

declined in the services industries. The rise in labor productivity in the goods industries constitutes a continuation of the trend evident for the last five years. The decline in the product of the goods industries derived primarily from the fall in manufacturing and construction product and the moderate increase in the product of agriculture.

The 9 percent contraction of construction is a continuation of the fall evident in the last three years, after the surge in the industry's product in 1999 with the absorption of the influx of immigrants in the 1990s. This adjustment was supplemented by a decline in 2001 that was associated with the recession, and apparently also with excess investment in 2000. Although investment in infrastructure structures rose in 2001, their share in the industry is too small to alter its development trend. The industry is characterized by high labor-intensity and the lowest wage in Israel (Table 1.7). The development that has typified the industry's production structure in recent years persisted in 2001: labor input fell by more than product, while the industry's capital rose markedly.²⁶ The growth rate of capital per worker accelerated from an annual 11 percent in 1996–2000 to 25 percent in 2001—almost two and a half times its growth rate in the entire business sector. Notwithstanding, capital per worker is still very low, about one fifth of that in the business sector as a whole.

Manufacturing product went down by some 7 percent in 2001, after it had risen sharply in 2000—mainly in the high-tech industry—after an average annual growth rate of 2 percent in 1998–99. This volatility is connected primarily with the industry's specialization in the area of electronics, the demand for whose products has fluctuated widely in the last two years, both in Israel and abroad.

Agricultural product rose by 5 percent in 2001, mainly due to increased demand arising from population growth.

The growth of the commerce and services industries stopped in 2001 mainly due to a fall in the services industry arising from the marked contraction in start-ups and catering, and the continued growth of commerce. The relatively positive development of commerce is explained by its closer connection with private consumption, which is less affected than other uses by global developments. Since the industry is labor-intensive, its continued growth in 2001 contributed as stated to labor input.

The product of transport and communications did not expand in 2001, due to the fall in transport and continued growth of communications, as the spheres of mobile telephones, TV services, and fast internet were opened up to competition.

b. Manufacturing

Main developments

Manufacturing product, which is about one quarter of business-sector product, fell by an unprecedented 5.7 percent in 2001. The decline was preceded by a 10 percent surge in 2000, a rate unparalleled in manufacturing in the last thirty years. The impressive

²⁶ The reference is to nonresidential capital stock, as measured at the beginning of the year (whereas economic activity relates to the whole year). The expansion of capital stock per worker can therefore express an increase in capital, reflecting the developments and expectations of the previous year.

The contraction in the product of manufacturing and construction led the fall in the share of goods in business-sector product.

The slump in the high-tech industry reduced manufacturing product.

The increase in private consumption contributed to the demand for services.

Manufacturing product fell by an unprecedented 5.7 percent in 2001.

growth in 2001 and the decline in 2000 were the result primarily of the wide swings in world demand for electronics products, as the exports of the electronics industry, which constitute half of Israel's manufacturing exports, dropped by 12.6 percent in 2001, after soaring by 69 percent in 2000. Domestic sales of manufacturing products also fell in 2001, after rising in 2000. The increase in 2000 stemmed from the expansion of total domestic demand, while the fall in 2001 was due mainly to the contraction of domestic demand and the increased market share of competing imports.

Table 1.8
Manufacturing Industry, Main Indicators, 1990–2001

	(rate of change, percent)			
	1990–1996	1997–1999	2000	2001
Manufacturing product	7.2	2.0	10.0	–5.7
Manufacturing exports (volume)	9.5	10.5	30.2	–4.3
Domestic sales (volume)	6.3	–2.0	0.8	–6.5
Output/input price ratio	0.4	1.0	–2.8	–1.4
Costs per hour worked (real, output prices)	2.5	2.6	9.3	5.8
Return on capital (gross, percent)	13.0	17.5	18.3	14.3
Labor input (hours)	4.2	–1.2	2.2	–4.9
Gross (real) capital stock ^a	6.8	7.1	7.2	4.8
Total factor productivity	1.8	–0.1	5.6	–4.7
Labor product	2.8	3.2	7.7	–0.8
Investment	4.5	0.4	6.5	–17.0

^a At beginning of year.

SOURCE: Based on Central Bureau of Statistics data.

In 2001, despite the sharp drop in demand and high unemployment rate, labor costs rose faster than output prices. Profitability was further eroded by the faster increase in costs of purchased inputs than of output. In response to the fall in demand and increase in labor costs, employers reduced the number of wage-earners in manufacturing by 2.8 percent; the 4.9 percent fall in hours worked was even sharper. Manufacturing product contracted by more than labor input, so that labor productivity fell by 0.8 percent. TFP also declined because of the rise in capital stock due to extensive investment in physical capital in 2000. Investment in manufacturing plummeted in 2001, encompassing both the electronics and unskilled-labor-intensive industries.

Developments in the two-digit industries

The manufacturing industry comprises 23 two-digit industries, which differ from one another in the quality of human capital, share of exports, capital-intensity, investment in R&D, exposure to competing imports, etc. To avoid unnecessary detail, we have classed them as two main groups, despite considerable differences within each group. The first group comprises three industries which in the past constituted the electronics industry. These industries accounted for 31 percent of manufacturing product and about half of manufacturing exports in 2000. The development of their output is influenced

to a great extent by global demand for communications and computer products, which as stated has surged and slumped in the last two years. The electronics industry is distinguished by its human capital: the proportion of engineers and other graduates among its employees is far higher than in any other manufacturing industry, and its R&D expenditure is also particularly high—78 percent of all manufacturing R&D investment in 1997. Note that in advanced economies the electronics industry accounts for only 25 percent of total R&D expenditure.

The other group is more heterogeneous and comprises all the industries meeting at least one of the following two criteria: 1. Most of their product (over 75 percent) is intended for the domestic market; 2. Their share of skilled employees is below the average in the manufacturing industry (less than 20 percent). There is, in effect, almost complete overlap between these two criteria, and apart from industries which meet both of them,²⁷ it includes only textiles, only 50 percent of whose sales are for the domestic market. The group's share in manufacturing product was 42 percent in 2001. Most of these industries were adversely affected by the reduction of import tariffs (except for food and drink, which was not exposed to competing imports) and the wage hike for unskilled workers, and this was evident in the fall in their share of the domestic market compared with the rise in that of competing imports.

The electronics industry: The electronic equipment and communications, and electronic components industries, which together account for some thirty percent of manufacturing exports, have been at the heart of the global crisis of the last two years. They contributed about 140 percent of the drop in manufacturing exports in 2001, after accounting for 75 percent of their rise in 2000. An analysis of the contribution of each constituent of the electronics industry to the overall contraction of production and exports (Table 1.9) shows that the effect of each one of them on the indices of production and export was far greater than their share in these indices. The high level of specialization of Israel's electronics industry is evident from the international

The output of electronics dropped by 10 percent in 2001, after soaring by 32 percent in 2000.

Table 1.9
Share of Electronics in Manufacturing Production and Exports,
and its Contribution to the Change in Them, 2000–2001

	(share, percent)					
	Share of industry in 2000		Contribution to change in 2000		Contribution to change in 2001	
	Production	Exports	Production	Exports	Production	Exports
Total electronics industry	32	49	88	83	–62	–135
Electronic components	11	13	57	43	–27	–51
Electronic communications equipment	11	18	16	32	–27	–89
Medical and scientific equipment	10	18	15	8	–8	5

SOURCE: Based on Central Bureau of Statistics data.

