneconomic production levels, the gap between component manufacture and local demand seems to be closing. According to a Department of Electronics estimate, although this gap is increasing in real terms, the rate of increase is slowing down (Table 3.2, Figure 3.1). This relates to a positive rate of indigenization in the electronic components industry. This should, however, be seen in light of the slowing in the rate of growth in the electronic equipments sector. The growth rate in electronic equipments dropped from a high of about 43 percent in 1984-85 to an estimated 29 percent in 1989-90. Consequently, component demand has also fallen off at about the same rate. The absolute size of the demand supply gap, nevertheless, is large enough to sustain further growth in component production. This is illustrated in the growth rates of component production in Table 3.2.

The expansion of the television industry has provided considerable impetus to component manufacturing. Initially, some local manufacturing of the relatively "low-tech" passive and electro-mechanical components was possible due to low capital requirements. Later, television picture tube production was started on a priority basis, as picture tubes constituted 40 percent of total value of television receivers and was, consequently, the largest item on the import bill of electronic products. However, the inconsistencies in the policies to replace imported components with indigenous components without reference to developing related technologies or raw material inputs created some problems. The development of the television picture tube industry provides an insight into how narrowly defined, uni-directional policies initiated a chain of events that generated accelerated growth with scarcity rents in the early stages and excess capacity soon after.

In the early 1980s, television picture tubes were the single largest item of import in the electronics sector. Only one public-sector concern, Bharat Electronics Limited (BEL), had limited capacity in black-and-white picture tube production. With liberalization of policies that included the removal of entry restrictions, several private-sector manufacturers set up production of television picture tubes. These manufacturers were protected from foreign competition by limiting imports of this item. However, indigenous production was not able to match international prices, even after accounting for the 75 percent customs duty levied on foreign components. The television

Table 3.2

Demand and Supply Gap During VI and VII Five-Year Plans

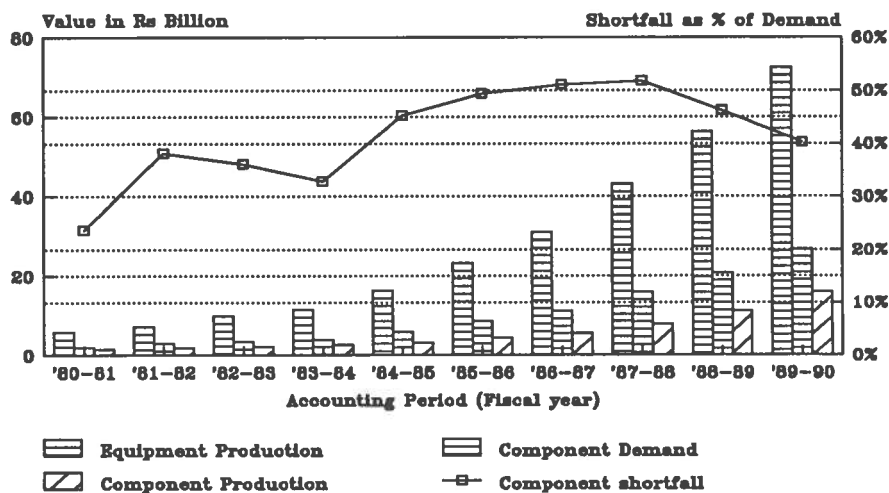
All Values are in Millions of Rupees						
Plan	Year	Equipment	Component	Component	Demand-	Gap as %
		Production	Demand	Production	Supply Gap	of Demand
		A	B	C	(B-C)	(B-C)/B
Sixth	1980-81	5,950	2,070	1,600	470	23.7
	1981-82	7,160	2,910	1,800	1,110	38.1
	1982-83	9,970	3,490	2,230	1,260	36.1
	1983-84	11,480	4,020	2,700	1,320	32.8
	1984-85	16,400	5,850	3,200	2,650	45.3
Seventh	1985-86	23,250	8,700	4,400	4,300	49.4
	1986-87	31,000	11,250	5,500	5,750	51.1
	1987-88	43,140	16,100	7,750	8,350	51.9
	1988-89	56,300	20,950	11,250	9,700	46.3
	1989-90	72,500	26,800	16,000	10,800	40.3

Growth Rates:				
Annual Average	30.30%	31.35%	28.11%	43.32%
Compound annual	29.85%	30.79%	27.58%	38.04%

Source: Adapted from Department of Electronics, Govt. of India, *The Eighth Five Year Plan in Electronics*, 1990, Table 8.3, page 87.

Figure 3.1

**Demand and Supply Gap
Electronic Component Production in India**



Department of Electronics, Government of India, *Eighth Five Year Plan for Electronics 1990-95*.

manufacturers now faced higher costs and long delays in the supply of picture tubes, which entailed other indirect costs of procurement.

At the time when the television manufacturers were facing declining demands and cutting production levels, the picture tube industry had matured and was growing rapidly. In 1989, the production of picture tube in the country was a little over 5.5 million. The production of color picture tubes had almost trebled over the 1988 production figures and facing excess stocks to the tune of 160,000 in early 1990.¹⁶ In the black-and-white picture tube industry, there was already a decline in production during 1988-89 due to the declining demand for TV sets. The estimated installed capacity in black-and-white picture tube production in 1990 was 12 million, which surpassed the most optimistic projection of local demand by 7 million. The rest would have to find markets outside the country. However, the low relative scales of production reduces the ability of the industry to be internationally competitive. Thus the electronics equipment sector is caught in the trap of low domestic demand, which is lowering levels of production and reducing competitiveness.

