JULKAISUJA
PUBLICATIONS 1

FINLAND 1990 – 2005
A TIME OF CHALLENGE AND PREPARATION

VALTION TALOUDELLINEN TUTKIMUSKESKUS
Government Institute For Economic Research

VATT-julkaisuja 1
VATT-publications

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ISBN 951-47-4409-8
ISSN 0788-4990

Government Institute for Economic Research
Hämeentie 3, 00530 Helsinki, Finland

Government Printing Centre
Helsinki 1991

Antti Romppanen (ed.)
Anne Ruohonen (translation)

Government Institute for Economic Research: Finland 1990-2005
A Time of Challenge and Preparation. Government Printing Centre. Helsinki 1991.

Abstract

The title of the publication "Finland 1990-2005 - A Time of Challenge and Preparation" shows the main features of the report. The international economic integration, the growing global and local environmental problems, and the changes in the population age structure are the main starting points in this long term scenario for the Finnish economy.

Finland will adapt to the international division of labour through the European cooperation. Because the labour input will diminish and the growth rate of labour productivity will be somewhat slower than in the past, the growth of total production will remain about 2,5 per cent per year.

The prevention of environmental damages will be the greatest challenge for the world economy. More effective international cooperation in environmental issues is necessary. Tighter environmental standards and higher energy taxes will raise the real price of energy thus making energy intensive products more expensive and leading to structural changes in production.

In order to decrease the net foreign debt a bigger part of investments must be financed from domestic sources than at the present. In the long run, the change in the population age structure, the improving pension security and the diminishing need to save for housing can keep the households' saving ratio low. If the saving of households will continue to remain low, the saving in the employment pension funds and the public sector saving must be kept on a high level.

The growth of public expenditures can be slower than in the past because of a favourable age structure of the population. During the next 15 years, public expenditures can be financed within the recent tax rate. However, the pressure on public sector expenditures will increase after the year 2005 when the expenditures on pensions and senior citizens' services begin to increase sharply. This requires growing efforts in raising the efficiency of the public sector during this decade.

Key words: long-term development, international economy, environment, public sector

FOREWORD

The current decade presents a time of challenge and preparation to Finland. The economic integration of Europe implies a continuing structural change in production and presumes higher productivity and labour market flexibility. Environmental problems are another great challenge for Finland. The environment, energy and growth form an entity which requires sustainable and internationally acceptable solutions. Finland has to take care of her share of international solidarity.

Early next millennium, pension, health, and social expenditures will rise sharply. The slow growth of public expenditures in this decade is one means of preparing for these changes. It is essential to slow down early retirement and to raise the level of funding for pensions. Also, it is important for the future that the level of savings remains adequate in Finland. Income distribution conflicts between generations and population groups must not be aggravated.

'Finland 1990-2005 - a time of challenge and preparation' is the fifth long-term development forecast prepared by the Economic Planning Centre. The translation of this English summary has been prepared by Anne Ruohonen.

December 1990

Seppo Leppänen

Contents

1. INTERNATIONAL DEVELOPMENTS

1.1. Tri-polar world economy

This century has been marked by a division of the world economy into market economy countries and planned economy countries. This division is now being removed sharply. Planned economy countries have increased their market orientation or tried to move rapidly into market economy systems. The change and deepening of the international division of labour is an evident result of this.

The world economy is changing - economic regions lead by the USA, Japan and Europe are forming a tri-polar system directed by the regions' internal and mutual economic relations.

In addition to West Europe, East European countries seeking new development, Middle East and the Mediterranean region's northern African countries are part of the European economic region. Other African countries as well strengthen their economic relations with Europe.

The USA and Canada form a relatively uniform economic region based on their free trade agreement. Mexico and other Latin American countries tighten their mutual economic links and are directed more and more towards North American markets.

Japan and South-East Asia's newly industrialized countries (NIEs), India and China form a strongly growing region together with other Asian countries. Australia and New Zealand are in contact with all the three main regions, but their geographical positions emphasize the significance of Asia.

In 1987, Europe's and Africa's share in the world output was approximately 35 per cent, the share of the Americas was approximately 38 per cent, and the share of Asia and Oceania only about 27 per cent.

A notable share of the world's trade is conducted within the greater regions. Almost three quarters of Europe's and Africa's trade is internal. More than half of the Americas' countries' trade is conducted internally. One-quarter of Asia's exports is directed to Europe, one-third to the Americas and more than 40 per cent takes place within the continent itself.

In the tri-polar world economy in the future there will be three main currencies: US dollar, Japanese yen and ECU of the EMS, which in the long term will become a uniform currency on the European domestic market. The rates of exchange will be relatively stable in each of the three currency-regions. This means that the monetary and financial policies of the developed countries within the currency region are going to be fairly harmonized.

World population development

In 1990, close to 60 per cent of the world population lives in Asia and Oceania. In Europe and Africa lives one quarter of the world population and 1/7 in the Americas. Since 1960 the population share of Europe and Africa has fallen and the population share of Asia has risen. By the year 2010 the rapid growth of population in Africa will offset the slow growth in Europe and their combined share of population will grow.

The growth of population in West Europe is predicted to stop early 21st century. It will continue only in South European countries. In East European countries as well, the growth of population will either continue slowly or fall.

Table 1.1. Growth of population 1960-2020, % per year

	1960-1970	1970-1980	1980-1990	1990-2000	2000-2010	2010-2020
OECD-Europe[1)]	0,8	0,5	0,3	0,1	-0,0	-0,1
North America	1,5	1,1	0,9	0,7	0,6	0,5
Japan	1,1	1,1	0,5	0,4	0,1	-0,2
Finland	0,4	0,3	0,3	0,0	-0,0	-0,2

1) Unweighted average, excluding Turkey

Source: OECD 1988, Ageing Population, The Social Policy Implications. Paris.

The growth of population in North America is quite rapid in the 1990s and the first decade in the 21st century. In 2030 the population is predicted to be a third bigger than what it is at the moment. A large part of the growth is caused by immigration. Especially the immigration of the highly educated brings dynamics and know-how to the development of the region.

In Japan the growth of population until the year 1980 was close to the level of the USA. The growth slowed down sharply during the 1980s and will remain slow until the year 2010. In the period 2010-2030 her population will decline even faster than in Europe.

In West Europe the ratio of the population over 65 years of age to population of working age is clearly higher than in North America and Japan. During the first decades in the 21st century, the population of Europe will be notably more aged than in the USA or Canada. On the other hand, the age structure of Japan "europeanizes" after the year 2000. In Japan in 2010, the ratio of population over 64 years to the working age population will be clearly higher than in West Europe.

Table 1.2. Old-age dependency ratio: population over 64 years of age to 100 of working age

	1950	1980	1990	2000	2010	2020
OECD-Europe[1)]	14,2	21,4	21,1	22,9	25,0	29,0
North America	12,5	16,8	18,4	18,3	19,1	25,4
Japan	8,8	13,5	16,2	22,6	29,5	33,6
Finland	10,6	17,6	19,4	21,3	24,9	34,8

1) Excluding Turkey

Source: OECD 1988. Reforming Public Pensions. Social Policy Studies No. 5. Paris.

The rapid ageing of population in Europe reduces occupational and regional mobility already in the 1990s. While the labour market reaction to the change in markets and technology should be more flexible, Europe's age structure stands in contradiction to this aim. In Japan the corresponding situation begins to affect the labour market after the year 2000. In the North American economies, on the other hand, the ratio of the population of pensionable age to the working age population is substantially more balanced.

Education bears an essential effect on longer term economic development. The major part of the European population of working age has received only primary education. In Japan two-thirds and in the USA three-quarters of the population have received at least secondary education.

With regard to higher education as well, Japan and the USA have a start over Europe. Almost 20 per cent of the North American and 10 per cent of the Japanese working age population have received university level education, whereas the corresponding rate in Europe is approximately 7 per cent.

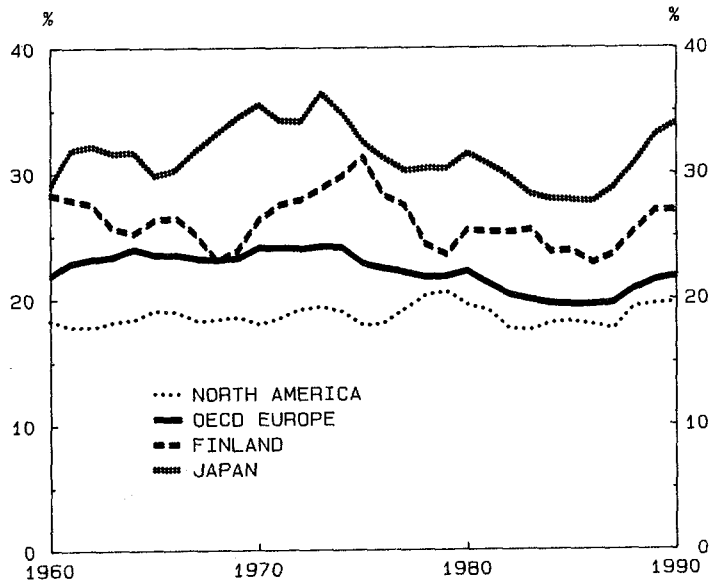
The formal level of education in the USA and Japan seems to be better than in OECD-Europe. On the other hand, the comparison is complicated by differences in the quality of education. According to international comparative studies, the quality of basic and, for some parts, intermediate

education in the USA, does not reach the level of education in several European countries or Japan. On the other hand the level of universities in the USA is comparable to the level of European and Japanese universities.

Capital stock, investment and technological development

During the past decades the share of gross investment in GDP has been essentially higher in Japan, than in Europe and North America. Also, Finland's level of investment has been clearly higher than elsewhere in Europe or North America, but lower than in Japan.

Figure 1.1. The share of gross investment in GDP in 1960-1990, per cent



Source: OECD

During the second half of the past decade, investments recovered everywhere. The level of investment in Europe has been higher than in North America, but in the 1980s the difference has been relatively minor. The Japanese capital

stock in the beginning of the 1990s, is fundamentally more modern than in the USA or in Europe.

Table 1.3. Growth of labour productivity and its components in the business sector in 1960-1988, % per year

	Growth of labour productivity	Effect of change in capital intensity	Effect of change in total factor productivity
		1960-1973	
OECD-Europe	5,0	1,7	3,3
North America	2,3	0,7	1,6
Japan	9,4	3,0	6,4
Finland	5,0	1,6	3,4
		1973-1979	
OECD-Europe	2,7	1,2	1,5
North America	0,2	0,5	-0,3
Japan	3,2	1,4	1,8
Finland	3,4	1,7	1,7
		1979-1988	
OECD-Europe	2,1	0,9	1,2
North America	1,0	0,6	0,4
Japan	3,1	1,3	1,8
Finland	3,2	0,9	2,3

Source: OECD Economic Outlook 46 (1989).

Investments, by far, determine the speed of introduction of new technology. Technological development is measured by growth of total factor productivity. Total factor productivity has risen faster in Japan and Europe than in the USA, which was technologically the most developed country after the World War II. Other countries, however, have succeeded in reducing the technological gap.

An impetus to the development of technology and economic growth has been given by directing funds to research and development. In the USA and Japan the share of these expenses

in the national product in the second half of the 1980s was a little less than 3 per cent. In the large European countries, excluding Germany, the corresponding share is somewhat smaller.

In Japan, research and development efforts are financed mainly by companies. Commercial applicability of innovations is therefore quite good. Process innovations, ability to imitate quickly, and applying and improving the already existing technology have been characteristic of the Japanese technological development.

Public sector's share in R&D investment is clearly higher in the USA due to research done for military purposes. This slows down the market application of innovations. In the USA, a lot more basic research is carried out than in Europe and Japan.

In Europe more funds were directed to research and development after the middle of the 1980s when international comparisons had revealed her technological underdevelopment in comparison to Japan and the USA. Within the framework of the European Community several development projects have been launched, in which countries outside the Community have also been able to participate.

Technology competition between the regions is growing, especially in the area of strategically important technology. The development of other areas is critically dependent on the level of this kind of key technology, such as biotechnology, new materials, electronics and space technology.

Technology policy is becoming more and more important as a means of competition in the international trade. In the area of strategic technology countries aim at self-sufficiency e.g. by protecting domestically invented technology and know-how. Technology subsidy has been, at least for the time being, viewed more tolerantly than the traditional trade barriers, direct export subsidies and import limitations.

1.2. Th int gration of Europ

The integration of Europe's internal markets is removing restrictions which have prevented companies from operating efficiently. The European Commission's report on the forming of the European single market predicts the following effects:

a. Sizes of production units and companies grow. Economies of scale lead to cost reductions.

b. Increased competition raises the efficiency of companies and improves cost responsiveness of prices.

c. Utilizing comparative advantages in the single market increases division of labour.

d. Integrated markets' dynamics increases innovations and brings about more efficient production methods and new products.

From the individual country's viewpoint the effects can also be negative. The production structure may become narrow and a lot of jobs may be lost in the peripheral areas. EC Commission's forecast, predicting that even after a difficult adaptation period the effects of the integration on growth and employment would be positive, can work out differently in various areas.

The position of various population groups can also vary in the integration process. For example the increasing mobility of labour force may open up new possibilities for young, educated men. On the other hand, unskilled labour force with poor knowledge of foreign languages may become a "pushover" in the economy, a reserve to be moved where cheap labour force is required at any given time. A family restrains women more often than men from taking advantage of advancing possibilities opened up by the mobility. Therefore, there is a danger of the labour market becoming more differentiated according to the mobility potential.

The development of integrated markets would speed up economic growth in Finland. This speeding up would be mainly caused by the strengthening of export demand in the most important market area. Almost two-thirds of the Finnish exports are directed to the EC and EFTA markets.

In Finland, like in EC countries, the closed sector operates inefficiently. The development of a European economic space will strengthen competition in agriculture, food production industry, construction industry, banking and insurance, wholesale trade, transport and other until now sheltered activities.

Finland's internationalization has been speeded up in the 1980s by the rapid liberalization of capital movements, which has given Finnish companies a possibility to operate on the international capital markets on equal conditions compared to competitors abroad.

The internationalization of companies has been a universal phenomenon, speeded up to some extent by the European integration. Finnish companies would have become internationalized even irrespective of the EC common market programme. Investments, however, would have been directed more towards South-East Asia and North America.

In the second half of the 1980s, medium-sized and large export companies have increased their direct investments to the EC markets. This has been caused by optimistic expectations of the growth possibilities opened up by, and fear of being excluded in, the integrated markets. The most popular investment countries have been the Republic of Germany and Great Britain. The greatest investors have been the metal, paper and chemical industries.

The reasons for the increasing willingness to expand activities abroad have been, apart from the expectations on the common markets, the small size of the domestic markets, high production costs in Finland, and shortage of labour

force in certain sectors. The foreign investments' effects on domestic employment depend on whether they replace or support domestic production. For the time being Finland has not succeeded well in attracting foreign investors. The possible removal of limits on foreign ownership may change the situation.

OECD countries' direct foreign investments in 1971-1987

The importance of direct foreign investments varies notably in OECD countries. In Figure 1.2. direct foreign investments from and to the country are expressed as a proportion of each country's domestic capital formation.

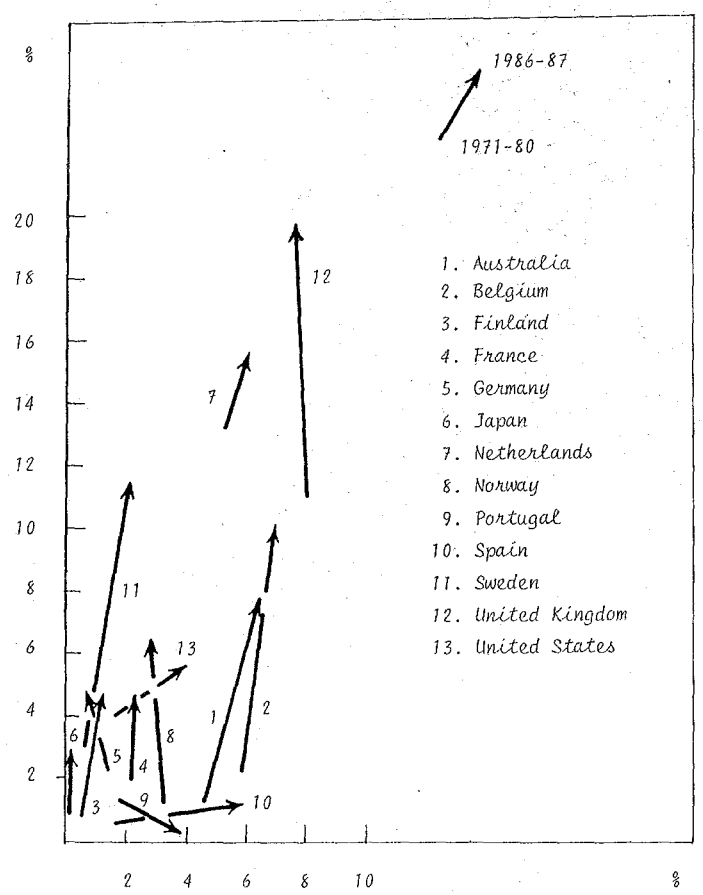
OECD countries' foreign investments have been, almost without exception, larger than investments from abroad to the OECD countries. Investment flows have also grown strongly.

In England and the Netherlands during the second half of the 1980s, direct foreign investment outflows in relation to domestic capital formation have been around 16-20 per cent and the share has grown in comparison to the 1970s. On the other hand, investment inflows to these countries, cover approximately 6-8 per cent of the domestic investments. Other countries which can be included in this group are Australia and Belgium, in which both investment flows cover 6-10 per cent of domestic investments. Still in the 1970s, both countries were, above all, target areas for investments.

Another group is formed by countries, to which foreign investments have been high in comparison to capital outflows and domestic investment. The poorest EC member countries, Spain, Portugal, Greek and Ireland are included in this group. The share of investments to each of these countries is around 4-6 per cent, but the investment flow out of these countries is only about one per cent. Especially Spain's position as a target country to investments, has been strengthened in the 1980s.

In the majority of OECD countries the ratio of foreign investments to domestic investments has grown. The growth has been fastest in Sweden, Norway and Finland. To this group belong also Germany, France, and Japan. The ratio of inward foreign investments to domestic investment, is marginal and it has remained unchanged.

Figure 1.2. The ratio of foreign direct investments to gross investments in selected countries, average in 1971-1980 and 1986-1987, per cent



Source: OECD

The EFTA countries have reduced their investments to the USA and increased their investments to the EC countries correspondingly. Japanese companies as well have strengthened their investments to the EC markets.

1.3. Economic outlook in East Europe

Economic reforms in the USSR have progressed slowly. Applying market mechanism to the economy has not advanced markedly and a price reform has been postponed. Even if the reforms prove to be successful the recovery of the Soviet economy will be slow at least until the turn of the millenium. It takes tens of years to adopt and apply new economic thinking. The price structure and stimuli should become operative, the prices should reflect the needs and scarcities, in which case relative prices would have a central role in allocating the resources.

Even if the Soviet economy's efficiency - provided that the change of management systems proved successful - started rising in the 1990s, the economy still has massive problems to resolve, which were caused by the negligence in the past and which mainly tie up the new capital as well as capital channelled from abroad and other resources. The Soviet economy has accumulated large investment requirements both in the industrial and service sectors as well as in environmental protection. At the same time, improving the consumption level is necessary to maintain work motivation.

Environmental protection arises as a central issue in the economic relations between Finland and the USSR. The major part of Finnish atmosphere's foreign pollution originate in the USSR and other East European countries. It is crucial to Finland that harmful emissions in the USSR are limited. Since the Soviet economy is facing an enormous investment task, environmental protection matters may be compromised or the country's own technological level may be inadequate to resolve these problems. In the Finnish-USSR cooperation,

limiting Kola's, Leningrad's and Estonia's emissions should be included in Finland's priorities already in the next few years.

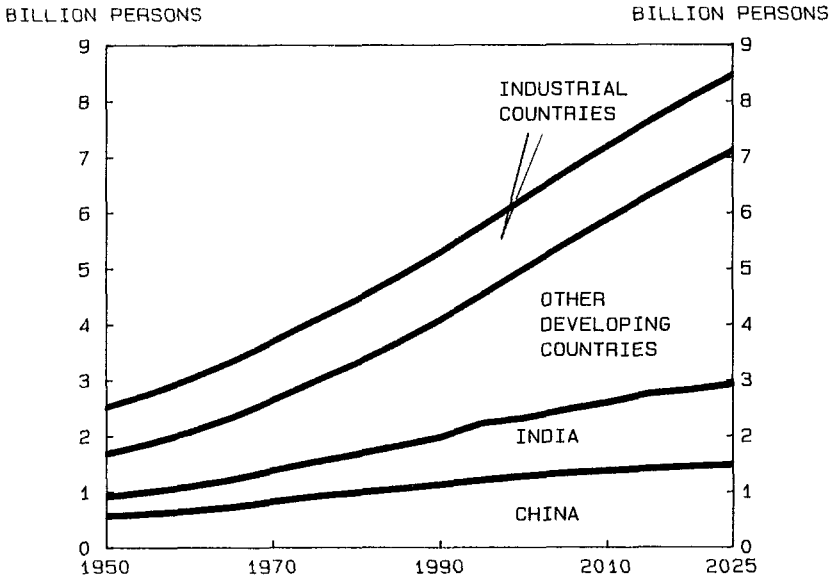
The recent changes in the small East European countries have been extensive. Most of these countries are aiming at moving to market economy systems. This presumes a thorough renewal of the price structure and other structural impediments. Economic reforms require also the transfer to convertible currencies.

The economic situation in East European countries, however, may remain difficult for a long time. The reconstruction of East Europe can only take place in stages. With help from West Europe a cooperation network can be established, to which extensive educational schemes on technology, company management, etc. can be linked. The reconstruction of East Europe implies a boost to the West European national economies as well. From the West European perspective it is crucial to immediately try to assist in environmental protection and to increase the efficiency of the USSR's raw material sector.

1.4. The future of developing countries

The explosive increase in population has been a central factor in developing countries in the past decades. It is also expected to continue in the beginning of the next millennium. The population increase is especially large, apart from China, in densely populated countries such as India, Brazil, Indonesia, Pakistan and Nigeria.

Figure 1.3. World population 1950-2025, billion persons



Source: World Population Prospects, UN. Population Studies No. 106. New York, 1989.

In the 1980s, differences between the developing countries grew, which made it more and more difficult to examine them as a single entity. Some South-East Asian countries, which have earlier been considered developing countries, have industrialized very rapidly. Middle East oil exporting countries are considered developing countries although the average level of income in some of them is very high.

The majority of developing countries has not achieved satisfactory economic growth. In many African and Latin American countries per capita income has gone down in the 1980s. The per capita growth in these countries may remain low in the 1990s as well, mainly because of the rapid growth of population.

Table 1.4. Economic growth in developing countries in 1965-1988, % per year

Country group	GDP		Per capita income	
	1965-1980	1980-1988	1965-1980	1980-1988
All developing countries	5,9	4,0	3,6	2,0
Sub-Saharan countries	5,1	0,5	2,4	-2,5
Asia	6,1	7,3	3,8	5,5
European low-income countries, Middle-East and North Africa	6,2	2,9	4,2	0,7
America	6,0	1,7	3,5	-0,6

Source: World Development Report 1989.

