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Size and scale economies in the Israeli industry: Effects of the Free Trade Area agreement with the Common Market

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SIZE AND SCALE ECONOMIES IN THE ISRAELI INDUSTRY:
EFFECTS OF THE FREE TRADE AREA AGREEMENT WITH
THE COMMON MARKET

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A. Theoretical Background¹

In May 1975 an agreement was concluded on the gradual establishment of a Free Trade Area between Israel and the Common Market. This agreement improved the access of Israeli exports to the European market between 1975 and 1977 and gave Israeli exporters an important new potential to step up their export sales to the Common Market. On the other hand, the agreement will improve the access of European exporters to the Israeli market in a gradual transition period up to 1985 or possibly 1989 and thus will increase competition for the Israeli industry, which enjoyed relatively high protection in the past. This new situation offers many possible gains but involves also great risks. It will only contribute to industrial development if the competitiveness of Israeli producers both in the domestic as well as the export market is substantially increased.

A number of factors can be considered as a potential means of achieving the needed level of competitiveness. These may include

- static trade effects connected directly with the rise in prices of, or the rise in demand for exports and the fall in prices or rise in supply of imports and import substitutes;

¹ This paper has grown out of a common project of the Kiel Institut für Weltwirtschaft and the David Horowitz Institute for the Research of Developing Countries, on "The Consequences of Free Trade in Manufactures between Israel and the E.E.C.", with financial support from the Stiftung Volkswagen. The statistical analysis for this paper was prepared with ample help and advice from D. Spinanger. I am indebted for comments on an earlier draft of this paper to R. Banerji, S. Baron, M. Bruch, J.B. Donges, U. Hiemenz, S. Hirsch, P. Juhl, R. Pomfret, D. Spinanger and B. Stecher.

- an increase in productivity in existing plants, often referred to as X-efficiency, through higher specialization, better quality, better utilization of existing capacity, better utilization of existing capacity, better work morale, etc.;
- an improvement in technology;
- a shiftover from less competitive to more competitive products and industries;
- an increase in capital investments; with or without foreign participation; this factor is always connected with the next;
- an increase in the size of plants and scale economies, which is defined to exist when all factors of production are increased by the same proportion.

1. Integration theory and scale economies

Scale economies and the size of enterprises is being singled out in integration theory and in this paper, because both are assumed to be related to the size of the market, which is changed by integration. Twenty years ago a conference dealt with the same topic¹ on the economic consequences of the size of nations. There was little doubt expressed as to the existence of economic disadvantages to smallness.² The question was mainly focussed on the means by which small nations manage to overcome such diseconomies. Foreign trade was discussed as one of the major means, even if it involved an additional cost of higher uncertainties. Integration was discussed mainly as a means to overcome some of the uncertainties involved in foreign trade, in view of

¹ E.A.G. Robinson Ed.: Economic Consequences of the Size of Nations, Proceedings of a Conference held by the International Economic Association (London, Macmillan, 1960).

² Op.cit., Introduction pp. xvi.

the fact that a universal liberalization of trade, as conceived by the GATT was not deemed feasible.

Scitowsky described some of the factors explaining the positive influence of integration vis-à-vis scale economies.¹ Balassa may have best summarized the argument for the market size hypothesis: "Under ceteris paribus assumptions, a wider market will make possible the attainment of higher levels of manufacturing productivity".² The most important statistical work in support of the assumption was probably done by Chenery.³ He made a cross-sectional analysis with 51 countries of changes in the branch structure of industry and manufacturing output per capita. Income per capita was found to explain some 70 % of the changes in the composition of manufacturing industries. Of the remaining 30 % the size of the market was found to be the most important factor. Chenery found a high correlation between per capita output in manufacturing and population, for groups of countries with a constant income per capita. The reason for this relationship lies in the fact that production depends on easily accessible markets. Foreign markets from this point of view are much harder to reach than national

¹ Op.cit., chapter 18: International Trade and Economic Integration as a means of overcoming the Disadvantages of Small Nations, pp. 282-290. See also T. Scitowski: "Economies of Scale Competition and West European Integration", chapter 3 in: Economic Theory and Western European Integration (Uwinn University Press, London 1958).

² B. Balassa: The Theory of Economic Integration (Irwin, Homewood, Ill. 1961), p. 116. See also G.C. Hufbauer: "The Impact of National Characteristics and Technology on the Commodity Composition of Trade in Manufactured Goods" in R. Vernon: The Technology Factor in International Trade (Columbia University Press, New York, 1970).

³ H.B. Chenery: "Patterns of Industrial Growth", American Economic Review, September 1960, pp. 645-46.

markets because of different barriers to trade, including protective tariffs. Here lies one of the essentials of economic integration: trade barriers are removed and a number of small markets become one large market in the economic sense. This in turn explains under normal assumptions the higher potential gain from integration for a small country compared to a large country. The latter finds far fewer constraints on its market possibilities and less to be gained by integration.

The relevance of size to integration programs does not explain how growth is achieved in practice. For exporters integration means better marketing possibilities in exports which enable growth in output. For companies selling in the local market the removal of tariffs is not directly related to size. Later, however, they may overcome the new difficulties through rationalization and lower costs of production with new investments, and the capture of a larger market share; or they may well be forced out of the market and enable the re-employment of the resources involved in larger plants.

2. The conceptual framework - size

Scale economies accrue at the different levels of industrial organization - the plant, the enterprise and the conglomerate or group of enterprises. Most of them may be realised in the plant and depend on the size of the plant.¹ The size of productive units have accordingly been measured at the plant level wherever feasible. Limitations of data, however, dictate deviations from this procedure.

¹ See discussion at the end of the present chapter.

The size of plants can be measured and compared on the basis of employment, turnover, value added, assets, installed power capacity or a combination of the above. While value added may be the optimal basis for the analysis of productivity and competitiveness, the necessary data are not available for comparisons.¹ In light of the data, most series measure size on the basis of employment.² A number of deviations of measurement of size on the basis of gross output will be specified.

The size index used in most cases is the number of employees per plant. Averages for an industry are calculated by dividing the total number of employees in the industry by the number of plants. This average size index has a number of limitations for the present discussion, which emphasises foreign trade and competition and involves inter-country comparisons.

The main problem with average size comparisons is that they fail to compare equals. Very often small plants in an industry are very different from large ones. The small carpenter who produces to the order of every individual consumer, has very little in common with a furniture factory selling through large outlets. Because of the special difficulty with the smallest enterprises, the average is often computed on the basis of all size groups except the smallest. The borderline, however, is an arbitrary one.

For the analysis of competing imports and intercountry comparisons, average size is somewhat misleading and irrelevant, competing imports and foreign trade are mainly of interest to the large producers.

¹ J. Dean prefers in theory a measure closest to correspond to capacity. With available information he prefers output to employment (Managerial Economics, Prentice Hall, New York, 1956, p. 306).

³ See R. Banerji: "Growth Patterns of Small Scale Plants in Manufacturing Industries - A Cross-Country Analysis, Kiel Working Papers, No. 61, November 1977.