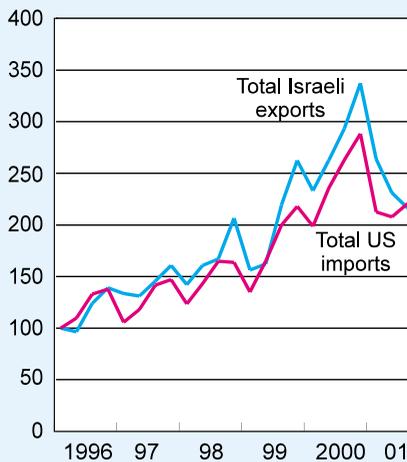
²⁷ Food, drink, tobacco, clothing, footwear, leather, wood, paper, printing, non-metallic minerals, metals, basic metals, and engines and appliances for electricity distribution.

comparison (Figure 1.21). This specialization made the economy more sensitive to global demand shocks, and the fluctuations in global demand for electronics products were revealed as being particularly wide.

Approximately three quarters of the output of the electronics industries was intended for world markets in 2000, so that the swings in demand for this output accurately reflect the boom and slump in global demand for these products. In the absence of by-industry data on global trade, US imports constitute a good indicator of the development of global demand for electronics products, as these imports account for 22.5 percent of total world trade (imports) in them. US imports are significant for examining the demand for Israel’s electronics products because about 32 percent of Israel’s exports in this category in 2000 was destined for the US market. The rise in exports of electronics products to the US from the beginning of 1999 to a peak in 2000:IV, and the decline in 2001, evident in each of the three electronics industries, is shown in Figures 1.11 through 1.13. As can be seen, there is a close connection between US demand for electronic communications equipment and Israeli export of it. In the electronic components industry, there was a marked and parallel decline in US imports and Israeli exports in 2001. The figure showing trends in the medical and scientific equipment industry gives three of the four industries in this group—industrial monitoring and measuring equipment, optical measurement equipment, and photographic equipment—but does not include medical equipment, which was not affected by the crisis. In these three industries the relation between US imports and Israeli exports is less close, although it

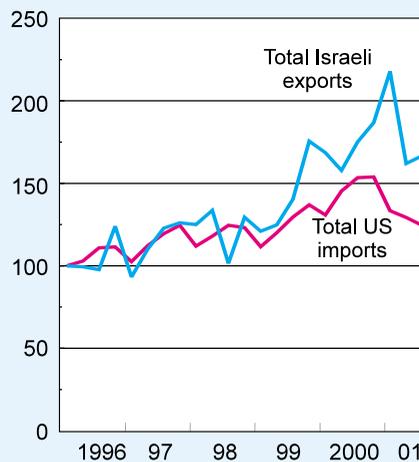
The fluctuations in electronics exports in the last two years reflect the swings in world demand for these products.

Figure 1.11
Industry Index: Electronic Communications Equipment; Israeli Exports/US Imports, March 1996–September 2001



SOURCE: Based on Central Bureau of Statistics data. For the United States, International Trade Commission.

Figure 1.12
Industry Index: Monitoring, Measuring and Scientific Equipment; Israeli Exports/US Imports, March 1996–September 2001



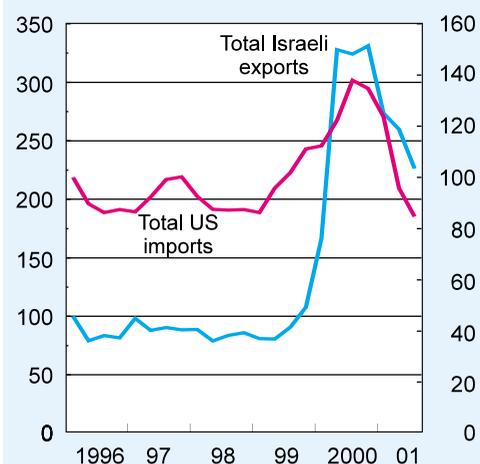
SOURCE: Based on Central Bureau of Statistics data. For the United States, International Trade Commission.

is statistically significant. US imports of these products grew from 1999:I to 2000:IV, while Israeli exports rose at a faster rate in that period, peaking one quarter later. In 2001:III both US imports and Israeli exports returned to their levels in 2000:I.

The effect of global demand on Israeli exports is not always symmetrical: whereas the contraction of world demand for the product of the electronics industry led to an almost immediate drop in production and under-utilization of capacity in this industry, the expansion of demand sometimes affects output only with a lag, as stepping up supply takes longer. An outstanding example of this is the electronics components industry, world demand for whose products has risen continuously in recent years, but the expansion of whose supply (i.e., Israeli exports) was made possible only in 2000, with the inauguration of the Intel plant in Kiryat Gat.

The enormous increase in world demand for the products of the electronics components industry is clearly expressed in the impressive growth of production in the US, where it grew five-fold from 1996 to 2000 (the extent of US production in 1997 was double that of US imports of these products). The electronics components industry differs from the other electronics industries because its production is concentrated in a very small number of huge plants relative to the customary size of Israeli plants. The exports of Intel Israel, for example, comprised 73 percent of the industry's exports in 2000, with the plant in Kiryat

Figure 1.13
Industry Index: Electronic Components; Israeli Exports/US Imports, March 1996–September 2001



SOURCE: Based on Central Bureau of Statistics data. For the United States, International Trade Commission.

Table 1.10
Development of Electronics During Year, 2001:III vis-à-vis 2000:IV
(rate of change, percent)

	Production	Exports	Wage-earners	Cost per hour worked ^a	Export prices
Total electronics industry	-24.9	-24.8	-5.3	11.9	
Electronic components	-38.1	-31.8	-15.4	20.6	0.2
Electronic communications equipment	-19.2	-35.0	-9.2	-6.7	-1.5
Medical and scientific equipment	-18.0	-13.2	2.6	4.0	-1.0

^a Cost per hour worked vis-à-vis 2000:III.

SOURCE: Based on Central Bureau of Statistics data.

Gat alone accounting for 50 percent. Because of the nature of the production process in this industry, it is natural that its expansion is characterized by a gigantic leap forward, as was the case in 2000:I, when the Intel plant in Kiryat Gat began production. The global crisis in the electronics industry was scarcely apparent in the price of its product (CBS data), except in the medical and scientific equipment industry, where prices declined in 2001. The effect of the global crisis in electronics did not lead to a real reduction in costs per hour worked during the year, as can be seen from Table 1.10, in which 2001:III is compared with 2000:IV, when production peaked. In the electronic communications equipment industry cost per hour worked did in fact fall in 2001, but in the other two electronics industries it rose sharply. This increase in costs is surprising in view of the crisis affecting both the electronics and the service industries, both of which are skilled-labor intensive in the area of computer and electronic communications. Thus, the influence of the crisis on wages in these industries may not yet have been utilized to the full, despite the great flexibility of wage contracts in them. In addition, this wage hike may reflect *inter alia* a rise in the labor productivity of the large number of persons employed and trained in the electronic components industry in 2000.

The electronics industry can adapt to a fall in demand by dismissing workers and not recruiting new employees. The adaptation does not depend solely on a fall in present demand, but also on expectations for the future and the quality of its human capital. The more rapid the expected recovery of demand, and the greater the specific human capital accumulated by its workers, the more moderate will be the adjustment in the number of workers. There are marked differences in the extent of adjustment in different constituents of the electronics industry, corresponding to the differences between employees. The proportion of skilled employees (engineers, other graduates, practical engineers, technicians) is far higher in the medical and scientific equipment and the electronic communications equipment industries—about 65 percent—than in the electronic components industry, where it is 32 percent. The relatively moderate reduction in the electronic communications equipment industry may be due to the large extent of human capital it has accumulated. In the medical and scientific equipment industry the number of employees rose, despite the fall in production. This is explained by asymmetry within the industry; while profitable projects continued to take on new employees, projects that had been hit by the slowdown in demand did not hasten to dismiss workers, preferring to hold on to their high specific human capital.

The decline in the number of hours worked in the electronics industry was more moderate than the reduction in product, so that labor productivity fell. In 2001 the contraction in the number of hours worked served to reduce capacity, while the increase in capital stock increased it. In the final event, capacity grew, and the combination of this with the contraction of production was expressed in a marked fall in TFP.