Problems in the poorest countries include indebtedness and high level of interest payments, falling raw material prices, capital flight, and export barriers. The turn in the direction of net financing flows from developing countries to industrialized countries has lowered investments and production possibilities of developing countries.

A reduction in the level of income in Sub-Saharan countries in the past decade is caused by the reduction in the value of exports together with the fall of raw material prices. The share of raw material exports is 90 per cent of the area's exports. The annual debt service corresponds to approximately two-thirds of the export revenues. Civil wars and corruption have added to the economic instability in the area.

In most of the developing countries the rapid population increase is the biggest obstacle to economic and social development. Although the rate of birth is going down in all developing countries, excluding Sub-Saharan countries, the reduction has not been fast enough. If the current trend of development continues, the world population exceeds the limit

of 6 billion people at the end of this century. Eight out of ten people will live in developing countries.

The debt problem is still critical in several developing countries. In the years 1983-1988 for example Latin American countries' capital outflow was, because of interest payments and installments, 135 billion dollars bigger than the inflow of capital. The high debt keeps the level of investments low. In several countries, investments do not exceed the consumption of capital stock. Production is reduced or grows slower than the population.

Environmental damage in several developing countries erodes resources that the growing population would need in the future. Developing countries' strong growth of population, consumption of wood as a source of energy, and felling of forests for agriculture's needs burdens the environment's bearing capacity. If, for example, China and India used energy and raw materials and discharged waste to the environment per capita as much as the developed industrialized countries on the average, it would be difficult to avoid a global environmental catastrophe.

The new stage of development in East-West relations may diminish the industrialized countries' interest and possibilities to increase development aid to developing countries. The reconstruction of East European economies requires massive investment flows from western countries. East Europe is economically and geographically close to industrialized countries, which also want to support East European political development. Scepticism on the effects of development aid may also restrict its growth. This kind of development would complicate the situation in developing countries even further.

A considerable part of developing countries' exports consists of agricultural products. Trade restrictions on processed agricultural products are often an obstacle to further processing, and have been especially harmful to developing countries.

Finland's level of foreign trade with developing countries is exceptionally low. No other OECD country's shares of developing country imports and exports in foreign trade are as low as Finland's'. In 1987, developing countries' share of Finland's total imports was 6 per cent and their share of total exports a little over 7 per cent. Developing countries' share in OECD countries' foreign trade is on the average 25 per cent. The low level of trade with developing countries is partly explained by the fact that Finland buys her crude oil from the USSR, whereas many OECD countries purchase their crude oil mainly from countries which are classified as developing countries. Only approximately 3 per cent of Finnish imports of industrial products comes from developing countries, while the corresponding figure in OECD countries is around 11 per cent.

The success of the Asian Tigers: an example of a transfer from a developing country to an industrialized country

The fast development of certain Asian countries in the past twenty years has markedly influenced the world trade structure. The rapidly industrialized Asian Tigers, i.e. South-Korea, Taiwan, Hongkong and Singapore (NIEs) have penetrated the industrialized countries' markets and superseded industrialized country production by their competitive exports. At the same time these countries have offered growing export markets to industrialized countries. The newly industrialized Asian countries present an example to the developing countries on how a country poor in raw materials can free herself from the poverty drive with a sustained development programme. During the past decade the average annual growth of the national product in Asia's newly industrialized economies (the Tigers) was over 6 per cent.

The Asian Tigers' export achievements have been based on cheap and well educated labour, long working hours, high level of investment, currency depreciation, and a strongly outward-oriented development strategy. Industrialization has

also been stimulated by capital and skills which have been brought about by industrialized countries' multinational companies which have established their operations in these countries. This is how the Tigers have acquired new production and management systems, which have been quickly absorbed by their own companies.

Shortage of labour and the raised level of professional skills and education have in the 1980s lead to a brisk rise in real income in Asia's newly industrialized economies. Labour-intensive low cost production is gradually moving to countries that have lower levels of wages and prices. These newly industrializing countries, like Thailand, Malaysia, and Indonesia, have during the next 10-15 years an opportunity to such rapid economic growth as countries similar to Japan and Korea have experienced. Due to the changing competition situation, industrial production in traditional NIEs is more and more directed towards high technology products and investment goods.

Deficient infrastructure, low level of education, bureaucracy and corruption form obstacles to the development of potential industrialized countries. Solving economy's structural problems is another precondition for growth. For example, India and China have notable power resources, but the utilization of these assets is limited by the weak economic control due to internal contradictions and deficiencies in education. The development of Latin American countries is weakened by large foreign debt, corruption and unstable political situation.

2. CONNECTIONS BETWEEN THE ENVIRONMENT AND THE ECONOMY

2.1. Sustainable development

Environmental and economic activities are inseparably connected. Environment provides natural resources that are used as inputs in production activities. On the other hand, production and consumption activities create waste which deteriorates the state of the environment.

The principle of sustainable development presumes changes in the level and structure of production and consumption. Part of raw materials is renewable resources that can be recycled in the production. At the same time emissions to the environment are reduced. An effort should be made to find ways to replace non-renewable resources which cannot be recycled, with renewable resources. Technological development plays an important role in changing production techniques to fit sustainable use of the environment.

Transferring resources to environmental protection presumes compromising the growth of material well-being. By tightening emission standards or by means of taxation, consumption and production structures can be steered towards environment saving practices.

Limiting the use of environment in Finland has so far been achieved mainly by legal regulation. This has been implemented by various emission standards, regulations on products and monitoring. The advantage in regulatory instruments is that they are quite successful in limiting emissions to a level set by emission standards, i.e. they are efficient in reaching protection objectives.

Since the marginal costs of reducing emissions vary, a general standard applied to all does not minimize the total costs of reducing emissions. Administrative control does not always have an equal effect on all producers because of

extensive exception permission arrangements. This reduces the effect of control.

Various environment taxes and charges, compensations paid for environmental damage, and financial subsidies to protection activities can be applied as economic instruments in pollution control. Their level, however, has been too low to be effective. Indeed, their goal can often be seen collecting money for the state budget rather than raising efficiency in environment protection. However, the significance of economic instruments has recently gained more emphasis.

Emission charges are aimed at making companies or other polluters reduce their emissions - which would also bring down their expenses caused by pollution - by using cleaner production technology or by cutting down production. Since the emission charge is a variable cost it provides an incentive to the company to minimize emissions. Therefore, investments are made in emission-reducing production technology and research, and environmental costs are taken into account in product development.

It is difficult to estimate the appropriate level of emission charges which would reduce the total of emissions to the desired level. It is also complicated to measure emissions. This problem, however, is common to all control methods.

Regulatory and economic instruments increase the production costs in the form of either pollution abatement investments or tax-like payments. If a single country or region introduces these measures, her relative competitiveness is lowered, exports become difficult and the growth of real income is slowed down. Countries which invest less in environmental protection benefit from this situation.

Although binding agreements may take time to be drawn up, the flows of international trade are in the long term more and more based on real production costs, concerning all mankind. Countries which introduce stronger measures than others to

protect the environment, can, thereby, gain a start over the others in developing their production structures so as to become more competitive in the long term. However, in the short term this means trading off slower growth of consumption.

In addition to mutual agreements, solving world-wide environmental problems calls for strengthening and redirecting development aid policies. Many environmental problems are caused in developing countries when they are forced to use natural resources over limits set by sustainable development. Developing countries are unable to solve their problems without help from industrialized countries in the form of technology and education aimed at saving natural resources and the environment.

2.2. Environmental pressures in Finland

In Finland the major concern in environmental and economic interdependency lies in the fact that emissions to the environment can have a detrimental effect on the health of the forests. The growth of trees is impeded by substances discharged to the atmosphere, water, and soil from energy production, transportation, industry, agriculture and forestry. A considerable share of the harmful compounds is carried to Finland from abroad as long-range transboundary pollution. On the other hand, emissions from the Finnish production processes are also carried to other countries.

Atmosphere

Two of the most notable consequences from air pollution are rising of the global temperature and acidification of the air and soil. Also, constructions and materials are damaged and people's resistance to illnesses may become lower as a result of pollution.

Carbon dioxide, born in the process of burning fossil fuels, is one of the most important emissions raising global temperature. Other greenhouse gases are nitrogen dioxide, methane and chlorofluorocarbons.

There is no solution in view to reduce the emissions of carbon dioxides through the combustion of fossil fuels. Saving energy and making its consumption more effective is, therefore, essential. Increasing world's forest and other biomass resources would be the most effective way to reduce the amount of carbon dioxide in the air.

A central method to save energy is to raise its price by e.g. energy taxation. Other methods include education, regulation, or various subsidies to encourage investments in savings purposes. The most notable saving could be achieved through a change in production structure, which cannot take place rapidly.

The use of chlorofluorocarbons in Finland has gone down considerably in the past few years. A decision has been made in principle to abandon their use by the end of 1998.

Sulphur emissions

Acidification of the air and soil is caused by sulphur and nitrogen emissions. Finnish sulphur emissions in 1987 totalled approximately 330 000 tonnes and nitrogen oxides 270 000 tonnes.

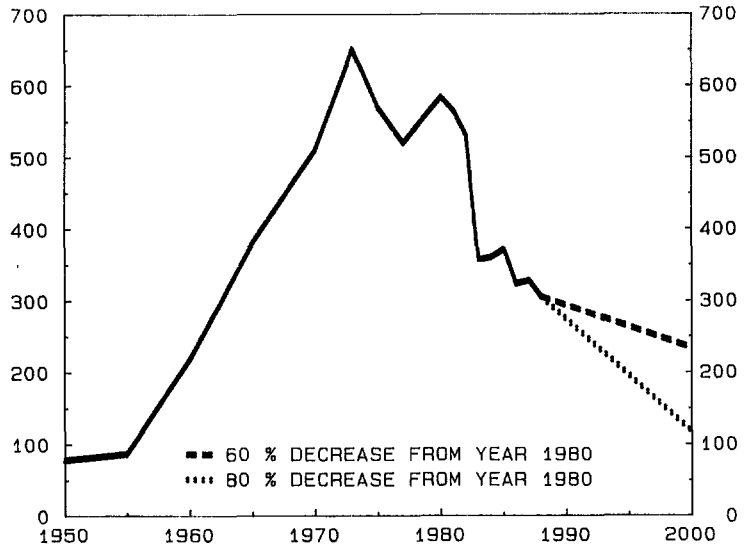
Table 2.1. Emissions of sulphur compounds in Finland 1987, in sulphur dioxide

Source	Share, %
Oil	29
Solid fuels	25
Cellulose production	19
Steel production	10
Oil refining	9
Others	8
Total	100
Thousands of tonnes	328

Source: Air Quality Management in Finland 2, Booklet 15/1989, Ministry of the Environment, Environmental Protection Department.

Sulphur emissions have been cut down in Finland by almost 50 per cent in the 1980s. If the decisions of the Government are realized, sulphur emissions are to be reduced by 60 per cent from the level of 1980 by the year 2000. In international negotiations Finland supports the recommendation on reducing sulphur emissions by 70-80 per cent from the 1980 level by the year 2000.

Figure 2.1. Sulphur compounds emissions 1950-2000, 1,000 tonnes of sulphur dioxide/year



Source: Air Quality Management in Finland 2, Booklet 15/1989, Ministry of the Environment, Environmental Protection Department.

Energy consumption in Finland is estimated to increase by approximately 15 per cent between 1989 and 2005. The structure of energy consumption changes; the consumption of oil is reduced by the same amount as the use of natural gas and peat is increased. As a result of this, sulphur emissions are diminished. The reduction is the more noticeable the more natural gas is used instead of industrial fuel oil. Reducing emissions by developing combustion techniques and installing pollution abatement equipment should be the precondition for increasing energy consumption. However, the amount of sulphur emissions caused by energy production depends mainly on whether the additional energy is produced with coal or nuclear power.

Whatever the choice will be for producing additional energy, the combustion and purification techniques for the existing industries operating on fossil fuels should be improved and strict emission standards should be set for the new establishments. Sulphur emissions from energy production would then be clearly further reduced.

The amount of sulphur emissions caused by pulp production depends on the shares of chemical and mechanical pulp. No sulphur dioxide effluents are born in the production process of mechanical pulp. On the other hand, its energy consumption is notably higher. If pulp production grows at the estimated speed of 2 per cent per year, the level of sulphur emissions will be more than 60 per cent lower than that of 1980, even if the total increase were based on increasing the production of chemical pulp.

Sulphur emissions from the chemical and basic metal industries have gone down one-third since 1980. By the already existing technical solutions of the air protection, the level of emissions can be even further reduced. In addition, the production growth in both fields is forecast to slow down, which also reduces sulphur emissions.

Nitrogen emissions

Reducing nitrogen oxides is especially vital in preventing acidification and high ozone contents. Finland has agreed to maintain the nitrogen oxide emissions on the 1987 level after 1994. Furthermore, Finland is aiming at reducing emissions by 30 per cent by the year 1998.

Table 2.2. Nitrogen oxides emissions in Finland[1)] 1987, in nitrogen dioxide

Source	Share, %
Traffic	59
Energy production	32
Industry	9
Total	100
Thousands of tonnes	270

Source: Air Quality Management in Finland 2, Booklet 15/1989, Ministry of the Environment, Environmental Protection Department.

1) Agriculture excluded, figures not known.

Traffic is causing more and more damage to the environment. The total growth of traffic has been rapid and the share of most polluting forms of traffic has grown strongly. Especially the amount of passenger cars has gone up. The average passenger car fuel consumption, which has gone down since early 1970s by about 20 per cent, has started rising again around mid-1980s. The level of emissions is also raised by the rising driving speeds.

A notable share of transport has been shifted from railroads to highways. One reason for this is that industry and trade aim at maintaining smallest possible stocks. The growth of air traffic can also be considered negative from the point of view of energy economy and environment protection. In comparison to railroads, air traffic consumes ten and heavy road transport about seven times more energy per freight unit.

Reducing damages caused by traffic can be fastest achieved by lowering exhaust gas emissions and by increasing the efficiency of fuel consumption. Some emission standards have already been set. All new car models from 1990 onwards, and all new cars from 1992 onwards, have to have a three-way catalyst, which reduces emissions by 80-90 per cent. There is

also a target to reduce heavy vehicles' emissions of nitrogen oxides by 50 per cent by the year 1995.

Since the car stock will be renewed slowly and traffic grows constantly, the total emissions of road traffic are perhaps not reduced sufficiently without traffic policy changes aiming at replacing heavily polluting forms of traffic with lighter ones. Introducing new less polluting fuels may on a long term help in solving emission problems.

Nitrogen oxides emissions from energy production in 1987 were approximately 86 000 tonnes, calculated in nitrogen dioxide. If the estimated growth of energy consumption were totally produced with coal, the nitrogen emissions from energy production in 2005 would be about 15 per cent higher than in 1987. Producing all the additional energy with nuclear power would keep emissions on the 1987 level. Therefore, here too, reducing nitrogen emissions presumes improving combustion techniques and introducing new combustion techniques in old establishments as well.

Water

The quantity of water is not a problem in Finland, but polluting discharges to both watercourses and ground-water are still too extensive in several areas. Badly polluted waters are often situated in densely populated areas, which limits their use in recreation. About 80 per cent of the Finnish lakes have remained in either good or very good condition. As a result of the first water protection programme 1975-1985, the share of lakes in the lowest classification group has gone down markedly since early 1970s.

The quality of ground-water is generally good. Since the ground-water resources are situated near earth's surface and are covered only by layers permeable by water, they are susceptible to pollution. The quality of ground-water in the

future may be threatened by poorly isolated refuse dumps, various industrial toxic discharges, oil leaks, discharges from agriculture and salting of roads.

Most of the waste water discharged into watercourses come from the pulp and paper industry. Due to successful water protection measures and structural changes in production, the industry's organic pollution has diminished in spite of production growth. The nitrogen and phosphorus pollution has nevertheless started rising again in the 1980s.

Environmental pressures caused by urban discharges (excluding nitrogen emissions) have been reduced. Diffuse discharges from agriculture, forestry, fisheries, fur farms, peat production and scattered settlements have grown. Also, building of power plants, controlling of water level and clearing of rivers have had major negative effects on e.g. migratory fish populations, water nature and water scenery.

The transfer from sulphite process to sulphate process in pulp production has reduced organic pollution, but at the same time it has introduced a new environmental problem: chlorine-containing compounds used in bleaching, waste remains of which cannot be totally removed even with modern techniques. New production methods, in which no sulphur or chlorine would be required, are being developed.

Also, industrial waste water brings other harmful substances to water systems, e.g. heavy metals. Major heavy metal polluters are chemical and metal industries. The production of titanium dioxide causes perhaps the single most harmful discharge.

The level of discharges of heavy metals and other harmful substances from industry has remained approximately the same in the 1980s. The monitored levels of discharges have varied notably from year to year due to fluctuations in production. Compared to the beginning of the 1970s, however, discharges of oil, iron, arcenic, cadmium and mercury have clearly

diminished. With the development of production and cleaning facilities, discharges can be even further reduced.

Water protection is based on a programme which has been accepted by the Government and which will continue until 1995. The programme is concentrating on three sub-sectors which are polluting the water systems: pulp and paper industry; diffuse pollution; and urban discharges.

If all the objectives in this programme were achieved organic pollution would be reduced by over 50 per cent from the level of 1986 by the year 1995, and phosphorus discharges by almost 40 per cent. Moreover, the discharges of organic chlorine compounds, heavy metals and oil are diminished. Although this target programme has been designed considering inland waters and coastal areas, the total level of discharges to the Baltic Sea will be diminished to the extent that Finland will be able to meet her international obligations.

3. ENERGY

3.1. World energy resources

In 1989 the amount of commercial energy used in the world was equivalent to 8 000 million tonnes of oil (Mtoe). Commercial energy includes oil, natural gas, coal, water and nuclear power. The annual consumption of wood and other forms of energy, statistics on which are not compiled, is estimated to be 800 Mtoe.

The share of oil in total energy consumption is one-third, the share of coal a little over one-quarter and the share of natural gas one-sixth. The share of both water and nuclear power is 5 per cent in total consumption.

In relative terms, the scarcest energy resources are oil, natural gas and uranium. The known oil resources will last, by current usage, approximately 45 years, and natural gas resources approximately 60 years. Cheap uranium resources for conventional nuclear power plants will last 50 years. The known resources of coal are sufficient to satisfy the current consumption for hundreds of years. There is a multiple amount of resources, production costs of which are higher.

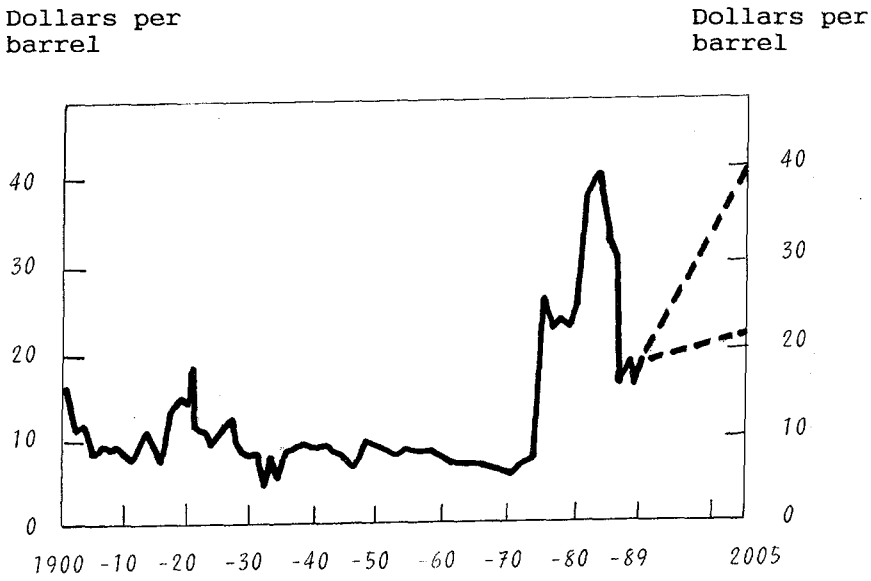
The scarcity of energy resources will not pose a problem until the year 2005. New energy deposits are discovered all the time. For example since 1973 a lot more oil has been found than has been consumed. With the advancing technology energy deposits can be economically more carefully utilized than before.

There are environmental, safety and availability problems connected to all the non-renewable energy resources. In due course, these problems will limit the use of these resources in the world. Moreover, the uneven regional distribution of energy resources may cause serious economic disturbances in the manner of the 1970s energy crisis.

When the oil exporting Arab countries reduced their production in 1973, the oil world market price was quadrupled. A few years later the price was doubled. The dearer oil was saved and oil production outside the OPEC countries grew more than what had been estimated. Oil exporting countries were forced to protect their market share to secure their export revenues, which triggered the oil price slump in 1986.

The development of the real price of oil cannot be predicted on the basis of quantitative demand and supply factors alone. It is crucially affected by the uniformity of the exporting countries' price agreements. Estimates in this publication are based on the assumption that the world market price of oil will grow in real terms approximately 50 % by the year 2005. Judging by the past 15 years, however, the variation in the real price of oil may be significant.

Figure 3.1. Crude oil price 1900-2005, 1988 prices



Source:BP Statistical Review of World Energy, July 1989. Petroleum Economics 10/1989. Energy Policy 1-2/1990.

The importance of gas as an energy resource has grown with the extension of the gas pipelines, although it is more expensive than coal and oil. The use of gas is estimated to grow fast, and its price may therefore rise more than that of other fossil fuels. Of fossil fuels, gas is the most environment friendly.

The share of coal in energy consumption diminished after the World War II, when oil became cheaper. The drastic rise in oil price changed this pattern in the 1970s. Coal is cheap but with regards the environment it is a problematic source of energy. Use of coal, like oil, increases the amount of sulphur and nitrogen oxides and carbon dioxide in the environment adding to the environmental load. By using smoke gas filters and a combustion technique, sulphur and nitrogen oxides levels can be brought down, although not completely.

The use of coal in the developing countries is likely to increase rapidly. Due to lack of funds and insufficient technological knowledge to use the best purification and combustion techniques, emissions to the environment will also increase correspondingly.

Extensive harnessing of new sources of energy will take tens of years. Even if technical problems were solved, economic reasons would limit their widespread use.

Solar energy, renewable and pollution-free, would be an ideal solution to mankind's energy problems. Less than one-thousandth of solar radiation would be sufficient to meet all mankind's energy needs. In comparison to other sources of energy, solar energy, at least for the time being, is very expensive.

Until the year 2005 the world's use of energy will still be based on the current sources of energy. Environmental risks become a more and more important factor directing energy policies. Therefore, saving energy will be made more efficient and emissions from energy production and

consumption will be diminished.

Energy consumption, both in Finland and in other industrialized countries grew more slowly than total production when the real price of energy rose in the 1970s. The notable reduction of the real price of energy has, at the end of the 1980s, ended the lowering of energy-intensity in many countries.