Smaller producers do not usually engage in foreign trade and often do not even know if competing imports exist in their industry.¹

The dominant interest in the larger plants is noted in many other studies, where different countries are compared.²

In the light of these limitations in the comparisons of average size another approach was also followed. The relative size of the largest Israeli company was compared to its largest EEC competitor on the Israeli market. Size was measured on the basis of the number of employees. The analysis was made on the basis of a sample of 209 of the most important products, produced by the largest Israeli companies on the local market, in every major branch of industry except four. Excluded were food, beverages and tobacco (major branch 11-12), diamonds (27), quarrying and mining (10) and printing and publishing

¹ In a recent study on "The Preparation of Industry to the Free Trade Area Agreement between Israel and the Common Market", 21 % of the 600 producers who were consulted said that they did not know if competing imports existed. Taking the group of smaller plants (of up to 100 employees), the percentage of producers who did not know if competing imports existed rose from 21 to 51. (B. Toren and N. Guttentag, The Van Leer Jerusalem Foundation, September 1976, Hebrew).

² George and Ward, for example, compare the largest 4, largest 20 and all enterprises with 1,000 employees or more (see The Structure of Industry in the EEC: An International Comparison, Occasional Paper No. 43, Department of Applied Economics, Cambridge University Press, 1975). Hughes uses only the last of the above three definitions of size (see "Company Concentration, Size of Plant and Merger Activity", Chapter 4 in M. Panić (ed.): The U.K. and West German Manufacturing Industry, 1954-1972, NEDO Monograph 5, London 1976).

(18).¹ The largest Common Market competitor was found to be West Germany in 60 % of all cases, Italy in 17 % and the U.K. in 11 %. French, Dutch and Danish products were only marginal and Ireland and Luxemburg were not included.

The identification of the size (by number of employees) of the largest Common Market competitors was dealt with in a different way in every country.²

¹ Major branch numbers according to the Israeli classification: Standard Industrial Classification of all Economic Activities, 1970 (Central Bureau of Statistics, Jerusalem, June 1973). Excluded industries are those with products not sold on the local market, or not tradeable, or excluded from the agreement with the Common Market (only 19 % of gross output in food, beverages and tobacco are included, see Toren and Guttentag, op.cit., p. 16). The sample of products was a sub-sample of 1,500 products included in the Toren-Guttentag study. Originally it included 288 products, but products were excluded when no local sales existed or when no competing imports existed, or when the definition of products was too general to achieve comparability. Where feasible the largest Common Market competitors were identified by Israeli producers, importers or import specialists in the Ministry of Commerce and Industry. In most cases, however, the largest Common Market competitor had to be identified indirectly. First, the largest Common Market supplier country of the group of products according to the detailed import statistics by country of origin in 1974 was selected (see Foreign Trade Statistics, 1974: Imports by Commodity and Country, Vol. 6, Central Bureau of Statistics, Jerusalem). Then, for the selected country the largest company was included.

² West Germany: (a) BDI Deutschland Liefert, 1976, Bundesverband der deutschen Industrie, Gemeinschaftsverlag GmbH, Darmstadt. (b) Handbuch der Großunternehmen, 1976, Verlag Hoppenstedt & Co., Darmstadt. (c) Direct enquiries.
Italy: (a) German Chamber of Commerce in Milano. (b) Compass Italia, Etas Kompass, Ed. 7, 1971/72, Edizioni per l'Informazione Economica S.p.a., Milano.
U.K.: (a) Trade Attaché, British Consulate in Hamburg. (b) German Chamber of Commerce in the U.K. (c) Ministry of Industry, London.
France, Netherlands and Belgium: Trade Attachés in respective Consulates in Hamburg.
Denmark: Jane's Major Companies of Europe, 1975, Jane's Yearbook, London.

3. The conceptual framework - scale economies and competitiveness

Economies of scale are usually analyzed in terms of changes in long-run average costs. These are not easily measured, however. Accordingly, most studies have measured factor productivity or more specifically output or value added per employee. As a first step labor productivity is analyzed, even if it cannot be regarded as most suitable.

The main focus in this paper is not on scale economies per se, but rather on their potential contribution to the needed improvement in the competitive position of industries. In static terms the competitive position of different industries is measured with effective protection, or in Israel the cost per dollar saved.¹ An analysis on the basis of cost per dollar saved will be undertaken as a second step.

The Free Trade Agreement of Israel with the Common Market: involves a dynamic process of adjustment, which depends only partially on the present level of effective protection. Not less important is the capability to carry out changes. The last stage in this analysis will, therefore, be addressed to the question of scale economies as a potential factor to enable the needed improvements in competitiveness. The competitive position of plants and branches of industry has been measured in the Toren-Guttentag study with two separate indices, for exports (index of export growth potential) and for import substitution (vulnerability index to import liberalization).² Both indices have

¹ Both concepts are inversely correlated to competitiveness. For a methodological discussion of the cost per dollar saved, see B. Toren: "The Structure of the Israeli Industry in terms of its Competitive Position" in The Effects of the Agreement for a Free Trade Area with the Common Market on the Israeli Industry, The Horowitz Institute (forthcoming).

² See B. Toren and N. Guttentag, op.cit., ch. C. (Hebrew). See also B. Toren: The Structure of the Israeli Industry in Terms of its Competitive Position, op.cit.

been based on a variety of partial quantitative and qualitative indicators.¹ The selection of these indicators and their relative weight has been based on intuitive weighting of a sample by a group of 7 economists and bankers well acquainted with all branches of industry. Their ratings of the sample were used for the development of a discriminant analysis function,² which was applied in each of the 600 plants included in the study.

The index of export potential and the vulnerability index are more suitable for the present discussion than the more conventional measures of competitiveness, such as effective protection. First, effective protection is a purely static concept, whereas the indices

¹ The indicators for each index are listed in order of importance in the analysis.

Export growth potential: (a) status of company as approved enterprise (granted typically under formal condition that exports are increased); (b) profitability in exports as rated by producers; (c) reasons for lack of exports (where applicable); (d) percentage gain in EEC import tariff due to Agreement; (e) volume of past exports; (f) effective export rate; (g) contractual ties with foreign companies; (h) value added ratio in foreign exchange; (i) output effects of investments under way.

Vulnerability to import liberalization (vulnerability index): (a) Existence and danger from competing imports, rated by producer; (b) cost per dollar saved in terms of local resources on the basis of ex-factory price; (c) rate of capacity utilization; (d) ratio of local in total sales; (e) share of competing imports in local consumption; (f) producers rating of difficulty in adjustment to Agreement conditions; (g) producers rating of reasons for competing imports; (i) Protection price per dollar defined like (b) above on the basis of c.i.f. price of competing imports.

The definition of the indicators is included in Toren-Guttentag, op.cit., Methodological Appendix.

² See N.H. Nie: Statistical Package for Social Sciences (SPSS) (McGraw-Hill, London, 1975, p. 434). The analysis was carried out with the assistance of J. Kornblith and D. Kaplin.

used here combine static and dynamic factors.¹ At a given level of effective protection, differences in competing imports; differences in profitability; differences in the trends of world prices; differences in attitude of management to undertake changes; may all yield very different possibilities for needed adjustment. Finally, the reliability of estimates of cost per dollar saved, or protection price per dollar is not high enough to justify their use as a single estimator of competitiveness.