The sharp drop in world demand for high-tech products surprised the capital market, which had expected the rapid growth of demand and profits to persist. The extent of the surprise was expressed in plummeting high-tech share prices on stock markets all over the world. The close connection between Israel's electronics industry and world capital markets exacerbated the intensity of the shock to the industry, as alongside the

The crisis in the electronics industry led to a fall in the number of persons employed in it.

The TFP and labor productivity of electronics fell markedly in 2001.

The capital market was surprised by the sharp drop in demand; this caused share prices to fall and the cost of raising capital to rise.

drop in demand the cost of raising the capital needed to finance current activity and new investment rose. The financing difficulties and expectations of a lower level of demand in the future were reflected by a 25 percent fall in investment in the electronics industry in 2001—a turnaround²⁸ after its continuous rise in the 1990s, at the end of which (1999 and 2000) investment stabilized at a level five times higher than at the beginning (1990).

The growth of the electronics industry in the 1990s stemmed from the accelerated expansion of world trade in its products.

Israel has specialized in electronics in the last decade, due *inter alia* to the accelerated expansion of world trade in these products, which grew by an annual average of 12 percent in 1990–2000, compared with only 6 percent for other manufactured products. Israel's electronics industry, most of whose product is destined for export, utilized this development and even enlarged its share of world trade. The growth rate of Israel's electronics exports outstripped that of world trade (19 and 12 percent respectively). After accounting for a proportion of world trade similar to that of all Israeli manufacturing in the early 1990s, Israel's specialization in this field is now apparent.

Table 1.11
Factor Inputs, Productivity, and Cost Per Hour Worked
in Electronics, 1990–2001

	(rate of change, prices)			
	1990–1996	1997–1999	2000	2001
Production	8.8	7.9	32.2	–12.5
Exports	18.4	18.8	69.1	–12.6
Cost per hour worked ^a	4.3	5.4	17.6	6.3
Labor productivity	2.9	3.6	18.5	–7.8
Hours worked	5.6	4.2	11.6	–5.1
Capital stock	9.6	16.5	15.0	9.0
Total factor productivity	1.6	–0.6	17.2	–12.4
Investment	12.0	16.7	0.0	–25.7

^a At output prices.

SOURCE: Based on Central Bureau of Statistics data.

Several factors contributed to the expansion of Israel's high-tech industry and its increased share of the world market.

1. Israel's manufacturing industry underwent a process of deregulation which enabled it to utilize its comparative advantage in human capital and R&D. The increased exposure to competing imports presented Israel's manufacturing industry with a global price ratio that favored human-capital-intensive products to the detriment of traditional industries, where the level of skill was low. As a result, there was greater incentive to divert new investment in physical and human capital away from the traditional industries, which were becoming less profitable, towards the electronic industry.²⁹

²⁸ According to foreign exchange control data, capital raised abroad by Israeli corporations in the electronics industry plunged from \$ 1,068 million in 2000 to \$ 200 million in 2001 (cumulative data to November).

²⁹ The cancellation of the Lavi project at the end of the 1980s diverted human capital from the defense to the civilian electronics industry.

2. The liberalization of Israel's capital markets, and the increasing entry of Israeli firms into world capital markets, made it possible to raise foreign capital by public offerings abroad and through venture capital funds. This enabled greater specialization in electronics and the utilization of Israel's comparative advantage in human-capital-intensive high-tech products without incurring all the costs this involves. Spreading risks between foreign and domestic investors reduces the risk involved in specializing in one industry where volatility is high.
3. The government actively promoted human-capital-intensive industries by means of the Office of the Chief Scientist (see Box 1.4). The subsidization of R&D has increased the demand for engineers and scientists, but because of the supply constraint its effect on expanding R&D is limited, and in the short run it serves mainly to raise wages in required occupations, and to enlarge the demand for studies in these spheres. An enlightened policy aimed at encouraging R&D should enable a parallel increase in the ability of universities and colleges to absorb engineering students, as has in fact occurred. The number of university students taking a first degree in computer sciences was up by 50 percent in 2000 over 1995, and the number studying for a degree in electrical engineering grew by 30 percent between 1997 and 2000.

The process of tariff reduction, the liberalization of the capital market, and government subsidization contributed to the growth of the electronics industry in the 1990s.

Table 1.12
Expenditure of Chief Scientist in Principal Programs, 1990–2001

	(annual average, \$ prices)			
	Incu- bators ^a	Generic and technological	Share of royalties in grants	R&D Law grants
1990–1993	9	1	15	200
1994–1996	25	21	21	275
1997–1999	25	57	38	314
2000	27	66	40	334
2001	25	51		330 ^b

^a Excluding costs of operating incubators.

^b Authorization for commitment.

SOURCE: Based on data from the Office of the Chief Scientist.

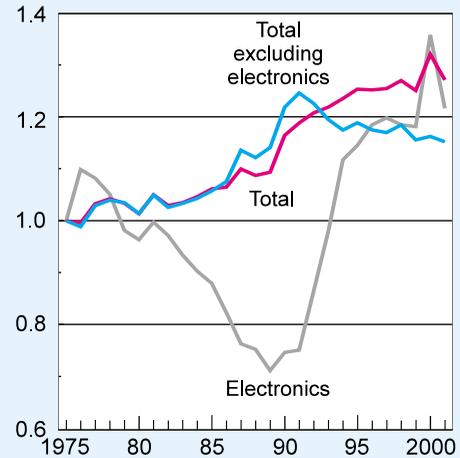
Government intervention also occurs under the provisions of the Capital Investments Law, which provides benefits for investment in physical capital on the periphery. Since most electronics industries are human-capital-intensive, however, the law in its present form provides only limited support. The one exception is the electronic components industry which, since it involves huge investment in physical capital, benefits greatly from government subsidization for locating plants on the periphery.

In view of the considerable government subsidy for R&D in the industry, it is worth examining whether this has led to an increase in productivity (i.e., a rise in product that

Specialization in electronics helped to increase TFP in manufacturing.

does not stem from an increase in labor input or physical capital).³⁰ Since 1975 the rise in the productivity of the electronics industry has been in line with that of TFP in manufacturing (Figure 1.14), even though the R&D capital stock in electronics grew more rapidly. Electronics productivity was greater than that of manufacturing as a whole, however, so that its increased share in manufacturing served to increase productivity. From 1975 to 1993 electronics did not contribute to the increase in productivity of manufacturing as a whole, but since then the situation has changed, and the rise in productivity in manufacturing as a whole has outstripped its increase without the electronics industry.

Figure 1.14
Total Factor Productivity Indices:
Total Manufacturing and
Electronics, 1975–2001



SOURCE: Based on Central Bureau of Statistics data.

Box 1.4

Financing R&D via the Office of the Chief Scientist: An Overview

The government's share of financing business R&D in Israel was 15.3 percent in 1998, far higher than the share in the OECD countries (5.3 percent), but similar to that in the US. Most of the government's involvement is via the programs of the Office of the Chief Scientist, the principal ones of which are reviewed below.

The Encouragement of Research and Development in Manufacturing Law (R&D Law) accords firms a loan of up to 50 percent of the cost of R&D of projects, and up to 66 percent for start-ups. The criteria for funding are the project's ability to lead to an innovation or improvement in a product or production process. In the past, a large proportion of requests for finance (70 percent) were approved. Projects which yielded income were required to pay royalties of 3–5 percent of their sales, eventually covering the full cost of the loan *plus* Labor, while the loan became a grant if a project failed and did not yield any income (see Box 1.5 for a discussion of the law).