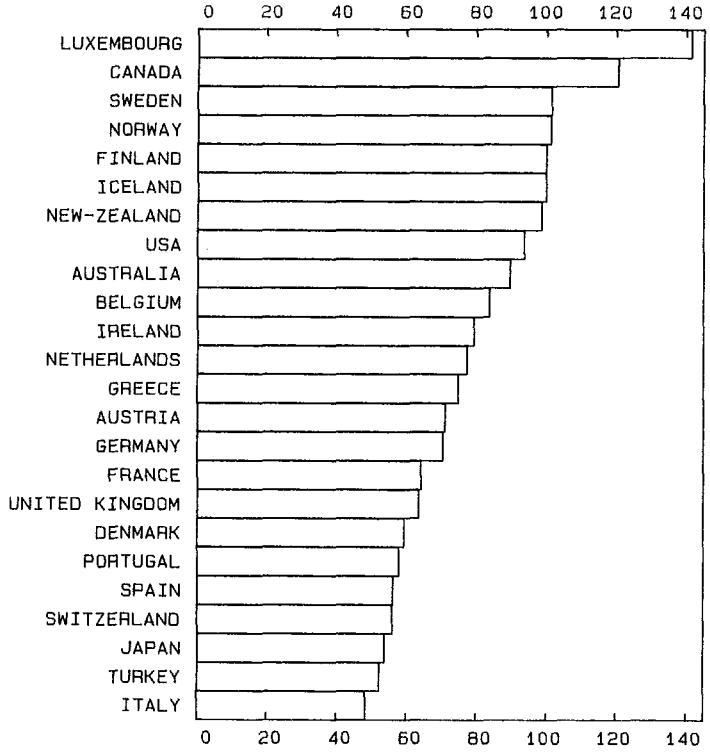
As a result of the increased production and consumption, around the turn of the millenium a lot more energy is used in the world, notwithstanding measures aimed at restraining the growth of consumption, i.e. price increases, environment taxation, etc. The rise in the real price of energy can partly be explained by the tightening of the environment legislation. Simultaneously with the price of energy, prices of energy-intensive products, e.g. pulp, paper, metals and construction materials, will go up.

The rise in the prices of traditional sources of energy will stimulate the development of new ones. By the year 2005, however, they will not have advanced essentially to replace fossil fuels. As a result of environmental pollution caused by fossil fuels, nuclear power may become more popular again.

3.2. Energy sector in Finland by 2005

Production in Finland, in comparison to other West European countries, is energy-intensive. Furthermore, our climate is relatively cold. Therefore, compared to real income, a lot more energy is used in our country than in most other countries with high level of income.

Figure 3.2. Energy intensity in the OECD countries in 1989. Index (Finland) = 100. Total use of energy per unit of national product calculated according to purchasing power parities



Source: OECD.

In the long term, energy consumption will be essentially affected by its real price. In this publication it has been estimated that the real price of oil and consequently the real prices of other fuels will increase one and a half times by the year 2005. The price of electricity as well, may rise a little in real terms. The price of energy will also be affected by tightening pollution taxation.

Energy consumption per product unit will decline. By the year

one and a half times and total production grows 2.5 per cent per year.

About 70 per cent of total value of energy consumption, tax included, is domestic. However, only 30 per cent of raw energy is acquired domestically. This level of self-sufficiency in energy remains approximately the same until the year 2005.

Wood-based energy is the most important of domestic energy resources. The major part of it consists of forest industry's consumption of wood-based waste to produce energy. The growing use of wood as raw material increases the production of wood-based energy.

Table 3.1. Energy consumption in Finland, 1960-2005, Mtoe

	1960	1973	1989		2005
Oil	2,36	12,67	9,3		7
Natural gas	0,00	0,00	1,9		3 1/4
Coal	1,85	1,95	3,2		
Nuclear energy	0,00	0,00	4,5	10,0	13 3/4
Electricity net import	0,11	1,08	2,3		
IMPORTED ENERGY TOTAL	4,32	15,72	21,1		24
Hydroelectric power	1,30	2,62	3,2		3 1/4
Peat	0,00	0,00	1,0		2 1/2
Wood-based and other energy	5,08	4,50	4,6		5 1/4
DOMESTIC ENERGY TOTAL	6,38	7,12	8,8		11
ENERGY CONSUMPTION	10,70	22,84	29,9		35

Of foreign energy resources, the consumption of oil will be reduced, but the consumption of natural gas and coal will increase. Current nuclear power plants will still be capable of production in 2005. If more nuclear power plants were built in Finland, nuclear energy would replace a major share of the consumption of coal.

The alternative of building more nuclear power plants in Finland has to be considered in the near future. If the use

of nuclear power is increased at the expense of coal, emissions of sulphur, nitrogen, carbon dioxides and heavy metals can be cut down. On the other hand, the risk of nuclear disasters is increased.

4. NATURAL RESOURCES AND RESOURCE-BASED PRODUCTION

4.1. Agriculture

The GATT negotiations round, which began in the autumn 1986 in Punta del Este, is trying to liberalize world trade in agricultural products and reduce public subsidies in agriculture. The negotiations' result with all its details is still unclear. However, it is clear that the tendency in agricultural products is towards trade liberalization; reducing public subsidies on production and especially exports; lowering import restrictions; and reducing over-production.

Agricultural production in Finland is clearly higher than consumption. Over-production is especially notable in dairy products. In spite of production cuts, over-production of butter has risen because the consumption has diminished faster than production. Self-sufficiency in especially grain varies from one year to the other depending on the crop.

Table 4.1. Production and consumption of selected agricultural products in Finland in 1988

	Production	Consumption	Self-sufficiency
	million kg		%
Dairy butter	61	41	149
Cheese	87	58	150
Eggs	77	58	133
Beef	111	103	108
Pork	169	162	104
Grain	2 826	2 976	95

The consumption of various food stuffs depends greatly on the developments in consumer attitudes. When measured by the energy content, the increase in the total food consumption remains quite low.

To meet the estimated consumption of agricultural products in Finland in 2005, the level of production then should be approximately 10 per cent lower than that of today. This would mean a 0.7 per cent annual reduction in agricultural output until the year 2005.

If the yields per hectare continued to grow by a little less than one per cent per year, the yield per hectare in 2005 would be 15 per cent higher than today. Due to reduced production, higher level of crops and more effective livestock production, the need of arable land in 2005 would be less than 1.5 million hectares. The area under cultivation should, therefore, be cut down by more than 0,5 million hectares.

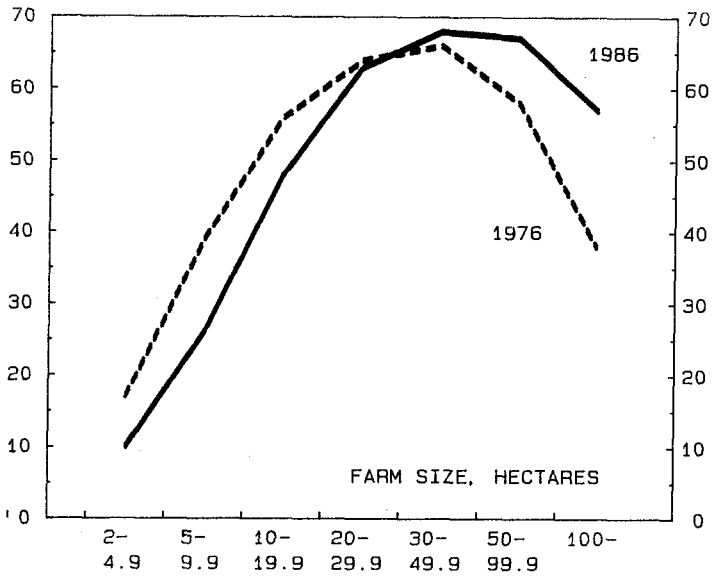
The need to export over-production is not necessarily removed even if the total agricultural production corresponded the domestic consumption. Trade liberalization generally implies an increase in both exports and imports compared to production and domestic consumption. If imports - competing with domestic production - are increased, over-production continues. If over-production cannot be profitably exported, domestic production should be diminished more than estimated.

Finding the right means to reduce production is a central concern in agriculture policy. Administrative measures, such as quotas, licenses, or compensations for taking acreage out of cultivation, are ineffective and slow down the development in agricultural productivity. Administrative regulation should be gradually abolished and the role of market forces strengthened instead.

In the long-term, agricultural supply reacts clearly to changes in producer prices. Thus, they have a central role in determining the level of agricultural production and product-mix. Production changes from one plant type or animal breed to another are common.

There are few farmers in Finland, who have no other sources of livelihood than agriculture. The share of agricultural income in farmer's total incomes is at its height on farms of 30-50 hectares. On small farms, incomes from agriculture and forestry are not sufficient, and other sources of livelihood have to be used. On large farms, the small share of income from agriculture can be explained on the one hand by high wage and capital incomes and on the other hand by the fact that the use of hired labour force cuts down entrepreneurial incomes from agriculture.

Figure 4.1. Share of agricultural income in farmer's and spouse's state taxed incomes in various farm size classes in 1976 and 1986, per cent



The smaller the share of agricultural income in farmers' total incomes, the fewer social problems are caused by a reduction in the profitability of agricultural production. In addition to agricultural policies, developing other sources of livelihood and social policies is required in order to diminish agricultural over-production in a balanced way.

Environmental protection objectives have to be emphasized more in developing agriculture. One central method is to reduce the use of chemical fertilizers, which at the same time means a reduction in the production intensity and less over-production. Introducing a substantial fertilizer tax, which would not be compensated, would be the most efficient way to reduce harmful effects from chemical agriculture.

4.2. Forestry

One third of the earth's surface, i.e. approximately 40 million square kilometres, is covered by forests, one half of which can be commercially exploited. Global forest area has been decreasing continuously. The main reason for this has been the increased consumption of firewood. Other reasons include clear-cutting forests for agricultural purposes to feed people or to increase the exports of agricultural products.

Large part of Europe's and other industrial countries' forests have been planted or otherwise developed to serve especially the needs of commercial wood production. One fifth of total Finnish forest area has been sowed or planted in the past 40 years.

Wood cutting in the world amounts annually to 3 billion cubic metres, half of which is firewood. When 85 per cent of firewood is used in developing countries, 75 per cent of industrial wood is used by industrialized countries.

Finland's wood resources increase clearly in the period under consideration. The growth of fellings is, however, restrained by forest owners' attitudes, multi-use of forests, and emphasizing the environmental and scenery values.

Fellings have been estimated by two alternatives. According to the first one, cutting is increased at the same speed as industrial use of roundwood i.e. 1,7 per cent per year. The

share of imported roundwood would in this case be a little over one-tenth as it is now.

According to the second alternative, the amount of fellings grows slowly and forest owners' willingness to sell remains low due to structural changes in forest ownership and changes in forest owners' attitudes. According to this alternative, fellings are increased by 1,2 per cent annually. Almost 20 million cubics would be saved every year. The share of imported roundwood grows to almost 20 per cent.

Table 4.2. Use of roundwood in 1973, 1989 and 2005, million cubic metres

			Fellings will increase	
			Rapidly	Slowly
	1973	1989	2005	2005
Volume of growing stock	1 520	1 750	2 000	2 000
Annual growth	57	75	80	80
Felling drain	54	51	67	62
Difference between growth and fellings (inc. natural drain)	3	24	13	18
Industrial use of roundwood	45	52	68	68
- domestic	40	46	60	56
- imported	5	6	8	12
Imported wood, % of industrial use	11	12	12	18
Felling drain, % of growth	95	68	84	78

Almost two-thirds of Finnish forests are privately owned. Companies own less than 10 per cent of the forest area. The supply of roundwood is affected by changes in the ownership structure of private forests, farm production methods, and owners' age. Farmers' share of private forests is 50 per cent and it is still declining. The share of other owners than farmers may rise to two thirds in the year 2005.

Table 4.3. Private forests ownership structure, per cent of forest area

	1971	1989	2005
Farmers	79	50	35
Others	21	50	65
Private forests, total	100	100	100

The change in forest ownership reduces wood supply. A change in the society's general values, may nevertheless pose a stronger effect. A situation where felling possibilities would be exploited to full extent, is not possible in a society which appreciates other forms of forest use apart from those for commercial purposes. The use of forests for recreation, scenery values and environmental protection are gaining more and more importance. This report estimates that the forest economy will develop according to the alternative of low growth in fellings.

The main danger in view is the effect environmental pollution has on forest nature and growth. A study, which was carried out a few years ago, estimated that environmental pollution will increase forest growth up to the year 2000, after which the growth will be slowed down. The initial acceleration of the growth would be caused by pollution's fertilizing effects. However, this condition would weaken the trees' binding force and growth, and thus, their growth might be slowed down earlier.

4.3. Mineral sector

The depletion of world mineral resources was in the 1970s seen as a factor limiting global economic growth. Lately, however, the sufficiency of metals has not been considered a problem. The known sources of most metals will last for tens of years. Raw materials are being consumed more and more efficiently in production and their recycling is becoming more common. Searching methods of mineral sources have

improved and poorer sources than earlier can be economically exploited.

Table 4.4. Growth of metal consumption and GDP, % per year.

	OECD countries		Developing countries	
	1962-80	1980-88	1962-80	1980-88
Iron	0,5	-1,8	8,1	5,2
Steel	2,6	-1,5	8,0	4,0
Aluminium	4,5	1,7	11,4	8,4
Copper	2,5	1,3	8,7	4,3
Zinc	2,1	1,2	7,3	5,2
Lead	2,7	0,7	6,6	5,1
Nickel	4,7	2,6	12,0	7,8
Tin	0,0	-1,0	1,9	2,6
Growth of GDP	3,6	2,7	5,9	4,0

Source: Metallgesellschaft.

The demand for raw materials grows fastest in the developing countries. These countries can also, when developing their basic production, adopt more modern technology which saves more materials than the technology introduced tens of years ago.

Metal production will concentrate and be located in countries with mineral reserves. Of OECD countries, mainly Australia's and Canada's positions as metal producers will be strengthened in the future. In several other OECD countries metal production will be cut down as mines are depleted and establishments grow old.

Technical development facilitates recycling of metals and offers substitutes for traditional raw materials. Metal recycling spread slowly in the 1980s. In the future it will be increased faster, especially because of environmental factors.

Table 4.5. Share of scrap metal in consumption of selected metals in OECD countries in 1970-1988, per cent

	1970	1980	1988
Aluminium	21	25	27
Copper	31	38	40
Lead	34	50	51
Zinc	19	20	22
Tin	28	19	19

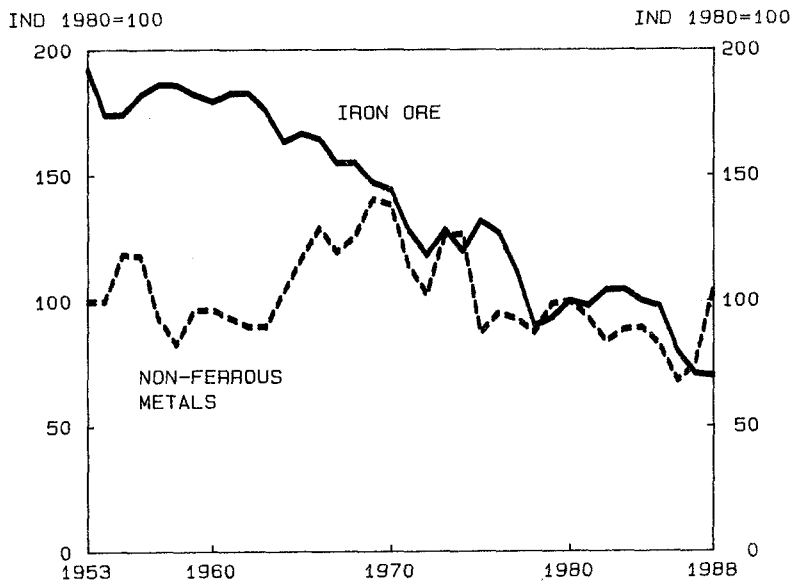
Source: Metallgesellschaft; Metallstatistik 1970-1980 and 1978-1988.

In a few years, tighter environmental regulations and new materials will affect the world market situations of certain materials. For example, wide-spread use of unleaded petrol brings down the demand for lead. Furthermore, price fluctuations and supply inflexibility may lead to a wider use of metal substitutes.

The prices of minerals and metals have fluctuated more than the general price development. This is mainly caused by the fact that the demand for mineral raw materials fluctuates according to trade cycles, but the supply is fairly inflexible. Increasing the production capacity takes usually several years.

Since early 1970s, in comparison to world market prices of industrial products, the trend in metal raw material prices has been down. In 1986 the real prices were at their lowest since the 1930s depression. However, in 1988, prices of several metal raw materials went up by tens of percentage points.

Figure 4.2. Metal raw material real prices on world markets 1953/1989/II, index 1980=100



Source: UN foreign trade price indexes. Metal export prices deflated by industrial products export prices.

The recent recovery of metal prices is likely to increase investments in mining industry, which would increase metal supply from mid-1990s on. Based on this it can be assumed that metal real prices would start going down already during this decade.

Mineral sector outlook in Finland

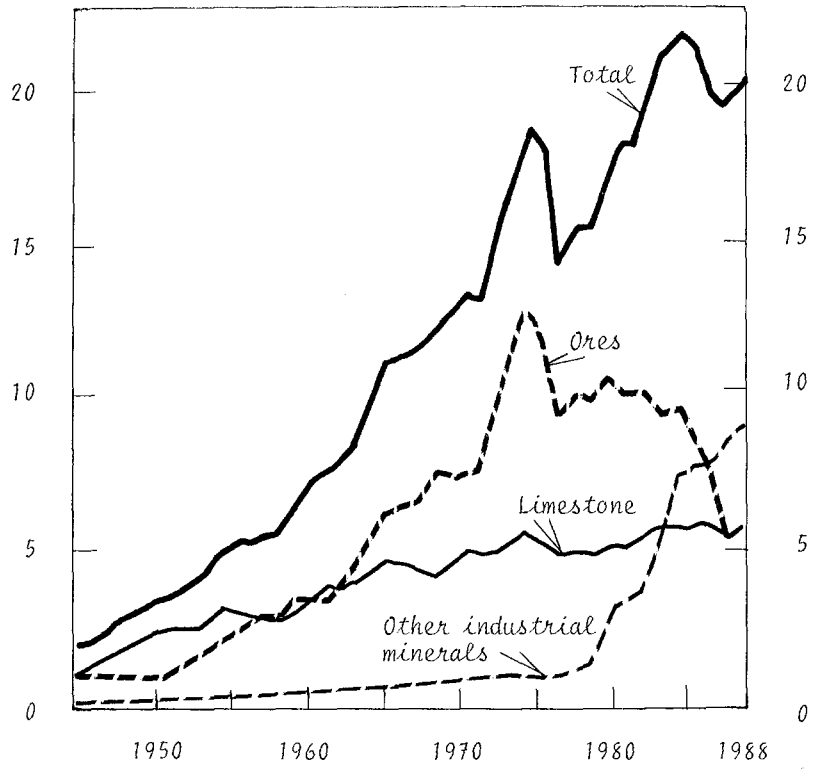
The production of industrial minerals in Finland has grown sharply since late 1970s. In 1983, the combined production of industrial minerals and limestone was more than the ore production in tonnes.

Finland is a notable producer of phosphate, talc and wollastonite. The most important imported industrial mineral

is kaolin, which is needed in paper industry. Its share in value is two-thirds of all imported industrial minerals.

The most important consumer fields of industrial minerals are the industries of clay, glass, stone, chemicals and paper as well as metal production. The use of limestone is no longer expected to grow notably. The consumption of other industrial minerals will grow slightly faster. Especially the use of kaolin is clearly increasing with the expansion investments of forest industry.

Figure 4.3. Production of Finnish mines in 1945-1988, million tonnes



Source: Pekkala Y.: Non-metallic Minerals in Finland, 1989.

Finnish metal sector dependency on imports has increased rapidly since mid-1970s. The domestic ore mine production, which had grown strongly until then, started diminishing. In the future, the speed of reduction is expected to accelerate and after the turn of the millennium, of the current mines only Kemi chrome mine will be in production. It is unlikely that new sources will be found. The current known sources are not economically exploitable at current and estimated future prices.

The production of metals, excluding chrome, is already now mainly based on imported concentrates whereas only ten years ago the majority of raw materials were of domestic origin. An effort has been made to secure concentrate imports by purchasing mines abroad and by drawing up long-term delivery agreements with foreign mining companies.

Table 4.6. Share of domestic raw material in metal production in 1975 and 1988, per cent

	1975	1988
Copper	84	30
Nickel	88	50
Zinc	48	30
Cobalt	100	-
Chrome	100	100
Iron	80	20

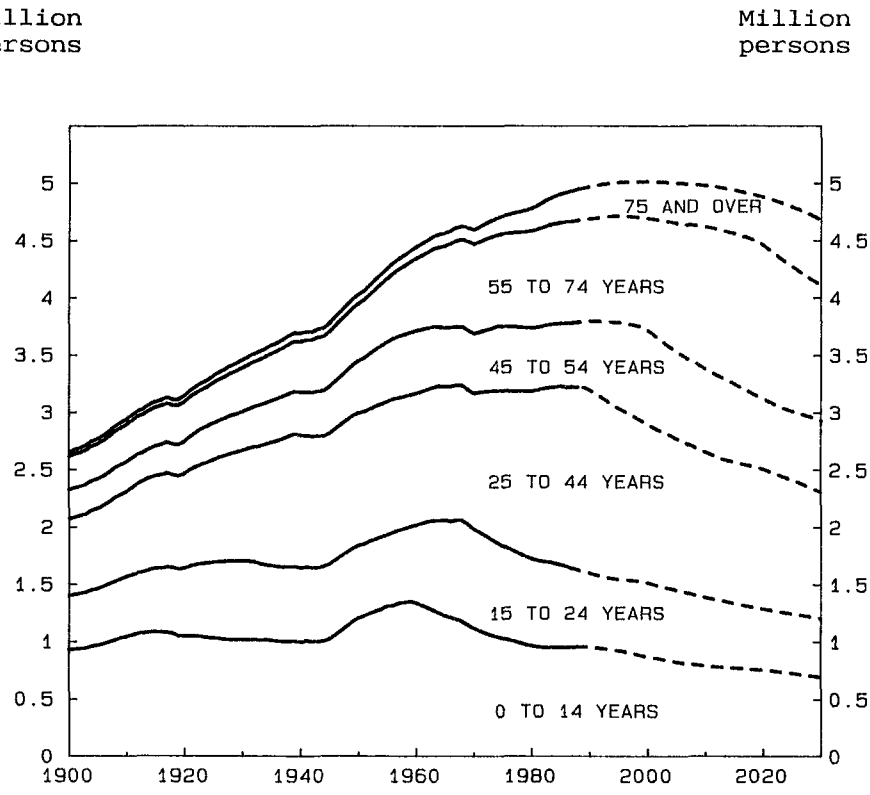
Metal production capacity is technically developed and if there will be no shortages in the supply of raw materials, production should continue at the current level or rise slowly. Finnish domestic market demand is low and most of the production is exported. There are also wide export markets for technology related to reducing environmental pollution caused by metal production.

5. POPULATION AND LABOUR MARKETS

5.1. Population development

If the birth rate remains the same as in the last decade and if life expectancy at birth will be increased by two years by the year 2005, the population of Finland will start to diminish around the turn of the millennium. Even relatively minor changes in the assumptions of this fresh population forecast by the Central Statistical Office, affect the growth of population notably.