Scale economies are usually assumed to exist because of a number of factors connected with the different aspects of production, marketing etc. While many writers have classified the different factors, each in a different way, the following discussion draws heavily on Koutsoyiannis² and Balassa.³ It is not very important to determine the role of each of those factors in the overall picture. They can help, however, to estimate how much of the anticipated saving can be expected at the different levels of industrial organization.

Koutsoyiannis draws a line between real economies and pecuniary economies of scale. Real economies include production economies, selling and marketing economies, managerial economies and transport and storage economies. Pecuniary economies of scale involve in one form or another lower prices due to volume transactions with raw materials, credit, advertising, transport, etc.

Economies of scale connected with production may be the main source for improvement in efficiency at the plant level. Volume enables specialization in the production process and the application of better skills, better tools, more sophisticated and automated

¹ See list in footnote on p. 9.

² A. Koutsoyiannis: Modern Microeconomics (Macmillan, 1975), chapter 4.

³ B. Balassa, op.cit., pp. 121-23.

machines and less waste of time with workers and machinery being shifted from job to job. Many specialized machines are indivisible and the level of their utilization rises with volume.¹ Volume to input relationships explain scale economies in fixed capital and maintenance costs mainly in the process industries.²

Real scale economies not connected directly with production and pecuniary economies may accrue in most cases at the company level, irrespective of the number of plants in a company. In a group of companies with important functions carried out at the level of the mother company, the group rather than the enterprise may explain some of the scale economies.

The relative weight of scale economies at the different levels of plant organization are not easy to ascertain. It seems reasonable to assume the role of the plant to be dominant, though substantial economies are made also at the company level. The analysis of relative size of the largest competitors was made at the company level mainly because of the availability of information.

The major purpose of this paper is to evaluate the relative importance of size and scale economies as one among a number of factors which may raise the competitiveness of Israeli industry, in light of the agreement with the E.E.C. The next chapter will review the size of Israeli plants compared to other countries for past trends and the present (ch. B). Scale economies are estimated next (ch. C), with the

¹ Balassa quotes Babbage with "the principle of multiples" which postulates that the maximum efficiency in the use of combined units of equipment requires the entire plant's capacity to be equal to some common multiple of the capacities of individual units of efficient size.

² Chemical engineers speak in this connection about a "0.6 rule" according to which the increase in the cost of equipment is given by the increase in capacity raised to the .6 power.

³ B. Balassa, op.cit., p. 136.

factors explaining differences in size following (ch. D). The last chapter tries to estimate the expected relative weight of scale economies in the adjustment process towards the Agreement (ch. E).

B. The Relative Size of Israeli Plants

1. Average number of employees per plant

The average size of industrial plants has shown an uninterrupted upward trend since 1955.¹ Table 1 below gives the main findings for the industrial sector as a whole. It shows that if the statistical bias of 1965 is eliminated, the average size for all industrial plants with 5 employees or more rose in the remaining 19 years between 1955 and 1975 by an annual average of 4.5 %.

The share of employees in plants with 100 employees or more in the total rose from 31.6 % in 1955 to 60.9 % in 1975, a rise of 92.7 % which implies an annual rate of growth of 3.3 %.

In 1962 the average size of the plant in Israel was 55 % of the comparable size in the Common Market (founding members).² The Israeli plant had an average of 46.3 employees and the Common Market plant had an average of 84.2 employees. (The Israeli average for 1972 rose to 61.0.) Substantial differences among Common Market countries were also noted. The smallest in 1962 was average size in Italian plants with 58.8 employees. The largest were West German plants with 107 employees. The size of the average Israeli plant in 1962 was 79 % of the Italian plant, but only 43 % of the West German plant.

¹ A marginal decline of average size of 1.3 % in 1972 is disregarded.

² 1962 was the only year for which all six Common Market countries had data on size defined in a uniform manner. Even in this year the only basis for comparison was for all plants employing 10 employees or more. Sources, E.E.C.: E.E.C. Statistische Studien und Erhebungen, 1969, 2, Table C, p. 651. Israel: Statistical Abstract of Israel, 1964, Central Bureau of Statistics, Jerusalem, p. 361. Israeli data for 1972, the last year for which a survey of industry was published are taken from: Industry and Crafts Survey, 1972, Part I, Table 16, Central Bureau of Statistics, Jerusalem, 1975.

Table 1 - Average number of Employees per Plant and share of Employees in Plants employing 100 Employees and more in total Employment in Industry (Plants employing 5 employees or more)

Year	Average No. of Employees				Share of Employees in Plants of 100 Employees and more in total (%)	
	1960 Classification		1970 Classification		No.	Index (%)
	No.	Index (%)	No.	Index (%)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1955	21.6	100.0			31.6	100.0
1964	29.8	138.0			43.7	
1965	26.4	122.2	27.1	100.0	42.5	
1972			36.8		56.9	
1975			41.9	154.6	60.9	192.7
Average annual rate of increase 1955-75 ¹						
including 1965					3.3 %	
excluding 1965 ²					4.5 %	

Source: Statistical Abstract of Israel (Central Bureau of Statistics, Jerusalem - relevant years).

Notes:

¹ As no data based on the same classification of economic activity was available for the 20 year period, the calculation of the average annual rate is based on linking (122.2 % x 154.6 %: 100.0 % = 188.9 %, which implies a 3.3 % annual compound rate of growth for a 20 year period).

² The 1965 figure on the basis of the 1960 classification is biased because the census of that year improved the coverage of the series mainly for small plants. The decline from 29.8 in 1964 to 26.4 in 1965 is therefore attributable to problems of measurement. This makes the exclusion of 1965 economically more meaningful. The calculation was accordingly made 138.0 % x 154.6 %: 100.0 % = 213.3 % which implies a 4.5 % annual compound rate of growth for the remaining 19 years.

The share of total employment in large plants is not available on a comparable basis. The only uniform group is for plants with 100 employees or more. These employed in 1962 61 % of all workers in the Common Market and 48 % in Israel.¹ There were only 59 large plants in Israel in 1962, defined to include all plants employing 300 workers or more. These employed 25 % of all workers.² There were over 2,000 large plants in the Common Market in 1962, defined to include all plants employing 1,000 workers or more and employing 29 % of all workers.

How does time affect this comparison? How does the Israeli growth pattern compare with Common Market countries? Time series are not available on the same basis. A partial comparison was only possible for West Germany. Between 1961 and 1970 the average size of German plants employing 10 workers or more rose by 0.6 % per year,³ compared to the Israeli rate of 4.5 % between 1955 and 1975, mentioned above.⁴ It can, therefore, be concluded that Israeli plants grow in size substantially faster than German plants. The same results are obtained for the share of workers in large plants. For the group of workers in plants with 100 employees or more, their share rose by 2.7 % between 1961 and 1970 in Israel, compared to 0.2 % in West Germany. Other Common Market countries, such as the U.K., may have been even less dynamic than West Germany.⁵

¹ All workers (= 100 %) include workers in plants employing 10 workers or more. The ratio for Israel rose to 61.6 % in 1972.

