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Pension expenditures, funds and contributions to the year 2050

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PREFACE

Finland has a very comprehensive pension system. In practice, all gainfully employed and self-employed persons are covered for statutory earnings-related pension benefits. No limit or pension ceiling is applied to the earnings-related pension, and thus there has been little need for personal or occupational pension plans.

The organisation of the Finnish statutory earnings-related pension scheme is decentralised. All private-sector employers and self-employed persons are obligated by law to take out pension insurance, but they are free to choose the pension institution. The Central Pension Security Institute (ETK) is the central body of the private-sector earnings-related pension scheme, and it also handles international pension matters. The scheme itself is supervised by the Ministry of Social Affairs and Health and the Insurance Supervision Authority.

The calculation forecasts presented in this report include, apart from private-sector earnings-related pensions, also pension expenditures for the public sector under the State Employees' Pensions Act (VEL) and the Local Government Employees' Pensions Act (KVTEL). From the private-sector earnings-related pension scheme, the total amounts of the actuarial technical provisions, i.e. of the funded parts of the pensions, as well as the development of the pension contribution under the Employees' Pensions Act (TEL) are also presented.

At the end of the report we have integrated the results of the forecast calculations with the forecasts of the Social Insurance Institution (KELA) and with the data of some other sources, and estimated the share of the total pension expenditures and other public expenditures directed at pension recipients in the national economy. The Social Insurance Institution runs the means-tested national pension scheme.

Previously, the Central Pension Security Institute has published long-term expenditure and contribution calculations for the earnings-related pension scheme at the beginning of 1997. This report continues from the same starting point, but takes into account the now prevailing views on the development of the economy and the population.

The calculations presented in this report have been done using the calculation model of the Central Pension Security Institute. The writers responsible for this report are Tapio Klaavo, Reijo Vanne, Janne Salonen and Erkki Tenkula. The writers would like to thank their colleagues, especially Lasse Koskinen, for their constructive comments. A special thanks also to Eeva Poutiainen, who

helped to speed up the technical production of the report, and to Janina Gröndahl for translating the report into English. We thank Timo Korpela, whose input at the start of the calculation work was crucial. We would also like to thank Bo Lundqvist for drawing our attention to the important issues. For possible remaining errors the writers take sole responsibility.

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1 INTRODUCTION

The Finnish earnings-related pension scheme is based on six private-sector pension acts (TEL, LEL, MEL and TaEL for employees, and YEL and MYEL for self-employed persons) as well as two public-sector pension acts (VEL and KVTEL). The pension schemes for private-sector employees and self-employed persons have been presented in the following publications of the Central Pension Security Institute: Tuomisto (ed., 1998) and Tuomikoski (1999). The Central Pension Security Institute is the liaison body for the private-sector earnings-related pension scheme. All earnings-related pension acts are based on partial funding, but in practice, funds have only accumulated in the employees' schemes. Almost half of the work input in the national economy is covered by TEL (the Employees' Pensions Act), and also otherwise the development of TEL is crucial for the reason that the pension contributions of all employees are determined in the TEL scheme.

Apart from the earnings-related pension scheme, another significant expenditure item is the national pension scheme handled by the Social Insurance Institution (KELA). Pensions are also paid on the basis of acts on military injuries, accident insurance and motor third party liability insurance and on the basis of the pension regulations for employees of the Evangelical Luthera Church, the Social Insurance Institution (KELA) and the Provincial Government of Åland. In addition to the statutory pensions, there are employer-specific voluntary supplementary pension arrangements.

The calculation estimates presented in this report include private-sector earnings-related pensions as well as pension expenditures under the two public-sector pension acts. Of the private-sector earnings-related pension scheme, the actuarial technical provisions, i.e. the total amount of the funded share of the pensions, as well as the development of the insurance contribution under TEL will also be presented.

At the end of the report, the results of the calculation estimates are combined with the forecasts presented in the actuarial report of the Social Insurance Institution (1999) and with the data of some other sources, and the share of the total pension expenditures and other public expenses directed at the pension recipients in the national economy are estimated.

The Central Pension Security Institute has previously published long-term expenditure and contribution calculations concerning the earnings-related pension scheme early in 1997 (Korpela, Klaavo & Lundqvist, 1997 and Lindell, 1997).

Since the previous calculations, the development of the Finnish economy and the employment prospects has so far proven more favourable than expected. The investment policy of the earnings-related pension funds has also become more directed at shares and risk-taking than was estimated in 1996. On the other hand, the risk-free interest rates have decreased correspondingly, which means that the prospects for the real yield from the earnings-related pension funds have remained the same as before.

Eleven member countries of the EU formed the euro-zone at the beginning of 1999. A common assessment is that the EU will be expanded through new member countries around 2010. The changes are significant from the point of view of economic growth, migration, inflation and investment policy of the earnings-related pension funds.

Economic growth on integrated and competitive markets is estimated to be more rapid than in a closed economy. Migration will increase and it will be easier for the earnings-related pension funds to diversify investment risks. On the other hand, a probable counterweight to economic growth, stable financial markets and smaller investment risks will be greater fluctuations in wages than before the '90s.

The deep recession at the start of the decade was already part of the era of integrated markets, albeit without stable financial markets, which means that the '90s cannot be viewed as a foretaste of future fluctuations in wages and employment rates in general. It does, however, give a clear picture of the size of the fluctuations in a situation where the internal tensions of the euro-zone grow too large for the common currency to carry.

In this report, we analyse the economy and the pension system in the long run, whereby fluctuating economies and even dramatic structural changes are levelled out. The relatively heavily increased pension expenditure burden caused by the recession has to a large extent levelled out already, although the effect of the pension cuts with a long-term impact, made due to the recession, are not yet decisive.

After the latest calculations of the Central Pension Security Institute, the people compiling the population forecasts have to a large extent started basing their calculations on continued decreasing mortality rates. The first population calculations based on a continued increase in life expectancy for Finland was published by the statistics agency of the EU, Eurostat (1996).

Since the previous calculations, other reports have included calculations of future pension expenditures and contributions in relation to wages or gross domestic product (Parkkinen, 1998, Pentikäinen, 1998 and Talousneuvosto (Economic Council), 1998). The calculations in the two first-mentioned reports have used the calculation models of the Central Pension Security Institute.

The report shows a basic calculation and sensitivity calculations for some of the central factors. The assumptions for population development in the basic calculation and the resulting population forecast are presented in Chapter 2. The prospects for economic growth in the basic calculation are presented in Chapter 3.

Chapter 4 presents the calculation model used, Chapter 5 presents the pension expenditures under the basic calculation and compares the results to earlier calculations of the Central Pension Security Institute. The basic calculation does not yet take into account the reforms agreed on between the labour market organisations in Summer 1999. Some assessments have been made, however. Chapter 6 contains an analysis of the development of pension expenditures in case of a reproducing population and stabilising life expectancy. Chapter 7 contains, on the one hand, an analysis of the significance of the real growth in earnings levels and, on the other hand, of unemployment and employment rates.

Chapter 8 provides an outline of the impact of an increased average effective retirement age on pension expenditure. The assumptions for the calculation presented are very close to the long-term target levels for increased employment rates and the age for exiting working life of the government programme. The estimated employment rate at the end of the election period ending in 2003 is, however, slightly lower than the target level stated in the government programme. Chapter 9 deals with the yields of the earnings-related pension funds based on the development of pension expenditure in the basic calculation, calculated on two different levels of real yield, and presents the resulting development of the TEL contribution.

Chapter 10 contains estimates on the share of the total pension expenditures of gross domestic product in the long run as well as a calculation of the distribution of national income to pension recipients as public spending and other disposable national income. Thus, the calculation includes, apart from earnings-related pension expenditure, also other pensions and public welfare services received by the pensioners. The chapter also contains a comparison of the basic calculation with other long-term calculations published lately.

2 POPULATION DEVELOPMENT

2.1 Bases

The population forecast of Eurostat (1996) was the first basic forecast regarding Finland where the decrease in the mortality rate was assumed to continue for the whole period of the forecast. The basic calculation in this report is done approximately on the basis of the population forecast of Eurostat.

The mortality rate is assumed to be decreasing for the whole time-period under scrutiny, that is, till 2050. By then the life expectancy of a new-born has increased from the present 80 years to 85 years for women and from the present 73 years to 79 years for men.

Table 2.1. presents the remaining life expectancy of a 65-year-old based on recent statistics as well as on this pension expenditure forecast and the previous one (Korpela, Klaavo & Lundqvist 1996).

Table 2.1. Remaining life expectancy for 65-year-olds in the basic alternatives of this and the previous calculation forecasts for the years 1995–2050

Year	Men		Women	
	PTS99	PTS96	PTS99	PTS96
1995	14.6	14.6	18.3	18.3
1997	14.9	..	18.9	..
2010	16.1	15.4	19.9	18.9
2030	18.0	15.4	21.5	18.9
2050	18.8	15.4	22.1	18.9

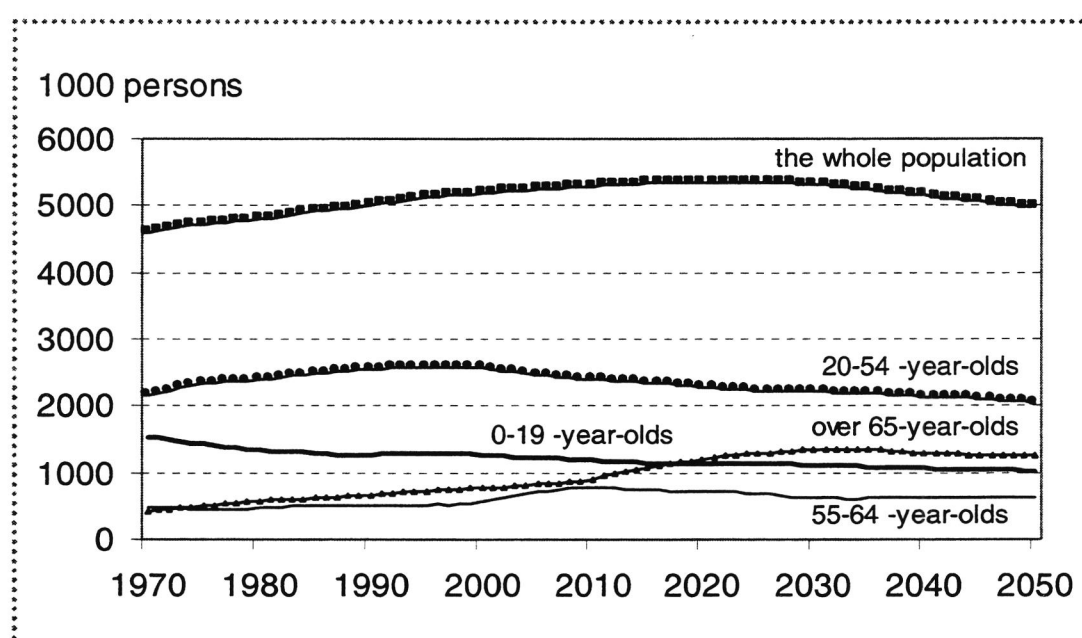
After the publication of Eurostat's calculation, Statistics Finland and the Social Insurance Institution (KELA) have also based their forecasts on a continued decreasing mortality rate (The Social Insurance Institution KELA, 1998a and Statistics Finland, 1998).

In the calculation, nativity and net immigration are on a standard level for the whole period of observation. The total birth rate is 1.75 in the basic forecast and net immigration 5,000 persons a year.

Chapter 6 presents calculation results where the birth rate is assumed to be at the level of the reproduction rate of 2.1 as well as calculations where the decrease in the mortality rate is assumed to cease in 2010.

2.2 Population till 2050

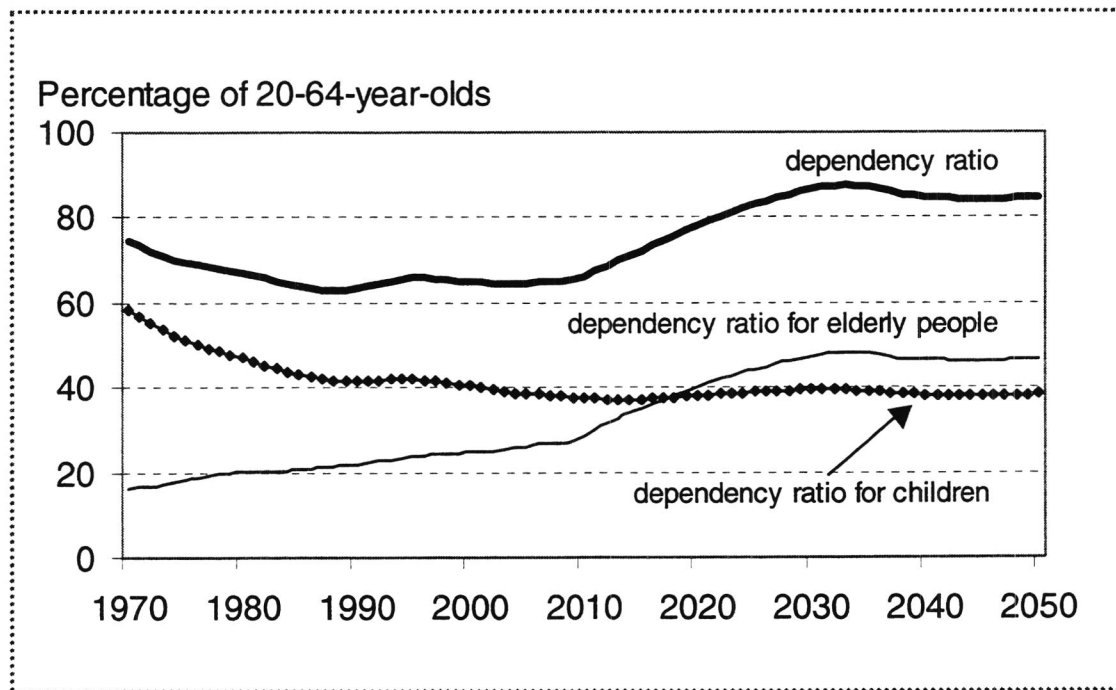
The development of the size of the whole population and of certain age groups derived on the basis of the population calculation is presented in Graph 2.1.



Graph 2.1. The size of the whole population and of certain age groups 1970–2050

According to the calculation, Finland's population will be at its largest in 2022, with a population of 5.35 million. The population in the age brackets 15–54 or 20–54 will be at its largest in 1999. The number of the whole population in active working life, i.e. in the age bracket 15–64, will be at its largest in 2009, according to the calculation. The population aged between 15 and 74 will be at its largest in 2015.

The development of the dependency ratio and its components is presented in Graph 2.2. The dependency ratio is the number of persons aged 0–19 and over 65 in relation to the number of persons aged 20–64.



Graph 2.2. The dependency ratio and the dependency ratio for old people and for children in 1970–2050 as a percentage of the corresponding population in active working life

The dependency ratio will rise by about 20 percentage points from the present 65 per cent by the year 2030, and the ratio will remain at this level. The rise in the dependency ratio is mainly due to the large age groups of the post-war baby-boom attaining the age for retirement and it will stay on this higher level due to increased longevity and low birth rates. An improved employment rate might level out the growing burden caused by the age structure.

The impact of estimation errors in the bases of the population forecasts as regards, let's say, the uncertainty in forecasting population numbers and dependency ratios is dealt with in Alho (1998). The most significant uncertainty factor in long-term forecasts for the dependency ratio has been the birth rate. According to the forecast, the dependency ratio will be 75–95 per cent 50 years hence with a probability of 50 per cent.

3 ECONOMIC DEVELOPMENT

3.1 The pension scheme in the economy

The economic analysis of the pension scheme is based on the long-term development of the whole economy. The economic development is observed with a different emphasis than in the analyses of economic fluctuations and share prices. One example of this is the economic development of the '90s. If the long-term analysis had been done at the beginning of 1994, emphasising the events of recent years, the picture would differ significantly from the present, as the traces of the recession have mostly disappeared from the economy.

In the calculations concerning the long-term sustainability and development of the earnings-related pension scheme, the most significant economic quantity is the real amount of earnings and its distribution on the basis of age, sex and applicable earnings-related pension act. Earnings include wages and self-employed persons' earned income. From the aforementioned factors we get the basis for the earnings-related pension contributions according to type of pension. After taking into account the length of the employment contracts, the starting and ending of pensions according to age and sex as well as the general development of the earnings level, we get the pension expenditure.

From the point of view of the national economy, The pension system has its effects an fiscal policy. Due to its character, the pension system is a very stable part of fiscal policy and it is one of the so called automatic stabilisers in the economy. As the proportion of ageing people grows, the relative proportion of the pensions grows, and, needless to say, the changes affect the structure of demand. The pension scheme has a direct impact through increasing insurance contributions. This, for its part, slows down the growth in wages to some extent. Of the employers' contribution, at least part is transferred through wage adjustment to be paid by the employee. On the other hand, a slower increase in wages affects the pensions due to index adjustments. Balancing this interaction has been solved in the calculation forecast by assuming that the total share of the wages and all the employer's social security contributions of GDP will remain stable in the long run.