Figure 5.1. Population in Finland by age groups in 1900-2030, million persons



Source: Central Statistical Office of Finland 1989.

If for example the rise in life expectancy were a couple of years faster, in 2005 the number of persons over the age of 64 would be approximately 50 000 higher than estimated in the forecast used in this report. If the birth rate rose by e.g. a quarter by mid-1990s, the number of children, and population, would be 180 000 higher than estimated.

The number of elderly grows rapidly after the year 2005, when the large age groups, born in the second half of the 1940s, turn 65. If the birth rate started increasing as well, there would be both a large population of elderly and a lot of children in Finland at the beginning of the 21st century.

International mobility will increase

The share of foreigners in the population of Finland is less than half a per cent. Almost half of them are Swedish citizens. Soviet citizens are the second largest group.

International mobility has in Finland during the past decades implied mainly the Finnish moving to Sweden and back. The common Nordic labour markets have existed for over 35 years, during which time mobility between Finland and other Nordic countries, apart from Sweden, has been insignificant and will also probably remain so in the future.

The integration of West Europe increases labour mobility. The most mobile groups on the integrated European labour markets will presumably be guest workers from the Mediterranean countries; people who have moved from ex-colonies outside Europe; and refugees. They will often undertake work that is for some reason not preferred by the local population. The original population in the Community countries is less mobile. Their moving is often related to studies, practical training or working at subsidiary companies abroad as well as sub-contracting.

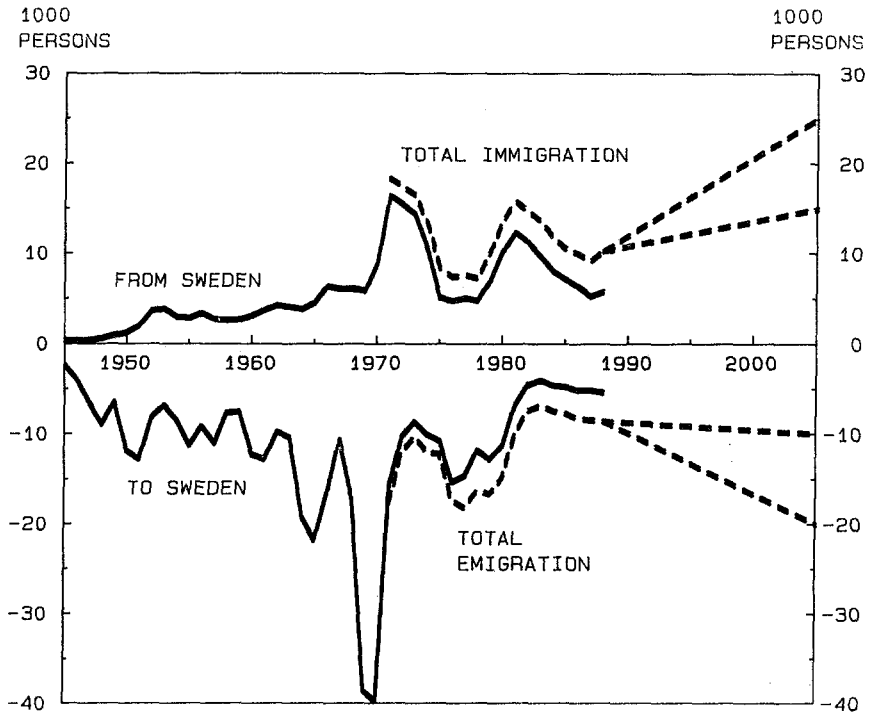
The flow of foreign investments to Finland has been minor and consequently migration related to it will remain low. In the same way, migration from West Europe related to studies and practical training is likely to remain insignificant due to language difficulties. In the long term, for example worsening environmental conditions elsewhere in Europe may increase the attraction to live in Finland.

Standardizing examinations in Europe will expand especially the labour market of the skilled labour force. Although the level of unemployment is high in several European countries, they at the same time suffer from shortage of skilled labour. Working at Finnish subsidiaries and partnership companies has also increased because of the rapidly expanded Finnish foreign investments.

The level of real wages in the Soviet Union and other East European countries is clearly lower than in Finland. If free migration from the Soviet Union were allowed, the number of job-applicants, especially from Estonia, would be increased. This would complicate the economic recovery of Estonia, which suffers from a shortage of skilled labour. Migration to Finland from the Baltic countries and from other parts of the Soviet Union is expected to continue mainly in the form of practical training or temporary work in Finnish companies and governmental services. These people can, at a later stage, be employed by Finnish-Soviet joint enterprises. This practical training programme is also likely to boost the founding of joint ventures.

Flows to and from the country will be strengthened in the 1990s and they include more foreigners in comparison with the current Finnish to-and-from migration. Moreover, temporary working abroad as well as migration to Finland for education or practical training will be increased.

Figure 5.2. Migration to and from Finland in 1945-2005, 1000 persons



In due time, a foreigner population will grow in Finland. From a national economy perspective, immigration is desirable, provided that it develops in a controlled way. Especially housing, education and social authorities as well as working life organizations have to increase their readiness to adjust people moving from abroad to the Finnish society.

5.2. Labour force

Labour supply grows only little

The population of working age, i.e. between 15 and 64 years of age, grows altogether by 85 000 people by the year 2005.

The growth is based on an increase in the population of 55 to 64 years of age.

The number of young persons in the labour market has diminished since the 1970s. Age groups have become smaller and the time used for education has become longer. The young labour force will still keep decreasing in the next few years, when the smallest age groups enter the labour market. After this the development will normalize.

In the prime-age group, i.e. population of 25 to 54 years of age, the participation rate in the past few years has been about 90 per cent where it will also stay in the projection period. In these age groups, women's participation in work life does not fall essentially behind that of men.

A little less than 5 per cent of the population of 25 to 54 years of age is on invalidity pensions. The risk of disability has been estimated to diminish as a result of improved working conditions, better general health and wider rehabilitation services. However, the share of disabled will rise slightly when the large age groups reach 45-54 years during this decade. The risk of disability grows fairly rectilinearly with age.

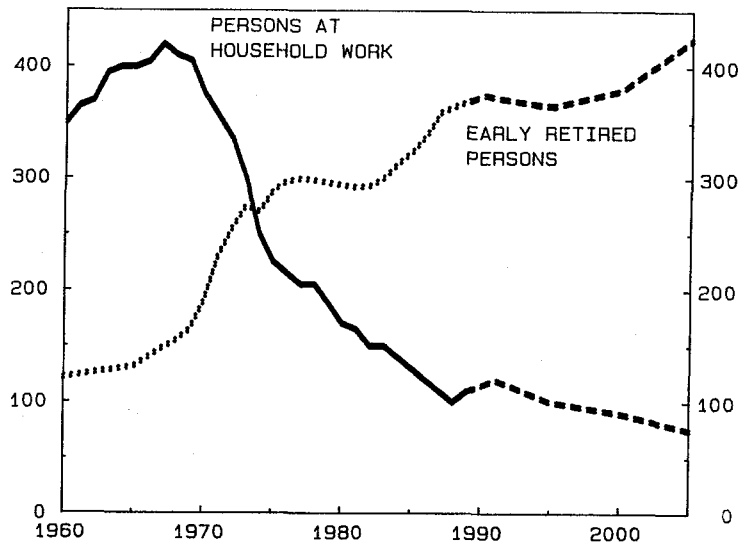
From the point of view of labour supply a crucial factor is the labour market behaviour of the elderly population. The number of people between 55 and 64 years of age grows by 200 000 persons by the year 2005. The labour force participation rate is only a little over 40 per cent in this age group. It has diminished by 25 percentage points since 1960 due to the introduction of various early retirement schemes.

The participation rate in the age group eligible for early retirement is expected to rise slightly during the review period. In 2005, it is expected to be almost 10 per cent higher than today. Even then only half of the population in this age group would belong to the labour force.

The rapid renewal of the labour force has been characteristic to the Finnish labour market since mid-1960s. Flows both to and from the labour market have been considerable. Women have moved from household work to "open" labour market. Flows from the labour market have been increased by early retirement schemes.

Labour force renewal slows down strongly. Very few people are engaged in household work and their number is not expected to drop essentially any longer. Early retirement will diminish in the early 1990s. This is caused by a reduction in the number of people who receive disability pension. After the middle of the decade, the total number of early retired persons will start growing again.

Figure 5.3. Number of persons engaged in household work and early retired population in 1960-2005, 1000 persons

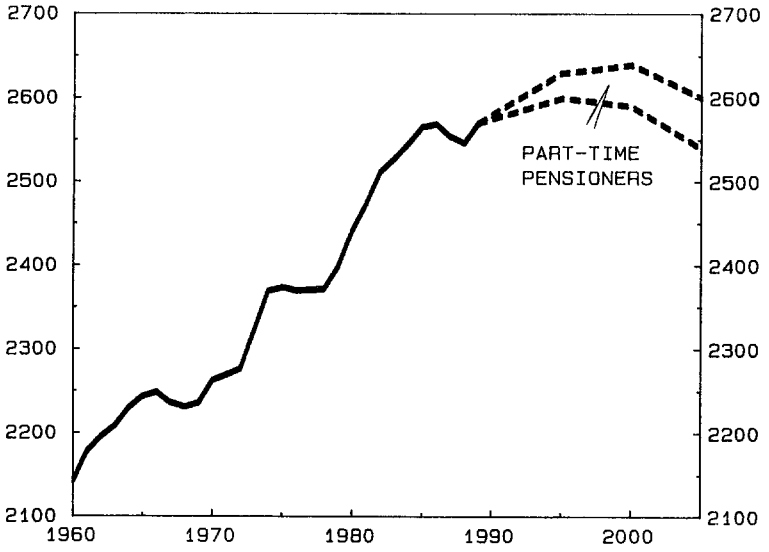


Part-time pension is expected to become a popular retirement alternative in the future. This presumes changes in the status of part-time employment and early retirement qualifications. Various forms of part-time work have to be

introduced on all sector . The age limit to part-time retirement should be at least as low as that to individual early retirement.

If part-time working became general among the early retired population, it would increase moderately the supply of labour force still in the 1990s. At the end of the decade, the growth of the supply stops. The supply starts to decrease clearly at the beginning of the 21st century. If full-time pensions remain the main forms of early retirements, the supply of labour force starts to diminish permanently already in the 1990s. The Figure 5.4 illustrates the difference between these development alternatives.

Figure 5.4. Supply o labour force in 1960-2005, 1000 persons



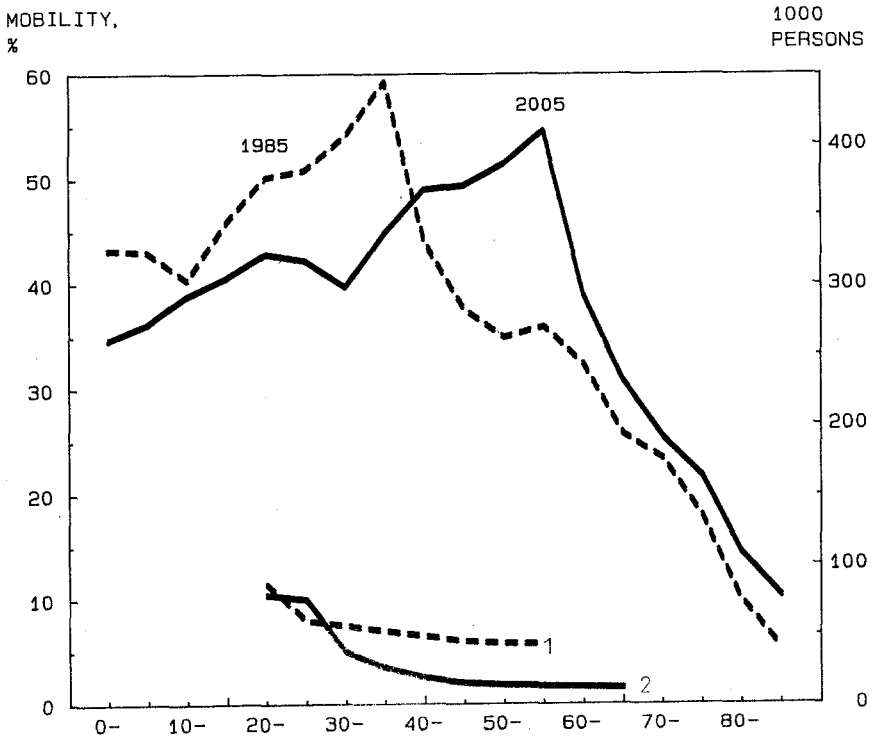
Labour force age structure, mobility and education

The large age groups are still firmly on the labour market in this decade. Ageing of the labour force will be most clearly

seen after the turn of the millennium. At this stage the supply of labour force as well will start to diminish.

Labour market mobility is greatest at the stage of entering the labour market. The young population changes occupation and residence notably more often than the more elderly population. At the end of the period under consideration the major part of the labour force has reached the age, when labour market mobility, until now, has been at its lowest. This can turn the labour markets more rigid and slow down necessary structural changes. Occupational mobility, however, has been fairly strong among the more elderly population as well, and it can be promoted by adult education and personnel policies.

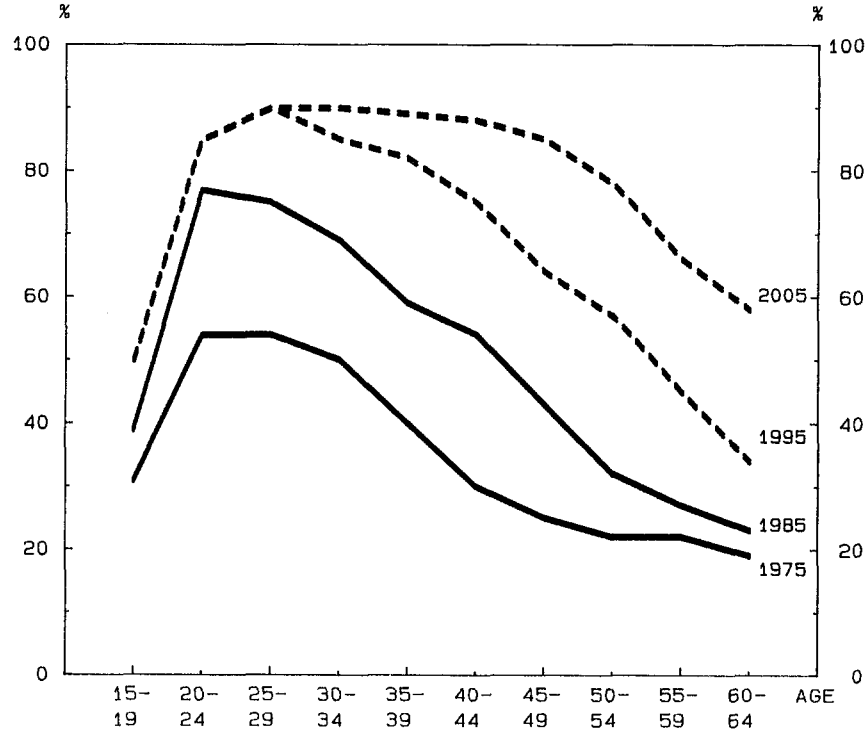
Figure 5.5. Population by 5-year age groups in 1985 and 2005 and labour market mobility in the early 1980s



(1) Occupational mobility The share of population in labour force who have changed occupation in 1980-85, annual average.
(2) Regional mobility The share of population who have moved from one municipality to another.

Expanding adult training is facilitated by better basic education of the labour force. Already now, three-quarters of the labour force under the age of 30 have taken some examination higher than the basic education. In the population group approaching retirement age, the share is only one-quarter. In 2005, even in the oldest population group, over 50 per cent have received at least secondary-level education.

Figure 5.6. Share of labour force, by 5-year age groups, with higher than basic education in 1975-2005, per cent



In the beginning of the next millennium, the average level of education of the labour force is notably higher and educational differences between various age groups are smaller than today. This helps the population to receive training for new occupations and new tasks. At the same time,

the improving level of education facilitates the maintenance of the growth of productivity and the renewal of the production structure.

Development of working hours

In the long term, working hours in Finland have been reduced by approximately 0.5 per cent per year. In 1960, the normal working hours in the industry were 2 100 hours per year. In the early 1990s they will be 1 700 hours. At the same time, working hours have become more standardized because the longest working hours have been reduced the most.

In addition to general reductions in working hours and increases in annual leaves, other factors will reduce the supply of labour input calculated in working hours. Long-term absences for childcare have increased and will continue to do so. Likewise, the use of study leave will become more common when the economic support for this purpose is improved.

Part-time working is relatively uncommon in Finland, but it is expected to become more general especially in the form of part-time retirement. As the labour force is ageing and there are continuous problems with the shortage of labour, part-time retirement will offer a possibility to utilize the work input of skilled labour force.

Although the normal working hours have been reduced, the real working hours have been increased in the past few years in the form of overtime and secondary occupations. This reflects the strong demand for labour. The need to work can also vary according to the individual. In due course this will lead to an increase in secondary occupations and overtime work and an unbalanced distribution of work load.

Another problem in shorter working hours is the shortening operating time of machines, equipment and buildings. The fact that the economy is continuously becoming more capital

intensive would presume longer operating times of capital. This implies an increase in uncomfortable working hours. The disadvantages of this, however, will be diminished by shorter working hours per year and the flexible time schedules becoming more general.

The shortening of working hours is estimated to continue in its various forms. When the growth of labour force in numbers remains low and starts to diminish, the supply of working hours will decrease faster than earlier.

5.3. Employment

Industrialization started later in Finland than other West European countries. Industrial employment was at its highest in 1981, when it amounted to almost 640 000 people. After that the industrial employment has diminished by 80 000 people. Since the number of jobs in agriculture and forestry has continuously decreased rapidly, the service sector has become more dominant in the occupation structure of the labour force. The job increase has been fastest in financing and business. In numbers, however, employment has grown the most in public services.

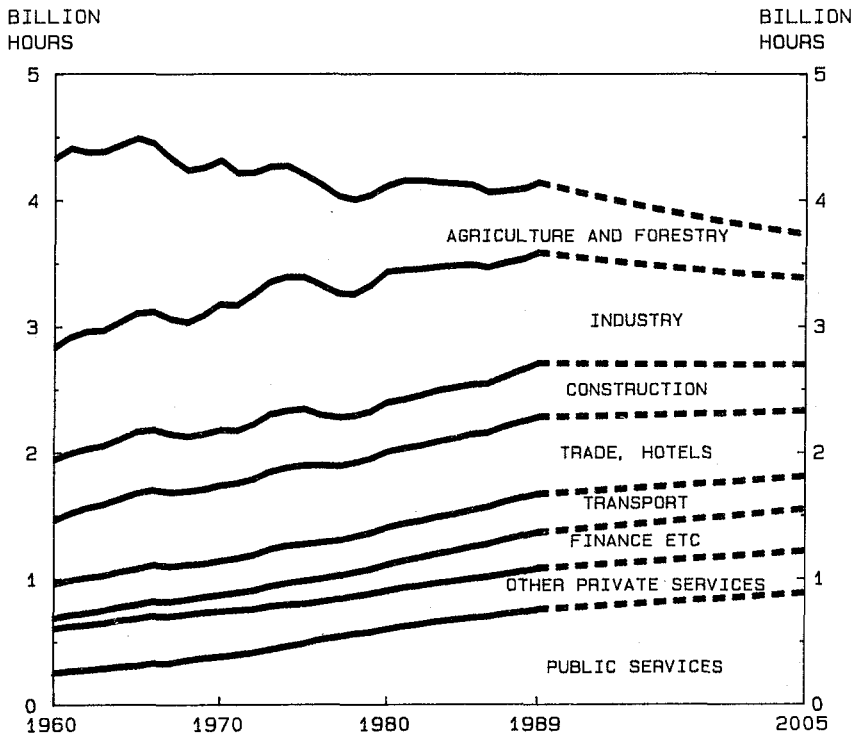
Table 5.1. Employment according to labour force study, 1960, 1973, 1989, and an estimate for 2005, 1000 persons

Industries	1960	1973	1989	2005
Agriculture and forestry	798	432	219	150
Industry	456	594	562	495
Construction	203	199	199	180
Trade	242	326	367	360
Transport	143	167	179	165
Financing and business services	54	99	194	250
Other services	293	449	759	920
Total	2 176	2 265	2 474	2 520

In the main industries, employment will grow only on certain service occupations by the year 2005. The labour force in traditional banking services will diminish, but activities serving business will increase rapidly. Employment will grow also in public services and equivalent services in private sector. However, the growth is slower than earlier.

By the year 2005, the number of employed persons may still grow by approximately 45 000 people, i.e. slightly more than the supply of labour force. The level of unemployment would remain around 3 per cent of the labour force. Keeping unemployment at such a low level presumes maintaining a flexible labour market and solving mismatch problems.

Figure 5.7. Working hours by industries in 1960-2005, billion hours



Although the number of employed people grows, the number of working hours diminishes. The total number of working hours grows clearly only in public services and slightly in private services. The growth of output is in the future more based on the increased use of other factors and the growth of productivity.

Shortage of labour force continues

Industries which have expanded rapidly until now have acquired new labour force especially from the young who have finished their studies and from women who have moved from household work to the labour market. Also, occupational mobility has been strong.

In the future, labour markets will become more differentiated. There are fewer tasks in manufacturing in which the demand of manual labour will grow. The development may be similar in office work. The demand for labour force grows clearly on fields of technical expertise and services. Mobility in the labour market means therefore more often a movement to a completely different occupation and new duties.

It is quite clear that labour market problems will be aggravated. For example 50-60 per cent of the new labour force in the service sector is formed by those who have entered the labour market recently. The rest have come from other industries. Since young age groups are diminishing and labour force reserves are depleted, it will become more difficult to find labour force for services.

There are few alternatives to meet the labour demand. One alternative is to allow, by Finnish standards, a large scale immigration - provided that willing and suitable immigrants are found. Another alternative is to try to postpone retirement and to make part-time retirement more general on all sectors. This imposes great demands on the flexibility of labour markets and the adult education system, and may lead

to labour force shortage in several fields, if the replacement requirements are underestimated.

The functioning of the labour market can also be improved by demolishing various role differentiations and limitations on the labour market. There is a clear differentiation into male and female dominated fields of work in Finland. When labour demand grows most strongly in fields dominated by women, and the supply of female labour force grows only little, the differences between women's and men's wages will be reduced and the gender distribution may become more even. The more even gender distribution on various fields can also be promoted with education. Adult education and especially personnel training by employers play a central role, since it may take longer to abolish the existing role differentiation in the traditional education system.

By expanding vocational training and broadening the contents of professions correspondingly, the skill range of the labour force can be widened and placement possibilities diversified. Using these possibilities presumes reconsidering skill requirements in various professions and broadening narrow job descriptions.