Looking further in backward linkages, it may be noted that indigenous production of picture tubes currently consists of high import content because the glass shells used in the tubes are mostly imported. The public-sector concern, BEL, has set up some capacity in the manufacture of television glass shells in collaboration with Corning Glass of the United States. Its installed capacity was being increased from 1 to 2 million in 1990. Several other private concerns have shown interest in joining production, and at least one has concluded agreements with Corning Glass for floating a joint venture in television glass shells. However, the declining demand for the consumer end product has stalled many of the projects. Thus, developing international competitiveness in electronics in the Indian context is closely related to increasing domestic demand on one hand, and increasing scales of production on the other. Local component manufacturers are now looking toward the government to initiate further regulation to protect their markets.¹⁷

Scales of production in the electronics sector have emerged as the most contentious issue both in the industry and in policy-making. The expectation was that growth in demand in the consumer end products would soon make component production both viable and cheap, which would further reduce price and increase demand for consumer electronics. This process would ultimately result in an internationally competitive electronics industry in the country. Deregulation—removing quotas and entry barriers—was the policy instrument used to accelerate this process.

Evidently, the Indian brand of liberalization stemmed from the inability of the public sector and the small-scale entrepreneurs, the two historically dominant sectors in electronics, to commit long-term, bulky investments. The larger private houses were wooed with the provision of certain

incentives, such as the minimization of import restrictions for technology and components on one hand and protection from foreign producers on the other. However, the small number of producers in the large capital-intensive establishments tended to form oligopolistic relationships, which were aided by protection from foreign competition. Presently, the sizeable amount of investments in even the minimum scales of operation is being used as a justification for protection from potential domestic and international competitors. The policy-makers are faced with the powerful large industry lobbies urging protection of private capital while trying, at the same time, to be consistent with their deregulatory policies.

IV. EFFECT OF LIBERALIZATION ON INDUSTRIAL PERFORMANCE

This section presents an evaluation of liberalization policies through the analysis of data published in the "Annual Survey of Industry." This survey, published by the Central Statistical Organization in the Ministry of Planning, is an extensive source of information for a number of input and output variables by industry sectors. However, its coverage is limited to the three-digit level of the National Industrial Classification Code. The sub-sector denoted by NIC364, which includes television manufacturing among other similar electronic equipment, is selected for the purpose of this analysis. It is contended that the items included in this sector have related technological characteristics, and are often manufactured in the same premises.¹⁸ Therefore the results of this analysis are also relevant to the broader range of industries having similar attributes and are often complimentary to the manufacture of TV receivers.

The period of time selected for study is the period between 1973 and 1987, which includes the period of liberalization in the early 1980s.¹⁹ The analysis will be based on comparing data on trends and growth rates between two periods of time, 1973-1980 and 1980-1987. A semi-logarithmic regression model for the two periods will be used to calculate compound annual growth rates. This model, which has been previously used by researchers such as Ahluwalia (1985),²⁰ can measure the significance of changes in growth rates between two periods with the help of a *dummy variable*. The estimated equation is of the form:

$$\log y = a_1 + b_1t + D(a_2 + b_2t)$$

where: $b_1, b_2 = 1+r$; r being the compound annual growth
and t = number of observations (years)

D assumes the value 0 for the period between 1973-80 and 1 for the subsequent period. The test of significance of the coefficient b_2 provides a measure of change in growth rates between the periods before and after liberalization, which began with the new regime in 1980-81. The coeffi-

cient b_1 denotes the growth rate of the earlier period (before liberalization), while the subsequent growth rate, during the period after liberalization, is represented by $(b_1 + b_2)$.

The period prior to 1980-81 can be characterized by the clear domination of the small-scale sector in the specific electronic industries. The policy bias for the small-scale sector is reflected in the rapidly changing composition of these electronic industries toward smaller average labor and capital inputs per factory. The number of factories was increasing at the cumulative average rate of 9.2 percent per annum, while both workers (exclusively involved in production) and employees (includes all persons in the payroll) per factory were declining by 4.8 percent and 3.8 percent respectively during the same period (Table 4.1). Also, while the decline in employees per factory was statistically significant (at 95 percent confidence level), the drop in average fixed capital was not. Obviously, there is a minimum level of capital requirement for each specific production process beyond which capital inputs cannot be scaled back. Thus, contrary to expectations, decline in size of manufacturing units did not entail increasing labor intensity. Instead, the change in the capital-to-labor ratio was positive although not statistically significant.

The most pertinent justification offered in favor of small-scale industries is in terms of its ability to generate employment. The questions regarding technological inputs and economic viability are often overlooked by the proponents of this theory. Such theories have very little faith in economic rationalities which suggest that manufacturing units will seek out the most appropriate mix of factors of production as reflected by factor costs. Economic rationality suggests that if capital scarcity and abundance of labor have appropriate costs, firms would seek out the labor-intensive processes without the help of policy. However, the rate of substitution of capital for labor is constrained by the technological characteristics of the product.