Generic and technological R&D: the purpose of this program was to foster cooperation between groups of firms and the academic world, in order to utilize Israel's academic knowledge and create pre-competition know-how that is of economic value and can benefit firms allied in a consortium. The program was

³⁰ Productivity is calculated assuming a Cobb-Douglas function and perfect competition. For the manufacturing industry coefficients of 0.32 for capital and 0.68 for labor were assumed, and the same coefficients were used for the electronics industry.

intended to contend in the most direct way with R&D market failure, where the return to the developer is too low, because the know-how generated spills over to other firms in the industry and benefits them. This market failure is particularly grave in the case of generic knowledge. By building a database of firms while extending generous public finance it is hoped to increase generic R&D to the desired level from the firms' standpoint. The program finances 66 percent of the cost of R&D without requiring royalties, and the extent of the subsidy provided in this framework has grown from \$ 10 million in 1994 to \$ 70 million in 2000.

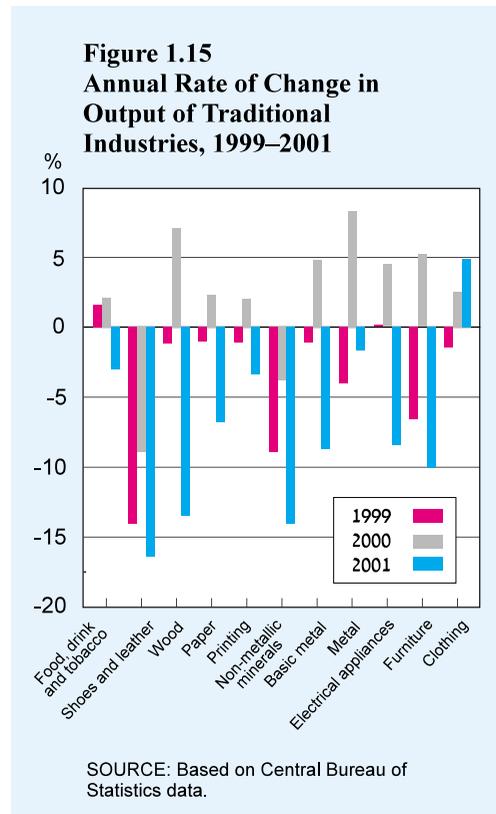
Cooperation between Israeli firms and firms and research entities abroad is particularly important in view of Israel's distance from its target markets. Israel is a member of several funds aimed at encouraging cooperation of this kind, foremost among them the fifth European program for cooperation between research institutions and manufacturing firms. The scope of the program, which has been in operation since 1999 and will end in 2002, is \approx 13.7 billion, of which Israel pays \approx 151.6 million. To date Israeli projects have received \approx 151.6 million, divided between the universities (42 percent), the manufacturing industry (54 percent), and other entities. In addition, Israel is a member of various other bi-national funds, the most important being BIRD, which supports projects in which Israeli and US firms cooperate and distributes \$ 20 million annually. The program has been operation since the late 1970s in a similar form to the R&D Law. The fund extends a loan of up to 50 percent of the cost of the project. Projects that succeed in attaining sales pay the fund royalties of up to 150 percent of the grant (about one percent of revenue), and those that fail are absolved from repaying it.

Incubators: these are intended to help scientists develop innovative commercial products by overcoming market failures that hamper the financing of small, new projects due to asymmetry of information between developer and investor. The object is within two years to accord the developer the ability to raise private capital and continue operating without government support. Currently some 240 projects (about 800 researchers) are functioning within 24 incubators, which assist them in building R&D plans, raising capital, marketing, accounting and legal assistance, etc. State funding for each project is up to \$ 300,000 for two years, and up to 85 percent of the project's budget. In return, the developer transfers to the incubator up to 20 percent of the ownership of the project, and successful projects pay royalties on sales. By the end of 2000, 643 projects had left the incubators, 53 percent of them succeeding in finding finance for continuing their activities, while the rest had failed. Private investment in the projects which found finance amounted to \$ 525 million, while government finance for all the projects which left the incubators was estimated at half that amount. The by-industry distribution of the activity of the incubators in 2001 was as follows: chemistry, 29 percent; electronics, 25 percent; medical equipment and software, 13 percent each.

The traditional industries: the product of the traditional industries contracted by 4.6 percent in 2001, and hours worked fell by 6.5 percent. The output of all the traditional industries which rely on the domestic market (all the traditional industries except textiles) has dropped since the events of October 2000, with the exception of clothing. The industries whose domestic sales account for more than 75 of their revenues are shown in Figure 1.15; the annual growth rate of their output for the year beginning in October 1999 and ending in September 2000 (2000 in the figure) is compared with that for the subsequent year (October 2000 to September 2001) and the preceding one. The figure clearly shows that the output of all the domestic industries rose from October 1999 to September 2000 and slowed in all of them except clothing in the following year. Despite the overlap between the period of this slowdown and the recession, the deceleration of manufacturing production in 2001 should not be ascribed solely to the decline in domestic demand, as this fell more moderately. Domestic uses excluding defense

imports, ships and planes, rose in 2001 (by 2.3 percent from October 2000 to September 2001 compared with 4.5 percent in 2000), and private consumption excluding durables continued to grow at a respectable pace, 4.2 percent, further to its 4.7 percent growth rate in 2000.

Domestic manufacturing industries can be divided into two groups: those producing consumer goods, the demand for which is influenced primarily by changes in private consumption, and those producing intermediates, such as the metals, non-metallic minerals, wood, and paper industries. The growth rate of private consumption has a direct effect on the growth rate of demand for the products of the food, drink, tobacco, clothing, footwear, leather, furniture, and printing and publishing industries. Furthermore, private consumption has an indirect effect on other industries, such as paper, which makes the raw material



for the printing industry, and on the plywood industry, which makes the raw material for the furniture industry. The expansion of production for the domestic market of industries manufacturing consumer goods, and the growth of private consumption and competing imports for these industries, is shown in Table 1.13 (each year does not

include its last quarter, but does include that of the preceding year). It can be seen that the private consumption of clothing, footwear, and furniture accelerated between October 1999 and September 2000, but did not slow down in the year after October 2000. Hence, the fall in the production of the traditional industries can be explained only in part by the development of demand. The table also shows that the growth rate of domestic production in the last two years was far more moderate than that of competing imports—in contrast with 1999, when both imports of consumer goods and private consumption rose moderately.

In general, domestic demand slowed only slightly in 2001, yet some industries were hard hit by the recession. The drastic drop in incoming tourism contributed to the contraction of private consumption of food, drink, and tobacco, while the sharp fall in investment in structures had a deleterious effect on industries producing construction intermediates. Construction activity has plummeted in the last two years (by 8.3 percent in 2001 and 5.7 percent in 2000), reducing demand for manufacturing intermediates, among them non-metallic minerals, and wood and its products. Demand for metals for construction and mining and quarrying also fell (by 8.7 percent in 2001 and 4.3 percent in 2000). These industries (which constitute 7 percent of the manufacturing production index) depend completely on construction, as almost all their product is destined for the domestic market.

The output of the traditional industries rose more moderately in the last two years than that of competing imports.