² Their number rose from 59 to 134 in 1972 and their share in employment from 25 to 42 %.

³ Unternehmen und Arbeitsstätten, Arbeitsstättenzählung vom 27. Mai 1970, Fachserie C, Heft 9, Nichtlandwirtschaftliche Arbeitsstätten, Unternehmen und Beschäftigte 1970, 1961, 1950 and 1939, p. 42.

⁴ The difference in the periods covered is not expected materially to affect the comparison.

⁵ K.D. George and T.S. Ward, op.cit., p. 38. This comparison refers to the period 1958-1971.

2. Relative size of largest competitor

Table 2 below shows that in terms of relative size of largest competitors, Israeli plants are very small indeed. The median relative size of the sample of 209 products turned out to be 11.8 times larger in the Common Market than in Israel.² The range was found to be very large between a low of 0.1 and a high of 2,938. The mean relative size of large competitors is 35. The one-sided skewness of the function (with no values below zero possible) explains the large gap between the median and the mean.

Details of the analysis included 14 cases out of 209 with a ratio exceeding 200. There were 4 cases with a ratio above 1,000. In 23 cases or 11 % of all products the Israeli company was found to be larger than the largest E.E.C. competitor.

What is the meaning of the sample for the whole industrial sector? First, companies were excluded, when they sold only abroad. This group included both small ones (e.g. diamond polishers) as well as large ones (e.g. Dead Sea Works). Products which were excluded because no imports existed, were either non-tradeable or very competitive; with both groups including again small companies (gravel) as well as large companies (cement or arms). In all these cases neither average size nor relative size of large competitors was assumed to introduce a bias. The effect of different omissions may have neutralized each other.

In a very small number of cases, Common Market employment

¹ Average relative size for major branches of industry was weighted on the basis of employment in Israeli sample plants. The overall averages were calculated on the basis of total employment in industry (source): Development Plan for Industry in Israel, 1969-1975; Summary of Follow-up on Implementation, Center for Industrial Planning, Ministry of Commerce and Industry, Jerusalem, September 1976).

Table 2 - Summary of Findings on Relative Size of Largest Competitor, 1977

1. Median relative size of largest competitor		<u>11.8</u>
a. Highest major branch (Manufacture of Transport Equipment)	69.2	
b. Lowest major branch (Manufacture of Wood and Wood Products)	2.5	
2. Mean relative size of largest competitor		<u>34.7</u>
a. Highest major branch (Manufacture of Electric and Electronic Equipment)	106.9	
b. Lowest major branch (Manufacture of Clothing and made-up Textiles n.e.s.)	3.3	
3. Range for single enterprise		
a. Highest ratio for 2 companies	2,938	
b. Lowest ratio for 2 companies	0.1	
4. No. of products in sample	209	
5. Coverage of sample in total (employment)	20 %	

Source: See text.

figures refer to concerns instead of firms.¹ As this was not the case in Israel, some upward bias must be assumed, even if its weight must be marginal.

Combining the findings of the above different size comparisons shows that the main reason for the difference in size is the almost complete lack of large plants in Israel. First, it can be noted that the Israeli group of largest companies is not really large.

¹ This difficulty must mainly be assumed in the case of Italy.

In 1972 134 plants with 300 or more employees per plant or a total of 94,000 employees had an average size of 700 workers. This group included 25 % in total employment in 1962 for plants with 10 workers or more (42 % in 1972). In the Common Market a larger share in total employment in 1962 (29 % of the same total) was employed by plants with 1,000 workers or more. Over 2,000 plants in this group employed 4.4 million workers with an average size of 2,200 workers.

The relative size of large competitors points in the same direction. It compares the size of the largest units in every group. The difference between the overall average number of employees per plant and the relative size of large competitors can only be explained with the very substantial size difference of the largest plants.

C. Economies of Scale

A number of recent Israeli studies have arrived at the conclusion that a positive correlation existed between gross output or value added per employee and size of plant.¹ The overall positive relationship included important exceptions, however, as indicated mainly by Dombrowski. He found in all years a fall in gross output per employee for the largest size group with 300 employees or more, compared to the smaller size group with 100-299 employees. Fewer and less uniform exceptions to the rule of scale economies have also been found in small size groups with 15-29 employees.

Many of the largest plants in Israel are publicly controlled and their relative inefficiency may be explained by the fact that profit was rarely their sole motive for industrial activity. The fall in efficiency of the smaller size groups may be explained by the nature of family enterprises. Beyond a certain size a single owner may find it more and more difficult to effectively control his enterprise. Only with additional growth and the crystallation of a professional management team, can the normal pattern of scale economies again be expected.

It was mentioned already, that for the present study competitiveness may be regarded as a better measure of efficiency than output or value added per employee. For this reason the relationship between size and the cost per dollar saved was studied next. It was based on the hypotheses that the cost per dollar saved is negatively correlated to size, because scale economies should contribute to an efficient use of local resources and to a low cost per dollar saved. Empirical findings prove the opposite. Table 3 below shows that the average level

¹ See G. Fishelson: "Changes in the Structure of Israel's Industry as a Result of the Agreement with the EEC" in: The Effects of the Agreement for a Free Trade Area with the Common Market on the Israeli Industry, The Horowitz Institute, Tel Aviv (forthcoming). See also S. Dombrowski, Center for Assistance to Small Scale Industry; The Institute of Productivity (Hebrew) - (a) "Size of Industrial Plant and Labor Productivity Evaluation", January 1973; (b) "The Potential of Small Scale Industry in Israel in a Macroeconomic Perspective", June 1976. Both writers used surveys of industry data over a number of years.

Table 3 - The Distribution of Plants in Israeli Industry by Size and Cost per Dollar Saved in Import Substitution
(in I£ per \$)

R a n g e	No. of Plants according to Cost per Dollar Saved								Average Cost per Dollar Saved
	- 6.90	7.- - 7.50	7.60 - 8.-	8.10 - 9.-	9.10 - 10.-	10.10 - 12.50	12.60 +	Total	
Employees per plant \ Average	6.30	7.20	7.80	8.50	9.50	11.30	14.-		
- 99	115	40	33	62	25	50	22	347	8.38
100 +	43	17	11	31	24	34	9	169	8.76
Total	158	57	44	93	49	84	31	516	8.50

Source: See text.

of cost per dollar saved for plants with up to 99 employees was I£ 8.38 per \$, while the average for plants with 100 employees and more was I£ 8.76 per \$, or by 4.5 % higher.¹

While the statistical significance of this difference cannot be taken for granted, an earlier study arrived at similar conclusions.² In that study 625 firms in manufacturing were grouped by the protection price per dollar in 1973 and by size, which was measured according to turnover in 1968. The average turnover per plant was found to be 2.2 times larger in the group with the highest level of protection (I£ 8.- and above in Spring 1973), compared to the group with the lowest level of protection (I£ 6.90 and below). Here the margin seems wide enough to be accepted without a significance test of the difference.

The prospects of an industry vis-à-vis the free trade area agreement with the Common Market is better evaluated with more dynamic gauges such as the index of export growth potential for export sales and the vulnerability index of import liberalization for import substitution.