The sum of earnings is dependant on the employment rate, the time at work and the development of real earnings per unit (earnings per unit of time). The real earnings per unit are dependent on the general development of the

earnings level and the structural change of the labour force. This kind of setting is observed from a short-term and mid-term perspective through supply and demand, and the price of work (wage) and the realised work input are defined. In a long-term perspective, this kind of analysis is not possible, because the development of total productivity cannot be derived from economic history or assumed policy. Another problem when creating a model is the imbalance of the labour market in the long run, which shows as high unemployment rates. The model should explain why the unemployment rate varies.

The practical solution to this and similar situations (Ministry of Labour, 1998) is to apply a growth model derived from the production function and an assumption of a stabilising labour market in the long run, if the starting point includes imbalance. The supply of labour force is mainly regarded as a calculation task for the population forecast.

Besides the development of the labour market, a central entity is the development of the real yield of investments with different risks and of the risk of the investments of the pension funds. On free financial and capital markets, the inflation transfers to the nominal yield of the funds and also to the required yield, i.e. the calculated interest rate. The difference between the calculated interest rate and the interest rate on the actuarial technical provisions (discount rate, 3 per cent) is used to increase the level of funding of the pensions after 1999, that is, to increase the actuarial technical provisions.

In the long run, the rate of return on the investments is determined on the international, free financial and capital markets, including the yield of investments in Finland. Due to changes in the economy, investments are continually redirected in new ways. For this reason, among other things, the rate of return on the investments may differ even remarkably from the growth rate of the Finnish economy.

In the long run, the significance of the economic growth rate for the earnings-related pension scheme lies above all in that rapid growth, due to the productivity, leads to a lower ratio between the average pension and the average wage at any one time than slow growth. This is due to index adjustments, which give a smaller real increase in pensions than the real growth in wages.

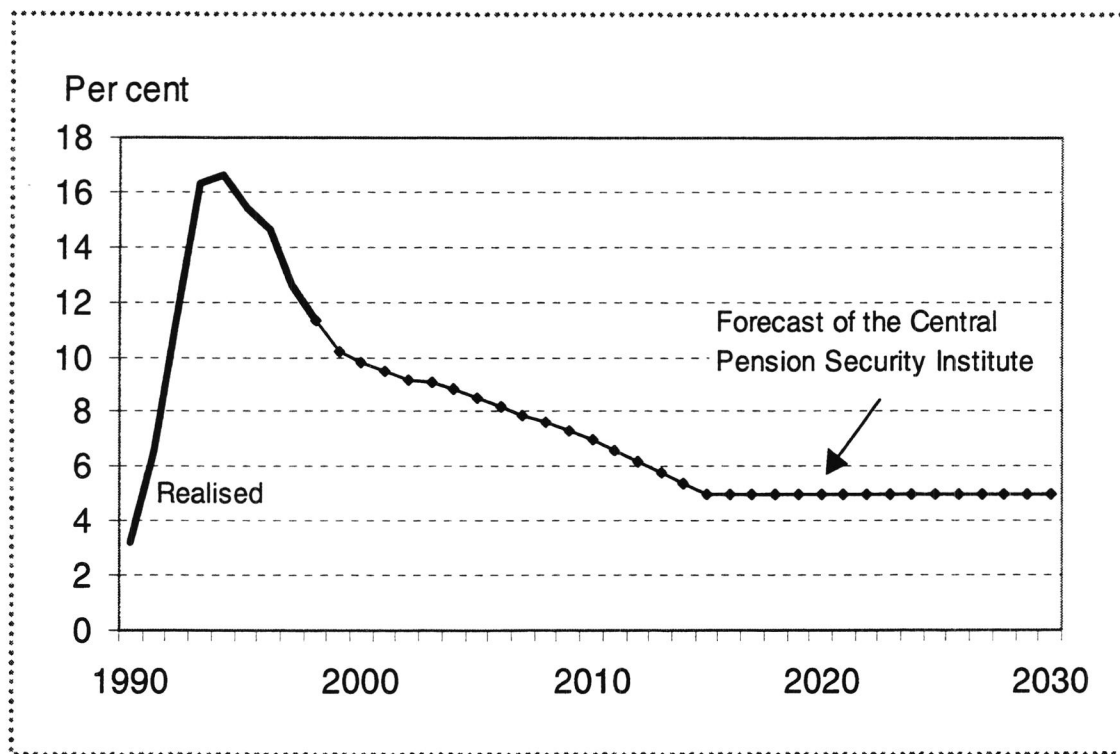
3.2 Bases

The assumption for the basic calculation of the forecast is a real growth in the earnings index of 1.5 per cent annually. Furthermore, there are increases in the wage level that don't show in the earnings index. These increases are on average 0.25 per cent annually in the forecast. On the other hand, the annual working time per employee is assumed to decrease 0.2 per cent annually, as in the basic alternative of the report by the Ministry of Labour 1999, whereby the annual earnings of the insured grow on average 1.55 per cent annually in real terms during the period of the forecast.

The assumed real growth rate of the earnings level is somewhat lower than in recent years. The development is influenced both by factors speeding up and factors slowing down the growth rate as well as the increasing demand for services. Some people think it quite possible that a price increase for energy will slow down the real growth in the earnings level. On the other hand, the average educational level of the labour force will increase more and more rapidly for at least the next 10–15 years. The already realised rise in investments in research and development to a record-high level takes the same direction.

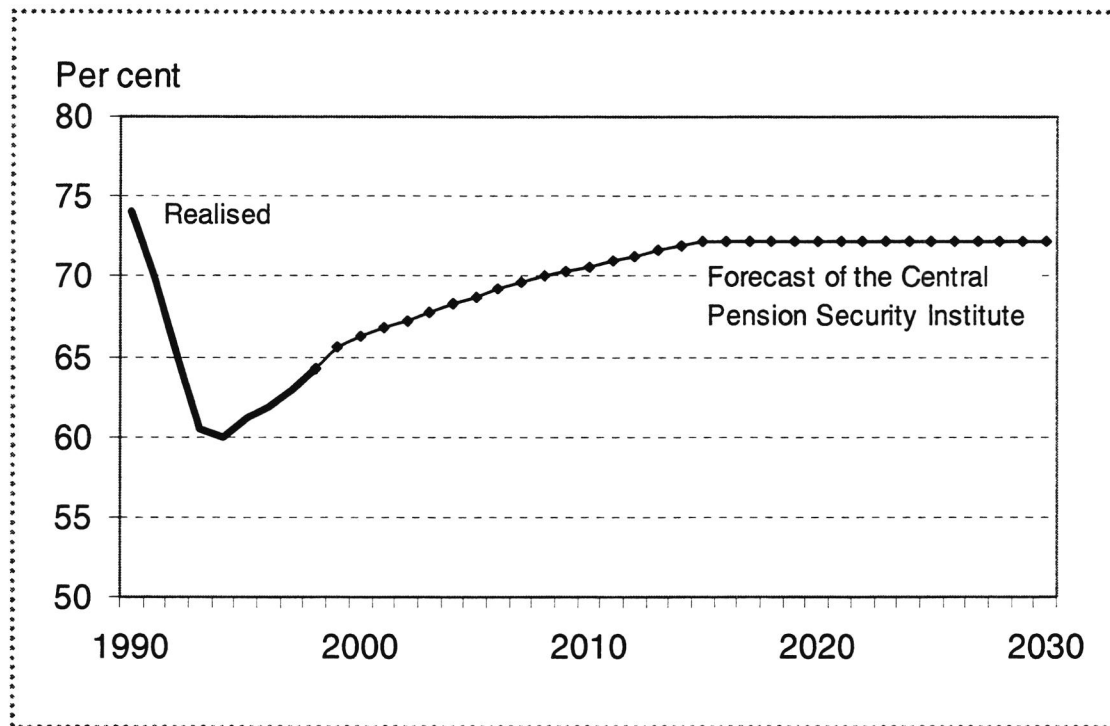
The growth in wages is also speeded up by the increasing scarcity of the labour force. When the increasing scarcity will show, depends on the level of structural unemployment. At the latest, this will happen at the level of full employment. Of course, it is to be hoped that enough flexibility can be found in this clash, so that we won't have a rapidly accelerating real growth that does not correspond to the development in productivity, which then leads to a rapid slowdown and unemployment.

The unemployment rate is assumed to decrease steadily and reach a balanced level of 5 per cent in 2015. The assumed development of the unemployment rate is presented in Graph 3.1.



Graph 3.1. Unemployment rates in 1990–2030

When taking into account the slight increase in the proportion of the labour force from the present 73 per cent to 76 per cent by the year 2015, the result is the development of the employment rate presented in Graph 3.2.



Graph 3.2. Employment rates 1990–2030

The employment rate is estimated to increase to about 68 per cent by 2003, the last year of this election period, when it should approach 70 per cent, according to the government’s plans. In 2015 the employment rate will reach its balanced level of 72 per cent.

The assumed inflation is 2 per cent annually and the real yield of the funds 3 per cent annually. This real yield can be obtained, for instance, if the share of fairly risk-free investments is 75 per cent and the real yield 2 per cent annually and the real yield of the risky investments is 6 per cent annually.

The estimates of employment and activities under the different earnings-related pension acts are based on changes in employment shares for different business sectors, which have been estimated up to 2030 in the report by the Ministry of Labour (1999). From 2030 onwards, the employment shares of the business sectors is assumed to remain unchanged.

The most important trends of change in the business sector shares are diminishing agriculture and expanding construction work during the first few years of the forecasting period. According to the report of the Ministry of

Labour, the share of the public sector will remain at the present level, which means that the corresponding private services will expand as demand grows.

When estimating the extent of work under the earnings-related pension acts, the inclusion of short employment contracts in the pension security both in the private and the public sector, increasing the share of employment for which pension rights accrue, of the whole employment in the national economy has been taken into account. The share of self-employment (under the Self-employed Persons' Pensions Act YEL) is assumed to increase slightly till 2030, though not at fast as the number of self-employed persons in agriculture is assumed to decrease.

In the employment in different business sectors and under different earnings-related pension acts, the development of the average real wage and working time is assumed to be the same, excluding the factor of the age structure. The age profiles for the earnings of the people employed under different acts differ from each other, which has been taken into account in the calculation forecast. The income profiles are described later in this report. The aforementioned average real growth in annual earnings of 1.55 per cent is an average for employment under different acts, where, for instance, the age profiles of the earnings has been taken into account.

3.3 The active labour force and the sum of wages

Based on the aforementioned we have estimated the number of employed persons and the wage sum in the national economy, and from there derived the active labour force, i.e. the people still accruing earnings-related pensions, as well as the corresponding wage sum for work under the different acts. Employment before the age of 23 is also taken into account in this connection. In the pension expenditure model itself, the start of accrual only after the age of 23 has been taken into account. On the other hand, employed persons aged over 64 are not included in these figures. Furthermore, when summing up the numbers for the different acts, one has to bear in mind that a person can be simultaneously engaged in work under more than one earnings-related pension act.

Table 3.1 shows all employed people in the national economy and the active groups of the different earnings-related pension acts in the form of annual averages for certain years of the forecasting period. Those employed under the earnings-related pension acts for the public sector (the State Employees' Pensions Act (VEL) and the Local Government Pensions Act

(KVTEL)) are presented as a total. The numbers do not include those falling under the pension regulations of the Social Insurance Institution (KELA), the Bank of Finland, the Evangelical Lutheran Church and the Provincial Government of Åland.

Table 3.1. The number of employed persons in the national economy and those having accrued earnings-related pension rights under the different pension acts as annual averages for the years 1998–2050, 1,000 persons

Year	TEL	LEL	MEL	TaEL	YEL	MYEL	public sector	national economy
1998	1069	89.5	74.4	59.2	159.1	118.4	615.2	2226
2000	1100	108.2	77.0	61.3	167.8	106.3	628.0	2301
2005	1182	110.9	80.7	64.3	180.2	89.6	646.5	2409
2010	1230	109.6	83.1	66.3	190.5	87.6	660.1	2486
2015	1216	106.3	82.0	65.3	192.7	84.3	645.0	2456
2020	1180	101.4	79.5	63.3	192.9	80.5	619.7	2382
2030	1126	93.4	75.7	60.2	197.0	75.2	578.6	2267
2040	1103	91.7	74.1	59.0	193.0	73.7	566.2	2217
2050	1061	88.1	71.3	56.7	186.0	70.9	544.6	2134

Table 3.2. describes the sum of earnings of the insured, derived from the calculation bases, for employment under the different earnings-related pension acts during the forecasting period. The insured earned income of the self-employed persons also includes the self-employed person's possible wage earnings under the Self-employed Persons' Pensions Act (YEL). The earned income insured under the Self-employed Persons' Pensions Act (YEL) and the Farmers' Pensions Act (MYEL) is, on average, smaller per person than, for instance, the self-employed persons' earned income in the national economy.

Table 3.2. Total earned income insured under the different pension acts for the years 1998–2050 in the level of 1999, billion FIM

Year	TEL	LEL	MEL	TaEL	YEL	MYEL	public sector
1998	151	10.7	1.5	1.6	13.2	7.1	79
2000	165	13.7	1.6	1.7	14.6	6.7	86
2005	191	15.0	1.8	1.7	17.1	6.2	96
2010	214	16.0	2.0	1.9	19.4	6.5	105
2015	228	16.7	2.1	2.1	21.1	6.8	111
2020	239	17.2	2.2	2.2	22.8	6.9	115
2030	266	18.4	2.4	2.5	27.1	7.6	124
2040	302	20.9	2.8	2.8	30.1	8.6	141
2050	336	23.4	3.0	3.1	34.5	9.6	157

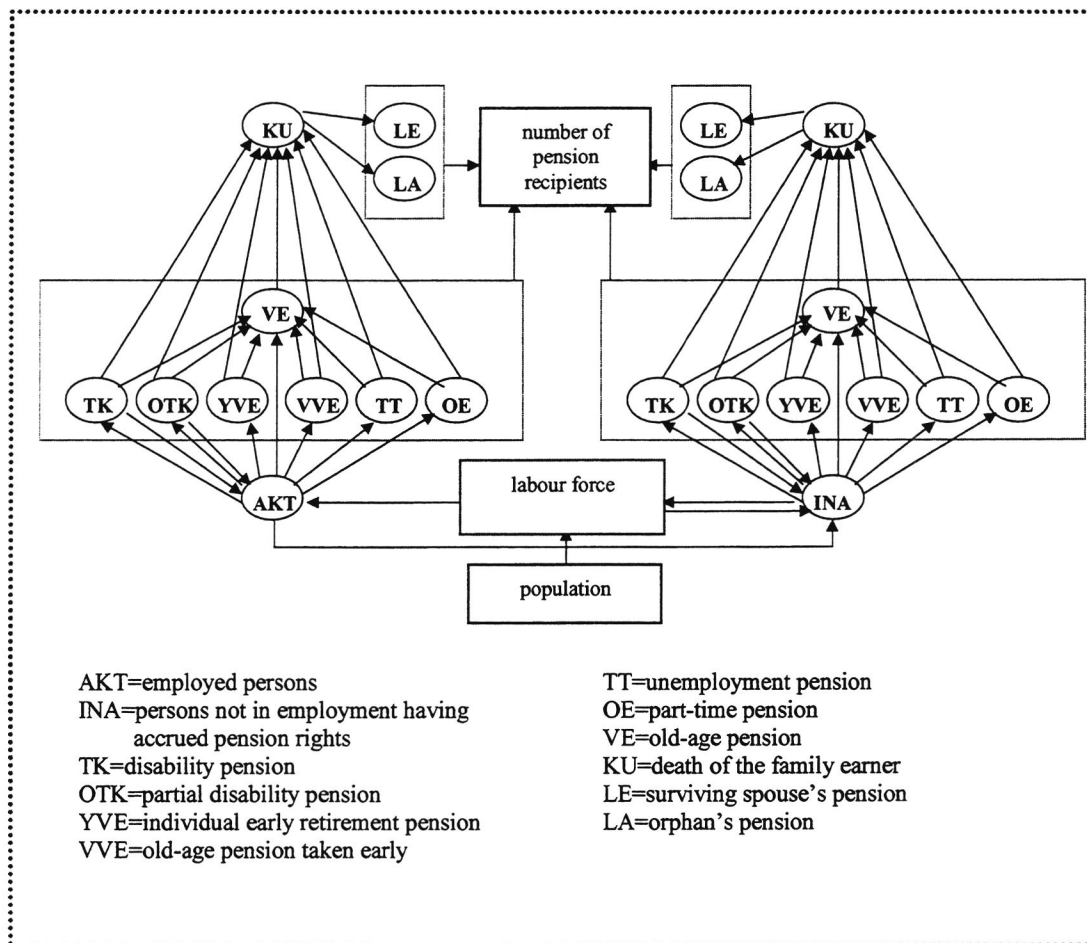
4 THE STRUCTURE AND FUNCTION OF THE CALCULATION MODEL

4.1 Calculation model

The pension expenditure and financing calculations presented in this publication are done using the calculation model of the Central Pension Security Institute. The model is deterministic and imitates the functioning of the pension scheme. Most questions about the future of the pension system can be answered with its help. On the basis of this model, calculations can be done for the planning and financing of the earnings-related pension scheme under different assumptions about population growth and economic growth a long way into the future.

The calculation model calculates each pension act separately. The population covered by the act is moved forward in time one year at a time and they are transferred according to transfer probabilities between different groups, for instance, employment, out of employment, retirement etc. New active participants are recruited each year so that the total number of active participants for this particular pension act develops in the desired manner.