Table 1.13
Domestic Private Consumption, Imports, and Exports in Selected Domestic Industries, 1999–2001

	(rate of change, percent)								
	1999			2000			2001		
	Production ^a	Imports	Consumption	Production ^a	Imports	Consumption	Production ^a	Imports	Consumption
Food, drink and tobacco	2.4	3.9	0.5	2.1	4.0	4.3	−3.2	9.2	−0.04
Clothing and footwear	−4.3	−1.1	0.5	−0.3	20.0	8.4	6.6	31.0	10.9
Furniture	−7.0	−2.3	−4.0	6.4	23.0	13.7	−2.3	14.4	12.2

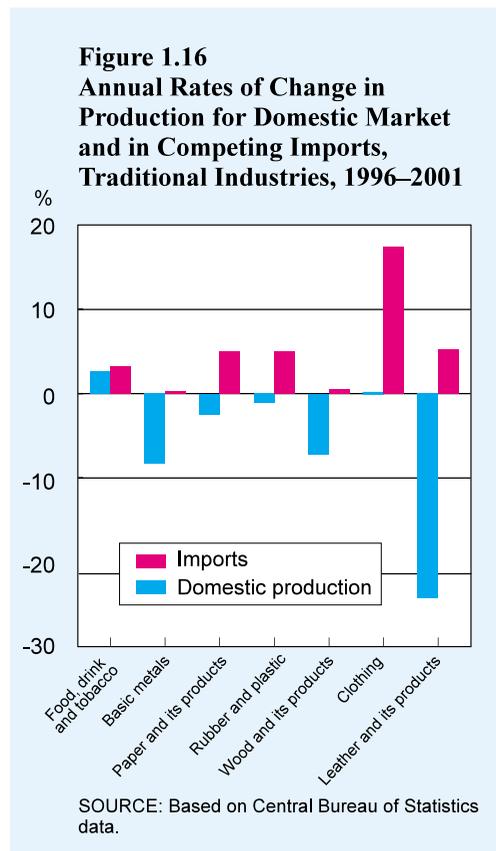
^a Production for domestic market

SOURCE: Private consumption, National Accounts; imports, Foreign Trade data; production, industry indices. The figures are not fully in agreement.

The traditional industries, which are characterized by a low proportion of skilled workers and little R&D investment relative to manufacturing as a whole, and most of whose product is intended for the domestic market, have been experiencing difficulties for some years. The reduction of tariffs on imports from countries which have an abundance of cheap labor exposed these industries' lack of competitiveness and reduced their market share. In addition, the cost of unskilled labor has soared in the last two years, and the industries that were exposed to competing imports were not able to roll costs on to consumers. A comparison of the increase in sales to the domestic market with the rise in competing imports in 1996–2001 shows that the market share of the latter grew at the expense of the former (Figure 1.16). The food, drink, and tobacco industry is the only traditional industry that has managed to increase its sales to the domestic market and maintain its market share. It is no coincidence that this is also the

Industries exposed to competing imports from countries with plenty of cheap labor lost a large part of their market share.

only industry not exposed to competing imports; the other industries that were exposed to imports from countries with large amounts of cheap labor lost a large part of their market share, and this applies particularly to textiles. In the last decade tariffs have been lowered on a wide range of imported goods from third countries (countries with which Israel does not have a free trade agreement). A partial list includes textiles and clothing, footwear, wood, iron, steel, glass, leather, printing, furniture, cosmetics, and ceramics. A review of the development of the share of third countries in total imports of items on which tariffs have been reduced (total imports excluding those from the EU, EFTA, and the US) shows that this share has risen markedly since 1996. While the increase in imports from third countries might displace domestic producers, it could in



some cases cause the price of imported goods to fall, ultimately benefiting domestic consumers without increasing total imports or adversely affecting domestic producers (thus, for example, imports of blankets, bedding, and curtains from third countries have risen). In most cases, however, third-country imports have crowded out both other imports and domestic products (clothing, footwear, glass). The manufacture of plywood has fallen both because of the decline in general demand for it (due to the drop in demand for furniture) and as a result of the larger market share of third-country imports. The tariff-reduction program also included signing free trade agreements with several countries rich in cheap labor (including Mexico, Poland, and Hungary). In 1998 a free trade agreement was signed with Turkey which abolished tariffs on steel imports from there. In 2000 purchase tax was reduced; this had also protected the steel industry and as a result basic metals manufacture plummeted in 2001.

Alongside the increasing competition from countries with plentiful cheap labor, costs per hour worked in Israel's traditional industries rose by more than did output prices. While the real rise in costs per hour worked was accompanied by an increase in labor productivity, the latter derived from a reduction in labor input rather than from improvements in technology and human capital, as is evinced by the decline in TFP. When technological improvements lag behind the rise in wage costs, firms have to reduce labor input and increase capital intensity per hour worked in order to make a

Imports from countries with abundant cheap labor displaced domestic production and imports from other countries.

profit. Since the number of actual hours worked fell while capital stock continued to grow, capital per worker has risen considerably in the last two years, expressed in an increase in labor productivity. Even after the reduction in the number of hours worked, labor productivity still lags behind costs per hour worked. This indicates that the profitability of these industries has declined, so that the number of hours worked may be reduced further.

Costs per hour worked rose considerably in 2001, reducing productivity.

Table 1.14
Share of Imports from Third Countries^a, 1996–2001

	Rate of change, 1997–2000		Share of imports from third countries ^b		
	Imports	Domestic receipts	1996	(percent)	
				1999	2000
Footwear	3.7	–13.2	22.0	40.0	47.0
Clothing	7.1	–2.0	4.0	23.0	42.0
Blankets, bedding, curtains	–1.0	–0.2	15.0	50.0	64.0
Glass and its products	4.4	–2.1	9.0	33.0	37.0
Wood and its products	–12.3	–7.2	2.0	15.0	23.0

^a Rate of change of imports and domestic production of products included in tariff reduction program.

^b State Revenue Authority data

SOURCE: Based on Central Bureau of Statistics data.

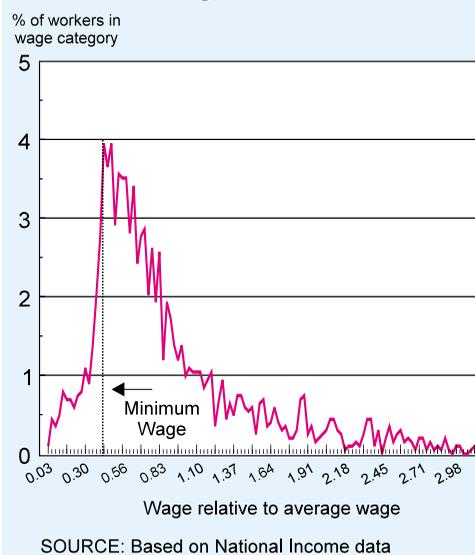
The increase in nominal labor costs in industries which are unskilled-labor-intensive (the traditional industries) was 13 percent in the last two years, while the inflation rate in the same period was only 1.4 percent. The notable rise in the real wage was due in part to expectations that inflation would be higher, the increase in the minimum wage, and an improvement in the quality of the average employee, *inter alia* because workers with low productivity were dismissed.

The last general wage agreement, which was signed in August 1998 and applied until end-2001, was in effect a nominal wage agreement, as it did not include a cost-of-living increment for a rise in the inflation rate of up to 4.25 percent in 2000. Consequently, the lower than expected inflation rate led to a rise in the real wage in that period. Expectations of cumulative price increases in 2000–2001, as derived from the capital market at the end of 1999, were 7.4 percent, while the actual inflation rate was only 1.4 percent. It is difficult to assess the precise effect of the inflation surprise in 2000 on the real wage in 2001, because the surprise effect of previous years diminishes once new wage agreements are signed. Assuming that the wage agreements are for two years, and that half of them were signed at the end of 1999 and half at the end of 2000, it can be assessed that as a result of the unexpected slowing of the inflation rate the real wage at the end of 2001 will be 2.5 percent higher than was predicted at the time the wage agreements were signed.

The inflation rate in the last two years was lower than expected, so that the real wage was higher than employers and employees had expected.

A major factor contributing to the wage hike in the traditional industries was the adjustment of the minimum wage. This could have a substantial effect on employment in the traditional industries as it leads to a permanent increase in labor costs, and hence its influence could be graver than the temporary effect of the inflation surprise. We

Figure 1.17
Distribution of Wage in
Manufacturing, 2000



examined compliance with the Minimum Wage Law in two ways: the distribution of wages in manufacturing on the basis of a survey of incomes, and the increase in wages in the traditional industries after the minimum wage was raised. Compliance with the Minimum Wage Law should alter the distribution of wages in manufacturing so that fewer workers earn a wage that is below the minimum, and the proportion of those whose wage is in the region of the minimum wage is higher than would otherwise be the case. In the first few years after the law went into effect (1987–90) we found that compliance with the Minimum Wage Law³¹ in the business sector was relatively low. An examination of the distribution of wages in 2000 shows that it was only slightly

higher in the area of the minimum wage, and that the proportion of workers in manufacturing who earned less than the minimum wage was relatively large (17 percent). These findings indicate that the rate of compliance with the Minimum Wage Law is relatively low in manufacturing. An analysis over time of compliance with the law yields a different result: the adjustment of the minimum wage every April was accompanied by a steeper wage hike in the traditional industries in the second quarter of the year than in the other quarters.