In the case of electronics in India, it is interesting to note that persons per factory in the specific electronics sub-sector continued to fall after 1981 at a rate which is not significantly different from the previous seven-year period. Also, the growth of total work force was not affected by the liberalization policies. Thus, the contention that liberalization would slow down the rate of employment growth seems to be unfounded. In fact, there was no statistically significant difference in the input variables between the periods before and after liberalization, although investment in fixed capital was marginally higher. However, the post-liberalization period can be characterized by the impressive growth in several output indicators, as illustrated in Table 4.2. The improved performance of this industry after liberalization with only marginal changes in input variables shows that productive efficiency was boosted through increased competition that accompanied the deregulatory policies.

Table 4.1

Annual Rate of Change in Capital and Labor Inputs Before and After Liberalization

VARIABLES	GROWTH RATES		TEST OF SIGNIFICANCE	
	1973-80	1980-87	"t" for b1	"t" for b2
1. Factories	9.3%	8.6% ²	7.16	-0.37
2. Fixed Capital	8.8%	15.3% ²	2.85	1.38
3. Working Capital	9.0%	12.6% ²	2.69	0.71
4. Fixed Capital/ Factory	-0.5% ¹	6.2% ²	-0.12	1.17
5. Workers	4.1%	3.8% ²	3.22	-0.15
6. Employees	5.1%	4.4% ²	4.60	-0.45
7. Employees/ Factory	-3.8%	3.9% ²	-3.56	-0.02
8. Workers/ Factory	-4.8%	-4.5% ²	-3.81	-0.21
9. Capital/ Labor Ratio	3.5% ¹	10.4% ²	1.14	1.53

Notes: a. Workers are persons exclusively involved in the production process while employees include all personnel and workers in the factory's payroll.
 b. 1 = Not significantly different from 0 (at 95% confidence level).
 2 = Not significantly different from the growth rate of the earlier period (at 95% confidence level).
 c. Capital/Labor ratio is the ratio of fixed capital to all employees.

Source: Central Statistical Organization, Government of India. Annual Survey of Industry, various issues.

Table 4.2

Comparison of Growth Rates for Certain Economic Indicators in Electronic Equipment Sector Before and After 1980

Economic Indicators	Growth Rate Statistics	1973/74	1980/81
		to 1979/80	to 1986/87
1. Gross Output per factory	Compound Annual growth test of significance	0.5% ¹ (0.32)	8.3% (3.44)
2. Net Value Added per factory	Compound Annual growth test of significance	-2.6% ¹ (-1.10)	4.9% (2.21)
3. Total Value-Added Industrywide	Compound Annual growth test of significance	6.5% (3.38)	13.9% (2.56)
4. Total Output Industrywide	Compound Annual growth test of significance	9.9% (5.49)	17.7% (2.83)
5. Value Added per employee	Compound Annual growth test of significance	1.3% ¹ (0.65)	9.1% (2.66)
6. Total Output per employee	Compound Annual growth test of significance	4.5% (3.64)	12.7% (4.42)
7. Wages per Worker	Compound annual growth test of significance	4.1% (3.0)	1.5% ² (-1.36)
8. Emoluments per employee	Compound annual growth test of significance	3.0% (3.67)	1.3% ² (-1.49)

Note: 1 = Not significantly different from 0 (at 95% confidence).
 2 = Not significantly different from the growth rate in the earlier period.

Source: Government of India, *Annual Survey of Industry*, Various Issues.

The value-addition and gross output *per factory* did not register any significant change between 1973 and 1980 in spite of a modest growth in total industry output and value added, as shown in Table 4.2. The overall growth in the industry was fueled by the growth in new firms rather than by increased productivities of the existing units. Although changes in net value-added per person were statistically insignificant during this period, wages and emoluments registered strong positive trends. Thus, low average output growth and continuous wage increases restricted the ability of firms in this industry to expand operations. Also, the lack of incentives to grow within the policy framework that heavily favored small-scale perpetrated a reliance on outmoded technologies and inefficient production processes. This led to higher prices and lower demand for the products and a rapid decline in international competitiveness for the industry.²¹

As noted earlier, the period between 1980-81 and 1986-87 shows a dramatic shift from the earlier period in terms of the growth rates of the output variables. The rate of growth in the number of firms remained high during the decade of the eighties. However, unlike the previous period, this occurred simultaneously with the growth of average output-to-capital and output-to-labor ratios. Figure 4.1 shows that toward the end of this period, both labor and capital had become more productive. As a result, the annual average growth in total output and value added during 1980-87 was approximately twice that of the corresponding rate between 1973-80.

The above analysis of trends and associated growth rates show that the electronic equipment industry was facing declining productivities and growing inefficiencies in production during the period 1973-80. The period of policy liberalization beginning 1981 provided the required impetus for rapid growth within this industry. Net output and value-added were growing rapidly during 1981-87, which contributed to expansion of production facilities. The decline in average employment per factory continued at about the same rate as the period before 1981, showing that, on average, smaller firms continued to exist. Total employment generation industrywide showed no significant declining trends. This suggests that liberalization does not necessarily affect employment generation nor does it signal an indiscriminate rise in capital intensity. Rather, liberalization induces competitive pressures that can increase productivities with little changes in the input variables.