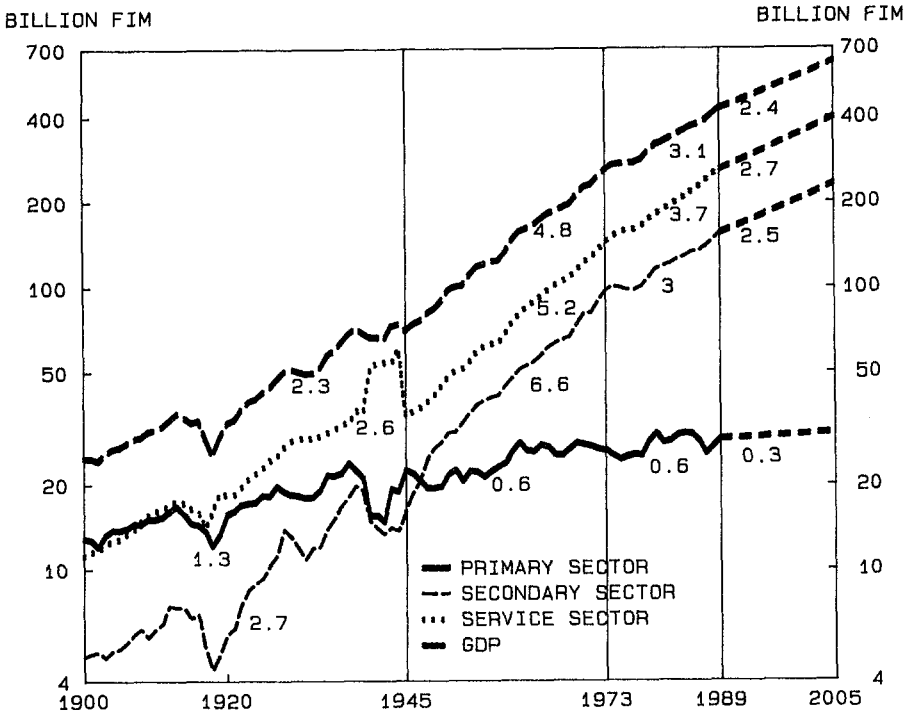
6. PRODUCTION, INVESTMENT AND FOREIGN TRADE

6.1. Production development and change in production structure

The century of growth

Finnish total production has grown almost 20-fold during this century. This can be explained by increased population and labour force; higher level of education; growth of capital stock; availability of natural resources and energy; as well as changed allocation of resources.

Figure 6.1. Value added in 1900-2005 in 1989 prices, FIM billion, and average growth rates in different periods, % per year



Source: Riitta Hjerppe; Finnish Economy 1860-1985. Growth and structural change. Helsinki, 1988. (In Finnish)

During the current century, the most rapid economic growth has been seen in the 1920s and especially during the decades following the Second World War.

After the First World War and the Civil War, the fast growth was triggered by the expansion in industry and service sector. Investments increased rapidly. As a consequence of the world economic depression, growth slowed down in the 1930s. Despite the increased investment in public infrastructure, the level of investment dropped to approximately 10 per cent of the national product. However, the effects of the depression were milder in Finland than in other countries and the economy recovered quite well during the second half of the 1930s.

After the Second World War the share of primary production in the Finnish economy was still high. Since the beginning of the 1950s, the reduction in the share of primary production and the increase in the service sector, however, were perhaps faster than elsewhere in Europe. The simultaneous development of an industrialized society and a service economy has been a distinctive characteristic in the development of Finland.

Rapid economic growth which continued after the Second World War is slowing down. The average annual growth of the GDP will stay around 2.5 per cent in the next 15 years.

At the end of the century, economic growth will be slowed down by a smaller increase in population and labour force, preventing environmental pollution, a rapid change in foreign trade competition situation and adjustment difficulties caused by it. On the other hand the European integration may stimulate the economy by removing limitations restricting the efficient operation of the economy.

Since the 1960s, the growth of production has been based on the increase in the capital stock and the growth of total factor productivity. The labour input has diminished and will decrease even faster in the future.

As the investment ratio goes down, the growth of capital stock is slowed down. Investments are directed more and more towards replacement investments. Old production technology is removed and replaced by new technology. However, during the period under review, capital intensity will continue to grow further and contributes to maintaining the growth of productivity. Future economic development will depend largely on the growth of productivity.

Table 6.1 Factors contributing to growth of production in Finland in 1960-2005

	Average annual change, per cent			
	Production	Labour input	Capital input	Total factor productivity
Whole economy				
1960-1973	4,6	-0,1	5,1	3,0
1973-1989	3,2	-0,3	3,7	2,2
1989-2005	2,4	-0,6	2,8	1,9
Agriculture and forestry				
1960-1973	-0,1	-3,8	2,6	2,0
1973-1989	0,5	-3,0	1,5	2,3
1989-2005	0,4	-2,9	0	2,6
Manufacturing				
1960-1973	6,6	1,2	5,6	3,7
1973-1989	3,4	-1,2	3,4	2,9
1989-2005	2,9	-1,5	3,5	2,5
Other business sector				
1960-1973	5,3	1,2	5,2	2,7
1973-1989	3,5	0,5	4,0	1,7
1989-2005	2,8	-0,5	3,0	2,1
Public sector				
1960-1973	4,9	4,3	6,1	0,5
1973-1989	3,9	3,2	3,7	0,7
1989-2005	1,5	1,0	2,7	0,4

The economic environment of firms was transformed rapidly in the 1980s. Financial markets were liberated, companies were internationalized and they began preparations for a single European market. Increasing mobility of production factors and the removal of trade restrictions will lead to increased trade and specialization. The expensive domestic production will be replaced by cheaper imports.

The intensity of adjustment difficulties depends on the flexibility of wages and other production costs and the occupational and regional mobility of the labour force. Another crucial factor is how fast international demand will grow. The faster the growth of export demand and the more flexible the transfer of resources from one sector to the other, the faster the new production lines can develop.

Integration affects differently the open sector which is used to international competition, and the sectors which have earlier been protected. The growth of export markets implies increased demand in the open sector. However, structural changes can be expected especially in branches which have not been able to take full advantage of the economies of scale due to e.g. the small size of companies and their lack of cooperation.

Activities which will face adjustment difficulties, are mainly those which have been able to set their prices irrespective of international competition, sheltered by customs, subsidies or other import restrictions. They include agriculture, food processing industry and several services. The new market situation will also affect sectors, whose major share of production has been composed of public purchases, protected from international competition.

In comparison with other countries, Finland's industry is energy- and raw material-intensive. The export market-shares are largest in products the demand of which grows fairly slowly. The share of high technology production is small compared to other industrialized countries, but it has risen rapidly.

Domestic natural resource base, skilled labour force, and fast adoption of new technology are advantages in industrial competition. Companies' production machinery is modern, but the share of research and development lags behind that of the main competitors. Activities are restricted mainly by small domestic markets, the small size of companies, and short

tradition of internationalization.

The EC has prepared a report on the effects of integrated markets on various fields of industry by combining the following factors: the volume of trade between European countries; the level of trade restrictions; differences in product prices in various countries; the achievement and the utilization of economies of scale. Based on these factors, 40 industrial branches can be separated which will face positive and negative structural changes in the integrated markets.

Integration-sensitive branches represent approximately 50 per cent of the industrial production of the EC countries. Therefore, the formation of a single market will change the competition situation within the Community. In Finland, the share of these branches in the industrial value-added is less than 32 per cent and in industrial employment, 35 per cent. This is a major difference in comparison with e.g. Belgium, where the share of the same branches in industrial production and employment is approximately 63 per cent.

Table 6.2. The share of integration-sensitive branches[1] in industrial production in Finland in 1970, 1980 and 1987, per cent

	1970	1980	1987
Group 1	1,1	2,1	4,8
Group 2	3,0	2,4	2,6
Group 3	6,7	6,5	5,7
Group 4	19,8	19,0	18,6
Total	30,6	30,0	31,7

1) Group 1: Information technology, office automation, telecommunication, medical and surgical equipment.
Group 2: Locomotives, pharmacentical articles, beverage industry.
Group 3: Ship building, electrical machinery, part of food production industry.
Group 4: Consumer electronics, clothing, glass and ceramics, agricultural and industrial machinery, aircraft, motor vehicles.

According to the report, the major sectors of the Finnish industry such as forest-industry are not likely to face the strongest changes, since they are open for competition and there are few trade restrictions. The integration of markets is likely to cause less major structural changes in Finnish industry than in many small open economies. On the other hand, several "sensitive" sectors are also the fastest growing ones, and their small share in Finland is therefore a mixed blessing.

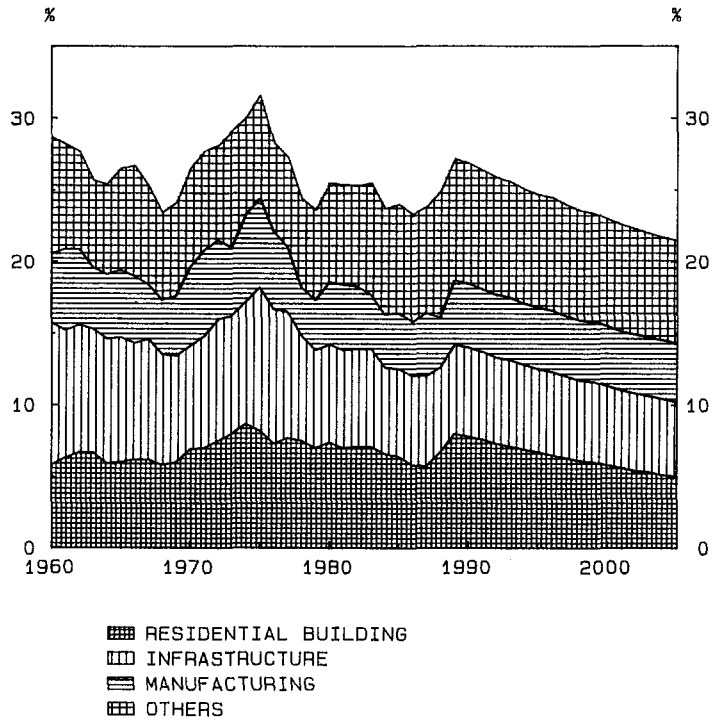
6.2. Investment and productivity

During the period after the Second World War, the investment-ratio has been higher in Finland than on the average in other industrial countries. In mid-1970s, the share of investment in the national product increased almost to one-third, but decreased after that rapidly. The share of investment varied in the 1980s around 25 per cent and rose at the end of the decade close to the level in the beginning of the 1970s. In 1989, over 27 per cent of the GDP was used to investments.

During the review period, investments will grow slower than total production and the investment-ratio will go down to a little over 20 per cent. The reduction in the share of investment can mainly be explained by housing investments which will come down from the peak of 1989. Investments in agriculture will also be reduced and the increase in public sector investments will remain minor.

The need for investment will be increased by the environmental protection legislation. It has been estimated that to reach the current objectives and to realize the environmental protection programmes, the required investments in the following few years would amount to approximately 1-2 per cent of total investments. Environmental objectives will probably be emphasized with the intensified international environmental policies and this will further raise the investment requirements.

Figure 6.2. Share of fixed capital formation in GDP in 1960-2005, per cent



Taking environmental protection views into consideration raises investment requirements especially in energy production and on certain industrial sectors. In traffic, limiting exhaust gases will speed up the renewal of the car stock and increase investments in railroads. Stricter environmental standards may also speed up the renewal of capacity, when it is not profitable to invest in environmental protection in old production plants.

The level of industrial investment remains high in the review period, although investments grow on the average only by 2.5 per cent per year. They will mainly consist of investments in machinery and equipment, the share of which in industry's fixed investments will be almost 80 per cent in the year 2005. Industrial enterprises operate more often in rented premises, which has been reflected in the strongly increased investments in the real estate sector. This development will continue also in the future.

Expanding export capacity is essential for the balance on current account. Indeed, investments are estimated to grow fastest in central export sectors, engineering as well as pulp and paper industries.

The above outlined investment development implies that the economy's production capacity i.e. capital stock, grows on the average by almost 3 per cent annually. Due to a high level of investment, Finland's capital stock is young. Whereas in 1980, the share of less than 5 years old machinery and transportation equipment in industry was 33 per cent, their share is now over 40 per cent. The age structure of the capital stock is affected by the high annual fluctuations in investments. Due to large investments in the past few years, there may be a considerable requirement for replacement investments at the end of the period under review.

The current high level of investment implies that the capital stock of several sectors will grow faster than production, although the growth of investments slows down. Capital output ratio rises further slightly.

Investments in research and education will increase

During the period under consideration, the economic growth will be based on the more effective use of inputs instead of their increased use. Production flexibility, versatile and extensive utilization of the workers' professional skills, and the quality and diversification of goods are the central elements in competition strategy. This implies a major input in labour force training, development of work methods and participation schemes as well as research and development activities.

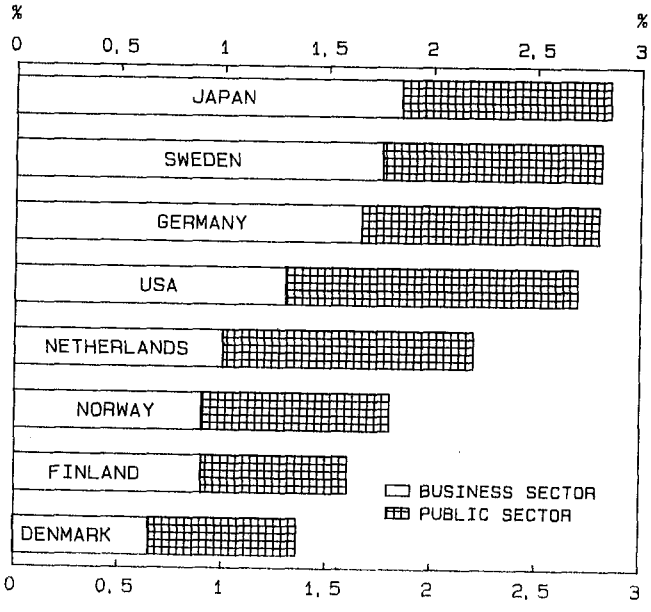
In 1988, manufacturing firms spent on training approximately 2 per cent of value added. This amounts to a sum corresponding a little over 10 per cent of fixed investments. These figures have doubled since 1974. A major part of the

increase in training has occurred in the 1980s. In 1988, approximately one-fifth of blue-collar employees and almost 70 per cent of white-collar employees participated in personnel training.

In all sectors the training expenditures will necessarily grow, although public resources in adult education will increase rapidly. Training will have to be expanded to reach the entire staff.

The share of research and development in the GDP is less than 2 per cent in Finland, which is in line with the average level in the OECD countries. During the review period, research and development expenditures will grow faster than total output, which means that their share in the GDP will rise to around 3 per cent.

Figure 6.3. Share of R & D in GDP in selected OECD countries in 1987, per cent



Source: OECD

A major share of the world's applicable and successful innovations is born in large companies or as a result of cooperation. Therefore, it is important for a small country to try to create propitious preconditions for research financed by companies in the same field. The central laboratory of paper industry can be mentioned as an example of such cooperation. In Finland, the enterprise sector's share in research activities is internationally quite high, almost 60 per cent. This improves and quickens the commercial applicability of innovations.

Direct foreign investment

The expansion in the Finnish firms' foreign investment activities has been affected by the small size of domestic markets, a desire to guarantee a foothold in the European common market, a need to secure the availability of raw materials and labour force, and an effort to transfer production closer to markets to avoid transportation costs.

Especially after the mid-1980s, Finnish direct investments abroad have grown faster than in most other OECD countries. When their ratio to domestic capital formation was less than one per cent in the 1970s and approximately 2,5 per cent in the early 1980s, the ratio increased to over 7 per cent in 1988. Measured this way, however, Finland is still behind for example Sweden and Switzerland as well as several EC countries. A large share of the foreign investment income is re-invested, which cuts down the amount of income reflows.

Thus far, over three times more has been invested from Finland abroad than from abroad to Finland. In the past few years, the ratio has been even more dramatic. The ratio of direct investments to Finland to gross investments is less than one per cent.

Over 40 per cent of Finnish direct investments in the past few years has been directed to the EC area, and approximately

one-third to EFTA countries. Only about 15 per cent of the Finnish annual direct foreign investments are directed to North America. The share of European Community has grown by almost 10 percentage points after the initiation of the single market programme.

When the EFTA countries' role in the single market becomes clear, the need to invest in the single market may diminish. In this case the Finnish investment activities may be directed elsewhere, especially to NIEs and North America. Direct investments to East European countries, after their economic and political reforms, are necessary to the Finnish industry as well.

Direct foreign investments may, in due course, affect the development of some branches. They will replace some domestic investments and may also channel the scare human and development resources abroad. To balance this situation, a stronger flow of foreign investment and other resources should be directed to Finland.

Rapid growth of productivity continues

The growth of both labour productivity and total factor productivity, which represents the efficiency of the use of all production inputs, has been faster in Finland than in other industrial countries in the 1980s. The increase in productivity has been maintained by the high rate of investment. It has facilitated the continuous renewal of the production capacity and the introduction of new technology. This way, Finland has been able to reduce the gap with technologically more advanced countries.

The rapid growth of production and the structural change related to it have also promoted the growth of productivity. Resources have shifted from sectors of low productivity to higher productivity ones. A third central factor, which has affected the favourable development of productivity, has been

the advantageous age structure of the labour force and the rising level of basic education. Organizational changes in production, structural rationalization and growth of unit size have also affected this development.

The growth of labour productivity slowed down in the 1970s. The slow-down concerned above all the closed sector of the economy. The growth of annual labour productivity in trade, transport, and construction activities was in 1973-1989 over one per cent slower than in the 1960s and early 1970s. The slow-down in the growth of productivity was smaller in industry and primary production. The development of the service sector thus contributed essentially to the slow-down in the growth of productivity of the national economy.

Table 6.3. Change in labour productivity and its contributory factors in 1960-1973, 1973-1989 and 1989-2005, % per year

	Annual change in labour productivity	Effect of growth in overall productivity	Effect of increased capital intensity
Whole economy			
1960-1973	4,7	3,0	1,7
1973-1989	3,4	2,2	1,2
1989-2005	3,1	1,9	1,2
Agriculture and forestry			
1960-1973	3,9	2,0	1,9
1973-1989	3,6	2,3	1,3
1989-2005	3,3	2,6	0,7
Manufacturing			
1960-1973	5,2	3,7	1,5
1973-1989	4,7	2,9	1,8
1989-2005	4,5	2,5	2,0
Other business sector			
1960-1973	4,1	2,7	1,4
1973-1989	2,9	1,7	1,2
1989-2005	3,4	2,1	1,3
Public sector			
1960-1973	0,6	0,5	0,1
1973-1989	0,6	0,7	-0,1
1989-2005	0,5	0,4	0,1

The opening up of the service sector to foreign competition strengthens the need to raise productivity. Even if direct imports competition in e.g. retail trade or construction activities remained low, its threat forces to intensify activity. In transport and financing services, preparations for the strengthening of foreign competition have already affected activities and this effect will become even stronger in the future. Enlarging company size and rationalizing service networks are means to raise productivity.

The possibilities for large-scale production are small in most branches in Finland. Competitiveness on the world markets has to be achieved with well-chosen products, quality and flexible organization of production.

The new production model emphasizes the significance of knowledge as a production factor. It presumes flexible organization, characteristics of which are short production series and the utilization of the workers' versatile skills and cooperation ability. Competition strategy is based on the quality of products and diversification. Saving can be achieved in multipurpose use of production factors rather than in scale economies as in the traditional production model.

A flexible production model presumes reforms in working life increasing the motivation of the employees. For these reasons, the need to develop various systems of profit sharing and participation is strongly emphasized. These can be realized by e.g. employees' partnership in the company and thereby in the profit sharing or decision-making alone through various participation arrangements.

Work organization as well as wage and bonus systems will affect the labour force's mobility between firms and other work communities. Personnel policies, in a broad sense of the word, will become a central means of competition on the labour markets. Wage differences, also, will grow along with wage and bonus systems applied by individual companies.

A flexible production model is a challenge to the incomes policy negotiation system and at the same time to the trade unions. Emphasizing decision making at the firm level will most likely lead to a smaller degree of trade unionism, which can weaken the role of the centralized incomes policy.

A centralized negotiation system, however, has proven to be advantageous especially from the point of view of employment. Therefore, the coordinating role of central labour market organizations should be emphasized in the renewal of the incomes policy machinery. Also, a well-functioning machinery of incomes policy which on the one hand takes notice of firms' special needs, and, on the other hand has a centralized coordination possibility, promotes the introduction of new technology.

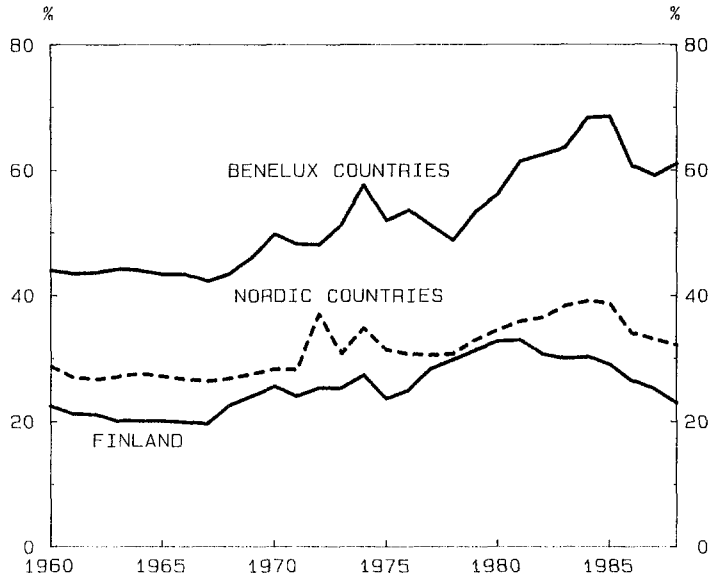
6.3. Foreign trade

The share of foreign trade in the national product is lower in Finland than in other small industrial countries. The share of exports in total production is approximately one-quarter; while it is one-third in other Nordic countries and 60 per cent in the Netherlands and Belgium. With the liberalization of foreign trade and structural changes in production, the share of foreign trade has risen in the long term, although this development has not been steady.

In Finland, the share of exports in the national product has gone down in the 1980s. This tendency has been affected by declining trade with the Soviet Union as a result of the lower oil price. The growth of exports to the west has not been enough to compensate the diminished Eastern trade. The growth of exports during the second half of the last decade was notably slower than the growth in imports in the most important purchasing countries. The slow growth of export volume was partly compensated by the rapid rise in Finnish export prices.

The volume of imports has grown strongly, but import prices, due to lower prices of oil and raw materials, have risen very little. The rapid growth of Finnish production and domestic demand has affected the strong growth of imports. Previous export production has also been directed to the domestic market.

Figure 6.4. Share of exports in GDP in selected countries in 1960-1988, per cent

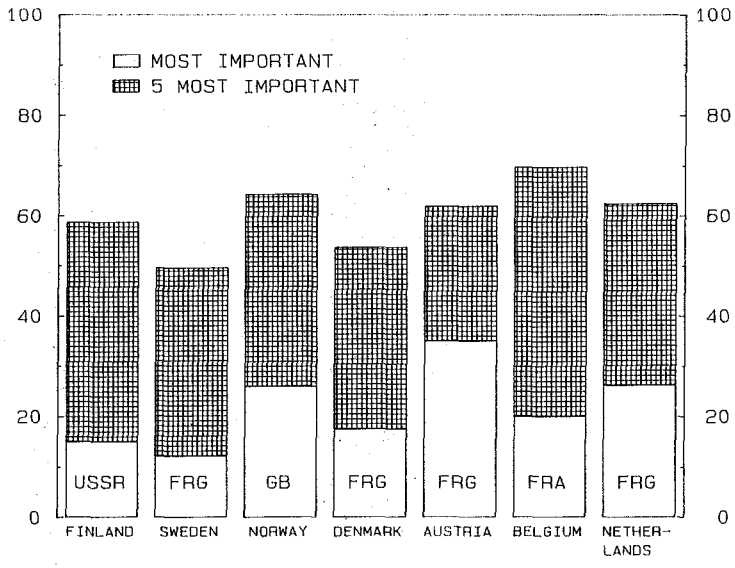


The commodity structures of Finland's exports and imports differ from each other more than in other small economies. The share of forestry products and "heavy" metal in exports is large and, in imports, raw materials and investment goods are dominant. Cross trade with the same commodity group is minor. This is partly explained by the bilateral nature of the Soviet trade and its large share in the Finnish foreign trade.