Table 1.15
Factor Inputs, Productivity, and Cost Per Hour Worked
in Traditional Industries, 1990–2001

	(rate of change, percent)			
	1990–1996	1997–1999	2000	2001
Production	6.5	-0.7	1.6	-4.6
Cost per hour worked ^a	2.4	1.0	4.8	5.9
Labor productivity	2.2	1.6	2.2	2.0
Hours worked	4.2	-2.2	-0.6	-6.5
Capital stock	5.8	4.0	4.2	2.0
Total factor productivity	1.6	-1.0	0.3	-1.6
Investment	-4.3	-3.0	14.4	-10.8

^a At output prices.

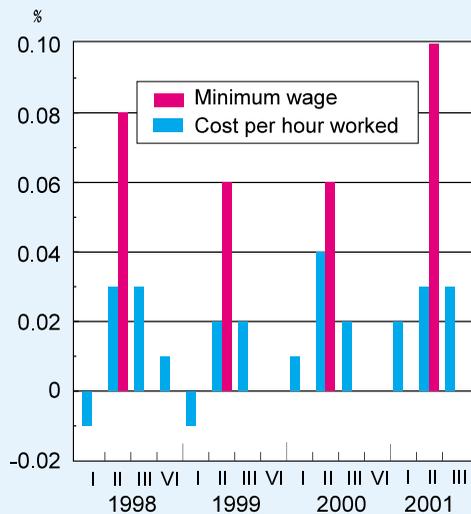
SOURCE: Based on Central Bureau of Statistics data.

³¹ Karnit Flug and Nitza (Kaliner) Kasir (1994), “Adherence to the Minimum Wage in the Business Sector,” Bank of Israel Research Department, *Discussion Paper* no. 94.12 (Hebrew).

In the textile industry, where the proportion of skilled workers is low and that of exports is high, the fall in domestic demand, and exposure to imported intermediates (threads and other raw materials for the industry) served to make it more worthwhile to export than to produce for the domestic market. Nevertheless, textile exports contracted by 8 percent in 2001, and employment in the industry fell by 13 percent. These trends reflect the ongoing decline in the competitiveness of products based on unskilled labor, because of the rise in the real wage (in contrast to production for the domestic market, as exposure to imports improves competitiveness); the high cost of unskilled labor in Israel led some producers to transfer labor-intensive activity to such countries as Jordan and Turkey, where wages are far lower. The average increase in costs per hour worked in the textile industry (10.3 percent) was far higher than in all the traditional industries (5.9 percent), because the workers who were dismissed in this industry were those earning low wages.

The decline in the number of persons employed in the textile industry reflects the lack of competitiveness in producing goods that are cheap-labor-intensive, indicated by the fact that persons dismissed from the industry were those earning low wages.

Figure 1.18
Rate of Change of Labor Costs in Traditional Industries and Rise in Minimum Wage, 1998–2001



SOURCE: Based on Central Bureau of Statistics data.

The mixed industries: the industries in which the proportion of skilled workers is higher than in the traditional industries but are not electronics constitute the third group of industries—the mixed industries.³² This group is less homogeneous than the other two; the proportion of exports in it ranges over a relatively wide range (from 28 to 62 percent), and it employs both skilled and unskilled workers. Heterogeneity characterizes the mixed industries both as a group and as individual industries. Thus, for example, demand for the machines and equipment industry derives from the demand for investment in manufacturing, and the transport vehicles industry includes the manufacture of sailboats, airplanes, and transport equipment—which are both skilled-

labor- and export-intensive—as well as the manufacture of motor vehicles and parts, in which the share of skilled workers and exports is far lower.

The production of all the mixed industries fell by a moderate 0.2 percent in 2001, but their situation was far better than that of both the electronics and the traditional industries, whose production plunged. The decline in labor inputs in the mixed industries

³² These industries are chemicals, oil and refining, transport vehicles, rubber, plastics, machines and equipments, mining and quarrying, and jewelry and objects d’art.

Table 1.16
Factor Inputs, Productivity, and Cost Per Hour Worked
in Mixed Industries, 1990–2001

	(rate of change, percent)			
	1990–1996	1997–1999	2000	2001
Production	7.0	1.9	4.2	–0.2
Cost per hour worked	2.0	0.1	1.9	5.0
Labor productivity	3.2	3.6	1.8	1.5
Hours worked	3.7	–1.6	2.4	–1.7
Capital stock	7.2	6.8	6.8	5.7
Total factor productivity	1.8	0.1	0.0	–1.5
Investment	–7.1	5.6	6.4	6.1

SOURCE: Based on Central Bureau of Statistics data.

The production of all the mixed manufacturing industries fell only moderately in 2001

was also more moderate than in the other two groups. The global and domestic recession impacted on demand for the product of the mixed industries, as evinced by the fact that their output rose far less moderately in 2001 than in 2000. Nonetheless, only some of these industries were affected, and to a slight extent. The output of the transport vehicles industry, much of which is intended for export, did not decline despite the world recession, and that of machines and equipment dipped by only 4.5 percent, in spite of the far sharper drop in total domestic demand for investment in machines and equipment. In general, the decline in investment in domestically-produced machines and equipment was far more moderate in 2001 than in imported machines and equipment (5.9 percent compared with 13.4 percent).

Table 1.17
Share of Industry Capital Stock in Total Manufacturing Capital
Stock,^a 1982, 1992 and 2001

	(share, percent)				
	CBS survey		Estimate of permanent capital stock		
	1982	1992	1982	1992	2001
Mining and quarrying	10.5	6.1	9.4	4.9	6.3
Food, drink, and tobacco	12.2	11.6	15.3	15.6	13.1
Textiles	7.7	7.2	8.5	4.8	3.4
Chemicals and oil	16.8	15.6	16.1	15.0	16.1
Plastic and rubber	4.6	7.3	5.9	7.6	8.1
Non-metallic minerals	5.3	5.5	4.7	5.3	5.2
Metal products	11.6	8.7	10.7	11.1	7.6
Electronics	6.9	13.0	7.3	15.7	21.2
Transport equipment	5.5	5.3	5.6	4.5	3.0

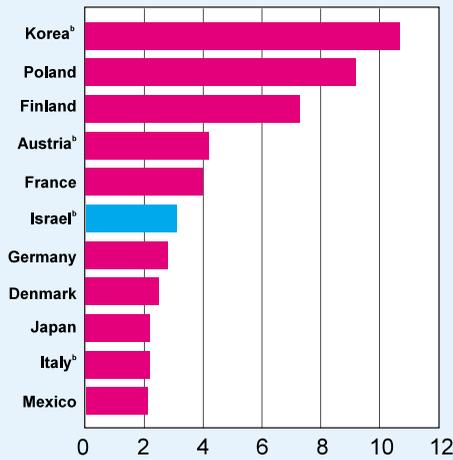
^a According to survey of permanent capital stock.

c. An international comparison

An international comparison of labor productivity in manufacturing in 1999 in Israel and the OECD shows that productivity in Israel is lower than in most advanced economies and similar to that in Spain and Italy. A comparison of the rise in labor productivity in manufacturing in Israel from 1991 to 1999 with that in those countries shows that Israel occupies the median position (Figure 1.19). Nevertheless, the rise in productivity in Israel was far slower than it was in Finland, which also specializes in electronics. An examination of the composition of manufacturing production shows that the share of electronics is far higher in Israel than it is in the other advanced economies. The share of the electronics industry in the advanced economies rises in line with the increase in labor productivity, so that the large share of electronics in Israel is remarkable, especially in view of its relatively low labor productivity. Labor productivity in Israel’s electronics industry is higher than it is in most of the advanced

Manufacturing product per worker is lower in Israel than it is in most developed countries, and similar to that of Spain and Italy.