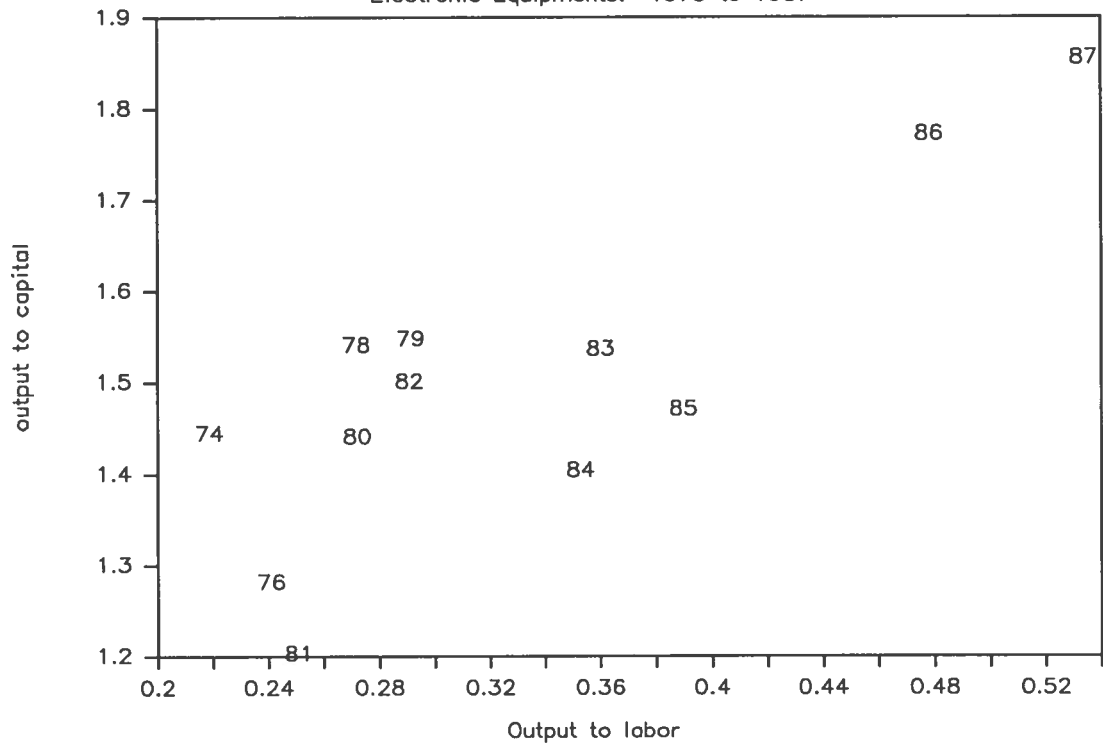
V. SURVIVAL STRATEGIES UNDER SHRINKING MARKETS

The television industry has come to a point where it has exhausted the pent-up demand created by increased coverage and the advent of color broadcasts in 1982. If new markets are not sought out, the industry would be facing boom and bust cycles periodically every ten years, which is the estimated working life of a TV set. The preconditions for continued growth of its market in the future depends upon three factors, which are: (a) the overall growth of middle and higher income

Figure 4.1

Changes in Output–Input Ratios

Electronic Equipments: 1973 to 1987



population; (b) increasing exports; and (c) creating new markets through cheaper products, and/or product segmentation. Presently, about 15 percent of all households in India possess a television set, while 65 percent of the population is covered by the television network.²² Thus, local demand is far from being saturated. Since incomes in India are not rising at a pace to ensure continued growth of the industry, its survival now depends on the innovative abilities of the entrepreneurs in creating new export and domestic markets.

This section presents an analysis of the survival strategies of entrepreneurs in the television industry, using data from interviews with managers, industry leaders, Department of Electronics officials, academics, dealers in consumer electronics, and also from printed media. A sample of 16 geographically dispersed units was selected to represent a broad range of firm sizes. The firms in the sample are assigned to three categories according to their gross output (sales) during 1988-89. The first category consists of four very large enterprises having sales volumes in excess of Rs.1,000 million (\$60 million). The second category includes seven firms having sales volumes between Rs.100-1000 million (\$6-60 million). The smallest units, with sales volumes in television receivers below Rs.100 million (\$6 million), constitute the final category and is represented by five units in this sample.

In comparing the three categories mentioned above along certain entrepreneurial and enterprise characteristics, some distinct patterns may be observed. Significant differences along five specific attributes are presented in Table 5.1. The characteristics and survival strategies of each of these categories will provide some insights into the product and process innovations that have taken place in spite of adverse market conditions. The analysis also highlights the inability of conventional theories on firm size, scale economies, and production efficiency to account for the experiences in each of the specific cases included in this sample.

The Big League: The handful of very large-scale manufacturers of television receivers have, from inception, projected a brand image that was associated with internationally reputed conglomerates.²³ This association often resulted in an agreement by which the respective local companies served as service centers for the associated foreign brand names. These manufacturers also started with enough capital to seek out dealers and markets nationally. An overwhelming majority of the entrepreneurs in this category are from Sindhi or Marwari communities, although there is at least one notable exception.²⁴ The members of these two communities are well known for their business and marketing skills and form a formidable economic class in India. Thus, the success of these ventures is, in large part, the result of the unique management and marketing skills of the entrepreneurs together with the vast informal and formal supportive networks that exist for the members of the two communities.