The significance of the neighbouring countries with the greatest purchasing power is crucial to small countries' exports. At least a half of small countries' exports is

directed to the markets of 5 most important purchasing countries. In this regard, Finland is hardly different from others. In the past few years, the Soviet Union has been the most important export country for Finland, while the other comparison countries' exports have been mainly directed to some leading EC country.

Figure 6.5. Most important purchasing countries' share in the export of goods in selected countries' in 1988, per cent



The significance of national markets becomes weaker in the 1990s when a commodity which is accepted for trade in one country within the EC-area, is automatically accepted in other countries as well. At the same time differences in economic development between individual countries within the economic region become smaller. The position of Finnish industrial exports, dominated by small companies, can be eased by the "disappearance" of national markets from the European economic region. Several versions of one product are not needed and marketing and selling costs may become smaller.

Finnish foreign trade is very Europe centred. Europe's share in exports is over 80 per cent and its share in imports is almost as large. The share of European Community has grown in the 1980s, but it is still smaller than in the beginning of the 1960s. East Europe's share in Finnish trade has varied according to oil price fluctuations. It was at its largest in the mid-1970s and early 1980s.

The Europe centrality of Finnish foreign trade has also been stressed by Finnish companies' strong direct investment activities in Europe in the past few years. In the long term, the share of fast growing South East Asian markets may increase in Finnish exports and at the same time the surplus of imports from these countries may be reduced. However, changes in the shares of the major regions will take place slowly.

The favourable economic development of Europe is estimated to continue. Economic integration will increase international trade, strengthen competition and speed up structural changes. From the point of view of the growth of the main export markets, the Finnish export development outlook is good.

The problem in Finnish exports has been the narrow commodity structure. The structure of exports was diversified in the 1960s and 1970s, but this development has not proven to be lasting. For example, companies which have specialized in Eastern trade, have not been able to enter the western markets when their exports to the Soviet Union have been reduced.

A major share of Finland's exports consists still of commodities, demand of which on the world markets grows slowly in the long term. The growth of demand is fastest in technology intensive products, the share of which in Finnish exports is small. On the other hand, Finland's share in the world markets, apart from paper industry, is so small that even minor changes in market shares have a stronger effect

than the overall growth of the markets.

Terms of trade will deteriorate

The balance of foreign trade is essentially affected by developments in export and import prices. The reduction in the real prices of imported raw materials and oil as well as the rapid rise in highly manufactured paper products improved Finland's terms of trade in the 1980s.

During the period under consideration, terms of trade are estimated to become slightly weaker, i.e. to return to the average long-term level. The real prices of oil and other sources of energy are expected to rise. Since Finland's export production is energy-intensive, such a development may be reflected as a slow-down in the growth of the demand of Finland's main export products. In relation to competitor countries, however, the competitiveness of Finnish production will not become weaker since the rise in energy prices affects the competitors as well.

Within bilateral trade, the rise of the oil price has implied increased exports from Finland to the USSR. During the review period, the situation will change since a transfer may take place to use convertible currencies in Finland-USSR trade. This will further emphasize the need to diversify the commodity structure of Finnish exports.

As the terms of trade may deteriorate, the volume of exports should grow clearly faster than the volume of imports to reduce the current account deficit. Imports of services are still estimated to grow faster than their exports, so the necessary exports surplus will have to be made in the trade of goods.

The share of forest-products in total exports is 35 per cent. Its share has decreased because the exports of sawmill and board industries have been reduced in volume. During the

review period, the exports of sawmill and furniture industries are estimated to increase. This, however, presumes a considerable input in product development and marketing. The exports of paper industry will grow at the same rate as production, approximately by 3,5 per cent annually. Of the main export sectors, forest-industry is the only one with a clear surplus. This surplus is estimated to grow further.

The share of metal industry in total exports is one-third. Exports have increased rapidly and the surplus of imports has diminished in the long term. Those metal branches which are connected to environment and communications technology, and the utilization of new technology in general, will expand quickly. These sectors have the best possibilities to increase exports, even though competition will strengthen all the time.

The exports and imports of other industrial products consist mainly of clothing and chemical industries' products. Exports in clothing have been reduced sharply, while their imports have been increased. Exports may revive if the planned changes in product development and production methods prove successful. The exports of chemical and building material industries are estimated to grow. The surplus of imports will remain notable, however, in these sectors.

Table 6.4. Exports and imports by sectors in 1973-2005

Sector	Exports share 1988 %	Change in quantity 1973-1988 % annually	Change in quantity 1988-2005 % annually	Imports share 1988 %	Change in quantity 1973-1988 % annually	Change in quantity 1988-2005 % annually
Forest-industry	35,0	2 1/4	3 1/2	3,8	6 3/4	3
Metal industry	33,1	6	5	43,3	3 1/2	2 1/2
Other manu-facturing	14,5	4 1/2	3 1/2	25,4	3 3/4	2 1/2
Other goods and electricity	1,6	5 1/2	2 1/2	11,2	2 1/4	2
Total goods	84,2	4 1/4	4	82,8	3 3/4	2 1/2
Total services	15,8	1 1/4	4	17,2	6	4 1/2
Goods and services	100	3 3/4	4	100	4	2 3/4
Billion FIM	109,0			110,2		

The deficit in the trade of services is estimated to grow. This is mainly caused by the faster increasing number of Finns travelling abroad in comparison to tourism directed to Finland. Other exports and imports of services are estimated to grow at equal rates. Service trade will be liberalized and the significance of price competitiveness in foreign trade is growing.

7. LIVING CONDITIONS

7.1. Households

There are just over 2.1 million households in Finland. In two decades, their number has grown almost one and a half times. The number of households of one or two persons has grown the most and the average size of households has reduced significantly. The total number of families with children has remained almost unchanged but the number of children per household has gone down.

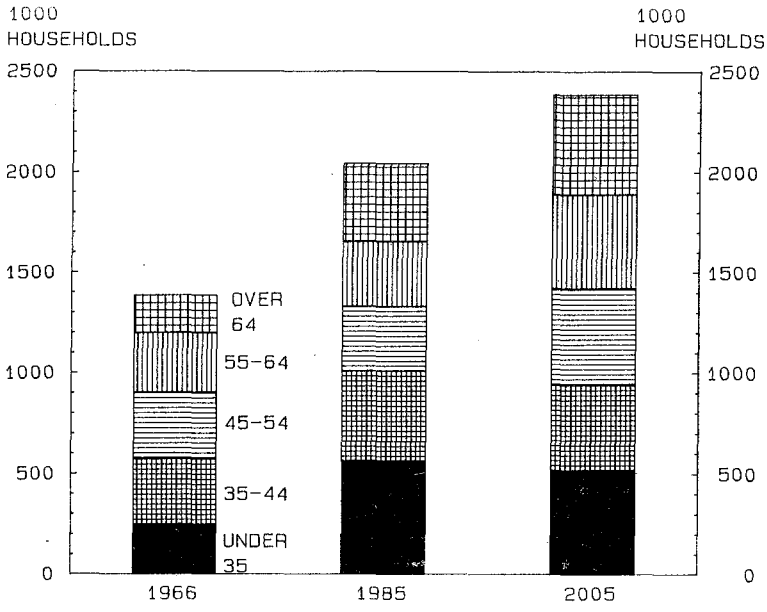
As a result of the young becoming independent at an earlier stage in their lives and the increase in the number of elderly people and those living alone becoming more general, the number of households in 2005 will amount to 2.4 million and the average size will be reduced to 2.1 persons.

Table 7.1. Households according to size in 1966-2005

	1966	1976	1985	2005
Number, million	1,38	1,64	2,05	2,39
Size, %				
1 person	22,6	25,7	35,2	39,4
2 persons	17,1	23,5	25,5	28,8
3 + persons	60,3	50,8	39,3	31,8
Total	100,0	100,0	100,0	100,0
Average size, persons	3,85	2,77	2,36	2,11

From 1966 to 1985, the number of households, whose head was under 45 years of age, almost doubled. Due to the reduction in the young age groups, the number of young households will go down until 2005. A typical household is then a middle-aged or older married couple with no dependents.

Figure 7.1. Number of households according to the age of the head of household in 1966, 1985 and 2005, 1000 households



7.2. Household income

Earned income

Internationally compared, real income has increased rapidly in Finland. Since 1960, the purchasing power of households has grown 2.5-fold. Provided that the annual economic growth will be 2.5 per cent, the disposable income per household will increase by approximately 40 per cent by the year 2005.

The higher standard of living can be seen in various aspects of material well-being. Floor space per person has more than doubled from 1960 to 1990. The standard of equipment in apartments has improved notably. The number of passenger cars has grown 10-fold in three decades and the density of cars is equal to the European average.

The income development will be based on the growth of production. Labour costs cannot increase faster than production without upsetting the balance of the economy. When the share of indirect labour costs rises, mainly due to the growth of pension expenditures, the growth of real wages will remain somewhat below the growth of labour productivity.

The supply of labour will not increase significantly by the year 2005. The reduction in the young age groups may be reflected as increased competition on the educated young, which would improve their relative labour market position. On the other hand, keeping the ageing population on the labour market until the normal retirement age or even over that will become an important aim in manpower policy. This, however, may be reached more easily by, for example, flexible working time arrangements and improvements in working conditions than by pure income incentives.

A third factor causing pressures on income policies is women's strengthening position on the labour market and the need to diminish the wage difference between men and women. The average level of women's wages is a little over 70 per cent of men's wages. This difference has been reduced by only a few percentage points in the 1980s.

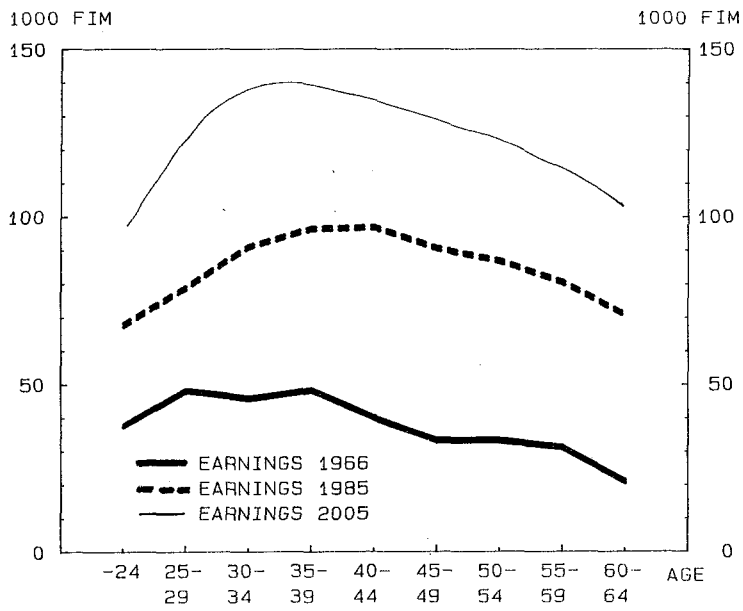
The main reason for these wage differences is the sharp division of the labour market into male and female dominated occupations. Over half of women work on fields where the share of women is over 70 per cent. A permanent solution for decreasing the wage differences between men and women is to lessen this division of the labour market. This can be reached gradually by strengthening vocational guidance and adult education as well as by raising the perception of female dominated occupations, which should be reflected in the wage level as well.

Figure 7.2, based on household surveys, shows the average earnings per employed person in households grouped according to the age of the head of household in 1966 and 1985. The peak of the earnings curve has shifted to older age groups.

An earnings profile at the beginning of the 21st century has been outlined in Figure 7.2, presuming that the relative position of the young on the labour market is improved. This "youth is an asset" scenario would imply both relatively high initial salaries and fairly fast career developments for the young.

The high earnings of the young would be explained not only by their scarcity but also by their working in the "modern" sector of the economy, their good level of education and high work intensity. In the older age groups, part-time working becoming more general would lower the average annual earnings.

Figure 7.2. Average earnings per employed person in households of various ages in 1966, 1985 and 2005, 1989 prices, 1000 FIM



Source: Household surveys

Income transfers

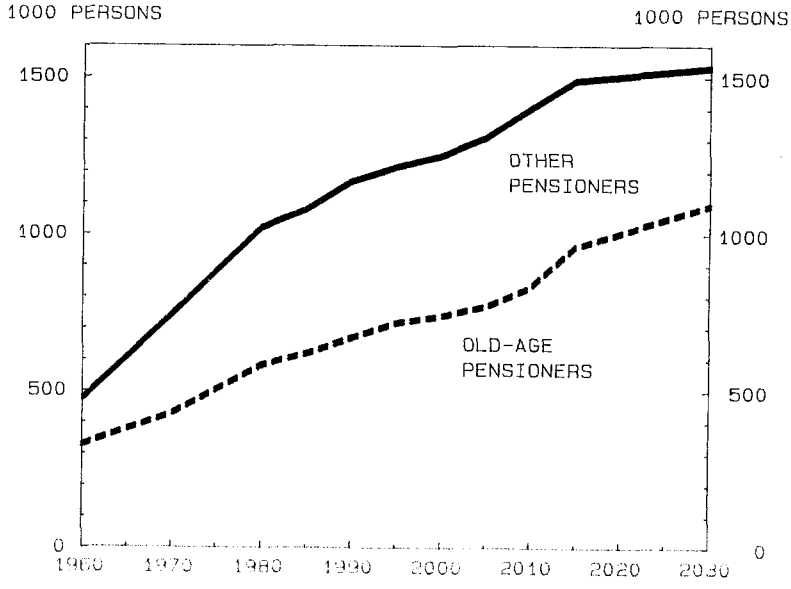
The increase in income transfers has resulted from the rapid increase in the number of pensioners.

Table 7.2. Households' income components in 1966-2005, households' gross income = 100,0

Year	Income from production	Income transfers received	Income transfers paid	Disposable income
1966	90,3	9,7	-16,2	83,8
1967	83,5	16,5	-25,0	75,0
1985	78,8	21,2	-25,2	74,8
2005	75,6	24,4	-26,2	73,8

The share of income transfers in the households' incomes grows further as a result of the increased number of pensioners and the raised level of pensions. The share of pensioners in the population grows from the current 24 per cent to 26 per cent. In 2030, the share is expected to be around 33 per cent.

Figure 7.3. Number of pensioners in 1960-2030, 1000 persons



The rapid increase in the number of pensioners in the 1970s and 1980s was caused by early retirement becoming more general. Almost 40 per cent of pensioners are below the age of 65. Early retirement is more usual in Finland than in other countries.

The average pension in 1990 is almost 4000 FIM per month, i. e. 45 per cent of the average wages. In the 1980s, it increased a little over 3,5 per cent annually in real terms, whereas the real increase in the wage level remained almost 1,5 percentage points smaller. In the future, pensions are estimated to grow half a percentage point faster than wages.

Due to the increasing number of pensioners and higher level of pensions, the pension expenditures are estimated to grow further strongly, i.e. by almost 4 per cent annually. This will generate a notable increase in labour costs, because pensions are to a large extent financed by employers' social security contributions.

In the 1990s, the growth of income transfers other than pensions will be relatively minor, unless the level of benefits is raised or the eligibility criteria are changed. This is due to the fact that the number of recipients of several benefits will be reduced. For example the lower birth rate is reflected not only in the amount of child allowances, but through the parents' leave benefits in the sickness insurance expenditures, too.

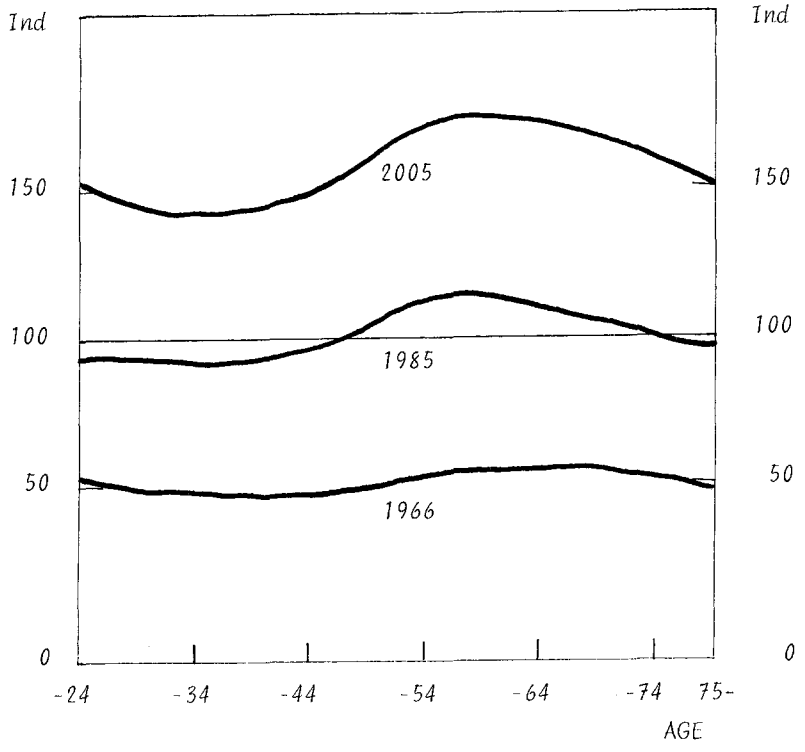
With the progressive income taxation the differences in household disposable incomes have been reduced. The starting point in outlining household income developments has been that income tax-ratio should not change essentially by the year 2005. In the table 7.2. above, the rise in the household's income tax-ratio has been realized already at the end of the 1980s.

Incom distribution

According to international surveys, income distribution is quite even in Finland and other Nordic countries. In the long term, income disparities have to some extent become narrower in Finland. One main reason for this development has been the rapid rise in the level of pensions.

The expected favourable income development of the young and the rise in the level of pensions will equalize income distribution further. By the end of the century, the large age groups will have reached the age when their level of income is high and the number of dependents is small.

Figure 7.4. Household income per capita in 1966, 1985 and 2005, index (1985 average income) = 100



The relative position of young families with children compared to others may be poor in the light of per capita income. If the comparison were based on consumption units, taking into account the joint consumption advantages of families, the differences between families with children and others would be smaller.

The possibilities for large households and families with children to improve their relative position are limited. Raising incomes by increasing work input is not possible, since both parents in most cases already work. The only possibility for the young to raise their standard of living is to limit the number of children in the family, which is not desirable from the point of view of population development.

In the 1990s, income distribution is affected by the ageing of the large age groups. When approaching retirement age, income disparities within the age groups seem to grow because of, for example, strengthened effects of education in career development. Income dispersion in these age groups is further strengthened by the fact that those who retire before normal pension age have usually been working hard physically and received a poor education.

Despite the high average level of income and the relatively even income distribution, there are still households in Finland which face subsistence difficulties. In some of these households the difficulties are temporary, due to illness or unemployment. In these cases problems are caused, in addition to possible extra expenses, by difficulties in adjusting consumption to the lowered income level. The increased indebtedness of households may worsen such difficulties in the future. All kinds of households may be struck by difficulties of this kind and therefore the support measures will have to be flexible and adequate.

On the other hand, financial difficulties in some households are more permanent. Such households can be found among young

families with children and one-parent families who struggle with housing loans and family subsistence. Older, poorly educated people may also face permanent subsistence difficulties due to frequent unemployment. Some pensioners also manage with minimum resources, although this group is diminishing.

7.3. Savings and consumption

Savings

Household saving in Finland has reduced during the 1980's. The liberalization of the financial markets around mid-1980s accelerated this tendency. In 1988, the household savings ratio was negative for the first time. In 1989 savings recovered slightly but remained low.

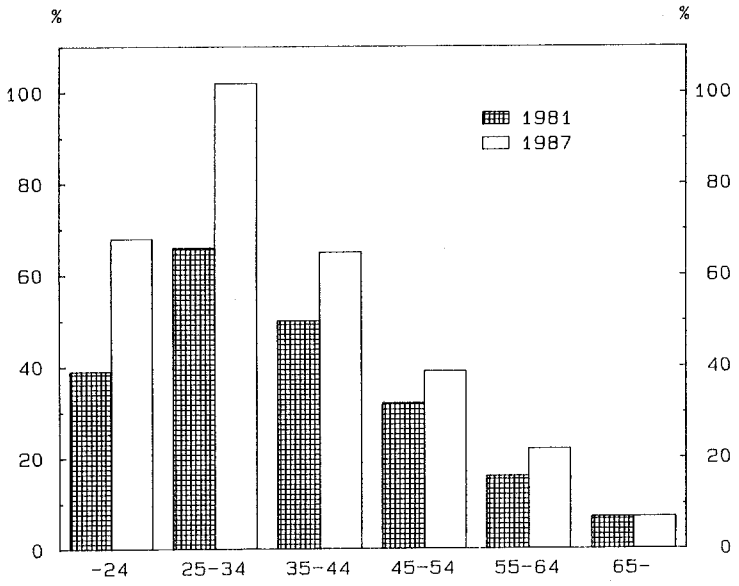
The lowering of the household savings ratio in the long term is almost a universal phenomenon. The improved social security especially has reduced the households' need to save for illness or for old age. However, the lowered level of household saving in Finland in the late 1980s can also be explained by the liberalization of financial markets and high income expectations.

Due to changes in the financial markets the consumption of young households especially depends more and more on income expectations. If the relatively fast growth of real incomes continued, the savings of young households might diminish even further. During favourable income expectations they maintain a high level of indebtedness and start "net saving" at a notably later stage than earlier generations.

The level of household indebtedness rose in the 1980s in almost all age groups, but most in the group under the age of 35. The rise of indebtedness reflects not only the higher apartment prices but also that, with easier credit availability, households estimated their indebtedness

according to their wealth. Therefore, reducing housing investments may not necessarily lower indebtedness to the same extent. Loans are used for other purposes and the repayment takes notably longer than earlier.

Figure 7.5. Ratio of debt to households' disposable income according to age of head of household, per cent



A change in the population structure in the 1990s would raise the household saving ratio provided that the savings behaviour in the various phases of life continued as before. Above all the ageing of the large age groups should increase the financial savings of households. If the large age groups saved in the same proportion as the earlier generations in the same phase of life, it would compensate the lower level of saving of the younger age groups.

However, it is unlikely that the savings behaviour of the various age groups will follow the example of the previous generation. The large age groups will save less in proportion to their predecessors. Neither is their saving of the same long-term character: collecting reserves for consumption

during pensioner years. Saving is more directed towards purchasing durable consumer goods and financing travel or longer vacations. Voluntary pension saving may increase if the willingness to retire at an early stage remains high.