Tables 4 and 5 summarize the main findings for the export growth potential and for the vulnerability index of import liberalization, respectively.³ In order to attempt to determine which factors play the more important role in both the export growth potential and import substitution, simple correlation coefficients were calculated for 14 different branches, groups of branches and the total, presented in both tables. It could be expected that export growth potential was positively correlated to size and the vulnerability index to import liberalization was negatively correlated to size.

¹ Data based on internal material of the Ministry of Commerce and Industry, Jerusalem, on the basis of which the Toren-Guttentag study *op.cit.* was prepared.

² I. Gal-Ed et.al.: The policy for the Promotion of Local and Foreign Capital Investments for Industrial Development in Israel, Vol. 4, The Protection of Local Output, World Institute, Jerusalem, December 1974 (Hebrew).

³ Source of data B. Toren and N. Guttentag, 1976, op.cit.

Table 4 - Distribution of Sales of Industrial Plants According to the Export Growth Potential and Size Group by Employees

Size Group by No. of Employees	Distribution of Sales According to Export Growth Potential (%)					
	Lowest	Relatively Low	Medium	Relatively High	Highest	Total
	(1)	(2)	(3)	(4)	(5)	
- 29	16	34	39	5	6	100
30 - 49	13	43	26	10	8	100
50 - 99	20	42	14	15	9	100
100 - 299	17	33	7	23	20	100
300 +	20	18	19	27	17	101

Table 5 - Distribution of Sales of Industrial Plants According to the Vulnerability to Imports and Size Group by Employees

Size Group by No. of Employees	Distribution of Sales According to Vulnerability to Imports (%)					
	Lowest	Relatively Low	Medium	Relatively High	Highest	Total
	(1)	(2)	(3)	(4)	(5)	
- 29	7	32	18	35	7	99
30 - 49	2	26	22	32	18	100
50 - 99	21	26	35	11	6	99
100 - 299	22	23	37	15	3	100
300 +	23	17	45	15	1	101

Results for the export growth potential (Table 4) proved the assumption of correlation. Both low and high export ratings were correlated with size groups of employment and the results were significant at the .025 level and .005 level, respectively.¹ In the case of import substitution a large number of branches were found with the assumed negative correlation only in plants with high vulnerability to imports. Vulnerability plants tended to be small. Non-vulnerable plants, on the other hand, were scattered over all size groups. The statistical test confirmed this finding. For the same 14 branches, groups of branches and total, no significant correlation was found between size and plants with low vulnerability. Plants with a high vulnerability yielded a negative correlation to the 5 size groups and to the two size groups mentioned above with significant results well below the .005 level.

One may wonder if Israel is unique in this respect. The comparison of size to the competitive position is not known from other studies. For the usual measurement of scale economies with changes in gross output or value added per employee, Israel may follow the same pattern as measured in other countries. Teitel, for example, has measured a positive correlation between size and value added in 27 countries.²

The exceptions to the general trend of scale economies are also noted in other studies. George and Ward, in an analysis of British and West German branches of industry found in both countries an increase in net output by size in the sector as a whole. In specific industries, however, a downward trend of net output by size was noted in some industries. In other cases a kink was noted, beyond which the positive correlation was discontinued.³

¹ Similar results were obtained when plants were divided into 2, instead of 5 size groups (plants with up to 99 employees and plants with 100 employees and more).

² S. Teitel: "Economies of Scale and Size of Plant: The Evidence and the Implications for Developing Countries", Journal of Common Market Studies, 13, 1975, pp. 92-115.

³ K.D. George and T.S. Ward, op.cit., p. 43.

The same pattern of overall correlation with important exceptions was found by Pratten for the U.K. on the basis of a very detailed study of some 25 British industries. He summarizes his findings with the conclusion that for many British industries and at many levels of output covered by the studies, substantial scale economies were found to exist.¹ He found the same results for the U.S. on the basis of the 1963 census data. In 13 out of the 21 industries covered by him, value added per employee, which was calculated for different size groups of plants, stopped rising with size, and in some cases was declining.²

Finally, our analysis of the U.S. census data for 1967 achieved the same results.³ The ITC study calculated exponents of scale economies for sub-branches of U.S. manufacturing industries.⁴ Of the 333 exponents 73 industries or 22 % of the total had measured diseconomies of scale and 142 industries, or 43 % had statistically insignificant information. In only 118 industries, or 35 % were positive scale economies verified beyond doubt.⁴ No studies are known which arrived at a universal positive relationship between size and value added per employee.

¹C.F. Pratten: Economies of Scale in Manufacturing Industry, Occasional Papers No. 28, Dept. of Applied Economics, Cambridge University Press, 1971, pp. 268-313.

²C.F. Pratten, op.cit., pp. 342-346.

³Data supplied by U.S. International Trade Commission, through Prof. S. Hirsch.

⁴The methodology for the measurement was developed by G.C. Hufbauer, op.cit., p. 178. Hufbauer defined scale economies as the exponent (a) in the regression equation

$$\frac{V_i}{\bar{V}} = KN^a$$

where V represents value added per employee in a given size group, \bar{V} represents the average of V for the whole industry, N represents the average number of employees in the size group and K is a constant. The cutoff point for statistical significance was relatively low, so that the 43 % is on the low side.

D. The Reasons for Differences in Size

The first reason for the small size of the plants is the small size of the market. The market size hypothesis was discussed in the first chapter above. It assumes that part of diseconomies connected with small scale are explained by the absence of a market large enough to enable scale economies.

In some countries the small size of the economy is not too limiting a factor, because a very liberal trade policy and few other trade barriers enable many scale economies through specialization and trade. In Israel trade barriers were high because of relatively high protection, currency restrictions and high transport costs. Israel's small economy was sealed off from many trade opportunities open to other countries, so that the limiting effect of her small size must have been worse than in some other small countries such as Switzerland or Hong Kong. The question should, therefore, be asked whether Israeli experience tends to support the market size hypothesis?

The relative size of the Israeli market is best brought out by empirical examples. Unfortunately, no studies on scale economies or on optimal size are available for the Israeli industry. Instead, a series of studies, which were prepared for the U.K.,¹ are compared to Israeli market conditions. Such a comparison may be misleading in the sense that minimum economic scale, or any other cost analyses differ from country to country. It is suggested, however, that conclusions based on broad levels of magnitude can be accepted.

¹ See C.F. Pratten, *op.cit.*, and A. Silberston: The Relationship between Size and Efficiency in Changes in the Industrial Structure of the U.K., papers read at the Society of Business Economists' Conference at King's College, Cambridge, April 1970, and published by the Society. Both studies summarize and evaluate with a uniform methodology 25-30 detailed studies of scale economies in different British industries.

Table 6 below includes the data for the products included in the U.K. analysis only where the product is being produced in Israel; where data on Israeli output was available and where the comparison seems relevant. Accordingly, it includes no more than a few random examples: of these many show a very substantial difference, with minimum economic size exceeding total Israeli output. For 11 out of the 18 products included, the Israeli market is smaller than m.e.s. For 7 the Israeli market is equal or larger than m.e.s. of a single enterprise.