Table 5.1

**Some Characteristics of Television Manufacturing Units
Along Firm Size Categories, 1989**

<u>Categories of Manufacturing Units</u>	<u>Entrepreneurial Characteristics</u>	<u>Growth Profile</u>	<u>Product Range</u>	<u>Foreign Affiliations</u>	<u>Survival Strategies</u>
Large scale (Sales: Rs.1000M+)	Overwhelming majority of entrepreneurs belong to certain traditional merchant communities	Growing rapidly increasing concentration	Started with television now diversifying into other consumer electronics	Projects strong affiliations Often serves as service centers for foreign brands	Vertical integration automation. Brand image associated with foreign makes
Medium to large (Sales: Rs. 100-1000M)	Mostly professionals with engineering, commerce, or management backgrounds	Mixed performance; some cutbacks but optimistic about future	Almost exclusively in manufacture of TV sets and related accessories	Some foreign affiliations but weak association with foreign brand image	Horizontal networks. Flexibility. Innovative marketing efforts to seek export and niche markets
Small scale (Sales: below Rs.100M)	Very heterogenous. Several are subsidiaries of other large business houses	Mixed performance; seeking local and low end of market. Subcontracting; many had severe marketing constraints	Many had other businesses and moved to television when it was profitable	Few have direct foreign affiliations	Deemphasizing television and seeking other related businesses; seeking affiliation with Govt. agency for technical and marketing assistance

Although television manufacturers were faced with declining demand since 1988-89, the largest of the "big players" continued on the growth path. The largest television receiver manufacturer, Videocon, was making plans to increase its market share from 22 percent (1988-89 figures) to a targeted one-third of the market even in this period of decline.²⁵ According to a later report, this target was achieved during November 1989.²⁶ Other very large-scale manufacturers have reported increases in their sales volumes, and sometimes the figures quoted seem very high (45-50 percent growth).²⁷ However, considering that the quoted figures are usually gross output of the company and its subsidiaries in all products, the claims seem reasonable. In fact, all the large television manufacturing companies have made considerable investments in diversifying their product range.²⁸ All these companies have also raised capital at some point by becoming publicly held companies. Thus, by distributing the risks and moving into relatively virgin and lucrative product areas, these companies have secured a comfortable position in a highly competitive market.

The largest manufacturers in electronics have also been increasing their production levels very rapidly to achieve scale economies. BPL-India manufactures practically all components (other than picture-tubes) in-house in highly automated facilities. Videocon is planning to go even further by setting up facilities for the manufacture of television picture-tubes.²⁹ In all such cases, a move toward vertical integration of facilities is apparent. The spreading out of production facilities in different locations to take advantage of backward area concessions have been reversed, as it was discovered that the costs of locating in a backward area, often without minimum services, can be more than the benefits derived from the tax concessions. However, many such large manufacturers, in the early stages, were able to use the state incentives for locating in backward areas to their own advantage by committing very large investments to overcome the lack of amenities in these areas. These entrepreneurs gained economies of scale in addition to obtaining tax concessions from the government.

In the R&D front, the results have been mixed. The government's contention has been that the large electronics manufacturers have not committed enough to indigenous research and have increased their dependence on foreign technology. This position is usually countered by the television manufacturers by citing figures on the declining import content of indigenously manufactured television receivers. Both sides of this debate have convincing statistics to back up their positions. However, the cited statistics do not necessarily refute the opposing positions. The reliance on imported components, or raw materials for the manufacture of the same in India, is an established fact and the manufactured components base in India is far from maturity.³⁰ With the rapid expansion of the consumer electronics sector, the value of aggregate imports have increased in spite of a

positive rate of indigenization. This fact, together with the declining value of the rupee with respect to the major currencies, has contributed to the increased outflow of foreign exchange.

It is also true that the largest television manufacturers have relied on foreign technology rather than developing any in-house. Initial purchase of technology can be justified as it may not be cost-effective to develop a technology widely available in advanced countries. However, the more disconcerting fact is that there is little faith on the part of the Indian consumers in indigenous technology. Furthermore, the manufacturers have used this concept of "foreign is better" to their advantage rather than counter it with more commitment to research. According to information from some R&D directors in this field, there are several examples of new and unique products that were developed in-house which the parent company thought too risky to market.³¹

The largest television manufacturers are using the strategy of vertical integration and diversification to remain market leaders in the future. The gains in market share by these companies can lead to further increase in the scales of production. It is also expected that a slowdown or decline in aggregate demand will force the large companies to seek out external markets while, at the same time, exploring the untapped domestic markets. Recently, there have also been reports of acquisitions and mergers of some television manufacturing units which point toward increasing concentration in this industry.³² It is expected that further concentration would force inefficient manufacturers out of business. However, this does not seem to be the death knell for all smaller establishments, many of whom have espoused some radically different, but nonetheless successful, strategies for survival. The importance of production and marketing strategy over scales of operation is evident in the present state of the television manufacturing industry in India.

The Medium-Scale Establishments: The entrepreneurs in this group are a heterogeneous mix of professionals (engineers, technicians, and management executives) who have committed their energy specifically into television manufacturing. Some have attempted diversification of their product range in the past with little or no successes. Among the establishments in this group, the overwhelming majority started operations either during 1972-74 or during 1982-84, the former period coinciding with the inception of black-and-white TV industry and the latter with the initial manufacture (or assembly) of color televisions in the country. Presently, all such establishments manufacture both color and black-and-white sets.