The model divides the population covered by the earnings-related pension acts into separate groups in accordance with Figure 4.1, and within each group the persons are divided into classes according to age and sex. These classes are the basic units of the calculation model, the describing factors of which, wages etc., are calculated as a group average. This procedure is much easier to do in practice than an individual calculation. The drawback of the system with averages is that distributions and variation spreads of the calculation quantities cannot be produced with the model.



Graph 4.1. Calculation model

Although the model simplifies reality by means of the system with averages, the selected procedure gives a lot of information about each calculation period, however. The development of, for instance, average pensions, average wages and accrued pension rights according to age and sex can be followed up on. Pension expenditure, sum of wages, numbers and contribution levels are especially important information in view of the pension scheme.

The decentralised earnings-related pension scheme of Finland consists of different pension acts, which all have their own special features. Even though the acts have been harmonised in recent years, the expenditures under different pension acts have to be calculated per type. Apart from the dissimilarity of the earnings-related pension acts, this is also due to the changes in the earnings-related pension acts taking effect only gradually at different times for different acts (e.g. the rise in retirement ages in the state and

local government schemes) and the acts are applied on different professional groups (e.g. the effects of the EU on agriculture and the impact of the recession on construction business). In the calculation model, calculations are done separately for pensions under TEL, LEL, TaEL, MEL, MYEL, YEL, VEL and KVTEL. National pensions, private-sector supplementary pensions, military injuries compensations and pensions for the employees of the Bank of Finland, the Provincial Government of Åland, the Evangelical Lutheran Church and the Social Insurance Institution (KELA) are not taken into account in the calculation. At the end of the report there is, however, an assessment of the total pension expenditure.

4.2 Input data and assumptions of the model

In the calculation model we need information about the present situation and the future development of the population and the economy. The starting point of the calculation model is the present situation, about which pension information was obtained from the pension contingency register of the Central Pension Security Institute, containing data on all earnings-related pensions. Private-sector employment contract data was gathered from the employment contract register of the Central Pension Security Institute and public-sector employment contract data was obtained from the State Treasury and the Local Government Pensions Institution. Occasionally some data, for instance, about wages, were obtained from the pension institution handling pensions falling under a specific act. Different numbers of new pensions have, apart from numerical data, data on average pensions and average wages, also been formed from the register data, which determine the probability for transfers between different groups of the insured population. In some cases, the number of new pensions have been levelled out or modified so that they correspond to the estimated future development.

The long-term earnings-related pension calculations are based on a population forecast and an estimate of the distribution of the labour force between the different pension acts, produced with the aid of a demand forecast for labour force in different business sectors. The starting point in the calculations are the statistical data from the registers on the distribution of the persons falling under each pension act into different groups according to age, sex, type of pension and participation in the labour force.

The assumptions for economic growth during the forecasting period are among the most significant input assumptions. For this reason, calculations are

usually done under several different alternatives for economic growth. The alternatives for economic development influence the development of the number of people in the active labour force and the distribution of the employed persons between the different pension acts.

The basic calculations are based on current legislation in force. The effects of changes in legislation are usually observed by comparing the so called calculation of change with the basic calculation under corresponding assumptions.

4.3 Uncertainty factors connected with the calculations

The most important assumptions of the calculation forecasts are connected with the economy and retirement. The calculations are based on the population forecast, which already in itself makes the long-term calculation uncertain. For this reason, calculations are done, apart from the so called basic population forecast, with different alternatives for population development, where, for instance, birth rates, mortality rates and migration can be changed.

There continually appear changes in the legislation that are not yet known at the time the calculation is done. This, of course, results in long-term calculations deviating from the real development already because of changes in the legislation. Changes in the legislation can significantly affect the expenditures of an individual pension type.

In the calculations, economic development is usually assumed to be level or develop according to some trend, which might well be a reasonable approach in the long run. Changes in the economy cannot be predicted, so at least in the short term, the calculations contain uncertainty factors because of this.

Especially the number of new pensions taken early are influenced by the employment prospects and the inclination to retire, the long-term exact estimating of which is impossible. On the basis of statistics, we have striven to estimate the average number of new pensions taken early in the long run. In reality, the number of new pensions varies annually, but if the variations take place on both sides of the estimated number of new pensions, the average number of new pensions in the long run gives results that are acceptable enough. Also the forecasts for new types of pensions always include uncertainty factors, because there are still no reliable observations about their level of usage. For instance, estimating the number of part-time pensions is

difficult, because the temporarily lowered age limit in July 1998 has significantly increased the popularity of the part-time pension (see e.g. the journal *Työeläke* 1998/4). From the point of view of the total expenditures, the uncertainty does not play any great role, however.

Long-term calculations are technical calculations done under certain assumptions. The realisation of the results depends on the realisation of the assumptions of the calculations. In other words, if all the assumptions used in the calculation came true, the calculation results would be realised.

Even though the calculation results are obtained from the forecasting model in detail, in the long run an indicator, significant from the point of view of the earnings-related pension scheme, describing the overall calculation, gives a more reliable view of the calculation results. The most common indicator is the pension expenditure as a percentage of wages, i.e. the pension expenditure percentage. Pension expenditures are also often presented as a percentage of GDP, as will be done later in this report. The curve depicting the indicators is usually very regular. However, in reality the realised figures vary on both sides of the calculated curve even in the best of cases.

Of the different types of pensions, the old-age pensions are mastered the best, because their number depends mostly on the age structure of the population, and thus the number of new pensions and the number of terminated pensions are easier to estimate. The amount of an average new old-age pension, for its part, depends on the level of earnings and the period of accrual. The amount of new old-age pensions is affected by the annual growth in the level of earnings, which is an assumption for the calculations. The amount of old-age pensions already in payment is mostly influenced by the growth in the TEL index. As the expenditure for old-age pensions will amount to 70% of all earnings-related pension expenditure in the future, it is quite understandable that possible small errors in the other types of pensions, which are more difficult to estimate, do not cause any large error in the overall calculation.

When investigating the effects of a certain indicator, that is, when comparing the results of the so called basic calculation with the alternative calculation, an assumption error for some other factor is not necessarily fatal. This is due to possible errors affecting both calculations in the same way, and thus the differences in the calculations to be compared give a clear picture of the impact of the changes in the alternative calculation. For instance, an erroneous assumption about economic growth does not hinder the assessment of the effect of differences in mortality rates almost at all.

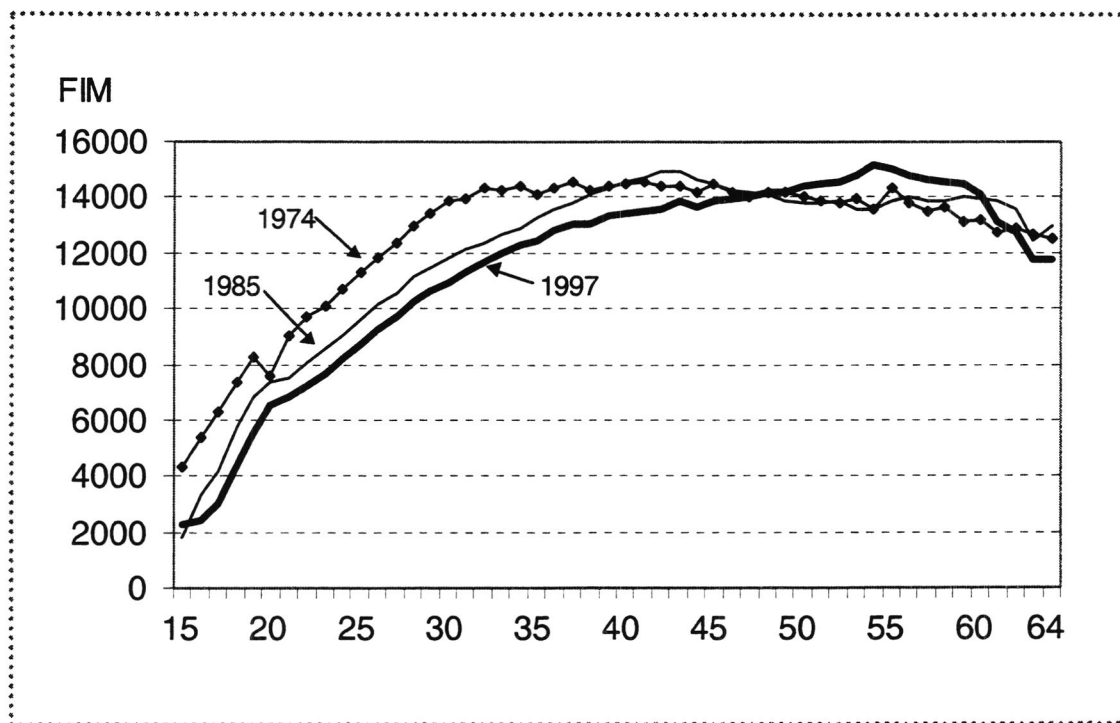
4.4 Earnings development

In Chapter 3 we described the earnings generation of the long-term model. A starting point based on the production function makes the development of overall productivity the primary quantity describing the development in the earnings level. In the basic alternative of the forecast, the average annual growth rate for the different acts is 1.5%, according to which earnings increase during the whole period of observation. In the alternative calculation the growth rate is 2.0%. Furthermore, the changes in the age structure affect the development of earnings to some extent.

The model includes life-cycle wage profiles in accordance with the earnings-related pension acts, TEL, LEL, TaEL, MEL, MYEL and YEL, as well as for public-sector insured. Typically a person's age-related wage profile has the shape of a mound. For most insured, the profile follows the wage profile derived for the persons insured under TEL. A profile showing the observed age-wage career for short-term jobs is used for those insured having short employment contracts. Furthermore, those insured under YEL, among others, have their own earned income career, depicting the later starting age of self-employed persons' insurance.

While belonging to the active labour force, people are moved forward in the model according to the wage career under one of the acts. When a person changes from being unemployed to being insured under TEL, he or she moves to the wage position of the relevant age group. Moving forward in the wage career is crucial from the point of view of pension expenditure, because the pensionable wage at any one time is calculated on the basis of this. The data on wages of the pension insurance companies show how the wages have developed in recent decades. The data include large-scale and small-scale employers' aggregated data on monthly wages for people aged 15–64 for the years 1974–97. The material is also presented separately for men and women.

The data show clearly how the life of different cohorts over time has changed the age-wage profile. Those born in 1946–49, that is, the so called baby-boomers, are now living at a wage top. However, for men the actual top is still formed by the age group of 1942, which was actually a remarkably small age group. The development of the wage top over time can be visualised in Graph 4.2.



Graph 4.2. The real age-wage profile for men in certain years

The wage profile for the forecasting model is always made according to the latest data. A profile adjusted from the data of 1997 is used in the present forecast. However, significant changes in the profile have occurred in the 1990s, especially on the part of young people. It is to be suspected that the effects of the recession are not yet over, so the profile will change in the next few years, increasing the wages of young people. Another matter is the generations at the wage top leaving the active labour force.

The calculation assumes that the profiles will return to the levels before the recession by the year 2002. The reasons for this are the improved employment prospects and general estimates of the development of young people's wages.

Women's wages have been lower than those for men throughout for all age groups, which also shows in the data of the earnings-related pension insurance companies. The difference has been 25–30 per cent regardless of the type of employer and the point in time. The forecast does not assume any rapid change in this matter.

The calculation describing the private and the public sector covers most of the labour force. The acts cover quite a heterogeneous group, living in very different situations in time. Among other things, a substantial structural change, due to the EU common agricultural policy, is under way in agriculture, which shows in the earnings development of the insured.

5 BASIC ALTERNATIVE

5.1 Private-sector pension expenditure percentage will rise to over 35

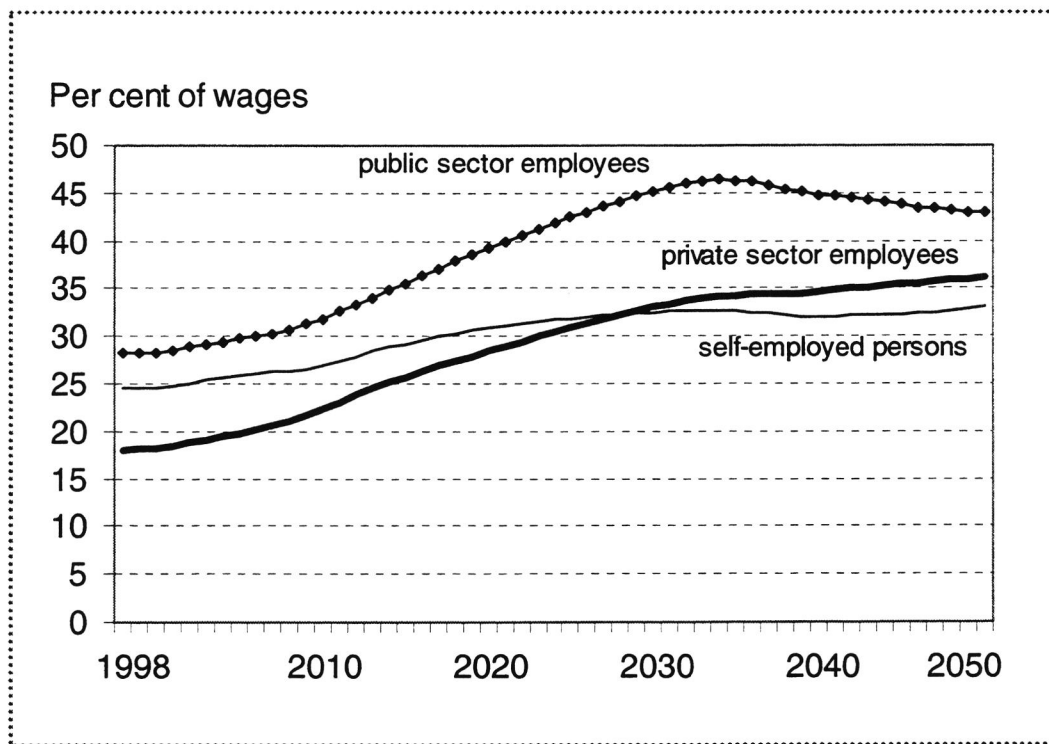
Viewed by sectors the development of the pension expenditure percentages clearly differ from each other. According to Graph 5.1 the lowest level applies to the pension expenditure percentage of private-sector wage-earners and the highest to the pension expenditure percentage of the public sector.

The earnings-related pension expenditure according to the private-sector wage-earners' basic security was about FIM 29.1 billion in 1998 (level of 1999). The pension expenditure will presumably increase to about FIM 131.2 billion in real terms by the year 2050. At the same time, the pension expenditure percentage will double from the present 18 to about 36.

The YEL and MYEL pension expenditures for self-employed persons amounted to a total of about FIM 5 billion in 1998. It is estimated that the pension expenditure will increase to about FIM 14.6 billion in real terms by the year 2040. The pension expenditure percentage of self-employed persons would increase from the present 24.5 to about 33.

The earnings-related pension expenditure of the public sector was about FIM 22.4 billion in 1998. The expenditures are expected to rise to about FIM 67.3 billion in real terms by the year 2050. At the same time, the pension expenditure percentage of the public sector will grow from the present 28.2 to about 42.9. The expenditure percentage will be at its highest in about 2035, about 46 per cent.

The relatively high pension expenditure percentage of the public sector is mostly due to the higher level of the pensions. At the beginning of 1995 a public-sector pension reform took effect, which will gradually adjust the pensions to the level of TEL. However, the implementation phase of the pension reform is so long that the pension expenditure percentage of the public sector will start decreasing clearly towards the level of TEL only after 2035.

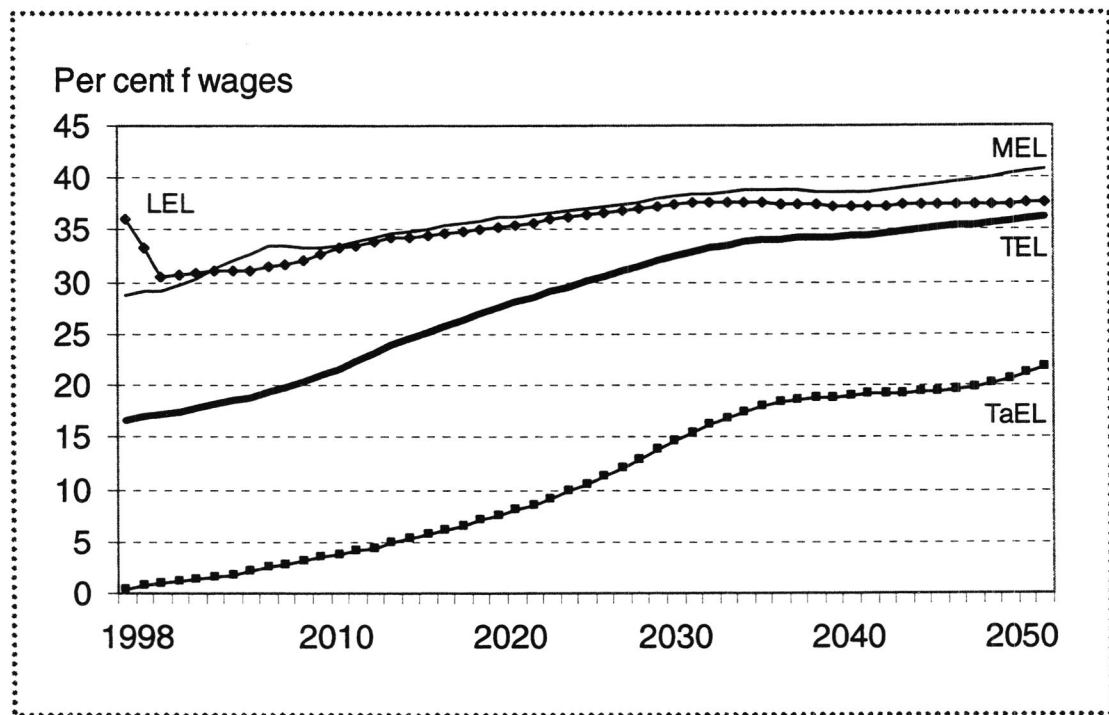


Graph 5.1. Pension expenditure percentage per sector

5.2 Large variations between the pension acts in the private sector

Employees

In Graph 5.2. the development of the private-sector employees' pension expenditure percentages are very different when observed for each pension act separately. In 1998 the employees' pension expenditure percentage varied according to pension act from about one for TaEL to about 36 for LEL. The pension expenditure percentage is heavily dependent on variations in the wage sum, whereby, for instance, the rapid decrease in the wage sum due to the recession of the 1990s immediately raised the pension expenditure percentage, and then again after the recession the substantially increased wage sum has lowered it.