Figure 1.19
Annual Growth Rate of Labor Productivity in Manufacturing, International Comparison, 1991–1999^a

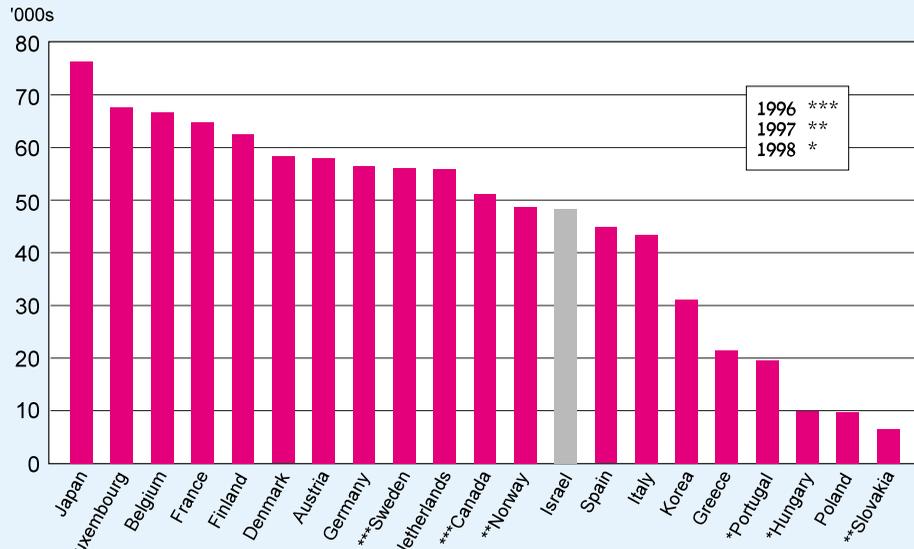


^a Korea and Poland, 1992–1999.
^b Weighted for product per hour worked.
SOURCE: Based on National Accounts of OECD countries.

economies, attesting to the relatively high level of its human capital, R&D, and physical capital. In the traditional industries (food, drink, tobacco, textiles, clothing, leather, wood, and furniture), on the other hand, Israel’s labor productivity is lower than that of the advanced economies, and lower even than in countries whose labor productivity in manufacturing as a whole is similar to Israel’s (Spain and Italy). The share of the traditional industries in manufacturing production in the OECD countries is declining in line with the increase in labor productivity, and the share of the traditional industries is only slightly smaller in Israel than in countries with a similar level of labor productivity. A comparison for 1990 shows that the share of the traditional industries was similar to that in countries with the same level of labor productivity, so that the decline in the extent of the traditional industries in

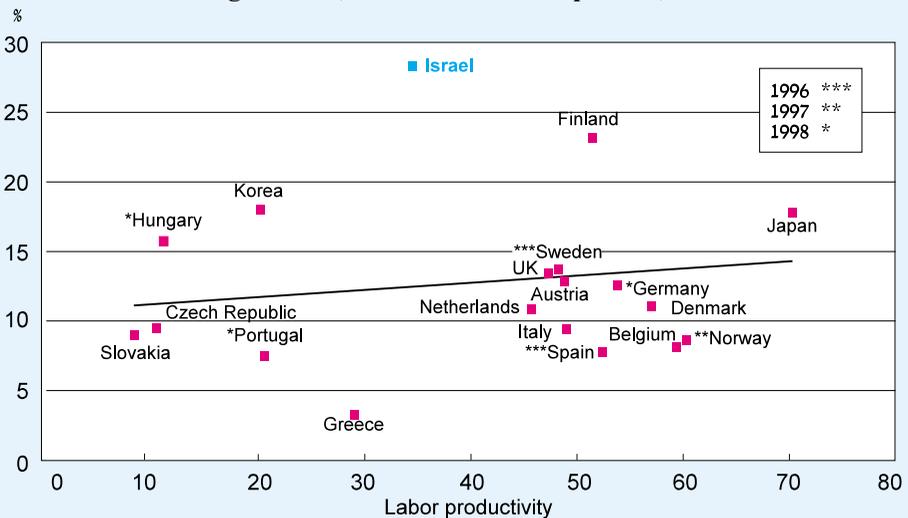
Israel in the last few years was not the result of the excess share of these industries prior to the reduction of tariffs.

Figure 1.20
Labor Productivity in Manufacturing; International Comparison
(OECD countries), 1999



SOURCE: Based on National Accounts of OECD Central Bureau of Statistics data.

Figure 1.21
Correlation Between Overall Labor Productivity^a and Share of Electronics
in Manufacturing Product, International^b Comparison, 1999



^a Calculated from GDP and total employment.

^b OECD countries.

SOURCE: Based on National Accounts of OECD countries.

Box 1.5

The Research and Development Law

The new R&D law (currently going through the Knesset) differs from its predecessor in two respects: it gives more leeway to the Committee for Scientific and Technological Research and Development and determines one clear criterion for obtaining an R&D grant—the extent to which a program will provide extra returns to Israel, over and beyond the gain to the firm. The proposed law also enables know-how and production processes to be transferred abroad—which was forbidden under the previous law. If know-how is sold abroad the loan must be repaid *plus* the return on the project and compensation of up to 20 percent of this amount. The firm requesting the grant can produce the product abroad if this has been declared in advance, but the committee is empowered to approve the transfer of production abroad even after the development stage and in contrast to the announcement, provided 120 percent of the grant is repaid with interest and indexation. The law revokes the current provision restricting the extent of the grant by the type of project (e.g., a lower grant for defense R&D or for improving a product or process); the committee will be free to decide on a grant of between 20 and 50 percent in accordance with the project's extra returns.

The decision-making freedom accorded to the committee is intended to enable it to undertake a close examination of each request without withholding subsidization from projects with marked extra returns. The law's positive or negative contribution to the economy depends crucially on the committee's ability to select projects with extra returns, and this will be addressed below. Griliches¹ makes a distinction between genuine extra returns, such as the spillover of know-how from the development team of one firm to that of another, as occurs with employee mobility, for example, and the externality resulting from the purchase of R&D-intensive inputs, e.g., better computers, which he does not regard as spillover of know-how. The distinction made by Griliches is particularly important for Israel as a small open economy. In the first case, the spillover of know-how from one firm to another through worker mobility, there is justification for subsidizing R&D, as this causes the developing firm to internalize its contribution to other firms in Israel. In the second case, that of selling a product in the goods market, there is no justification for subsidization, as the products developed in Israel are used abroad in the main, and the extra returns of using them are not confined to Israel.

Since, as stated, the rule for R&D should be subsidization as compensation for the know-how that spills over to other firms within the economy thereby benefiting them, more generous subsidization is justified. Hence it is better to subsidize a decentralized industry than a concentrated

one (in cases of extreme concentration, where only one firm operates in an industry, know-how does not spill over to competitors, so that there is no justification for subsidization). Note, however, that there is a dynamic aspect to the spillover effect: in fledgling industries, especially in the area of biotechnology, there are currently only a few firms but the industry is expected to expand rapidly, and there is a chance that the know-how created in it will benefit firms yet to be established. Naturally, it is preferable to subsidize know-how that serves various uses than specific know-how (as was the case with the generic and technological R&D program), and subsidization should be accorded especially in areas where patents are not applicable.