This group seems to be a well-knit and cohesive unit in spite of the intense competition within the industry. All are members of the Television Manufacturers Association and their representatives form the top tier of office bearers in this association. In the past, there have been

several examples of cooperation among these establishments in several areas, including exchange of technology and excess materials, and agreements on markets delineation.³³

The initial conditions for the majority of the medium-scale entrepreneurs were favorable, as demand was high while suppliers were relatively few in number. Profits were made easily and many graduated from very small-scale operations to modest-sized establishments within a few years. Most started marketing their products regionally before expanding their operations across regional boundaries. Thus, with increase in production levels, these entrepreneurs concentrated on increasing their market reach rather than expanding their range of products. Also, the incentives offered by different states induced these manufacturers to set up production in other (often less-developed) areas. This segmentation of capacities in different units, together with the additional costs imposed by the lack of infrastructure in many areas, proved to be retrogressive.

The smaller initial capital available to most of the entrepreneurs in this category made foreign affiliations or outright purchase of foreign technology difficult. In the case of black-and-white television, such foreign collaboration was banned. Initially, the black-and-white television circuit developed by Central Engineering Research Institute, Pilani, was the industry standard. However, the poor performance of this circuit pushed the manufacturers toward developing their own through reverse technology on foreign brand-name sets. The acquired technology was often traded or otherwise passed on to the other manufacturers. The technology for color television receivers had a different history. With the first color broadcasts, the country was faced with a pent-up demand for color TV receivers, which was further augmented by the hosting of the Asian Games and the Non-Aligned Conference in New Delhi. The government allowed a large number of firms to import color TV kits for quick assembly, supposedly on a one-time basis. Several entrepreneurs cashed in on this kit-assembly boom. Later, when the government pressed the industry to incorporate more indigenous components, certain modifications to the borrowed circuit were needed. The technology required for making these modifications was minimal and the circuit remained largely identical to that of the foreign kits. However, due to a large number of initial vendors for the kits, standardization of technology has not been possible.

The mid-level entrepreneurs have adopted a range of strategies to stay alive in a tightening market. In general, these strategies pertain to flexibility in production and marketing. In many instances, firms have cut back production in their own assembly lines due to erratic demand for their products.³⁴ However, the supply of TV sets bearing their brand is augmented during the better periods through purchase of completed sets from a number of sub-contractors. This has reduced their overheads considerably and has helped to keep their inventories under control. The proliferation of a large number of independent sub-contractors is the result of widespread

use of such strategies by brand-name manufacturers. This evidence also refutes the argument that the small-scale operators are the first ones eliminated with the increasing intensity of competition.

Not surprisingly, some of the sub-contractors have grown rapidly to the status of medium-level establishments themselves. Presently, the largest manufacturer of black-and-white sets in India is a company called Calcom; it has not marketed its own product nationally but functions as a supplier to other major brands.³⁵ It has registered a spectacular growth rate of about 85 percent per annum between 1981 and 1989 and expects to join the "big league" with sales turnover of Rs. 1000 million in 1989-90.³⁶ The DOE's list of top-50 television manufacturers during 1988 features 13 such establishments which do not market their products. These producers are now known as "Original Equipment Manufacturers." In the export front, these OEMs are also forging ahead since they are able to concentrate on building external markets unencumbered by pressures of marketing products locally.

Several innovative marketing strategies have also been adopted with relative success by some of the firms in this group. One such strategy was to take advantage of a 1989 regulation that allowed Indian products bought abroad to be imported back without any duty. Since Indian products that are exported are not taxed by the Indian government, they tend to be cheaper abroad. Especially in the Middle East, which has a large number of Indian expatriates and where local taxes are unheard of, the market for Indian television sets is booming. Although this strategy results in some socially wasteful expenditure, the entrepreneurs have been quick to capitalize on regulatory loopholes and create opportunities for rent-seeking. Other marketing strategies include exploring niche markets (e.g., manufacture of smaller, portable sets) and seeking out dealers in areas where competition is less keen.

The Small-Scale Establishments: The small-scale manufacturers can be broadly classified into three categories according to their production relationship. These categories are: (1) manufacturing units that rely on sub-contracting jobs but are free to seek out any number of clients; (2) small-scale units set up by large business houses (for purposes of bypassing entry restrictions) that function as a sub-contractor for the specific parent concern; and (3) independent small units that both manufacture and market their products, often with the help of government schemes such as the one initiated by Electronics Trade and Technology Development Corporation Limited.

The declining demand for television sets since 1988 seems to have disproportionately affected the subsidiaries of large business houses. These businesses had established products with comfortable market shares prior to the boom in television manufacturing. Their interest in television was merely to cash in on the super-normal profits that the television industry was making for a protracted period of time. The initial commitment was small in scale and had short-term objectives. Thus,

when the market started shrinking, they could shift their focus to other profitable areas relatively painlessly.³⁷ The group of independent sub-contractors was the most optimistic among the small-scale enterprises. While more and more manufacturers were sourcing their production from outside, these sub-contractors benefitted from a steady flow of orders. However, being aware of the difficult market conditions, these units are trying to distribute their risks in several directions, often through trading in other electronic items and also by keeping their operations small and flexible.