Graph 5.2. Pension expenditure percentage of private-sector employees

In the calculations, the development of the number of private-sector employees was assumed to be fairly constant after the recession, whereby there won't be any large variations in the wage sum. Thus, the effects of the variations in the wage sum caused by the recession will slowly disappear, and the pension

expenditure percentages of TEL and LEL will slowly approach each other by the year 2050.

The pension expenditure under the basic security of TEL was about FIM 25 billion in 1998 and the pension expenditure percentage about 17. The pension expenditures are estimated to about FIM 121 billion in 2050 and the pension expenditure percentage to about 36.

The number of people employed under TEL is assumed to increase by about 170,000 by the year 2010. Then the number of employed persons will exceed the pre-recession level by about 60,000, which corresponds to the increase brought by the privatised state-owned companies. As a result of the rapid increase in the number of employed persons and the resulting fairly rapid increase in the wage sum, the TEL pension expenditure percentage has stayed more or less on the same level after the impact of the recession, although the absolute pension expenditures in Finnish marks have continually increased.

The pension expenditure according to the basic security of LEL was about FIM 3.8 billion in 1998 (level of 1999) and the pension expenditure percentage about 36. The pension expenditures are expected to increase to about FIM 8.8 billion in real terms by the year 2050. The pension expenditure percentage will develop differently from the PTS96 forecast, however. According to the present calculation, the pension expenditure percentage will temporarily reach the level of 30 in the current year. In the coming decades the expenditure percentage will grow slightly, until almost reaching the TEL expenditure percentage at the end of the forecasting period.

During the recession, unemployment was most common among the labour force covered by LEL in proportion, as a result of which the number of people insured under LEL has decreased since 1989 in a few years to half of the previous level. At the same time, the diminished wage sum has raised the pension expenditure percentage to a high level. But the number of employed persons covered by LEL is expected to rise steeply till the beginning of the 2000s due to factors such as the recovery of the construction industry, after which the number would slowly diminish in line with the population development. This kind of development in the number of employed people will bring the pension expenditure percentage downwards close to the level of TEL.

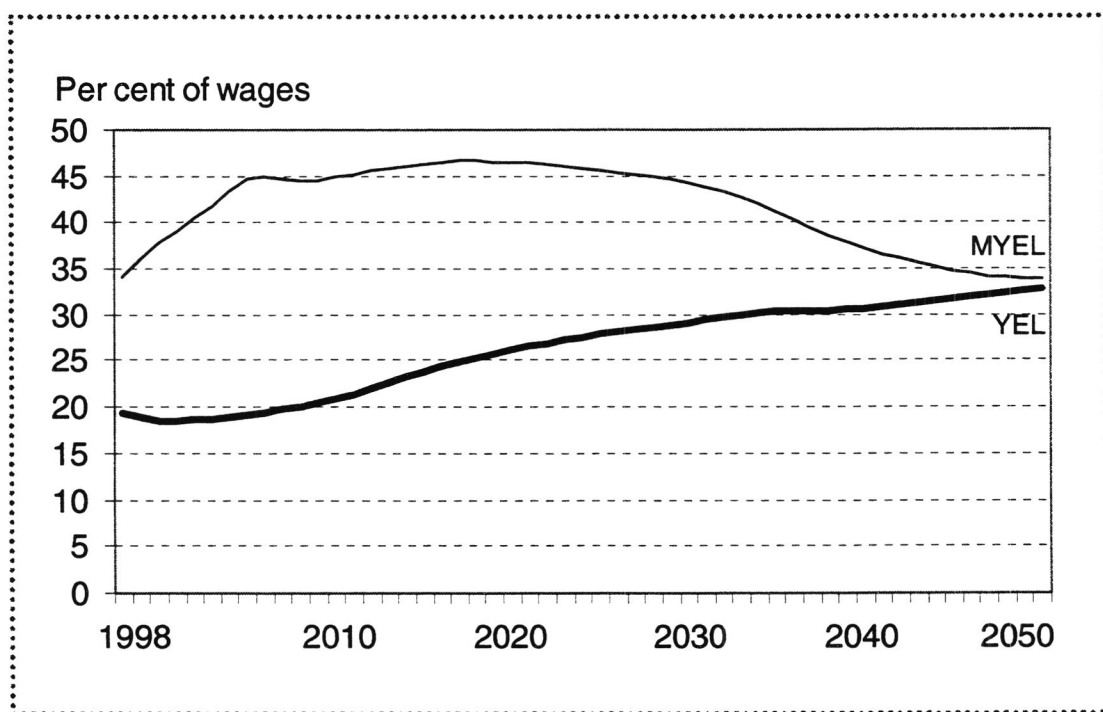
The Pension Act for Performing Artists and Certain Other Employee Groups (TaEL) took effect in 1986 and important small changes, significantly broadening the scope of the Act, was made to the Act in 1998, so due to the short accrual period the pension expenditure percentage was still quite low in 1998. Pensions under TaEL were only paid to an amount of about FIM 8 million in 1998. The pension expenditures are estimated to stay below

FIM 700 million in 2050 and the expenditure percentage about 22. However, the pension expenditure is expected to rise close to the TEL level in the long run.

Self-employed persons

According to Graph 5.3 the pension expenditure percentages of self-employed persons covered by YEL and MYEL will develop very differently in the future, which is due to the differences in the past and future development of the number of self-employed persons.

The pension expenditures for MYEL were about FIM 2.4 billion in 1998 (level of 1999) and the pension expenditure percentage about 34. The pension expenditures are expected to rise to about FIM 3.2 billion by the year 2050. The pension expenditure percentage is expected to remain the same as it is now.



Graph 5.3. Pension expenditure percentage for YEL and MYEL

The number of self-employed persons covered by MYEL has steadily declined since the act came into force to less than half. The decline in numbers is expected to continue strongly till 2005, after which it will slowly diminish. In the long run there will be about 70,000 persons insured under MYEL. A result of

this kind of development is that the ratio of people retired on an old-age pension to self-employed persons will grow till 2010. At the same time, the pension expenditure percentage will also grow from the present about 28 to about 55. After 2010, as the number of farmers stabilises, the pension expenditure percentage will decline steadily to about 35 by the year 2040.

The pension expenditure for YEL was about FIM 2.5 billion in 1998 (level of 1999) and the pension expenditure percentage about 19. The pension expenditures are expected to increase to about FIM 11 billion in real terms by the year 2050 and the pension expenditure percentage to about 33.

The number of self-employed persons covered by YEL grew till 1990, but at the beginning of the '90s the number declined by almost 10,000. The number of insured has been rising at the end of the '90s and it will grow till 2010. After that, the number will remain stable in the calculation till 2040, and then it will change according to changes in the number of the labour force.

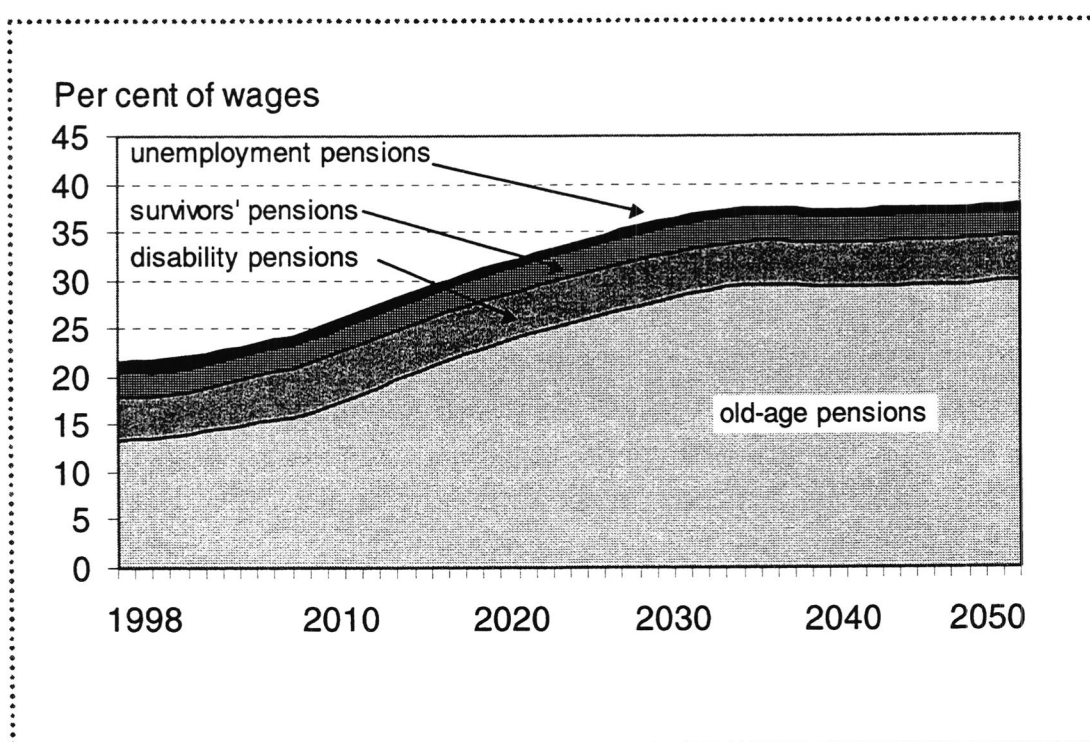
As a result of the fairly stable development trend for the number of self-employed persons, the development of the pension expenditure percentage is mainly influenced by the age structure of those covered by the act and the rise in the pension level due to YEL taking effect.

In the future, the pension expenditure percentage for self-employed persons will change more or less in the same manner as that for employees, but as a result of relatively lower expenditures for pensions taken early, the pension expenditure percentage is expected to stay somewhat below the pension expenditure percentage of employees.

5.3 TEL pension expenditure percentage according to type of pension

Old-age pensions under TEL were paid to an amount of about FIM 13.5 billion, disability pensions to an amount of about FIM 6.8 billion, unemployment pensions about FIM 2 billion and survivors' pensions about FIM 2.8 billion in 1998.

As the population ages, the expenditure percentage for old-age pensions will rise from the present about 19 percentage points to almost 28 by the year 2050 or thereabouts, in accordance with Graph 5.4.



Graph 5.4. Earnings-related pension expenditure per type of pension

The representatives of the labour market organisations and the earnings-related pension institutions have in July 1999 agreed on measures to postpone effective retirement and to promote continued active participation in working life. The determination of the unemployment pension is changed so that the time between the pension contingency and the general retirement age, that is, the post-contingency period, is no longer included. Consequently, the stipulation in the Act about the right to include the post-contingency period being a prerequisite for entitlement to the unemployment pension will be removed. The age limit for the individual early retirement pension is raised from the present 58 to 60 years. At the same time, the temporary special act regarding the part-time pension, where the age limit is lowered from 58 to 56 years, will continue to be in force till the end of 2002. Furthermore, changes were agreed on regarding the risks for the disability and unemployment pension expenditure that the employer has to carry. Here the aim is to make it easier for ageing unemployed persons to become employed.

It has not yet been possible to take into account the effects of these changes coming in force at the beginning of the year 2000 in the calculations of this publication. It is difficult to assess the effects of these decisions before the details of the changes have been determined. Leaving aside the behavioural effects, the changes will probably have no large impact on the total earnings-related pension expenditure. Still, there may be pension typespecific effects, which depend on the permanency of the changes. The Central Pension Security Institute will calculate the effect of the reforms when it has become clear how the legislation will be changed. In the long run the basic forecast and the postponed retirement alternative give a reliable view of the earnings-related pension expenditure and the contributions.

The share of the disability pensions (including the partial disability pensions and the individual early retirement pensions) of the pension expenditure percentage is about 4.5 percentage points at the moment. As the baby-boomers are ageing, the share of the disability pensions of the pension expenditure percentage will reach its highest level in about 2010, when it will be almost 5.5 percentage points. After that, as the age structure changes, the share of the disability pensions will decrease in twenty years by about half a percentage point.

The share of the unemployment pensions of the pension expenditure percentage is about 1.5 percentage points at the moment. Due to the assumed decline in the unemployment rate, it is calculated that it will start declining in a couple of years and stabilise at the level of a good 0.8 percentage point after 2015.

The share of the survivors' pensions of the pension expenditure percentage is expected to increase from the present near two percentage points by about one percentage point by the year 2035, and after that decline slightly.

As the expenditure for old-age pensions grows, the share of pensions taken early of the pension expenditure percentage will be relatively small in the long run. If we want to diminish the pension expenditure percentage for TEL in the future, the pensions taken early will not alone bring any significant savings, so it is important to also influence the old-age pension expenditure in the long run.

5.4 Comparison with earlier forecasts

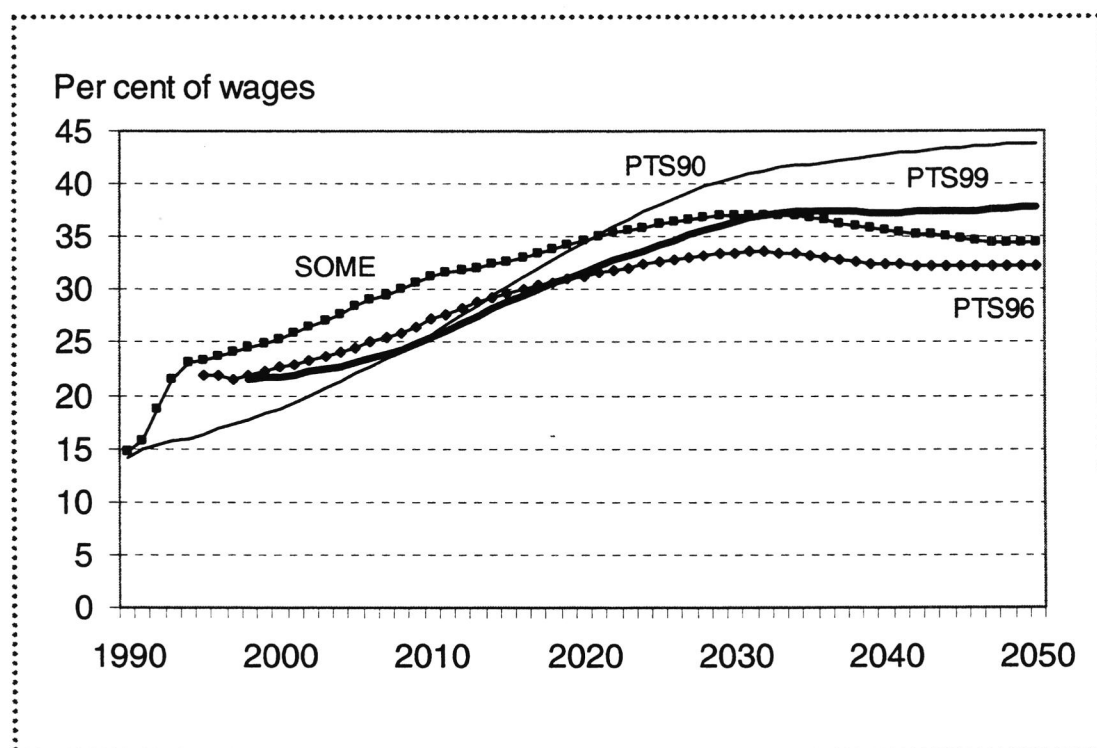
During the last decade, numerous calculations have been done using the model of the Central Pension Security Institute. Especially the PTS and SOME calculations are points of comparison, as are the calculations done by certain other quarters. However, it should be born in mind in the comparisons that the economic situation and the pension system itself have changed and that the concepts and limitations of the calculations have varied. Thus, different assumptions regarding the economy and the pension scheme have been used in the different calculations. For instance, when doing calculations for the turn of the 1990s, the turn in the economy could not be forecasted, nor the substantial changes that were soon made in the pension scheme. The differences show in the calculation results.

Graph 5.5. presents some of the forecasts and in Table 5.1. we have gathered the assumptions for these forecasts. The perhaps best point of comparison is comparing the present and the previous PTS forecast from three years hence.

Later in the report we will present how all this relates to GDP and analyse what the pension expenditures in each calculation consist of. It is, however, worthwhile to pay attention to the differences between the concepts when making comparisons.