The effects of this very small size of the market on the structure of the Israeli industry was analyzed next. For this must be borne in mind that average size for an industry is only partially determined by scale economies. Scale economies are the major consideration for a given enterprise, producing a given product.¹ For a group of enterprises, however, average size is also influenced by specialization, the product mix or the branch structure of industry.

The same point can be put in different terms. The individual enterprise is trying to avoid scale diseconomies by increasing the size of the plant. The industry as a whole may instead shift output from industries with large scale economies to industries with small ones (with a constant or rising long-run cost curve). It is, therefore, relevant to see how much change in average size in the past is explained by changes in the product, or industry mix. In more statistical terms - the weighted average growth in size of an industry (A) can be measured by multiplying the average growth in

¹ Which does not preclude the possibility that scale is also related to technology, skill or capital, and dependent on the size of the market, as discussed in the next chapter.

Table 6 - Estimates of Scale Economies in Relation to Total Output in a number of Industrial Products
in the U.K., in Comparison to Output in Israel

Product	United Kingdom			Output in Israel		
	m. e. s. ¹		Percent Increase in Value Added Costs per Unit at 50 % m.e.s. (over costs at m.e.s.)	Scale at which Value Added rises by 10 % as % of m.e.s.	in Physical Terms 1976 ²	as % of m.e.s. in U.K.
	in Physical Terms ²	as % of U.K. market ³				
1. Oil refinery ⁴	10 m.t.p.a.	10	27	76	7-8 m.t.p.a.	75 %
2. Ethylene plant	300,000 t.p.a.	25	25	78	22,300 t.p.a.	7 % ⁵
3. Sulphuric acid	1 m.t.p.a.	30	19	68	208,100 t.p.a.	20 %
Synthetic fibres -						
4. polymer manufactures	..	33	23	73	..	75 %
5. yarn extrusion	..	16	11	53	..	16 %
6. Beer brewery (barrels)	1 m. p.a. (at least)	3	55	86	0.3 p.a.	30 %
7. Bread bakery	..	1	30	78	..	1,800 % ⁶
8. Detergent powders	70,000 t.p.a.	20	20	69	24,000 t.p.a.	34 %
9. Portland cement	2 m.t.p.a.	10	17	66	2.0 m.t.p.a.	100 %
10. Steel rolling plant ⁸	4 m.t.p.a.	80	13	59	100,000 t.p.a.	25 %
11. Iron foundry for engineering castings	10,000 t.p.a.	0.2	10	51	15-20,000 t.p.a.	150 %
12. Cars (models & variants)	500,000 cars p.a.	25	10	59	7,000 ⁹	1.3 %
13. Producer of 10 elec- tric home appliances	500,000 p.a.	20	12	55	247,000 ¹⁰	49 %
14. Cotton spinning mill ¹¹ (spindles)	60,000	2	270,000	450 %
15. Weaving mills (looms) ¹¹	1,000	2	3,800	380 %
16. Warp knitting (machines)	100	3	(small)	..	359 ¹²	359 %
17. Footwear (pairs)	300,000 p.a.	0.2	5	26	9-10 m.p.a.	3,200 %
18. Books - one title ¹³ (hardbacks)	10,000 copies	100	50	..	3,000 copies	30 %
Inweighted Average		21	22	64	34 % (median)	

Sources: U.K.: Pratten, *op.cit.*, pp. 270-277.

Silberston, *op.cit.*, pp. 382-385.

Israel: *Statistical Abstract for Israel, 1976*, C.B.S., Jerusalem, 1977.

Industrial branch sections, Ministry of Industry Trade and Tourism.

Notes: See next page.

Notes to Table 6:

- 1 m.e.s. - minimum economic scale is measured only within the range of scale for which estimates were made. m.e.s. is the minimum scale above which any possible subsequent doubling in scale, would reduce total average unit costs by less than 5 %, or average value added per unit by less than 10 %.
- 2 m - million; t - ton; l - liter; p.a. - per annum.
- 3 Estimates refer to 1969. For products with sizeable transport costs Pratten discusses also the size of submarkets. For a country like Israel, however, such submarkets may be assumed to be of lesser importance, except where otherwise mentioned.
- 4 Capacity of the Israeli refineries is 9.9 m.t.p.a. or roughly equal to the listed m.e.s. (World Wide Refining Survey, International Petroleum Encyclopaedia, 1975). Furthermore, the m.e.s. figure for the U.K. seems to be relatively high, at least as an indication for other countries. West Germany, for example, exceeds 10 m.t.p.a. in only two refineries (Israeli Petrol Institute and World Refining Survey, Petroleum Times, March 1977).
- 5 A new plant under construction will raise production capacity in Israel to about 60 % of m.e.s. in the U.K.
- 6 Israeli bakeries may be assumed to have a lower m.e.s. than those in the U.K. because of a lower level of utilization of capital equipment which is 8 hours a day in Israel compared to about double this time in the U.K. If this bias is disregarded, there would be a market in Israel for 18 bakeries of the size of m.e.s. in the U.K. With an Israeli population of 3.5 million, each such bakery would sell to 200,000 people. In reality, marketing of bread is carried out in some 30 different regions, of which only 5 have over 200,000 inhabitants. 4-5 bakeries have actually reached this output of m.e.s. in the U.K. and 75 others are smaller.
- 7 1975 data.
- 8 The relatively new mini-mill process is believed by some experts in UNIDO and Israel to lower the minimum economic scale very drastically to 200-300,000 t.p.a. This would raise Israel's output to 25-30 % of m.e.s.
- 9 All models and variants of passenger cars and other cars. The largest single model may not exceed one third of total output.
- 10 Total production or in most cases assembly of imported components of 7 electric home appliances including TV sets, washing machines, refrigerators, electric stoves, air conditioners, food mixers and vacuum cleaners.

Notes - continued:

- 11 The increase in value added costs at 50 % of m.e.s. is small for spinning and weaving mills. It is high, however, for individual products. Another limitation with these products is the fact that capacity rather than output was compared. Output per spindle or per loom may differ substantially between countries.
- 12 Includes different types of warp, including kettenstuhl, ~~rachell~~, crochet, etc. These are partly mixed in single mills in Israel, non of which uses 100 machines.
- 13 Only 6 % of all books printed in Israel, exceeded the U.K. m.e.s. level of 10,000 copies.

plant size (with fixed weights - B) by the average change caused only by change of weights (with fixed plant size - C).¹

Data on the size and weight of every plant in the Israeli industry was not available over time. The closest approximation to this was information on average size and weight of sub-branches,² which could be transformed to a comparable basis within each of the two periods 1958 - 1964 and 1968 - 1972.

Table 7 below summarizes the main findings. Between 1958 and 1964 there was an overall increase in average size of 39 %. The overall increase in the size of plants on a basis of fixed weights was larger, 51 %. This implies a shift in weights towards sub-branches with a low average size, and a negative contribution to size by the structure of sub-branches, of 8 %. The same relationship was measured in the 1968 - 1972 period, even though size rose more slowly and the negative contribution to size by the structure of sub-branches was limited to 3 %.