The small-scale entrepreneurs who wanted their own share of the market relied mostly on local, low-income consumers and government schemes to survive. Prior to 1981, small-scale units were thriving as a result of expanding markets and government protection. When entry barriers and production ceilings were relaxed, the small-scale producers were threatened by the aggressive marketing strategies adopted by the larger companies. However, in May 1984 an innovative plan was proposed by the Electronics Trade and Technology Development Department under which the small-scale manufacturers would find material, technical, and brand-name support.

The scheme is suitably termed Material, Technology, and Brand Name Plan. Under this plan, complete kits with technical documentation packages are available to the entrepreneurs at very competitive prices. After providing the kits, ET&T also undertakes quality-control checks with the help of a team of technical investigators who visit each of the establishments periodically at no extra cost to the manufacturer. The final products from the kits provided by ET&T have their brand name, indicating that the sets have passed stringent quality-control inspection. Furthermore, ET&T markets their brand name in the same fashion as do the other leading brands, thus providing crucial marketing support to the small-scale manufacturer.

The ET&T plan serves over 120 small-scale manufacturers scattered all over the country. By pooling the raw material demands of a large number of small entrepreneurs, it has been able to exert considerable bargaining power in the components market. Thus the smaller manufacturers were also able to avail themselves of volume discounts in price and superior quality materials which, previously, only the large-scale manufacturers could command. As a result, the television receivers made in the small-scale establishments, under the ET&T brand name, are the cheapest of all TV sets available in the market.³⁸ The volume of black-and-white sets sold has increased from 58,000 in 1985-86 to 157,000 in 1987-88, an increase of about 40 percent annually. The color TV kit sales did even better. Table 5.2 shows the comparison between industrywide and MTB growth in sales for television receivers between 1985 and 1989. The impressive performance of the small-scale units under this plan provides a model for the state in its effort to achieve the objective of growth with equity.

Table 5.2**Comparison Between MTB Sales and Total Industry Sales for Television Sets
1985-1989**

<u>Year</u>	<u>Black & White</u>		<u>Color</u>	
	<u>ET&T Brand</u>	<u>Industry Total</u>	<u>ET&T Brand</u>	<u>Industry Total</u>
1985-86	58,000	2,150,000	1,800	900,000
1986-87	146,000	3,000,000	20,000	1,100,000
1987-88	157,000	4,400,000	40,000	1,300,000
1988-89	149,000	3,500,000	44,000	1,150,000
Annual Avg.	51.39%	21.92%	373.70%	9.62%
Compound Ann.	36.53%	17.45%	187.14%	8.43%

Source: MTB and ITMA figures.

VI. LESSONS FROM INDIA'S LIBERALIZATION EFFORTS

The policy shift from protection of small-scale television manufacturers through ceilings and entry restrictions to the alleviation of the disadvantages of scale has provided for both efficient and rapid growth in the television industry and keen competition between all sizes of manufacturing units. The temporary period of decline in demand, which began in 1988-89, will force several firms out of the industry but the expectation that smaller-sized units will be affected disproportionately cannot be substantiated from the results of this analysis. Indian liberalization of the electronics industry has reinforced the fact that government intervention in the market to meet social objectives does not necessarily involve a complex set of regulations. Rather, by enhancing the ability of all players to participate in the market and compete effectively, the government has more efficiently served the twin objectives of industrial and social progress.

The liberalization of the electronics industry in India did not result in complete deregulation across the board. It was both selective—targeting specific products and technologies—and gradual—staggering policy measures over a period of six years. The results of this effort have been mixed. The inconsistencies resulting from the promotion of an internationally competitive industry in a short period of time within an import substitution framework is evident. Especially in the area of high technology, access to the global networks of products and technology is extremely important. Protection of domestic producers not only encourages "rent-seeking" and complacency but also reduces the chances of other downstream or upstream industries to compete in the international market. The government can better serve the interest of the manufacturer and also reduce social costs if it concentrates on providing the necessary infrastructure for quick dissemination of information on new markets, new technologies, and new products. The role of the state in this situation is analogous to an informal partnership in which it creates conditions for the industry to stay abreast of evolving technologies and exploit the economies of scale.

Within the scope of the liberalization policies in electronics, the electronic equipment sector (including television) has performed creditably. Since 1981, this sector experienced rapid growth in production through the efficient use of resources. This was accompanied by a positive rate of indigenization, especially in the television industry. Liberalization also created highly competitive markets which induced the manufacturers to evolve innovative strategies at all stages of production and marketing. These strategies included exploiting scale economies and horizontal networking, as well as seeking rents through regulatory loopholes. The growth potential is not restricted to large manufacturing units only. The small units have also discovered certain advantages of "smallness." By taking advantage of their unique attributes and by seeking help through state institutions,

small-scale industries have been able to function in the face of growing competition. Thus, scale, per se, does not seem to be the determinant of survival and growth in this industry.

In the face of an unfavorable economic situation and the deteriorating value of Indian currency, the manufacturers of television receivers have adopted some creative survival strategies which defy the realm of any unique theory. Neoclassical economic theory seems to suggest that liberalization would create conditions for vigorous competition and thus decrease concentration. But in this case, both competition and concentration have increased. However, the fears of socialist planners regarding mass extinction of the small-scale units have not been confirmed. While the larger industries are increasing their scales of production through automation and vertical integration of their facilities, the smaller units are adopting flexible production strategies with some innovative marketing approaches. The smallest units, on the other hand, have come under an umbrella organization of the government which provides technical, financial, and marketing assistance. Thus, the coexistence of units of different sizes in spite of the removal of entry restrictions has provided another justification for further liberalization of the Indian economy, with innovative support systems for other sectors as well.