Table 5.1. Assumptions for pension expenditure calculations

	PTS90	SOME	PTS96	PTS99
Productivity	1.5	1.5	2.0	1.5
Unemployment rate	5->3	5.1	7.5(2040)	5(2015)
Net immigration	0	0	5000	5000
Increased life expectancy			constant(2010)	increasing
Employed persons in 2040, 1,000 persons	1890	2010	1946	2094
Number of pensions in 2040, 1,000	1690	1600	1581	1843



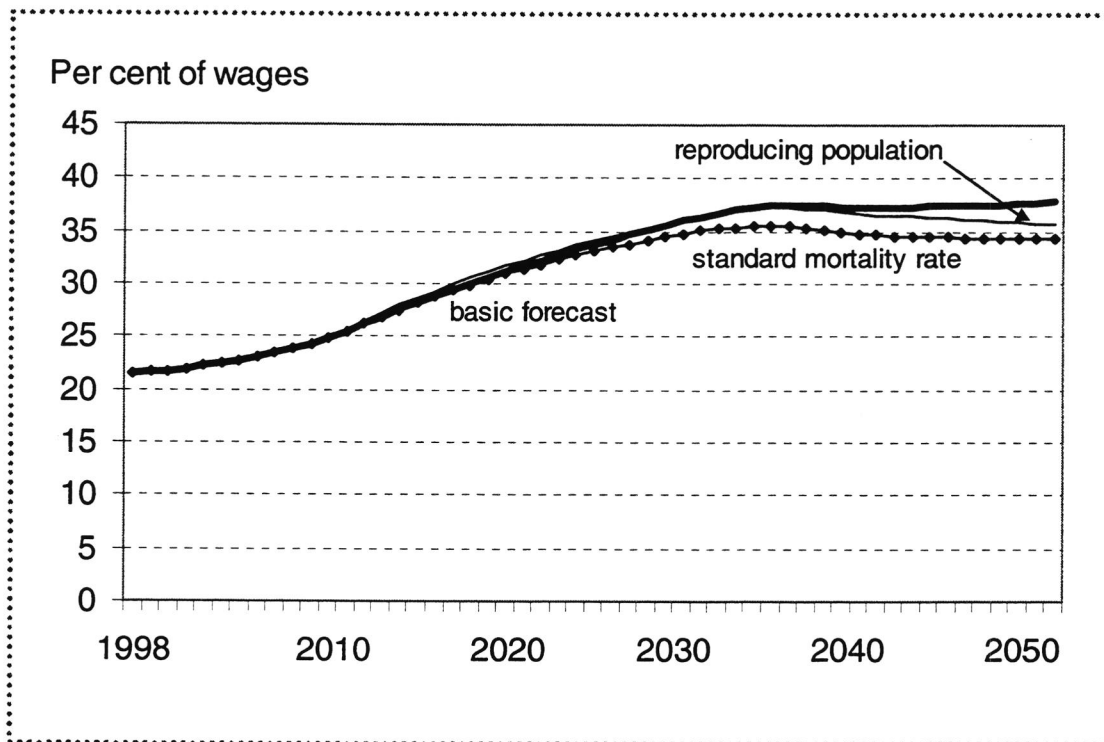
Graph 5.5. Earnings-related pension expenditure percentage in long-term calculations done during the 1990s, private and public sector

6 POPULATION ALTERNATIVES

Two alternative calculations were done concerning the population. In the first one, birth rates are assumed to increase in such a way that the total birth rate will rise from its present level to the reproduction rate within the next ten years. In the second calculation, the decrease in mortality rates and the increase in longevity are assumed to cease in about 2010. The scope of these calculations is to assess other population prospects than shown in the prevailing population forecasts. Furthermore, the aim is to bring attention to the significance of the population numbers and the payers of the pensions for the economy and the pension scheme.

6.1 Birth rates start increasing

In this calculation the total birth rate grows from 1.75 to the level of the reproduction rate of 2.1 by the year 2010. The effect of this will start showing in the number of the labour force in 2025. Since a stable employment rate is achieved fairly early in the calculation, the increasing labour force is mostly employed and starts increasing the wage sum. The increase in the birth rates will, of course, show first in maternity leaves etc. before the growth in the supply of labour force.

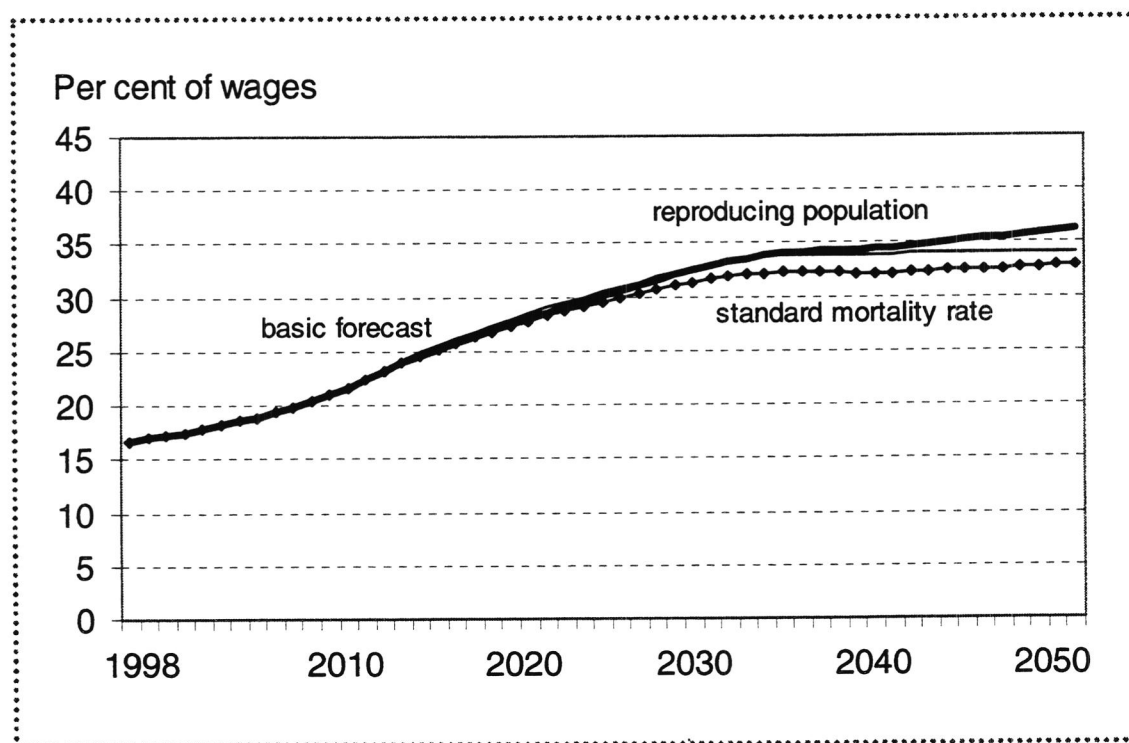


Graph 6.1. Pension expenditure percentage in the population alternatives, earnings-related pensions

Figures 6.1. and 6.2. show the impact of a reproductive population on the pension expenditure adjusted with the wage sum both for the whole earnings-related pension sector and for TEL. In both cases differences from the basic calculation occur after 2040. In the long run the difference is at its largest in 2050, about 2 percentage points.

6.2 Decline in mortality rates broken off

In the second population alternative we analyse what will happen to the pension expenditures, if the prevailing trend of increased longevity is broken off. As there will be no changes in retirement, the impact will be substantial in the long run. The effect shows steadily in the calculation as of 2020. The difference from the basic alternative will stabilise at a level of near five percentage points in 2040.



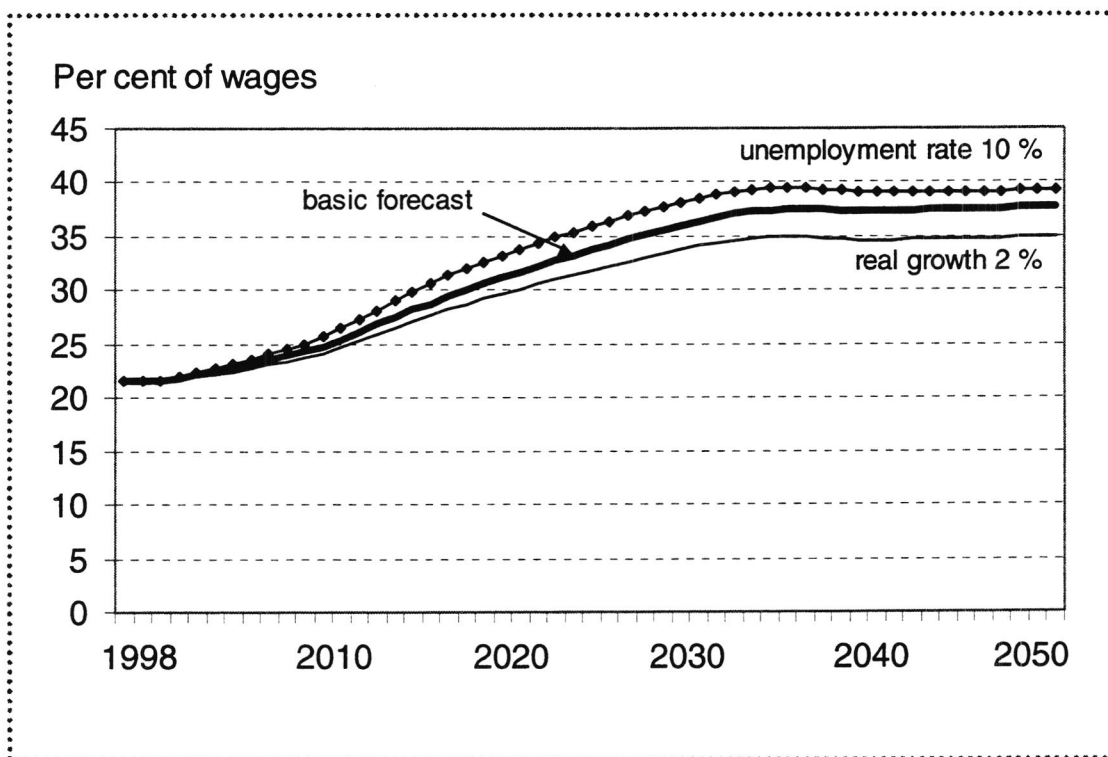
Graph 6.2. Pension expenditure percentage in the population alternatives, TEL

7 ECONOMIC ALTERNATIVES

Calculations were done with two alternatives for economic development. In the first alternative, long-term so called balanced unemployment remains at the level of 10 per cent. In the other alternative calculation, the real growth in productivity and the level of earnings is 2 % annually.

7.1 Employment rates stay low

In the basic calculation, the unemployment rate decreases from the present level of 10.5 per cent to seven by the year 2010 and stabilises from the 2015 onwards at a level of five per cent. The basis for this development is that economic growth takes care of the decrease till 2005 and after that the decrease in the supply of labour force. In the unemployment alternative, the decrease in unemployment rates stagnates at the level of 10 per cent. The employment rates and the number of the labour force will, thus, remain at a lower level than in the basic calculation.



Graph 7.1. Pension expenditure percentage in the economic alternatives, earnings-related pensions

As the development in employment rates remains weak, its effect will start showing in the wage sum already in 2005. The difference in the pension expenditure percentage of the earnings-related pensions from the basic forecast will stabilise at a level of 2 percentage points as 2015. The effect of unemployment will raise the pension expenditure percentage to 38 per cent in the long run, that is, 1.7 percentage points higher than the basic alternative.

7.2 Higher real growth in earnings level

The important sum of earned income for this forecast is dependent on employment, the working time of the employed persons and the development of the real earned income per unit. Because of this, the effect of employment and productivity on the wage sum are similar. In the basic calculation, earnings increase 1.5 per cent annually in real terms in the long run. In the alternative calculation, the growth in productivity is more optimistic, 2.0 per cent annually.

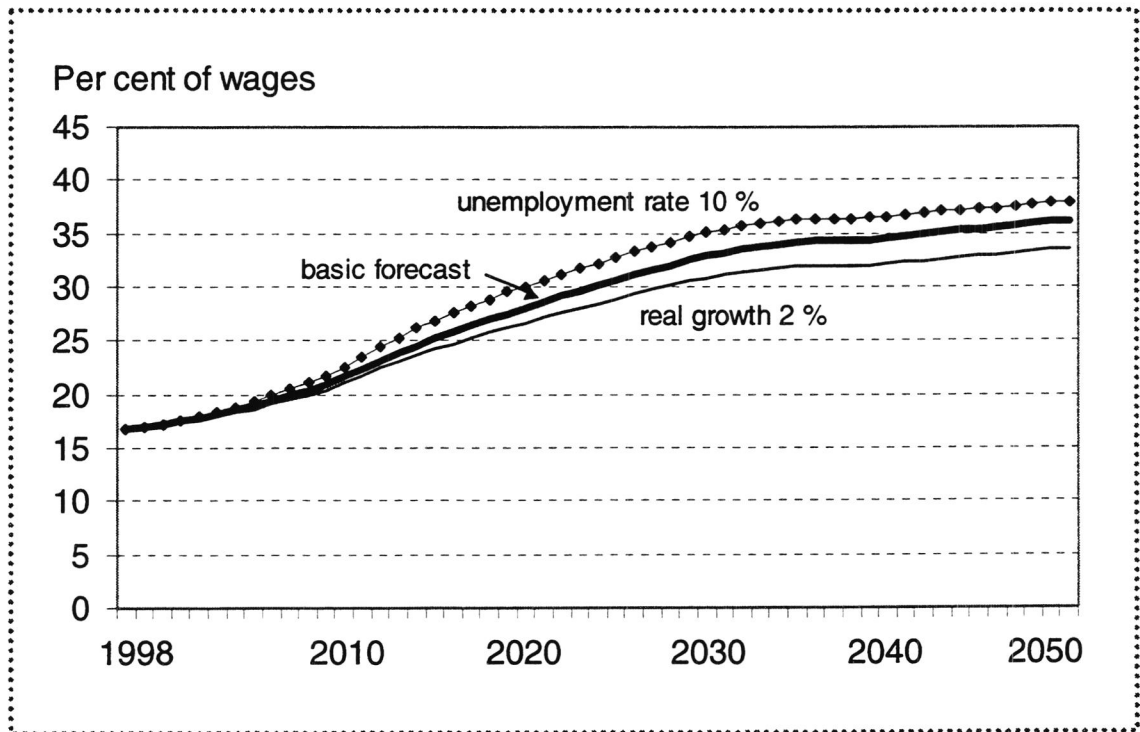
The TEL index, used for adjusting the pensions up to the age of 65, includes half of the real growth and after the age of 65 only one fifth. Thus, as the earnings development accelerates, the growth rate of the TEL index lags even more behind the earnings growth rate. For instance, a 3.5 per cent annual real growth in earnings almost doubles the wage in real terms in 20 years. A pension benefit paid on the basis of this wage grows during the same period of time only about 1.3 times in real terms, if we assume that it is adjusted for ten year with an index of 1.75 per cent and for another ten years with an index of 0.7 per cent. Thus, the value of the pension benefit in relation to the wage diminishes about one third in 20 years. If the real growth rate is 0.5 per cent annually, the corresponding decrease is only about six per cent.

The pensions to be paid, including on average about 20 years of index-linking, are the smaller compared to the wages the stronger is the development in real earnings. The difference is at its largest for the survivors' and the old-age pensions, where the effects of the index are the most lasting. There are also small differences between the acts: the effect is the smallest in the public sector, where the final wage has the largest impact on the pension, whereas under LEL and for self-employed persons the effect is substantial, since the pension is based on the index-adjusted earnings for the whole period of accrual.

The difference between the unemployment alternative and the basic alternative diminishes in the long run, as the cohorts having accrued less pension rights due to unemployment retire, and the pension expenditure is, thus, smaller. This will not be fully realised during the forecasting period.

In the alternative of higher growth in real earnings, the pension expenditure percentage stays on a lower level than in the basic alternative, due to the effect of the index. The difference grows gradually, and starting in 2035, the pension expenditure percentage will stabilise on a level about 2.5 percentage points below that of the basic alternative.

The effect is similar to TEL for all earnings-related pension acts (Graphs 7.1 and 7.2)



Graph 7.2. Pension expenditure percentage in economic alternatives, TEL

8 PENSION POLICY ALTERNATIVE

Depending on the way of calculating, the average effective retirement age in Finland is just below 60 years at the moment (see the journal *Työeläke 2/99*). Postponing effective retirement is considered one of the main aims of pension policy in public discussion, because the so called baby-boomers are nearing the ages for early retirement. The present government states that it aims to postpone the exit from the labour market by 2–3 years. As an alternative calculation, we analyse the cost effects of a three-year postponement compared to the basic alternative.

Postponement is achieved by raising the retirement age for the old-age pension and by postponing the new pensions taken early by one year in 2010, 2020 and 2025. Even though the effective retirement age cannot be raised this schematically in practice, the calculation gives an exact enough picture of the effects of raising the effective retirement age in the next decades.

Graph 8.1. shows the average effective retirement age of those covered by TEL in the basic calculation and in the three-year postponement alternative. One should bear in mind that the effective retirement age rises already in the basic calculation, and the rise in the alternative calculation comes in addition to that. Age is calculated with a formula which results are independent of changes in the age structure and which immediately reacts to changes in legislation and behaviour (the journal *Työeläke 2/99*).