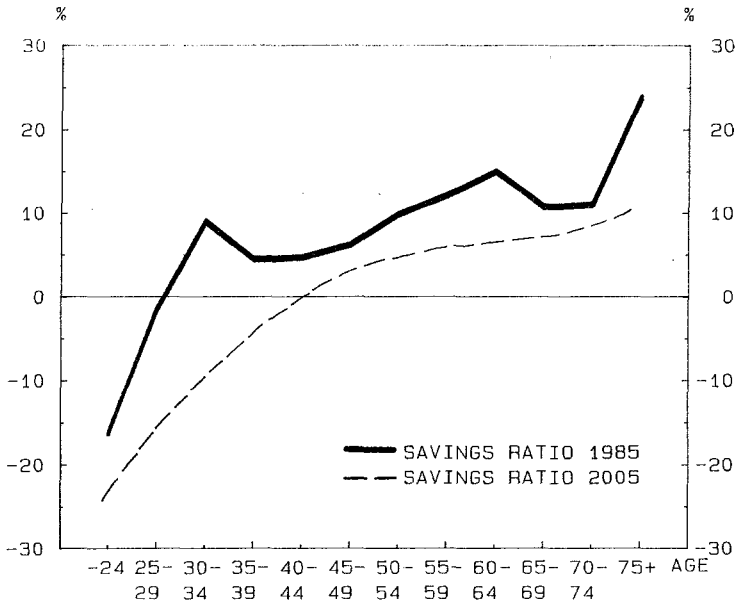
Pensioner households in Finland have traditionally had a high level of saving, up to 10-20 per cent of the disposable incomes. It is difficult to find a reason for this high savings ratio. Apparently saving is considered a virtue regardless of whether it is profitable or necessary. On the other hand, private consumption needs are reduced with age.

Those retiring during the period under consideration are already used to a good social security, and their health is better compared to earlier generations. This may also bring down the savings ratio of pensioner households.

Figure 7.6 shows a "saving profile" by the age of head of household calculated according to 1985 household survey. A corresponding profile has been outlined for the year 2005, following the scenario presented above. The age after which the savings ratio is positive is probably already now higher than in 1985. The growth of indebtedness of the young seems to reflect the rapid lowering of their savings ratio. On the other hand, the savings ratio of older age groups has probably not lowered essentially yet. In the future, the savings ratio of older households is estimated to decrease but remain positive.

Changes in behaviour seem to be the main reason for the low level of household savings at the beginning of the 21st century. The lowered need to save for own dwelling may also bring it down, unless other especially attractive savings objectives appear. However, since saving is very sensitive to income changes and expectations, it is possible that household savings will rise in the next few years.

Figure 7.6. Household savings ratio according to age of head of household in 1985 and 2005, per cent



Consumption

The structure of private consumption has changed considerably in the course of the last few decades. Due to higher incomes, a smaller share of them is needed to secure the basic needs, and the households' freedom of choice in consumption has grown. Another factor which has affected the consumption structure is the development of technology. New goods have entered the markets and the relative prices of goods have changed. This especially concerns durable consumer goods. On the other hand, it has been noticed that a change in the population age structure affects the consumption structure relatively slowly.

Consumption demand does not easily saturate when incomes grow higher. Even in wealthier countries and households, a higher consumption level is desired. Growth itself creates new needs. Something without which one could easily have managed becomes a necessity. This is illustrated by the rapid

expansion in the use of various household appliances and other durable goods and the endless stream of new goods into the markets.

Prosperity depends on the relative level of consumption, which is one explanation for the continuous growth of consumption. The quantity or quality of consumption is not important as such. What is important is how one's level of consumption compares with others. With the rising general level of income, this seems to have become a more and more important motive contributing to the growth of income and consumption.

Table 7.3. Frequency of selected household appliances in 1981-1988, share of appliance owners in total number of households, per cent

	1981	1988
Microwave oven	0	42
Freezer	45	52
Dish-washer	10	27
Washing machine	73	72
Black and white TV	51	20
Colour TV	50	90
Videotape recorder	-	40
Home computer	-	15
Car	49	60
2 cars	6	20

Source: Household survey 1981 and the Association of Finnish Electric Utilities

The growth of incomes and changes in the relative prices of various commodities affect the consumption structure in the future as well. Increasing leisure time together with higher incomes increase travelling, consumption related to leisure time activities and the demand for restaurant services, for example. Changes in taxation and subsidy policies brought about by the integration of Europe may reflect in the consumption structure. The environmental policy measures may change the structure of consumption notably as well.

Table 7.4. Private consumption in 1960-2005

	Structure				Volume change		
	1960	1973	1988	2005	1960-1973	1973-1988	1988-2005
					% per year		
1. Food, beverages, tobacco	36	29	23	17	3,8	1,2	1
2. Clothing	11	7	5	5	3,1	2,2	2 1/4
3. Dwelling	18	18	17	16	4,3	3,9	2 1/4
4. Furniture etc.	7	7	7	7	6,7	2,6	2 3/4
5. Health	2	3	4	4	7,2	2,4	3
6. Traffic	11	16	18	20	9,1	3,0	2 1/2
7. Leisure etc.	5	7	10	11	8,3	3,7	3
8. Other	10	13	16	20	4,5	5,5	4
Total	100	100	100	100	5,2	3,0	2 1/2

8. PUBLIC SECTOR

8.1. The changing role of the public sector

Slower economic growth, increasing structural unemployment and strengthening inflation in the 1970s lead several OECD countries to reassess the role of the public sector. Growing public expenditures, high levels of taxation and large budget deficits were considered to distort the allocation of resources and to diminish the growth possibilities of the economy. Slowing down the growth of public expenditures and raising efficiency in public services were considered essential. Reforming taxation and stopping the growth of public debt has been a common line in all Western countries in the 1980s.

The share of public sector in the national economy is smaller in Finland than in most other West European countries, but higher than in the USA and Japan. The share was still growing rapidly at the beginning of the past decade, but due to the brisk economic growth in the past few years, it has diminished slightly.

Despite the rapid growth of public expenditure, the level of gross taxation in Finland has remained around the average of OECD countries, because the growth of total output has been rapid as well. Securing basic functions and an efficient public sector can be reached also in the future in Finland without major reductions in services.

Developing the public sector requires political consensus since increasing efficiency and the reassessment of functions may change the welfare and income distribution of the society. An extensive system which secures a good level of service and an even income distribution is expensive, as the Swedish model shows.

Table 8.1. Share of public expenditure in selected countries, in 1960-1988, per cent of GDP

	1960	1975	1980	1986	1988
Finland	26,6	36,1	36,5	42,3	42,0
Sweden	31,0	48,9	61,6	63,5	60,4
Norway	29,9	48,4	50,7	52,0	54,4
Denmark	24,8	48,2	56,2	55,4	59,1
England	32,3	46,3	45,1	46,2	42,8
France	34,6	43,5	46,4	51,8	50,9
West-Germany	32,4	48,9	48,3	46,6	46,3
Japan	..	27,3	43,6	33,1	32,6
USA	27,0	34,6	33,7	36,9	36,0
OECD	28,6	38,0	39,3	41,0	39,9

Source: OECD, Economics in Transition. Structural Adjustment in OECD countries. Paris 1989.

In a welfare state, individual needs are more and more emphasized. Citizens become more demanding as their levels of income and education grow higher. The basic services of health care, social security and education are already quite extensive. Instead of wide, general programmes, the quality of services and greater freedom of choice are emphasized. Self-care and voluntary activities should be supported. The role of the public sector is transformed from supervising to guiding and supporting.

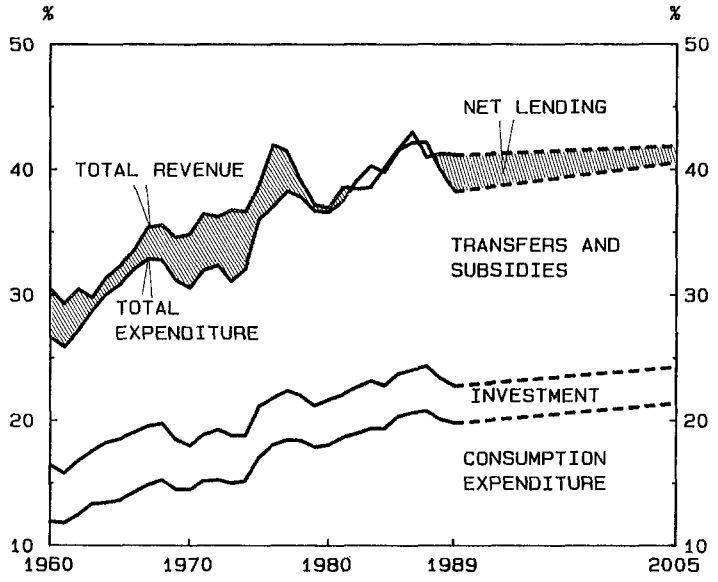
8.2. Public expenditure

The share of public expenditure in GDP has grown 1.5-fold after the year 1960. This has been caused by both an increase in the volume of services and their prices which have risen faster than the average. During the past 30 years, almost half of the growth in the share of public consumption expenditure has been caused by their price development.

The financial position of the public sector improved substantially at the end of the 1980s with the fast economic growth. At the same time, the growth of expenditure has

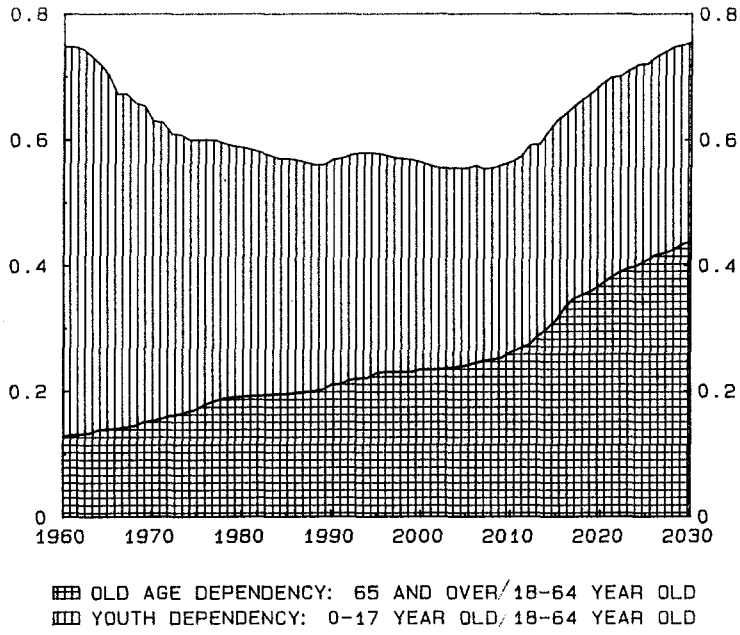
remained low and consequently the share of public expenditure in GDP was reduced.

Figure 8.1. Share of general government revenue and expenditure in 1960-2005, per cent of GDP



The growth of public expenditure in the period under review is restrained by the advantageous age structure of the population. The ratio of children (0-17 years of age) and the elderly (over the age of 65) to the population in working age (18 to 64 years of age) is exceptionally low until the year 2010. The decrease in the number of children will cause a decline in the child-dependency ratio. On the other hand, the higher number of elderly people will raise the old-age dependency ratio around the year 2010 when the large age groups born after the Second World War will reach retirement age.

Figure 8.2. Dependency ratio of the Finnish population in 1960-2030



The need for health and social services rises with the ageing of the population. In addition, labour input per "product unit" in health and social services grows further and the unit costs rise.

The volume of public consumption will rise by the year 2005 on the average by 2 1/4 per cent annually. This is only half of the growth of the last three decades. The share of public consumption in GDP, however, rises approximately by 1 1/2 percentage points by the year 2005, because the price of public consumption still rises faster than the average prices. This is mainly due to rapid growth in labour costs.

The growth of public labour costs is speeded up by the preparations for pension expenditures in the forthcoming decades. The state is transferring to a pension fund system and the level of funding of the communal pension system

rises. Difficulties in finding enough manpower for public services and efforts to diminish the wage differences between men and women will also accelerate the rise in labour costs in the public economy.

The share of welfare services in public consumption is currently almost two-thirds and still rising. At the beginning of the 1960s, the share was only 50 per cent.

The expansion of public services presumed a significant increase in the number of employees in the past decades. The employment in public activities grew three-fold in 1960-1989.

Table 8.2. Public employment in 1960-2005, 1000 persons

	1960	1973	1989	2005
Education services	45	72	118	140
Health services	32	70	122	160
Social services	13	29	87	145
Others	96	124	183	185
Total	164	295	510	630

Source: National Accounts

Although the growth of public services slows down significantly, in the year 2005 some 120 000 employees more than in 1989 will be needed in public activities. Securing the supply of labour presumes re-education of labour available from other fields of work to public services. The new labour market entrants alone will not be able to secure the supply. The gender distribution of the labour force in public services should become more balanced. The growth of the supply of female labour will be notably slowed down as there are no longer available labour resources in household work.

Public investment will grow a little over one per cent annually. The starting level of investment is high at the

beginning of the period under consideration. Therefore, the average level of investments is significantly higher than during the past 15 years.

An ever larger share of the welfare services investments is directed to the renovation of the establishments already existing as well as to machinery and equipment acquisitions.

Road construction peak years were seen in the 1960s and early 1970s. After the energy crisis, however, the investment activities slowed down and the building of motorways was reduced. Nevertheless the traffic grew more than estimated in the 1980s which was reflected in the inadequate capacity of roads and streets and the worsening of their condition. Investments in the main roads network, in communication networks and in the railroads will be increased.

Other investments include e.g. buildings for leisure time services and administration. The level of investments serving leisure time purposes especially remains high.

The growth of income transfers by the year 2005 will remain slow, because subsidies and certain income transfers to households will be diminished. On the other hand income transfers of a family policy nature such as child, study, and housing benefits will increase rapidly. The share of public income transfers in GDP will stay more or less the same: approximately 16 per cent from 1989 to 2005.

Agricultural production is estimated to decrease to correspond to domestic consumption by the year 2005. The export subsidy on agricultural products and other agricultural subsidies would thus be reduced. Subsidies to other industries such as supporting research and development remain in real terms at their current level.

Extensive reforms which have been made e.g. in the national pension system in the past few decades have improved social security. In the next few years, national pension

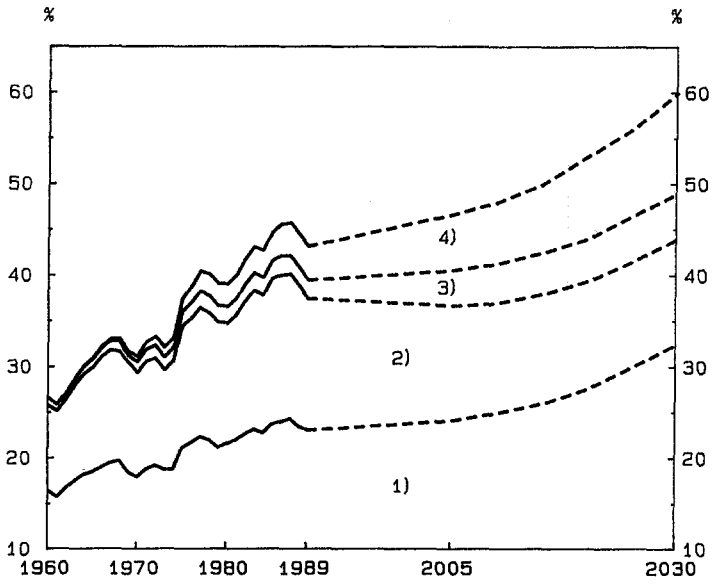
expenditures will be reduced in real terms, as the improved employment pensions diminish national pension expenditures.

The public sector employment pension expenditures will almost double by the year 2005. The main responsibility for public pensions will be transferred from the state to the local sector. Local government employment grew very fast in the 1960s and 1970s. If new early retirement schemes in the public sector became general, it might increase the number of pensioners more than estimated.

Development aid has been one of the fastest growing public expenditures. Worsening environmental problems may necessitate the introduction of development aid type measures to finance environmental protection in East Europe and developing countries. Development aid is estimated to rise to one per cent of GDP in 2005.

The slow-down in the growth of public expenditure will be temporary and expenditures on the employment pension scheme will grow strongly at the same time. The growth of public expenditure will accelerate as the size of the elderly population grows strongly in the 2010s.

Figure 8.3. Share of public expenditure and private employment pensions in 1960-2030, per cent of GDP



1) CONSUMPTION AND INVESTMENT
2) TRANSFERS AND SUBSIDIES
3) PUBLIC SECTOR EMPLOYMENT PENSIONS
4) OTHER EMPLOYMENT PENSIONS

8.3. Production policy of public services

Until now, the public sector in Finland has by itself mainly produced its own services which have been financed out of tax revenue. Services have increased in number and their quality has been improved. This can be seen in the fact that a day in a hospital, a visit to the health centre, a school day, or other service performances include more labour and capital input than earlier.

With the higher quality of services, public expenditures may grow in the future almost at the earlier speed. Shortage of labour force and financing difficulties, however, will limit the expansion of the public sector.

In addition to own service production, ervices can be bought from other public service producers or from private sources. Citizens can purchase services also from private producers by financing them for a major part out of public sector income transfers.

Besides tax revenue, services can be financed by collecting charges directly from the service users. Various production and financing alternatives of public services will have to be considered, while preparing for the quickening growth of the public sector in the 21st century.

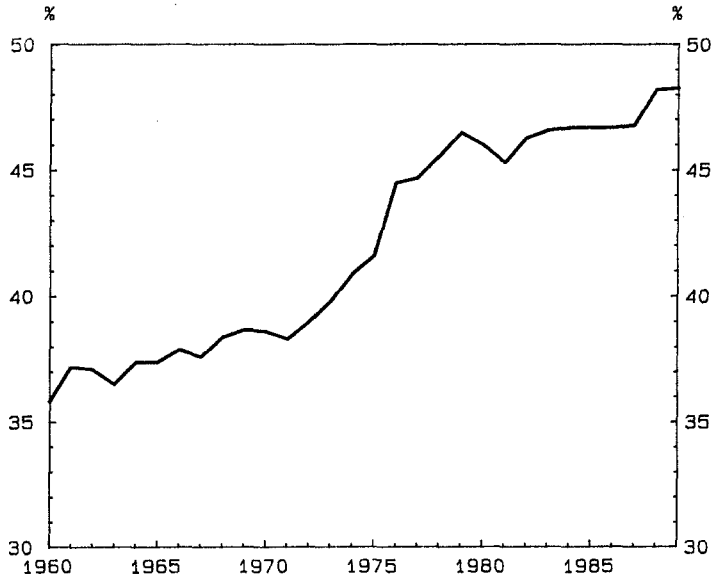
Pressures on the tax burden can be restrained through service charges. They will increase the awareness of citizens on the costs of public services. Service charges are also likely to affect the demand for services. For the sake of income distribution, charges should be differentiated if necessary. This might, however, increase bureaucracy.

By using purchased services, efficiency advantages can be achieved, provided that the selling party's service production costs remain smaller. The purchase of services can also promote a more economic use of private and public sector resources as well as increase flexibility on the service markets.

Public services have as a rule been the responsibility of municipalities and municipal federations. The share of local government expenditures in GDP and in public economy has constantly risen along with the growth of services. The share of municipal sector in GDP has doubled in three decades. Up to 2005, this share will grow further slightly.

The state's share in financing the municipal economy rose in the 1970s. An increasingly notable share of the costs of health care, social, educational and cultural services is financed by the state. The state pays almost half of the consumption expenditures of the municipal sector.

Figure 8.4. State's share in financing municipal consumption expenditures in 1960-1989, per cent



State grants to local governments are based on the operation costs of individual service-functions. This has not encouraged municipalities to restrain costs, nor has it allowed municipalities real decision power to arrange their services.

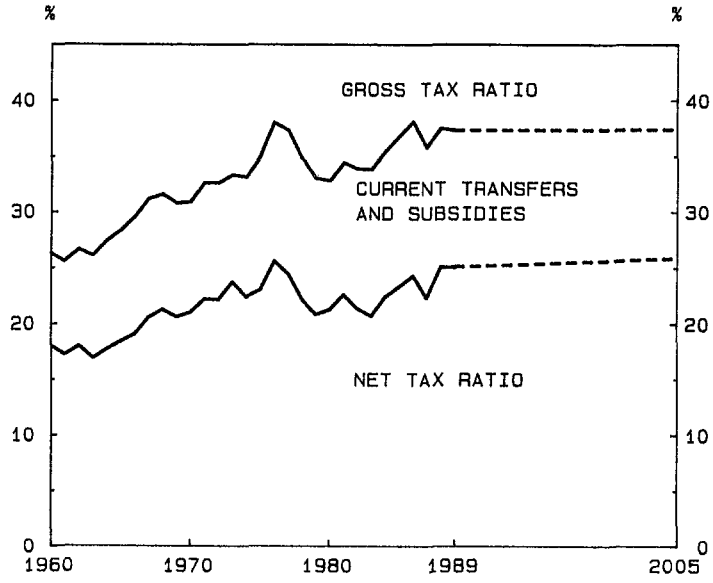
There are currently 460 municipalities in Finland, over one-third of which have a population of less than 4000 inhabitants. In the review period, raising efficiency in public sector, developing user charges, increasing cooperation in service production between municipalities, and revising state grant legislation will create possibilities for municipal fusions.

8.4. Financing public expenditure

Over 90 per cent of public expenditure has been financed out of tax revenue in the past decades. Tax revenue will also

remain the main source of financing in the future. The efficiency of the public sector must be increased in order to finance public expenditures until the year 2005 within the framework of the current gross tax ratio. The net level of taxation, however, will rise because of the increased share of public consumption in GDP. The growth of income transfers will remain slower than the growth of GDP.

Figure 8.5. Gross and net tax ratio in 1960-2005, per cent of GDP



In addition to tax and sales incomes, other public income sources are provided by capital incomes. Their role in financing public sector expenditure is minor.

The gross tax ratio in Finland rose by over 10 percentage points in the period 1960-1989. Until the mid-1970s, this rise was mainly caused by the tightening of direct taxation. After that, the share of indirect taxation has risen.

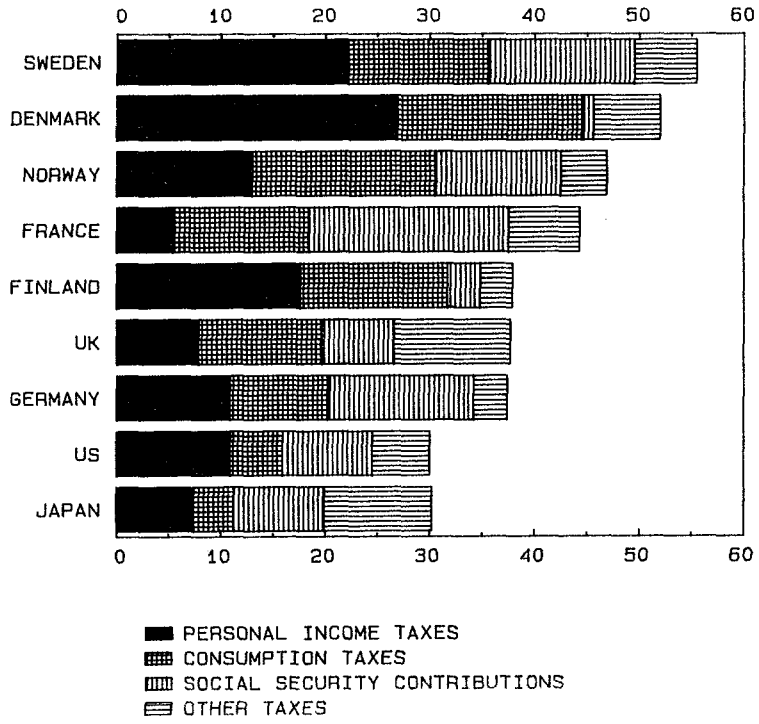
One-third of the increase in direct taxes resulted from the tightening of local taxation in the 1960s. After this, the

rise in local taxes has been smaller, since the share of central government grants in financing local government expenditure has grown.