NOTES

- ¹Refer to "Liberalization Road to Economic Ruination" (a report on a number of seminars attended by some distinguished economists) in *Economic and Political Weekly*, August 19, 1989.
- ²Refer to articles by Pranab Bardhan, Albert Fishlow, and Mrinal Datta-Choudhuri in "Symposium on the State and Economic Development," *Journal of Economic Perspectives*, Vol. 4, No. 3, Summer 1990.
- ³Small-scale sector is delineated by investments in plant and machinery (fixed capital). The investment ceiling has been periodically revised upward to account for developments within this sector and inflation.
- ⁴The licensed capacities were 10,000 sets/year for the larger units and 5,000 sets/year for the small-scale units.
- ⁵Bureau of Industrial Costs and Prices, *Report on Electronics*, December 1987, p. 19.
- ⁶*ibid*, pp. 19, 20.
- ⁷Three other TV centers were commissioned in Calcutta, Madras, and Lucknow in 1975.
- ⁸This phenomenon was reported by all manufacturers interviewed by the author.
- ⁹Department of Electronics, *Report of the Committee on Electronics*, New Delhi, 1979.
- ¹⁰Large business houses falling under the "Monopolies and Restrictive Trading Practices Act" and/or "Foreign Exchange Regulation Act."
- ¹¹Cost including freight.
- ¹²IBM operated in India up to 1977, when it was asked to relinquish its controlling shares to below 40 percent. IBM refused, and subsequently wound up its facilities in India. However, recently it has sought to re-enter the Indian market through a collaboration with an Indian firm.
- ¹³These are less sophisticated components like resistors, connectors, relays, and switches.
- ¹⁴*Business World*, Feb. 28, 1990.
- ¹⁵National Institute for Science, Technology, and Development Studies, *A Diffusion Model for the Indian TV Market*, Mimeo, March 1990.
- ¹⁶Figures are from *TV Veopar Journal*, January 1990.
- ¹⁷Refer to the letter from ELCINA (an electronic components manufacturers association) to the government in *TV Veopar journal*, January 1990.
- ¹⁸NIC 364 includes the following: manufacture of radio and television transmitting and receiving sets, including transistor radio sets; sound reproducing and recording equipment, including tape recorders; public address system, gramophone record and pre-recorded magnetic tapes, wire and wireless telephone and telegraph equipment, signalling and detection equipment and apparatus, and radar equipment and installations.
- ¹⁹A change in classification of Indian industries in the 1973 Annual Survey creates problems of comparability with earlier publications. The 1987 Annual Survey was the latest volume available to me.
- ²⁰The growth rates are calculated from antilogarithms of the relevant regression coefficient minus 1, when the equation estimated is of the form $\log y = a + bt + D(a + bt)$ (which is the linear form of $Y = AB^t$ where $B = 1 + r$; r being the compound annual growth rate). This model has been used by Isher Judge Ahluwalia in *Industrial Growth in India: Stagnation Since the Mid-Sixties*. Delhi: Oxford University Press, 1985.
- ²¹Also refer to B.I.C.P., *Report on Electronics, op. cit.*, p. 21, sec. 25.
- ²²Indian Television Manufacturers Association figures.
- ²³Most prominent among them with strong foreign affiliations being: BPL-India (Sanyo, Japan); Videocon (Toshiba, Japan); Onida (JVC, Japan).
- ²⁴BPL-India seem to stand out as the exception.
- ²⁵Interview with company Managing Director, Mr. V. N. Dhoot, in *Financial Express* in January 1989.
- ²⁶Refer to *Business Standard*, November 23, 1989.

- ²⁷Interview with Rajeev Karwal, Product Manager, Monica Electronics (ONIDA) in April 1990.
- ²⁸Refer to *Economic Times*, Dec 1, 1989: Reports investments in new products by BPL-India, Videocon, Bush, Onida, and Weston group of companies. The new range of products include washing machines, VCRs, vacuum cleaners, cordless telephones, and TV components.
- ²⁹*Business Standard*, November 1989.
- ³⁰For actual statistics on imports of components refer to the BICP *Report on Electronics*, December 1987.
- ³¹Interview with Dr. G. T. Murthy, Vice President R & D Electronics & Systems, Crompton Greaves Limited, Bombay.
- ³²Acquisition of Binatone electronics by Weston as reported in *India Today*, November 1990.
- ³³Interviews with A. Choudhury of Telerama, Calcutta; and V. P. Luthra of Televista, New Delhi.
- ³⁴This information was corroborated by several dealers in electronic products and by the sub-contractors interviewed during the survey. The manufacturers themselves, although admitting to this sub-contractual relationship, have remained tightlipped about the details.
- ³⁵1989 Department of Electronics figures.
- ³⁶Calcom's own marketing brochure.
- ³⁷Interviews with executives from Blue Star, Crompton & Greaves, and with a number of dealers.
- ³⁸Comparative prices quoted by all issues of *TV Veopar Journal* between March 1988 and January 1990.

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