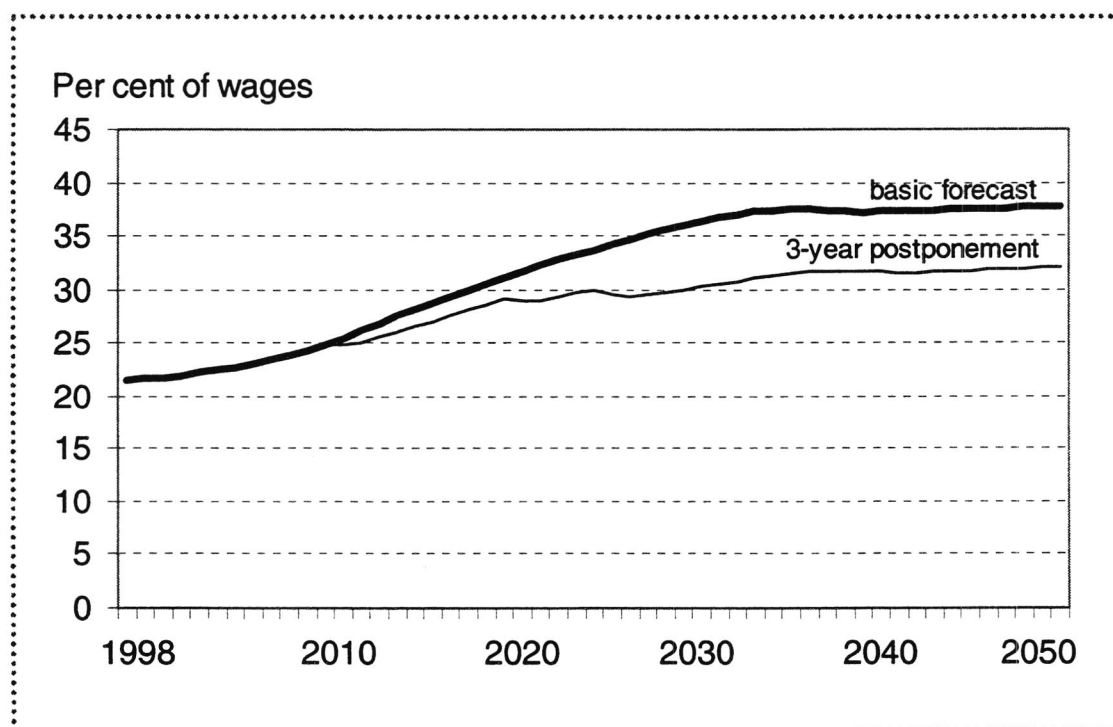
Table 8.1. Average effective retirement age under TEL

	2000	2015	2030
Basic forecast	57.8	58.8	59.2
3-year postponement	57.8	59.8	62.1

The rise in the effective retirement age varies according to pension act. The smallest growth in the 3-year postponement alternative is for YEL, where effective retirement is postponed by 3.1 years during the period 2000–2050. This is due to the high initial level of YEL, self-employed persons retire on average at an age of 60.2 years at present. Postponing effective retirement is at its highest in the public sector, where, apart from the 3-year postponement,

effective retirement is moved to a later date by the gradual disappearance of retirement ages lower than 65. Effective retirement will be postponed in the public sector by on average 5.5 years in the period 2000–2050, according to the calculation.

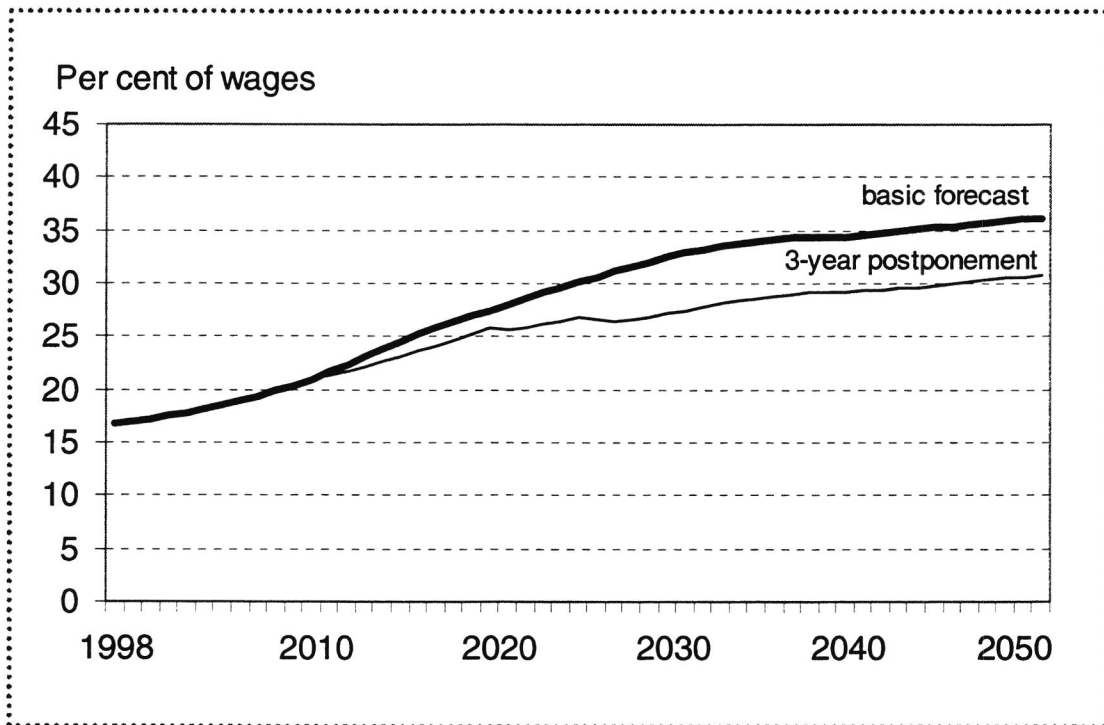
Postponing effective retirement by three years is an ambitious aim. Raising the general retirement age alone only affects the average effective age for retirement to a small extent, for instance, raising the retirement age under TEL by one year only raises the average effective retirement age by 0.2 years, since few people work till the general retirement age. The number of new pensions taken early should also be lowered from the present level, so that more people than at present would continue working till the general retirement age. In this way, raising the retirement age would have a greater effect.



Graph 8.1. Postponed retirement alternative, earnings-related pensions

The postponed effective retirement will show immediately in the active population. When effective retirement is postponed by three years by the year 2025, the number of the labour force is more than 85,000 larger in the basic alternative. The difference prevails also in the long run.

As regards pension expenditures, the deviation from the basic calculation is noticeable. The pension expenditure percentage will be about 30 in 2050, which is about 5 percentage points below the level of the basic calculation (Graphs 8.1 and 8.2). In the following chapter we will present the effect of the postponement alternative on the earnings-related pension contributions.



Graph 8.2. Postponed retirement alternative, TEL

9 FUNDS AND CONTRIBUTIONS

The private-sector pension acts for employees (TEL, LEL, TaEL, MEL) are so called partially funding pension schemes: part of the annual insurance contribution is used directly to pay for the pensions, part is funded for future pension payments. A more detailed description of the funding techniques can be found in the publication Tuomikoski (1999).

The amount of a 25–54 -year-old employee's pension funded each year under TEL is increased annually by an amount corresponding to 0.5 per cent of the wage (before 1997 1.5 per cent). At the same time, old-age pension funds are accumulated by an amount, the interest for which (3%), and taking mortality rates into account, would suffice to pay this person a pension of this size as of the retirement age of 65 (the capital value of the old-age pension). In addition, the so called calculated interest rate from the funds and the interest yield corresponding to the three-percent difference are used to increase the funded pensions and, hence, the funds. Thus, the old-age pensions are funded in advance, but the disability pensions (and in part also the unemployment pensions) are funded only as the pension starts. On certain conditions the initial amount of the disability pension makes up the funded part of the pension, and the funds are accumulated by an amount, which on an actuarial basis would suffice to pay for this pension till the general retirement age. On the other hand, if the person dies, the funded share is released and as the retired person gets older, the funded share usually diminishes. Thus, pension type specific funds are accrued and dissolved all the time for different reasons. Actuarial funds further include other components, the most important of which is the clearing reserve. The funded parts of the pension are paid from the corresponding funds and the rest of the pension expenditure is covered by the annual pooled component of the contribution.

With the calculation model of the Central Pension Security Institute we can calculate, apart from the pension expenditures, also the funded parts for the private-sector pension acts for employees (TEL, LEL, TaEL, MEL). Based on this, the model also calculates the provisions for each type of pension.

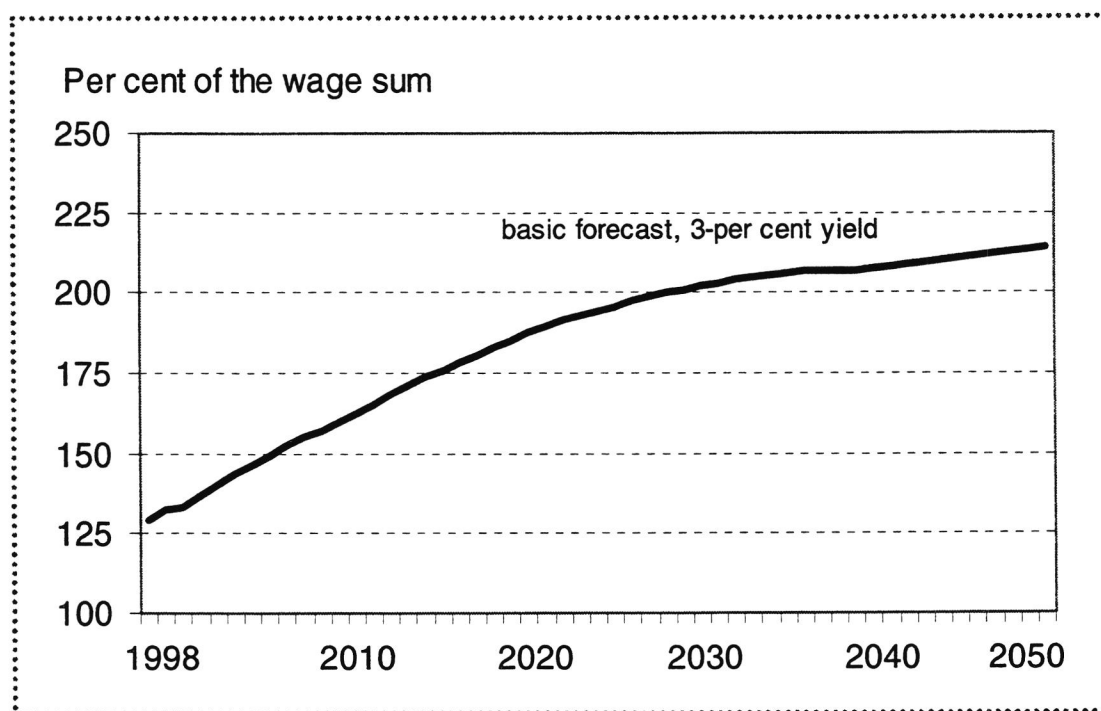
On the basis of the basic calculation for the pension expenditures, we can, thus, estimate the long-term development of the private-sector employees' earnings-related pension funds. Based on the development of the pension expenditures and liabilities, we can present an estimate on the development of the earnings-related pension contributions. The alternative calculations also show how a higher yield from the funds clearly affects the contribution level

required, and how large an impact postponed effective retirement would have on the lowering of the contributions.

9.1 Fund calculations

Two fund calculations were done. In the first one, the fund grows 3 per cent annually in real terms. The alternative calculation is more optimistic, with a real yield of 4 per cent. This reflects a reality where higher risk-taking in investment activities is successful in the long run.

The long-term increase in the earnings-related pension liabilities is from a present 130 per cent to 214 per cent of the wage sum in the basic alternative. With a safeguarding real yield of three per cent, the present calculation bases produce the liability profile shown in Graph 9.1. This real yield can be achieved, for instance, if the proportion of relatively risk-free investment objects is 75 per cent and the real yield 2 per cent, and the real yield of the risky investment objects is 6 per cent annually. These calculations do not assume any policy changes affecting the fund position due to the baby-boomers.



Graph 9.1. The ratio of the actuarial fund and the wage sum

In the long run the fund amounts will stabilise on a level exceeding two times the wage sum. Thus, the liability presented in the calculation shows an actuarial fund, consisting of present and future pension liabilities and different components of the solvency margin. It is somewhat smaller than the investment capital of the pension insurance companies. That is, in the future we will have to get used to two different fund concepts.

As a result of the funding reform at the beginning of 1997 we can talk about funds in two different ways. Firstly, there is, as before, the actuarial technical provisions, which mainly consist of insurance contribution and compensation liabilities. Secondly, as of 1997 the fund consisting entirely of the technical provisions and the whole solvency margin has been separated to a new fund concept. The instructions for the reform are clearly included in the legislation. The activities of the pension insurance companies are directed in detail by the Insurance Companies Act, the Act on Earnings-Related Pension Insurance Companies and the calculation bases confirmed by the Ministry of Social Affairs and Health.

The aim of the reform in the solvency margin is to strengthen the ability of the institutions to participate in open investment markets and adapt to the risks this entails, as well as investment risks and risks for changes in the value of money. The solvency margin includes the following entries in the pension company's balance sheet: capital and reserves, as well as transfers to the reserve for future losses. Corresponding to all this, there has to be assets in the balance sheet. Furthermore, the solvency margin includes valuation differences taking account of the investment risks. The fund including the solvency margin is thus larger than the actuarial fund. The biggest differences and variations stem from the valuation differences.

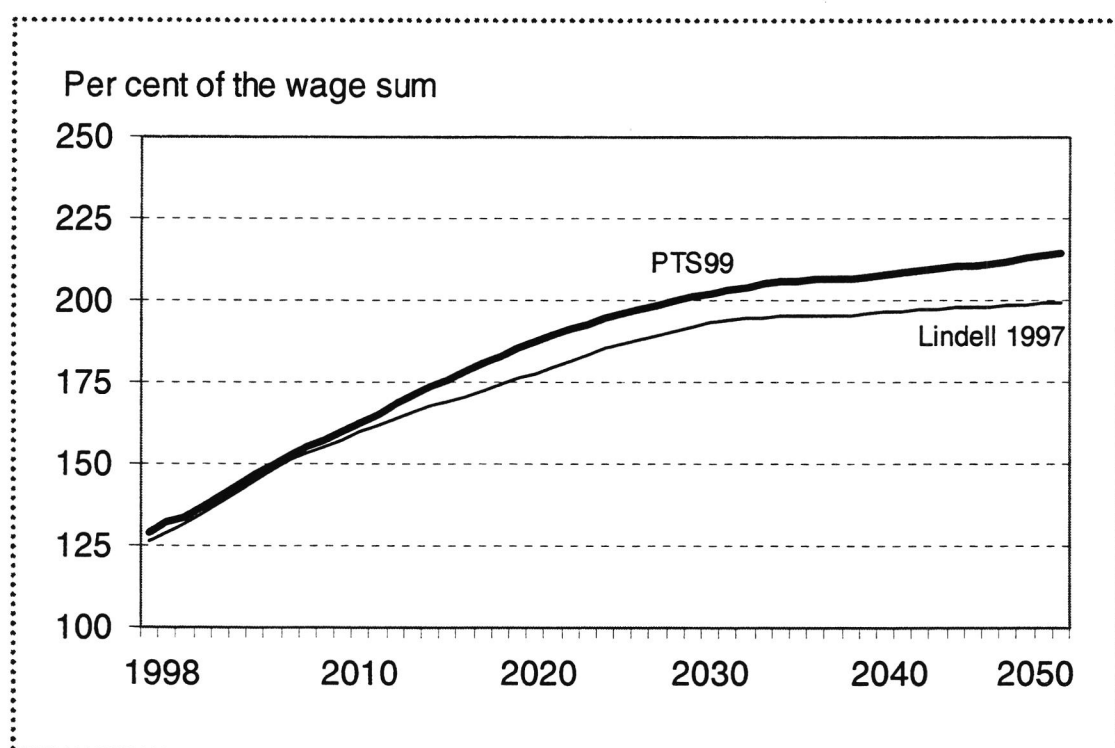
The difference and its real development can be illustrated by a schematic example. The actuarial liability of the private sector was about FIM 215 billion in 1998 (henceforth level of 1999) (column 2). The fund containing the valuation difference was about FIM 247 billion (column 3). Column 4 in the table contains a calculation of an alternative of increased investment risk, that is, the expected valuation difference has increased. The proportion of debt securities will be decreased in the calculation by 15 per-centage points during the next few years and the proportion of shares as well as real estate will be increased correspondingly by 12 and 3 percentage points. This distribution will increase the proportion of shares in the investment distribution to about 30 per cent in the long run.

	VV	VV+AE	VV+AE'
1998	215	247	247
2005	312	359	365
2020	488	562	572
2050	784	901	918

The PTS99 calculation produces an amount for the actuarial liability in accordance with the calculation bases prevailing in the basic alternative. The level of real yield in the calculation is 3 per cent annually.