The combined share of personal income tax and indirect tax from goods and services in the total amount of taxes in Finland is almost 85 per cent, which is, together with Denmark, the highest share in OECD countries. Only in Denmark and Sweden are the shares of personal income taxes in GDP higher than in Finland.

Only in Austria is the share of corporate income taxes in GDP lower than in Finland. The share of these taxes in the total tax revenue is for example over 20 per cent in Japan, but only about 4 per cent in Finland.

Figure 8.6. Various taxes in selected OECD countries in 1988, per cent of GDP



The share of social security contributions in GDP is currently less than 5 per cent. The contributions to employment pension funds are excluded from this because these funds belong to private sector in Finland.

The wider the tax base the lower the tax rate needed to collect the tax revenue. In Finland the tax base is quite narrow and its extent varies in different forms of income, which weakens the equality between tax payers.

The objectives of tax reforms in Finland as in many other countries are to simplify taxation, broaden the tax base, and lower marginal tax-rates significantly. In several countries, broadening the tax base has proven to be so difficult that it has been impossible to simplify taxation and ease income taxes as planned. People are not willing to give up the achieved benefits or exemptions from taxes.

The economic integration of Europe aims at standardizing the indirect taxation to a certain extent. The free mobility of capital and labour will harmonize the capital income taxation systems of various countries, and also, in due course, their income tax levels.

Environmental and pollution taxes will rise. These taxes aim at directing consumption behaviour and production techniques towards environmentally friendly systems. Introducing and harmonizing environment taxes and charges can be better realized in international cooperation.

9. GROWTH AND BALANCE

Problematic starting position

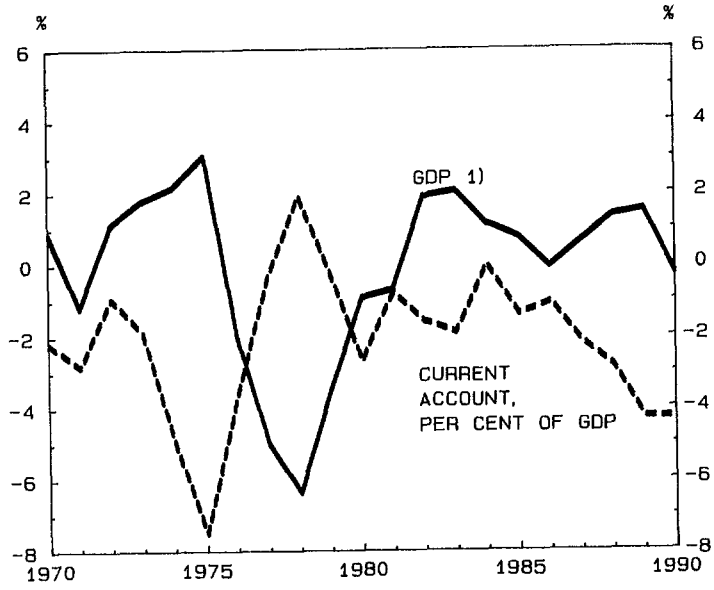
At the beginning of the 1990s the central problem of the Finnish economy is the external imbalance and the high inflation rate. A deep current account deficit has resulted from too rapid growth of domestic demand in relation to domestic production. The growth of domestic demand has directed former export production to domestic use. Although international demand has grown rapidly, Finnish exports have increased little.

The high level of private consumption and the diminished saving can be explained with favourable income and wealth expectations. They have been supported by the liberalization of financial markets and a taxation system which favours indebtedness.

As the manpower reserves have diminished, increased demand has lowered the level of unemployment and maintained wage claims at a high level. Raises in nominal incomes have weakened price competitiveness. The employment has increased in the service sector which is protected from international competition and at the same time the labour force has been reduced in industry.

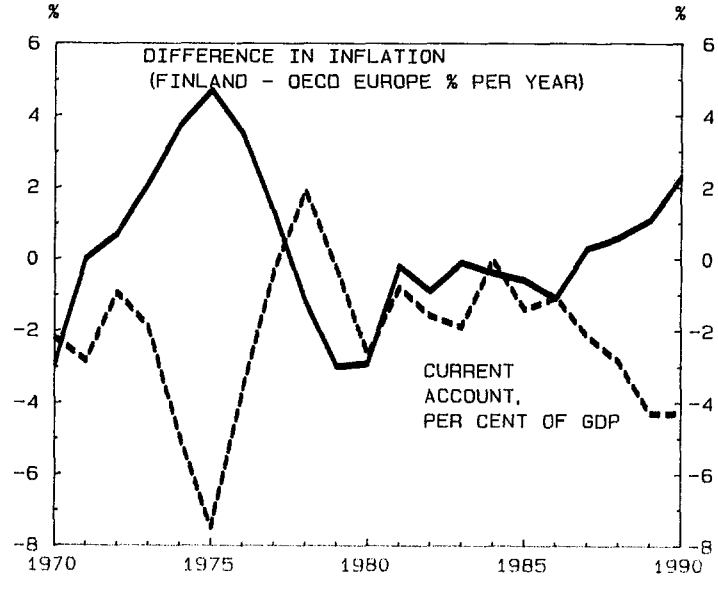
If the imbalances are not successfully corrected by financial and income policies, interest rate will remain high for a long time. It will dampen domestic investment and consumption demand, raise the level of saving and reduce the growth of foreign debt. This, however, will increase unemployment.

Figure 9.1. Difference in growth of production between Finland and OECD countries and Finland's current account in 1970-1990



1) DEVIATION FROM TREND FINLAND - OECD (14 MOST IMPORTANT EXPORT COUNTRIES)

Figure 9.2. Difference in inflation between Finland and OECD-Europe and Finland's current account in 1970-1990



Seeking a balanced development track

The external framework for economic policy has changed in the past decade. Aiming at a stable currency has become an important objective. A stable currency is an anchor in an insecure and changing international environment, on which firms, households and public sector can lean. Stable price level and currency give an incentive to improve real competitiveness and productivity. The quality of products is improved and new competitive products are developed.

Keeping the external value of currency stable is, however, quite demanding. Free capital movements and fixed exchange rates limit the independence of monetary policy. The flexible adjustment to external development can be assisted by financial and income policies and supply side measures, e.g. education and competition policies. Transferring resources from the closed to the open sector is important.

Reaching a balanced development track presumes that total output grows more rapidly than domestic demand in the next few years. The level of saving should be raised especially in the household sector. This would slow down inflation and improve price competitiveness as well as restore the interest rate to the level supporting investments, growth of production and employment.

If nominal wage claims remain high irrespective of weaker growth, inflation slows down and price competitiveness improves too slowly. In particular those working in the protected sector, where the risk of unemployment is small, may try to raise their relative incomes. This should make other unions more militant. Such developments may be followed by a quite strong growth of unemployment.

With the integration of Europe, economic policy will have to be thoroughly reconsidered in the 1990s. The Finnish economy is opening up more and more. Capital mobility between Finland and other countries is already quite free. Labour mobility

within Western Europe will be liberalized. Import competition in the agricultural and service sector will be increased. Also, minimum price systems, import licenses, price equalization charges, and administrative barriers protecting the basic industry and services will be abandoned.

Wage formation and labour market policies will change considerably during this decade. There is a need to emphasize company-level decision making in labour market policy. Regional and occupational differences in supply and demand of labour are reflected more clearly than earlier in the wage level. Centralized income policy negotiation systems should be developed so that the wage structures become less rigid. To avoid a disadvantageous combination of inflation and unemployment, caused by income distribution conflicts between unions and various employee groups, the coordinating role of central organizations should be strengthened.

If the coordinating role of central organizations becomes weaker and company-level agreement practice is not generally accepted, Finland will transfer to a European labour market practice which is marked by conflicts between individual unions. This may imply an increase in labour market restlessness and unemployment. A crucial question is whether the labour market organizations in Finland in the 1990s play a balancing role or increase instability. The realization of the latter alternative is not totally excluded.

The slow-down of consumption growth to the average level of industrial countries, or below that in the first half of the 1990s, is a more suitable economic policy objective than an eager striving to maximize consumption in the near future. The export surplus of goods and services should amount annually to about 2 per cent of GDP during the next 15 years, to diminish foreign debt below 20 per cent of GDP by the year 2005. The export surplus is needed because interest payments on foreign debt remain high. The recent sizeable investments abroad may at a later stage increase the return flow of incomes to Finland. On the other hand, real estate

investments abroad by households and their interest payments will increase.

The development of Finland's net foreign debt is very sensitive to the timing of the export surplus. If the required export surplus accumulates evenly, the ratio of foreign debt to GDP rises to almost 40 per cent before it starts declining. Such high growth of indebtedness would maintain the interest rate so high that the growth of production and investments would remain low for a long time. The external balance is indeed expected to be restored sooner due to the high level of interest rates in the next few years.

The structure of demand becomes European

On the basis of labour supply and the growth of productivity in various industries, total output will grow approximately by 2.5 per cent annually during this decade. After the turn of the millennium, the supply of labour is reduced and growth possibilities are weakened.

In 2005, GDP per capita would be 40 per cent higher than in 1989. The estimated growth of production is of the same magnitude as the long-term growth estimates in West European countries. In these countries as well, the ageing of the population will start to slow down the economic growth in the 21st century.

Table 9.1. Supply and demand

	Value 1989 billion FIM	Volume change, % per cent 1900-1950	1950-1973	1973-1989	1989-2005
GDP	493,5	2,7	4,9	3,1	2,4
Imports	125,7	2,1	8,4	4	2,6
Exports	117,4	2,7	7,6	3,7	4
Private consumption	258,1	2,4	4,8	3	2,5
Public consumption	89,5	3,5	4,9	4,2	2,2
Private investment	119,2		6,7	2,5	1,1
Public investment	14,2		4,7	2,6	1,2
Total investment	133,7	3,1	6,4	2,5	1,1
Domestic demand	501,8	2,7	5,2	3,1	2

The approximate 4 per cent increase in exports would correspond to the OECD countries' estimated average rate of growth in imports. Finland should maintain her market share in the most important market areas. The required increase in exports is achieved with an approximately 3 per cent annual increase in industrial production, since the growth of domestic demand will remain significantly slower than this.

The level of investments was exceptionally high at the end of 1980s. If the economic life of capital goods does not become significantly shorter, a one per cent annual increase in investments would imply an almost 3 per cent annual increase in the capital stock in the period under consideration.

The structure of total demand in Finland in 2005, would correspond approximately to that of Germany at the end of 1980s.

Table 9.2. The structure of demand, per cent of GDP

	Finland 1989	Finland 2005	FRG 1988
GDP	100	100	100
Private consumption	53	54	55
Public consumption	20	21	19
Total consumption	73	75	74
Investment	28	21	20
Export surplus	-1	4	6
Total "investment"	27	25	26

The share of investment in GDP would be on the same level in Finland in 2005 as in West Europe during the period of strong investment activity at the end of 1980s. The share of consumption would be on the same level in Finland in 2005 as it was in Germany in 1988.

An important question is, to what extent will both domestic and foreign companies invest in Finland. If the investment preconditions are weak, investments go down and the financial balance of the business sector is improved in the short term. In the long term, the low level of domestic investments will lead to a narrowing production base and slow growth.

Private consumption will increase at about the same rate as their disposable incomes and the level of household saving will remain low. It has to be taken into account, however, that part of the households' incomes is transferred to employment pension insurance funds. Savings in the form of pension insurance funds should remain high. This way the national saving can be supported while preparing for the strongly growing pension expenditures at the beginning of the 21st century.

10. UNCERTAINTIES

The outturn of earlier forecasts

Since the beginning of the 1970s, the Economic Planning Centre has prepared forecasts every 4 to 5 years on the long-term development possibilities of the national economy. The economic growth has remained slower than estimated in the 1970s. On the other hand, the growth path of forecasts of the 1980s has been clearly exceeded in the past few years. The forecasts of output growth have decreased all the time and become more cautious.

In 1977, a forecast covering the period up to 1990 was completed. The growth of total output and various components of demand has been slightly slower than estimated. The difference in annual growth rate has been around 0.5 percentage points.

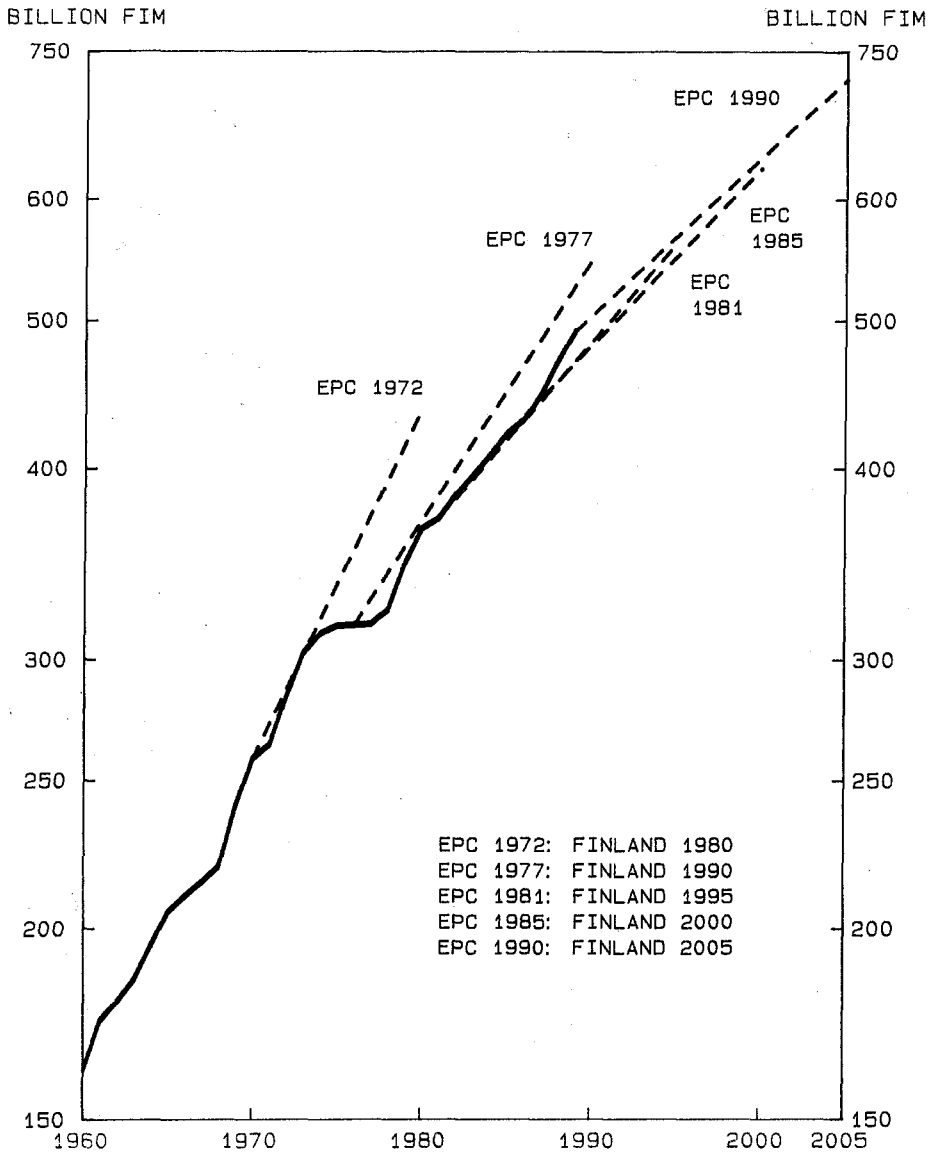
The expansion of the service sector was underestimated and, correspondingly, the development of industry was overestimated. The annual growth of industrial output remained at 4 per cent instead of the anticipated 5.5 per cent. Employment in industry has started to diminish although it was still expected to increase during the 1980s.

Energy saving has been greater than estimated. The total consumption of energy in 1990 will remain approximately 20 per cent, and the consumption of oil 50 per cent smaller than estimated in 1977.

The growth of population has been faster than presumed, mainly due to the increased life expectancy. This partly explains the surprisingly rapid growth in the number of households. The number of households is almost 300 000 bigger in 1990 than estimated. This means that the forming of new households and the breakup of old ones were also clearly underestimated.

The general trends of development were foreseen quite well. Several detailed development characteristics, mainly those caused by changes in behaviour, were underestimated.

Figure 10.1 GDP in 1960-1989 and forecasts prepared by the Economic Planning Centre at various points of time, billion FIM, 1989 prices.



Elem nt of unc rtainty in the 1990s

As a small open economy, the development of Finland depends greatly on the economic development of West Europe. The integration process in Europe may be slowed down for several reasons. In this case, integration would not increase the economic growth in Europe and the growth of the Finnish economy could also remain slower than expected.

The economic and political reforms in East European countries may create tensions and conflicts, which could bring about a long period of uncertainty and an economic recession. In the long term the most disastrous consequence could be a worsening of the environmental problems in East European countries and as a result of long-range transboundary pollution throughout Europe.

The situation in developing countries is in many respects gloomy. The rapid growth of population may lead to the exhaustion of natural resources, regional environmental catastrophes, deepening of poverty, and increased indebtedness. If the real development remains clearly worse than expected, political crises, mass emigration, and restlessness will be increased. If over-indebtedness is relieved by stopping repayments, the international monetary system will be put to a test.

The most current domestic factor of uncertainty is external imbalance. If Finland's terms of trade were clearly weakened and the deficit of current accounts remained high, it would be painful to adjust to the increased external competition. The price for restoring the competitiveness may be a slow long-term economic growth with high unemployment as its consequence. Firms would direct their investments abroad and part of the unemployed would leave the labour market permanently.

In the long term, there are also factors of uncertainty connected to population development. If for example the

birth-rate were to rise rapidly, there would be at the same time both growing populations of children and elderly in Finland during the first decades of the 21st century. This would increase public expenditure more than estimated and lead to a tightening of taxation.

Possible aggravation of environmental problems

The worsening of global environmental problems is very probable. Information on environmental damage, its accumulation and reasons is insufficient. Further information could reveal that the severity of problems is greater than is now believed and the requirements for responses are far more urgent and profound.

Changes in the atmosphere, caused by the greenhouse gases, may increase international efforts to reduce the emissions of these gases. The growth in the amount of carbon dioxide in the atmosphere could be restrained by increasing the amount of biomass in the world. However, it is difficult to increase the amount of biomass rapidly since it is being reduced by deforestation.

If the amount of emissions containing carbon dioxide and other greenhouse gases has to be diminished, the use of fossil fuels has to be reduced. The possibility of filtering carbon dioxide from smoke is practically nonexistent.

Extensive replacement of fossil fuels by other sources of energy by the year 2005 is difficult. Increasing nuclear power would increase the risk of nuclear accidents and the opposition to nuclear power is very strong in several countries. Hydroelectric power cannot be increased very much. Therefore, the greenhouse effect should be fought by reducing the use of energy.

The World Energy Congress in 1989 estimated that the consumption of energy in developing countries would grow by

75 per cent by the year 2005. If the developing country energy consumption cannot be limited on economic grounds and the global consumption of energy cannot be increased, the industrialized countries should diminish their energy consumption by almost 50 per cent of the current level. If the decrease were directed to Western industrialized countries alone, they would have to cut down their energy consumption by two-thirds.

The energy-intensity of production in OECD countries was lowered by a little less than one-quarter from 1970 to 1986. If this tendency continued at the same rate from 1989 to 2005, the 45 per cent reduction in energy consumption would imply a decline in total output and real income by a little over one-quarter. If the energy consumption had to be diminished to one-third, real incomes would be cut to less than half of the current level.

Milder environmental problems may already change the course of Finland's economic development from what has been estimated. If severe damage begins to occur in our forests, the amounts of sulphur and nitrogen emissions will have to be cut down more effectively than expected. Other European countries should do the same, to reduce pollution carried over from other countries.

Reducing emissions would presume both tighter norms and notable increases in tax-like charges. These charges would first of all concern the energy sector and traffic. Nitrogen effluents from agriculture would also have to be strongly diminished.

If hydroelectric and nuclear power is not increased, an effort could be made to reduce the energy sector emissions by taxing fuels according to their levels of sulphur and nitrogen emissions. A tax of this kind would be mainly directed towards the use of coal, oil and peat and to a lesser degree towards the consumption of natural gas. The tax should be rather high to reach the reduction objective.

If a rapid reduction in sulphur and nitrogen emissions is to be reached by international agreements, other countries are facing corresponding problems. The effects of emission reduction measures depend essentially on what the other countries do. A little over 40 per cent of the Finnish energy consumption is used in the production process of export goods, i.e. Finland's export is clearly more energy intensive than her home market production. If the energy used in industry were taxed more in Finland than in competitor countries, the price competitiveness of Finnish exports would be worsened unless the rise in energy taxes was compensated by lowering the taxation on other factors of production.

In particular the paper industry and metal production would suffer from the increased cost of energy. Development which depends on forestry would have to be reconsidered carefully.

If competitor countries followed an equal pollution taxation system, various industries would not suffer in relation to competitor countries. Finland's export production in its entirety, however, is energy intensive. Higher prices of export goods would reduce their demand and thus weaken the Finnish production. The effects could be stronger in Finland than in several other countries due to the Finnish production structure.

Studies on the effects of environmental protection and energy decisions have been prepared recently in Norway, the Netherlands, Sweden and the United States for example. The outcome of these studies shows similar effects on the economic growth. If in the calculations an individual country has been presumed to impose tighter emission limits than internationally agreed, the negative effects have been the greatest. The reduction in growth is somewhat greater than that estimated according to earlier research.

Environmental protection in the model calculations understandably shows a reduction in the economic growth because calculations are based on the traditional national

accounting system. This system does not recognize the reduction in the quality of the environment and natural resources as a factor negatively affecting the welfare of people.

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Valtion taloudellinen tutkimuskeskus (VATT) on valtiovarainministeriön alainen tutkimusyksikkö. Se perustettiin vuonna 1990 yhdistämällä Taloudellinen suunnittelukeskus ja valtiovarainministeriön suunnittelusihteeristö. Keskuksen tehtävänä on tutkia kansantalouden voimavarojen tehokasta kohdentumista, julkisen talouden toimivuutta sekä kansantalouden pitkän aikavälin ongelmia. VATT osallistuu talouspolitiikan valmisteluun sekä tutkimustensa avulla että asiantuntijana valtionhallinnon valmistelutyössä.

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ISBN 951-47-4409-8
ISSN 0788-4990