The next factor which was reviewed, in order to explain differences in size, dealt with managerial attitudes. A small survey by

¹ Denote size of plant (s) and of industry (S); an average for n plants is computed for the period between t₀ and t₁ with weights (w)

$$\frac{\bar{S}_1}{\bar{S}_0} = \frac{\frac{\sum_{i=1}^n s_1^i w_1^i}{\sum_{i=1}^n w_1^i}}{\frac{\sum_{i=1}^n s_0^i w_0^i}{\sum_{i=1}^n w_0^i}} = \frac{\frac{\sum_{i=1}^n s_1^i w_0^i}{\sum_{i=1}^n w_0^i}}{\frac{\sum_{i=1}^n s_0^i w_0^i}{\sum_{i=1}^n w_0^i}} \times \frac{\frac{\sum_{i=1}^n s_0^i w_1^i}{\sum_{i=1}^n w_1^i}}{\frac{\sum_{i=1}^n s_0^i w_0^i}{\sum_{i=1}^n w_0^i}}$$

A = B x C

² Size measured in terms of employees per plant. Weights measured in terms of employment in sub-branch.

Table 7 - The Growth in Average Size due to Size of Plants
and due to Change in Industry Mix

	Average No. of Employees per Plant	Increase over previous Period (percent)
<u>1958 - 1964</u> ¹		
1. 1958	12.7	
2. 1964	17.3	39
3. 1964 on basis of 1958 weights	19.2	51
4. 1964 increase (decrease) in average size caused by change in weights (139 : 151 = 92)		-8

<u>1968 - 1972</u> ²		
1. 1968	32.4	
2. 1972	36.8	14
3. 1972 on basis of 1968 weights	38.1	18
4. 1972 increase (decrease) in average size caused by change in weights (114 : 118 = 97)		-3

Notes:

¹ Includes all plants with 1 or more employees. Industry classification according to old classification (see Classification of Branches of the Economy, Publication of Population and Housing Census 1961, No. 2, Central Bureau of Statistics, Jerusalem, June 1961).

² Includes all plants with 5 or more employees. Industry classification same as above, with coverage limited to 1970 Classification (op.cit).

Sources: Industry and Crafts Surveys, Central Bureau of Statistics, Jerusalem.

1958-1964 - 1964, Special Series 219, 1967, Table 1.

1968 - 1968, Special Series 351, 1971, Table 7.

1972 - 1972, Special Series 496, 1976, Table 7.

the Institute for Productivity in Tel-Aviv made a comparison of Israeli and Japanese management.¹ A case study was used to evaluate responses in instances of difficulties in the implementation in the plant, of a new production program. The Japanese recipient of such a non-operative program reacts to difficulties very seriously, making every feasible effort to iron out and clarify mistakes and to adjust to the new production program so as to make it workable. His feedback is co-operative. The Israeli recipient of such a production program may typically take another attitude. First, he will try to accept the main idea involved in the new program and improvise his own solution to the difficulties, by replacing the faulty program with his own. He may often refrain from any feedback, regarding it as a fruitless effort.

The Israeli manager seems to be a much better improviser in cases of difficulty, than a follower of instructions. The opposite is much more typical of a Japanese or a German manager.

A similar problem of larger enterprises in Israel is the strong inclination of the best people in middle management to leave and start up a new (typically small) business. Whoever can, likes to be his own boss.

It can, therefore, be assumed that managerial skills needed for large scale plants and enterprises are relatively scarce in supply, so that, with other things being equal, Israel will use production methods and specialize in products and industries which are somewhat less dependent on large scale. Plants and enterprises are bound to be somewhat smaller.

¹ I. Meidan, Director of the Institute, unpublished material.

The dominant role of the government in the economy makes the question of governmental impact on the size of plants also of great importance. Even if never formally announced, the Israeli Government contributes to growth in the size of enterprises in a number of ways. The Law for the Encouragement of Industry (Taxes, 1969) promotes mergers through tax concessions. Furthermore, the Israeli anti-trust legislation is directed against concentration or collusion, not against size.¹

Government controls can be regarded as an important source of scale economies. Administrative procedures are always fixed in universal form, equal for all, so that any cost of compliance with government controls is a fixed cost element. This fixed cost component is far from negligible in an economy which is controlled by government to a very large degree. New regulations tend to increase the potential of scale economies and liberalization tends to limit such a potential.

Governmental promotion of industrial development is strongly biased in favour of large enterprises. A study of the effectiveness of the Law for the Promotion of Capital Investments has compared the average size of enterprises which were promoted and which were not promoted under the law. Size was measured with turnover. "Approved Investments" under the law had on the average a turnover which was, even before promotion, 6.9 times as high and total assets which were 4.2 times as high as the respective averages for firms without the status of approved investment.² Similar findings were obtained for the incidence of development loans, which were much more frequent in enterprises with a large turnover.³ Both findings were based on large enough differences to assume their statistical significance.

¹ M. Sheffer: "A Critique of the Implementation of the Trade Restraints' Law in Israel", *The Antitrust Bulletin* XVI.2, Summer 1971, pp. 415-442. See also: M. Sheffer: "The Trade Restraints' Law, *The Economic Quarterly*, October 1967, pp. 163-175 and July 1969, pp. 177-188 (Hebrew).

² I. Gal-Ed: op.cit., Vol. 2, *The Law for the Encouragement of Capital Investments*, p. 46.

³ I. Gal-Ed: op.cit., Vol 3, *Development Finance*, p. 37.

An opposite role is played by the government in its function as tax collector. In Israel, which is known as the country with the heaviest tax burden, this collection is less than absolute, and some taxes due are not being paid. For the normal tax averting Israeli businessman it is important to be unimportant.

One can be unimportant first of all by being small, as tax compliance is a positive function of size.¹ The same need to be unnoticed by tax authorities speaks against any reporting and accounting. Exports, complex ownership and mainly foreign ownership, all depend on detailed reporting and are often shunned for tax considerations. Even the small number of development loans among small enterprises may partially be explained by their unwillingness to commit themselves to various reports.

Most of the considerations mentioned here against size work mainly with the very small enterprises. Once a minimum scale is achieved; once a report is demanded, most other tax considerations disappear.

Having reviewed a number of factors which were assumed to affect size, a summary can now be attempted. First, the small size of the Israeli economy has limited the scope for scale economies in the past. Relatively high transport costs and protective tariffs have further added to seal off the Israeli industry from possible growth in size and scale economies, based on specialization through trade. Second,

¹ See J. Gabai, A. Arian and N. Sabag: Basic Survey of Companies 1971, Economic Research Dept., Internal Revenue Administration, The Treasury, Special Publication No. 14, June 1975 (Hebrew), p. 92. No direct estimates are available of taxes due which are unpaid. A good indirect indicator is the difference between declared and final net profits and taxes due. Both were positively correlated to size measured by turnover in 1969/70, op.cit., pp. 86, 90).

psychological factors connected with management do render the Israeli enterprise less suitable than other industries to benefit from economies of scale. Thirdly, the Government did affect size with conflicting influences. Growth in size was promoted through legal and other measures connected with development assistance. Small plants, however, had an opposite disincentive to grow in size because of tax considerations.