Comparison with the PTS96 fund calculation

This fund calculation can be first and foremost compared to the fund forecast based on the PTS96 forecast (Lindell 1996). The fund profile follows the same pattern. The funds will be about one tenth larger in 2050 than in the calculation of 1996. Related to the wage sums, the difference is about 15 percentage points (Graph 9.2.). Most of the difference is explained by the lower assumptions for inflation, real growth in earnings and mortality rates in the new calculation.

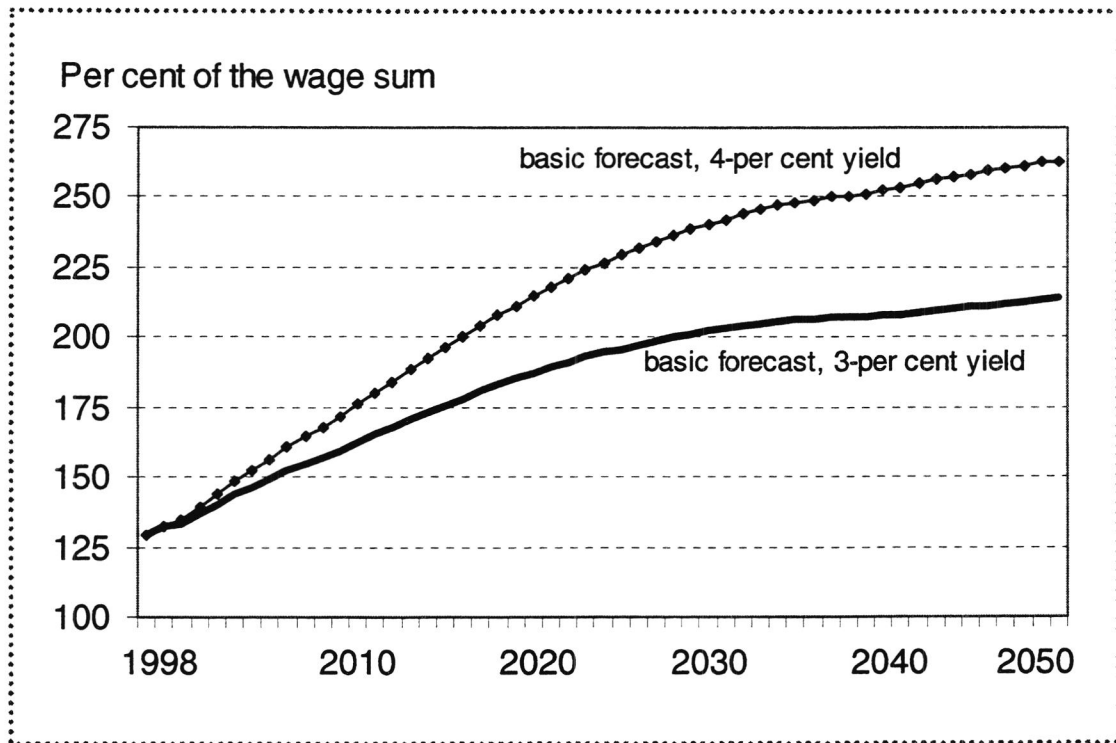


Graph 9.2. Ratio of actuarial fund to wage sum, forecast of 1996 and 1999

Higher real yield

The funds increase four per cent annually in real terms in the alternative fund calculation. The purpose of the calculation is to show the effect of a higher yield on the long-term development of the liabilities.

Graph 9.3. shows how directly a higher yield increases the liability beyond the basic alternative. The difference will be about 45 per cent of the wage sum in 2040. The difference will remain stable in the long run. The earnings-related pension funds would amount to about 2.6 times the wage sum in 2050.



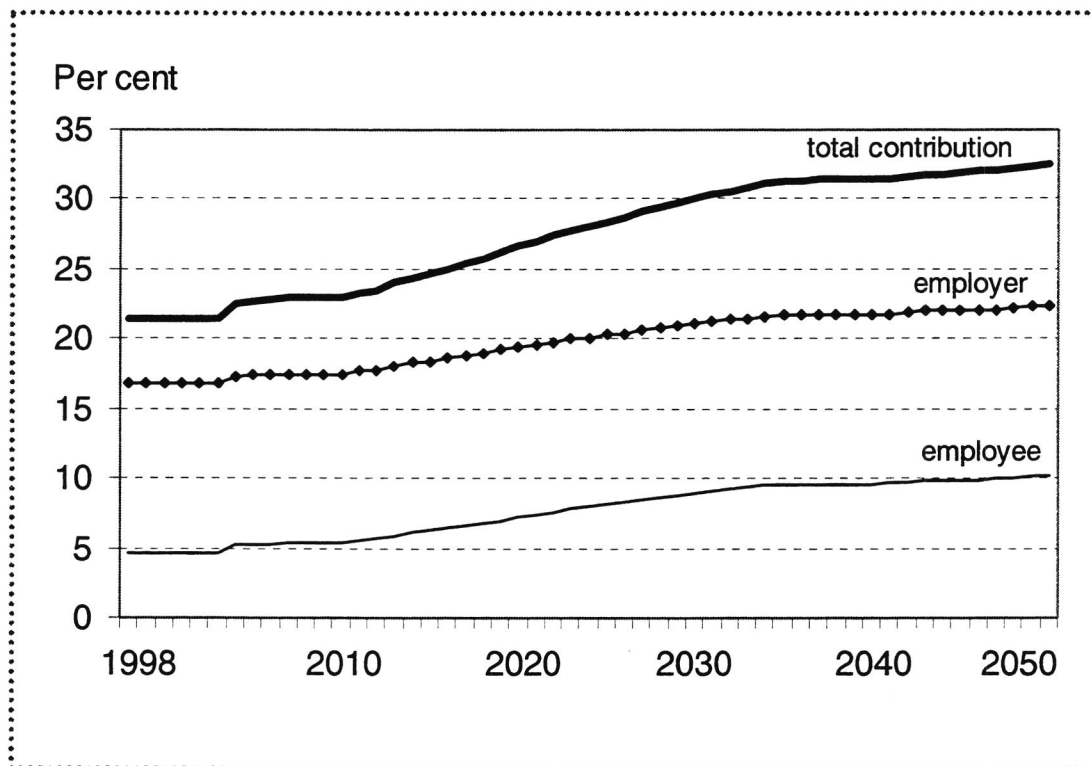
Graph 9.3. Actuarial funds in different calculation alternatives

9.2 Contribution calculations

Three contribution calculations were done. The basic calculation analyses the required level of contributions due to the expenditure and fund forecasts. According to the basic calculation, the fund accumulates 3% annually in real terms. The first alternative contains the development in contributions with a fund yield of 4%. The other alternative calculation analyses the effects on contributions of the retirement alternative analysed earlier with regard to expenditure.

Contribution percentage increases to 32

The total contribution percentage will grow very slowly till 2010. The rapid growth in pension expenditure will start after 2010. During the period 2010–2035 the total contribution percentage will increase on average 0.3 percentage points annually. The contribution will stabilise on the level of about 32 per cent in the long run (Graph 9.4).



Graph 9.4. Contribution percentage in the basic alternative with a 3% real yield

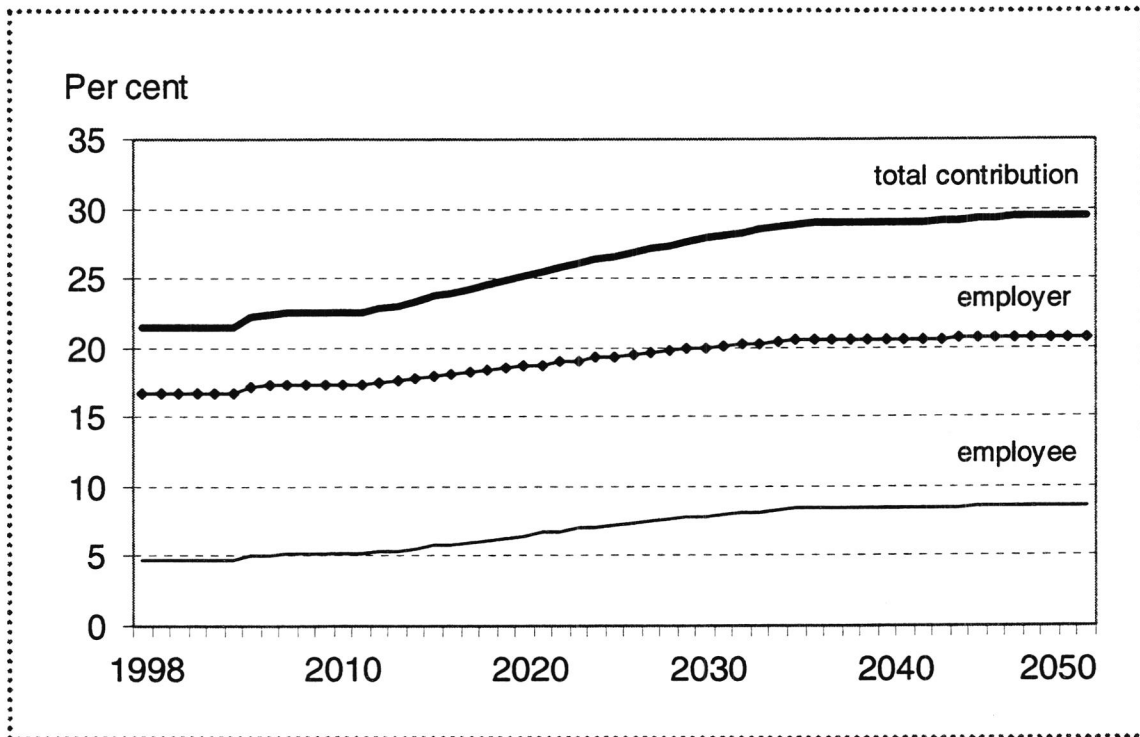
Half of the future growth in the total contribution will be carried by the employers and half by the employees. The employers' contribution will stabilise on a level of about 22 percent in the long run. The employees' contribution will double from the present level and stabilise on a level of about 10 per cent.

9.3 Higher fund yield eases the pressure on the contributions

The higher fund yield is channelled to cover liabilities for old-age pensions, whereby the yield that exceeds the discount rate increases the liabilities and the funded pensions more than the basic alternative. In the next few years the impact on the contribution level is not great, because the higher interest yield is mainly channelled to the funds. There will be a visible difference in the contribution percentage in the long run, because the proportion of the funded pensions of the total pension expenditure will be significantly larger than in the

basic alternative. This means that from 2020 onwards, the fund increased with the higher yield, thus, clearly slows down the increase in the total contribution.

The total contribution percentage will rise to 29 per cent in the long run (Graph 9.5), which is about 3 percentage points below the basic alternative.



Graph 9.5. Contribution percentage in the basic calculation with a 4% real yield

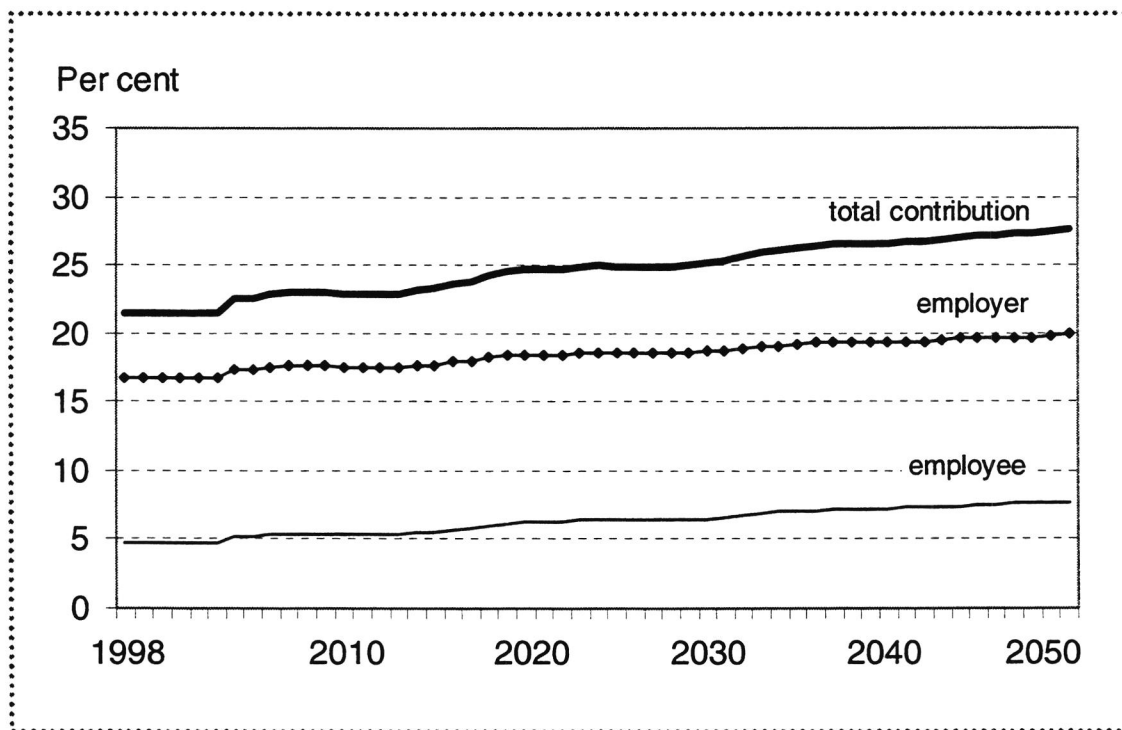
The impact of the interest rate on the contribution percentage is fairly straightforward, which means that the contribution levels for other levels of the interest rate can be fairly reliably estimated from the contribution patterns presented.

In the long run, a 4% real fund yield requires a very successful investment strategy on the level of the pension scheme. The benefit of success shows clearly in lower insurance contributions.

9.4 Postponing effective retirement has the greatest impact

In this alternative, the pension expenditures develop according to the expenditure forecast presented in Chapter 8. The real interest rate of the funds is assumed to be 3 per cent annually in accordance with the basic calculation. The average effective retirement age is assumed to rise by about three years from that in the basic calculation by the year 2025.

A lower pension expenditure will show rapidly in the contribution percentage (Graph 9.6.). The total contribution percentage will not exceed 25% until 2025, and the long-term increase is moderate. The total contribution percentage will increase with only a good 0.1 percentage points annually from the present level by the year 2050.



Graph 9.6. Contribution percentage according to the 3-year postponemen calculation

The contribution will stabilise on a level of about 28 per cent in the long run. The most visible difference from, let's say, the previous calculation of a higher fund yield will show in a mid-term perspective. When the present students are in the best active working age, their contribution percentage will be about 2.5 percentage points lower. A similar decrease can also be seen in the employers' contribution.

10 CONCLUSIONS

10.1 The PTS99 calculation

According to the basic forecast, the private-sector earnings-related pension expenditure will rise to about 36 per cent of the wage sum by the end of the forecasting period, although there will be significant act specific differences. The most important factor behind this rise is the increased longevity.

On the basis of the alternative calculations, we can see that the effects of an increasing birth rate and a diminishing mortality rate will show in the private-sector and public-sector earnings-related pension expenditure in the long run. The expenditures will stabilise on a level 3–4 percentage points below that of the basic alternative (37%). The impact of the high unemployment rate shows for the whole forecasting period, and the expenditures will finally stabilise on a level a couple of percentage points above that of the basic calculation. On the other hand, the increased growth in the earnings level will improve the financing prospects of the pension scheme, and the expenditures will stabilise on a level about 3 percentage points below that of the basic calculation. In the postponed retirement calculation, the calculation model produces an actuarial estimate of a three-year postponement. There the average effective retirement age under TEL is about 62 years in the year 2000. The effects on the expenditure of the post-ponement are significant, the expenditures will rise to about 32 per cent in the long run. One has to bear in mind that the model gives a maximal effect of the shift.

The actuarial liabilities follow the legislation in force and, on the basis of the model, they will grow from the present 130 per cent of the wage sum to a good 200 per cent in the long run. If the real average yield on the investments is 4 per cent annually, the liabilities will increase to 270 per cent.

On the basis of the expenditures and the liabilities, calculations have been done on the required pension contribution percentages. After a moderate growth in the next few years, the total contribution percentage will increase to about 32. A higher yield for the liabilities would, on the other hand, ease the expenditure burden somewhat; the total contribution percentage stabilises on the level of about 29. From a contribution viewpoint, the best alternative is again the postponement of effective retirement. In that case, the total contribution percentage stabilises on a level about five percentage points

below that of the basic alternative. This would mean a fairly moderate growth in the shares of both employers and employees.

10.2 Comparison with some calculations of total pension expenditure

In order to analyse the prerequisites for an economic stabilisation of the earnings-related pension scheme, it is enough to compare the earnings-related pension expenditure contributions and funds to the wage and the income sums. Many other public expenditures in the national economy are also dependent on the relative proportion of the ageing population. The expenditures are financed by tax revenues and it is quite sensible to compare them to GDP. Next we will present calculations on the total pension expenditure and the pensioners' social expenditures on the basis of the forecast for the earnings-related pension expenditure.