The object of the R&D law is to increase domestic expenditure on R&D with extra returns. The question that arises is whether it achieves its aim, but because of the difficulty of examining the extra returns of R&D, it is by no means easy to answer it. A recent study² examined the contribution of the grants extended by the Chief Scientist to increased R&D expenditure by manufacturing firms, but not whether and to what extent the increased R&D expenditure yielded extra returns. While under the current law public finance is matched with private investment in order to increase private expenditure on R&D, the public subsidy cannot be expected to cause private R&D expenditure to double. Public finance could even displace private finance, as it is sometimes extended to projects that would have been implemented without a subsidy, and firms can divert their R&D budgets from unsubsidized to subsidized projects. The study found that public subsidization of R&D increased private expenditure on it, and that on average, in 1990–95 each shekel allotted for R&D by the Chief Scientist increased total private R&D expenditure by 0.4 shekels. Although private financing of R&D did not increase in the year the grant was allocated or the subsequent year, it increased in the year after that.

¹ Zvi Griliches (1995), "R&D and Productivity: Economic Results and Measurement Issues," in Paul Stoneman (ed.), *Handbook of the Economics of Innovation and Technological Change*, Blackwell, Oxford.

² Saul Lach (2000), "Do R&D Subsidies Stimulate or Displace Private R&D? Evidence from Israel," *Science, Technology and Economy Program (STE)*, working papers series.

Box 1.6 Permanent Capital Stock of Manufacturing Industries

There are two ways of calculating the capital stock of the various industries. The first is to make a direct estimation on the basis of a capital stock survey, something that is done every ten years and assesses the stock of equipment, structures, and vehicles in each two-digit industry. The second, which is the one adopted here, is to make an indirect estimation on the basis of the

investment data collected by the Central Bureau of Statistics (CBS). Since these data are collected regularly, this method enables capital stock to be estimated on an annual basis; these estimates also make it possible to calculate the productivity of the various industries.

We estimated the capital stock of equipment, structures, and vehicles of each of the 18 two-digit manufacturing industries. These estimations were updated in 2001, and the three stages of the calculation are described below:

1. The base year for capital stock is the beginning of 1969, when an exhaustive survey was undertaken to obtain a direct estimation of the capital stock of each industry, and from that we extrapolated the capital stock for the last few years. Capital stock at the beginning of 1970 is what it was in 1969 *plus* investment in 1969 *less* discards, which is an estimate of the capital stock that has become scrap in that year.

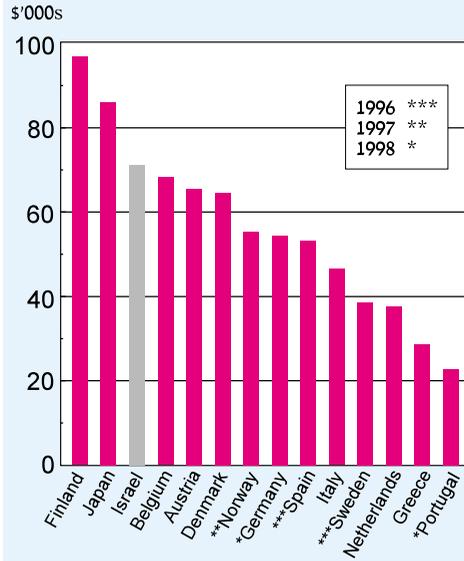
2. Investment series: the CBS publishes a series of total investment in manufacturing, but no series for investment in specific industries. In order to construct detailed series we used the industry surveys that specify investment in each three-digit industry. The estimation of investment in each of these is a multiple of the industry's share of investment (on the basis of the industry survey) in total manufacturing investment. This system has disadvantages. First, the weights accorded by the industry survey are updated only every few years, which detracts from the validity of the survey. Second, industry surveys are not undertaken every year (in which case the estimate is based on investment in imported equipment, as was done in the past).

3. The calculation of discards: estimates of the lifetime of equipment, structures, and vehicles are the same as those used in the past: 10–15 years for equipment; 25 years for structures; 7 years for vehicles. The general view is that the lifetime of equipment has grown shorter in recent years, but an estimate of the lifetime of manufacturing equipment in the US (1995 data) found that the average lifetime is 14 years, similar to our assumptions.¹ Note that the asset is subtracted from capital stock over a period representing 40 percent of its lifetime; for example, if a structure was erected in 1975, use of it will decline gradually over ten years from 1995 to 2005.

In order to examine the estimates of permanent capital stock, we compared them with those obtained from the CBS surveys of capital stock for 1982 and 1992. The comparison in the table focuses on the share of the industry capital stock in total manufacturing capital stock. With regard to the latter, we found that the estimate of total capital stock in 1992 was 16 percent higher than in the CBS survey, while in 1982 it was 10 percent lower.

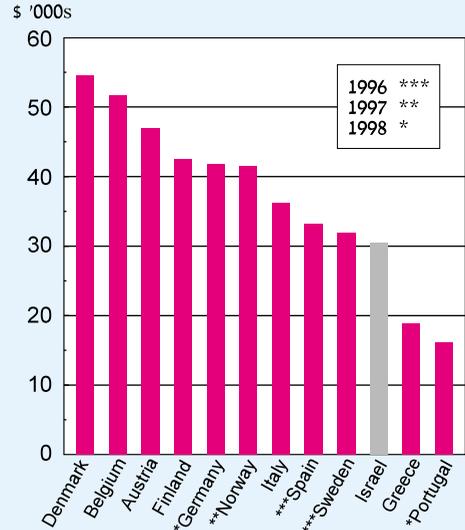
¹ Yigal Menashe (1998), "A Comparison Between Lifetimes of Equipment Capital Stock in the 1990s in Israel and the US," unpublished internal memorandum, Bank of Israel Research Department (Hebrew).

Figure 1.22
Labor Productivity in Electronics,
International Comparison (OECD
countries), 1999



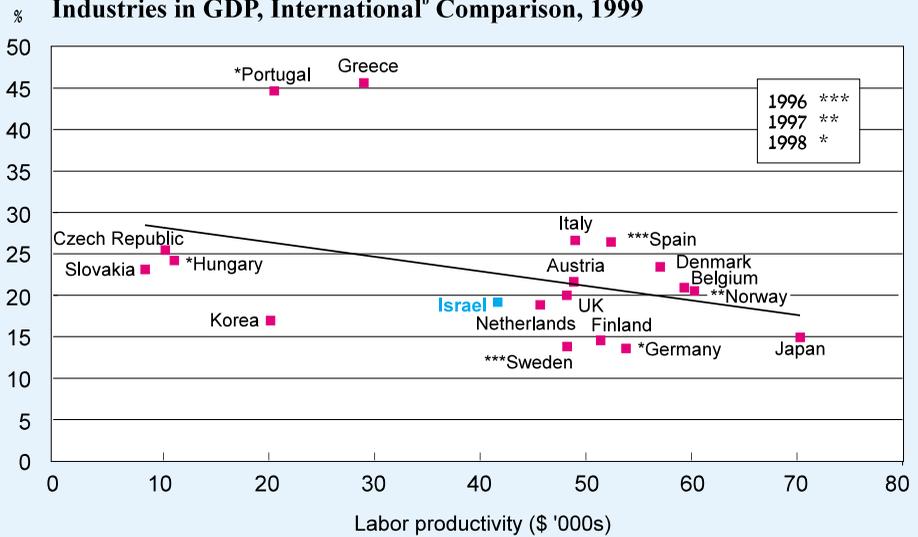
SOURCE: Based on National Accounts of OECD countries.

Figure 1.23
Labor Productivity in Traditional
Industries, International
Comparison (OECD countries), 1999



SOURCE: Based on National Accounts of OECD countries.

Figure 1.24
Correlation Between Overall Labor Productivity^a and Share of Traditional
Industries in GDP, International^b Comparison, 1999



^a Calculated from GDP and total employment.

^b OECD countries.

SOURCE: Based on National Accounts of OECD countries.