These different factors seem to explain very well past trends and the present situation in relative size of Israeli plants. First, a fast growth in average size in the past; second the present very small size of Israeli plants (see chapter B); and third the gradual shift in branch composition between 1958 and 1972 towards industries typical of small scale and long-run-declining cost curves. The fact is that a number of the best success stories in exports are based on relatively small enterprises (diamonds, electronic components, medical instruments and ready to wear).

E. The Relative Benefit from Scale Economies due to the Agreement

As a final step an attempt is made to evaluate the role of scale economies vis-à-vis other factors in Israel's adjustment process to her free trade area agreement with the Common Market. Logically speaking, the first question to be asked in this context is one of linkages. Scale has been proven to be positively correlated with competitiveness, at least in many cases. Does this necessarily prove that size contributed to the level of efficiency or the competitive position? It is not impossible to argue, for example, that size was correlated with capital intensity and that capital intensity rather than size contribute to efficiency.

An analysis of variance was undertaken on the basis of 53 sub-branches and 17 main branches of industry. Four factors were evaluated in their ability to explain variations in the average level of

- a. the export growth potential
- b. the vulnerability to import liberalization.

The four explanatory factors included:

- (1) average size of plant (average no. of employees per plant);
- (2) skill-intensity share of engineers and academic level employees in total employment);
- (3) capital output ratio in existing industry;
- (4) technology factor (3 level ratings, as explained in Pomfret-Toren, op.cit.).

Variations in the export growth potential were best explained by skill intensity with a statistically significant coefficient of correlation on the basis of both sub-branches and main branches.¹ All

¹ t-ratio of 1825 which is significant at a 8 % confidence level. Because of the qualitative nature of the analysis, a confidence level of 10 % was defined as acceptable.

other factors by the order of their explanatory power capital output ratio, technology factor and average size, came second, third and fourth, respectively, with insignificant results. On the basis of the main branch analysis the technology factor came second.

Variations in the vulnerability to import liberalization were best explained by the capital output ratio, with close to significant results. All other factors, i.e. the technology factor, skill intensity and average size turned out to be insignificant. On the basis of the main branch analysis, the technology factor did come out first, with significant results at the 3 % or 1 % levels of confidence. In one case only did size (measured by median relative size of large competitors) come out second as explanator though with insignificant results.

The analysis clearly shows that size is a less powerful explanator of changes in competitiveness than some other factors, such as skill intensity, the level of technology or capital output ratio.

Besides this rather negative evaluation of the role of size, no other, more direct way has been found to make a quantitative estimate. Instead, a number of considerations will be discussed, based on past trends and the present situation. These may emphasize, or de-emphasize the role of scale economies for the future.

The first reason to expect an important role of scale economies is to be found in their present low level. Many potential gains from size are as yet to be gained.¹ The Israeli market is very small in comparison to minimum economic scale in many industries. The Israeli plant and company are very small in relation to their Common Market competitors. This implies that in many industries very drastic changes

¹ B. Balassa, op.cit., pp. 118 and 140.

must be expected with the Agreement, either in the size of plants, or in their specialization in products with constant (or decreasing) returns to scale.

Both these possible adjustments have been noted in the past and are expected to accelerate in the future, with the Agreement through trade liberalization, which implies a larger market for a smaller list of products. Larger markets will enable scale economies with exports and in some cases with the improvement of competitiveness due to standardization and size also on the local market. Easier access to export markets and unemployed resources due to tougher competition from imports, will accelerate the process of specialization in the most competitive industries. These will continue to include a large share of small-scale industries and thereby continue to decelerate the growth in average size.

The relative weight of these two main conflicting factors will first of all be influenced by management attitudes. These seem to limit to some extent the scope for large companies and large scale economies, as compared to some other countries with a better attitude to industrial hierarchy.

The second factor relates to the governmental impact which is not easy to predict. On the one hand, tax considerations against the growth of small enterprises are expected gradually to diminish in weight. The main reasons are the reform in the direct tax system, the abolition of most customs duties through the Agreement and the gradual replacement of the intricate purchase tax by a much simpler value added tax.

On the other hand, it is hard to foresee how much of the present system, which promotes growth, is going to be altered. A recent change in the Israeli government, makes it strongly committed to

economic liberalization. Industrial activity and development policy can be expected to become more automatic. Promotion in the future can be expected to be less biased in favour of large enterprises, many of which are controlled by the State or by the Histadruth.¹ A first step in this direction has been implemented with the recent abolition of the state controlled credit, which was heavily concentrated in the larger enterprises. More recently, the abolition of foreign currency controls has taken away a large portion of the economies of scale connected with government controls.

The promotion of mergers is also somewhat doubtful. Mergers have been proven in many studies to be less effective in raising efficiency than expected.² This is a further reason to foresee changes in the law for the Promotion of Industry (Taxes). Furthermore, it can be assumed that, in order to limit the role of the government in industry, development assistance will become more automatic and granted irrespective of size, to any enterprise which will qualify according to a clear set of criteria. Such changes may discontinue any planned or de-facto preference which is now being granted to large enterprises.

In a nutshell, growth in size and scale economies which will accompany it, can be expected in the future as in the past. Some important driving forces will be intensified through the Agreement; but some of the retarding and braking forces will be strengthened too. It may be fair to assume that in spite of a continued process of growth in size, the Israeli industry will continue to lag behind in

¹ The general federation of labor, which controlled together with the State 30 % of industrial employment in 1972. They had an average of 152 employees per plant compared with an average of 27.8 in privately owned enterprises. (Source: Industry and Crafts Survey, 1972, op.cit., p. 50.)

² M.A. Utton: "On Measuring the Effects of Industrial Mergers" in Scottish Journal of Political Economy, No. 1, February 1974, pp. 13-28.

this respect and shift to industries with a relatively low minimum economic size and a non-decreasing long-run cost curve.

If "big is beautiful" then this is a fairly pessimistic view of the expected role of scale economies in the adjustment process of Israel's integration into the Common Market. It may, therefore, be useful to support these findings with two additional points.

The first is based on the fact that Israel is not alone in this respect. Denmark may serve as another example. Preparing her entry into the Common Market with menacing competition from German industry, nobody expected Danish plants to grow to the size of their new trading partners. Danish plants hoped to overcome tougher competition by further concentrating on design-intensive products and by more subcontracting for large German and other firms, all of which are typically small scale industries.¹ The family of giants in the Danish industry was not expected to grow beyond the present three.

The second point of support is based on the fact that more or less the same findings were obtained in a qualitative survey of opinions on this question among Israeli industrialists, bankers, top advisors on government policy and economists. The results will be presented in a forthcoming study (co-authored with R. Pomfret). Here the relative role of scale economies is compared to other factors contributing to competitiveness. Scale economies were ranked fifth in importance out of a total of 7 factors.² They were graded less important than improvements in quality; improvements in technology; improvements in the utilization of existing capacity and improvements through more specialization in the production process. Less important than scale economies were changes in the production program to more competitive industries and the role of direct foreign investments. The first of these two less important factors clearly disagree with the above findings.

¹ It is too early to tell whether such expectations did in fact materialize.

² The survey also evaluated the degree of uniformity of each rating with standard deviation. Here the rating of scale economies was even lower than in relative importance.

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