GDP has been estimated with the help of the forecast for the wage sum. The GDP calculations are not absolutely necessary for the forecast. Here they have been done, so that we can make comparisons with calculations using the same concepts. GDP for a certain year consists of the following (GDP via earnings):

$$\text{GDP} = \text{PS1} + \text{SOVA1} + \text{PS2} + \text{SOVA2} + \text{YPS} + \text{VERO} + \text{KULU}$$

where

PS1	=wage sum included in the earnings-related pension expenditure forecast
SOVA1	=sum of the employer's earnings-related pension insurance contribution included in the earnings-related pension contribution forecast
PS2	=wage sum in the national economy - PS1
SOVA2	=the employer's all social insurance contributions - SOVA1
YPS	=sum of operating yield and capital income
VERO	=taxes on production and imports - subsidies
KULU	=wear of fixed assets

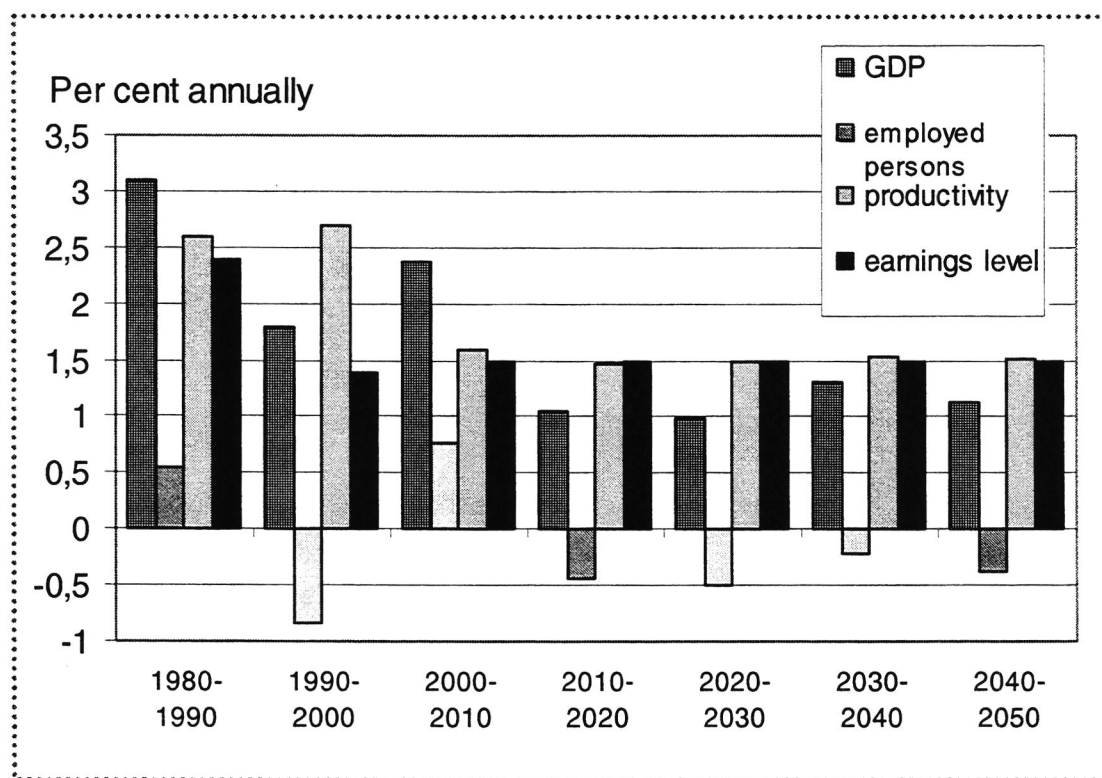
PS1 and SOVA1 are obtained from the forecast presented. The other multipliers are obtained from the equations below. The equations state the values of the multipliers in the basic forecast for 1999 and 2050, except when calculating VERO, where the multiplier will stabilise as of 2005.

PS2	=0.073...0.072 x PS1,
SOVA2	=0.272...0.3 x (PS1+PS2) - SOVA1,
YPS	=0.63...0.64 x (PS1+PS2),
VERO	=0.305...0.29 x (PS1+PS2) and
KULU	=0.186 x (PS1+SOVA1+PS2+SOVA2+YPS+VERO).

The share of the employer's total social insurance contributions of the wages (0.272-0.3) is not assumed to increase by the same amount as the employer's earnings-related pension insurance contribution, because the unemployment insurance contribution will decrease, as will possibly also the social security contribution (national pensions). The decrease in the share of VERO by the year 2005 (0.305...0.29) is due to the harmonisation of indirect taxation in the EU. The factor used when calculating KULU means that the share of capital wear of GDP is assumed to remain stable (0.157).

Under the assumptions used, the share of the wage sum and the employer's social security contributions of GDP will stay more or less stable at about 49 per cent for the whole forecasting period.

The graph is a summary of the assumptions for wage development and employment rates as well as the level of real growth these will lead to. The figures are shown as average annual changes in ten-year periods. The first two pillar groups represent historical facts.

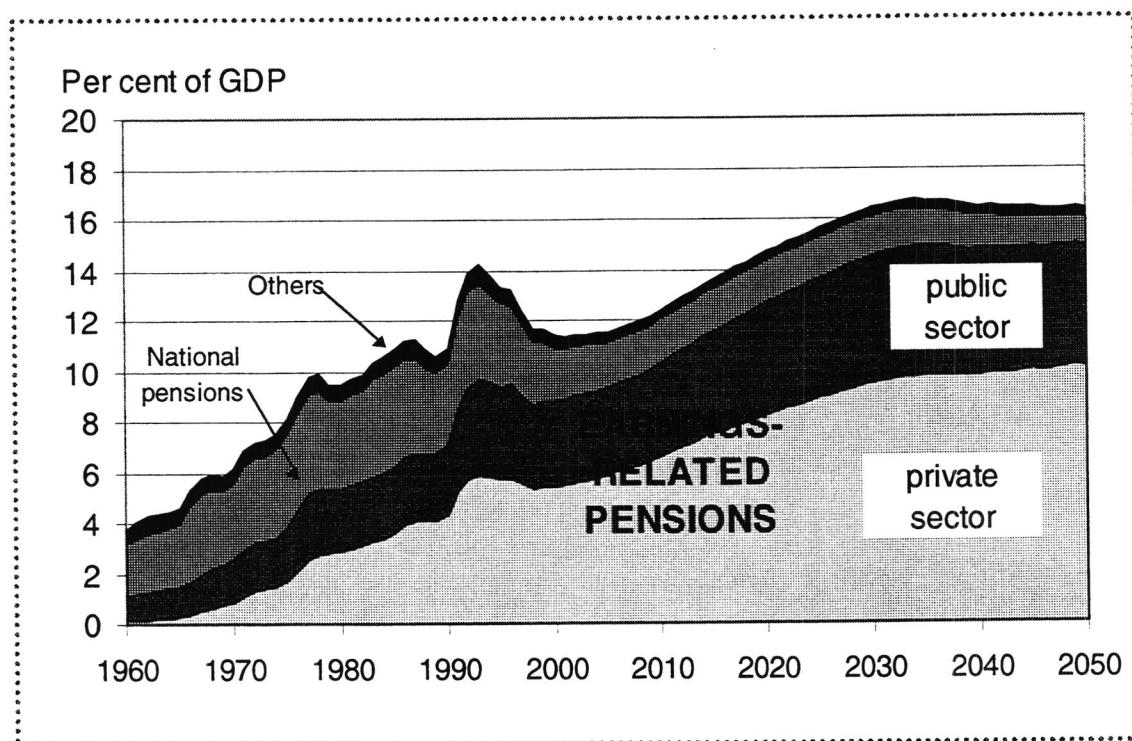


Graph 10.1. Average annual percentage change in real GDP, number of employed persons, productivity (GDP/employed person) and real earnings level in ten-year periods 1980–2050

The most important factor in the slowdown of real growth is the diminished work input due to the decrease in the number of the labour force.

The total pension expenditures include in the following, apart from the statutory earnings-related pensions, also the voluntary collective career-based supplementary pensions (in the graph combined with the statutory earnings-related pension expenditure, share of GDP 0.3 per cent), the national pensions, military injuries compensations, pensions under motor third party liability insurance and accident insurance as well as the farmers' special pension provisions (see KELA 1998b, pages 38–39).

In the calculation forecast for 1999–2050, presented in the following graph, the earnings-related pensions are on a par with the basic calculation, and the shares of the national pensions of GDP are obtained from the actuarial report of the Social Insurance Institution (KELA) (1999). The share of the military injuries compensations included in the other pensions of GDP will stabilise by the year 2010 from the present about 1 per cent to 0.1 per cent. Otherwise no changes are assumed in the shares of GDP.



Graph 10.2. The share of total pension expenditure of GDP in 1960–2050, the earnings-related pension expenditure for 1999–2050 on a par with the basic calculation

The share of the total pension expenditure of GDP will be at its highest in 2034, an estimated 16.4 per cent. In 1998 the share was about 11.7 per cent.

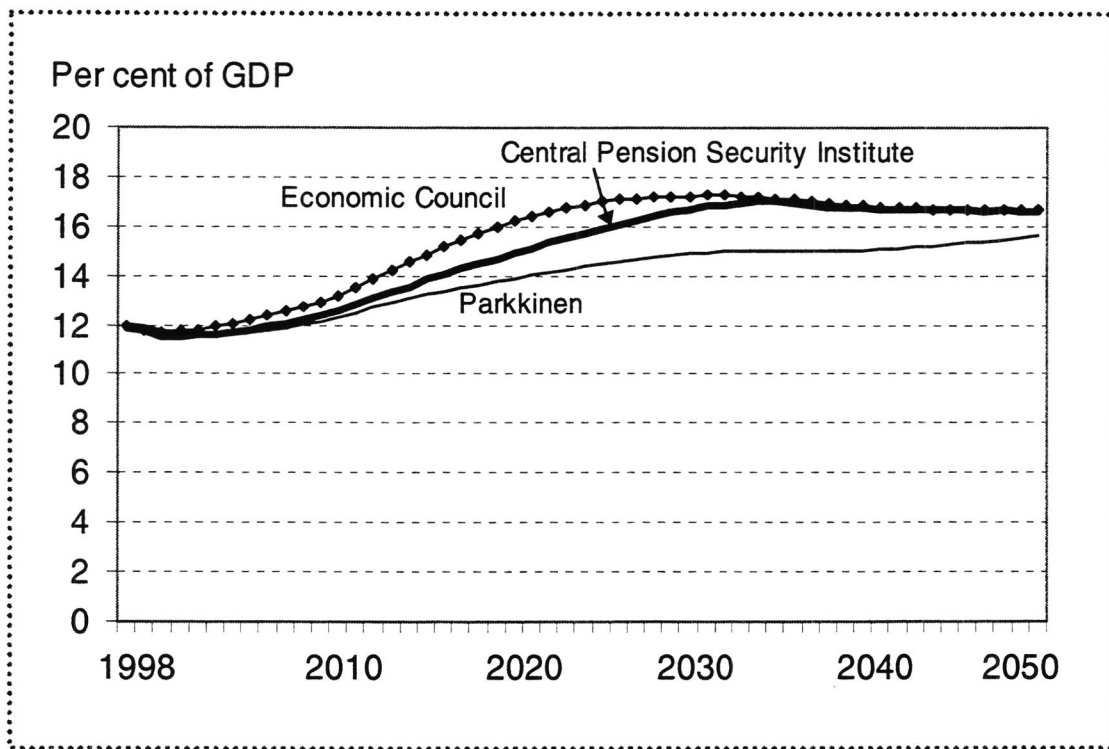
So far the share has been at its highest in 1993, when it was 14.3 per cent. The share of the statutory earnings-related pensions of GDP will grow from 8.3 per cent in 1998 to 14.6 per cent by the year 2050.

Recent forecasts

The Social Insurance Institution (KELA) publishes a forecast for the national pension expenditure and for the expenditure of its other administrative sectors. The forecasts for the earnings-related pension expenditure have a long history, from a STAT report at the end of the 1970s to the numerous calculations of the 1990s.

The Ministry of Finance (1998) has done calculations on the shares of the earnings-related and the national pension expenditures of GDP up to 2030. The Ministry estimates that the share of the earnings-related pensions of GDP will rise at its highest to 15.8 per cent in 2025.

The Economic Council (1998) presents calculations up to 2050. In the calculations, attention is drawn to the effect on the pensions of changes in the so called real quantities. Changes in the participation rate and productivity are analysed in the alternatives.



Graph 10.3. The share of the total pension expenditure of GDP in some recent calculations

In Graph 10.3 we have compared the basic calculations of the Economic Council and Parkkinen (1998) with the shares of the expenditures of GDP in the PTS99 calculation. A difference of a couple of percentage points occurs in a mid-term perspective. The difference is mainly due to deviating assumptions as well as economic assumptions and the size of the labour force. These assumptions change in different ways over time even though in the end the variables are fairly close to each other.

If effective retirement is postponed by on average three years from the assumptions of the basic calculation by the year 2025, the share of the total pension expenditure of GDP will diminish by about 1.4 percentage points, i.e. to 14.9 per cent, by the year 2030. By the year 2050 the decrease will be 1.5 points. The calculation also takes into account the rise in GDP due to the increased number of employed persons.

10.3 Growing possibilities for consumption

The age structure of the population also affects other social expenditures than just pensions. The national income is the disposable income of the country's own citizens and it is the result of subtracting the wear of fixed assets and net production factor compensations abroad from GDP. In this connection, we wanted to analyse how the disposable national income for others than pension recipients develops in the long run.

According to Thompson (1998), the burden caused by the pension recipients is shown by their consumption in relation to the national income. We did a calculation, where the consumption of pension recipients was analysed by summing up all pensions, medical expenses compensations paid to pension recipients as well as the value of public social and health services they receive at production cost minus user fees. The assessment of the reimbursement of medical expenses and services was based on an age profile with one-year cohorts. The expenditures are estimated to increase over time in each age group by the growth rate of GDP, i.e. 1.5 per cent annually in real terms.

By the year 2030 the national income will grow 65 per cent in real terms from the level of 1999. This contains an assumption of a decrease in the share of factor income paid abroad of GDP (net amounts) from the present about 2.5 per cent to 0.3 per cent. The pension recipients' share of consumption will grow in the aforementioned manner from about 19 per cent in 1999 to about 28 per cent in 2030, after which the share will not increase anymore by 2050.

Thus, 81 per cent of the national income remains for other uses in 1999 and 72 per cent in 2030. Within the same period of time, the share of the rest of the population diminishes from 77 per cent to 68 per cent. The ratios mean that the pension recipients' average consumption level and the part of national income remaining for other uses grow at the same speed, when calculated per person.

In more detailed estimates of the development of the pension recipients' consumption, one has to take into account the pension recipients' other income (such as capital income) and the income taxes they pay, other public consumption than social and health services as well as the part of the income that is saved and transferable to others. At the moment, the income taxes paid by the pension recipients are of the same size as their other income, that is, other than pensions. Thus, it is reasonable to assume that the consumption does not largely deviate from the aforementioned outline, and at least not its relative development.

The fact that the pension recipients' average income or level of consumption per person follows the long-term development of the earnings level for the rest of the population also means that the political stability of this income distribution will remain as it is.

REFERENCES

Alho J. (1998) A Stochastic Forecast of the Population of Finland. Statistics Finland, Reviews No. 1998/4, Helsinki.

Eurostat (1996) Demographic Statistics 1996. Office for Official Publications of the European Communities, Luxembourg.

Kansaneläkelaitos (The Social Insurance Institution) (1998a) Väestöennuste 1998–2050 (Population forecast 1998–2050). Actuarial publications of the Social Insurance Institution No. 1, Helsinki.

Kansaneläkelaitos (The Social Insurance Institution) (1998b) Kansaneläkelaitoksen tilastollinen vuosikirja 1997 (Statistical Yearbook of the Social Insurance Institution 1997). Publications of the Social Insurance Institution T1:33, Helsinki.

Kansaneläkelaitos (The Social Insurance Institution) (1999) Kansaneläkelaitoksen hoitama sosiaaliturva 1998–2050 (Social security administered by the Social Insurance Institution 1998–2050). Actuarial publications of the Social Insurance Institution No. 2, Helsinki.

Korpela T., Klaavo T. and Lundqvist B. (1996) Työeläkemenot 1995–2040 (Earnings-related pension expenditure 1995–2040). The Central Pension Security Institute, Papers n.o. 11, Helsinki.

Korpela T., Klaavo T. and Lundqvist B. (1997) Työeläkemenot ja väestömuutokset (Earnings-related pension expenditure and population changes). The Central Pension Security Institute, Papers n.o. 17, Helsinki.

Lindell C. (1997) Työeläkemaksujen ja rahastojen kehitys vuosina 1995–2040 (Development of earnings-related pension contributions and funds 1995–2040). The Central Pension Security Institute, Papers n.o. 18, Helsinki.

Parkkinen P. (1998) Kansantalous ja eläkkeet vuoteen 2050 (The national economy and the pensions till 2050). Discussion initiatives No. 172 of VATT (the Government Institute for Economic Research), Helsinki.

Pentikäinen T. (1998) Ikääntymisongelma ja sen ratkaisu (The ageing problem and its solution). The Central Pension Security Institute, Reports No. 13, Helsinki.

Talousneuvosto (The Economic Council) (1998) Julkinen talous 2000-luvulla: Reunaehdot, haasteet ja uudistusten suunta (The public economy in the 21st century: Boundary conditions, challenges and the direction of the reforms). Work group report, Publication series 1998/4 of the Prime Minister's Office.

Thompson L. (1998) Older and Wiser: The Economics of Public Pensions. The Urban Institute Press, Washington, D.C.

Tilastokeskus (Statistics Finland) (1998) Väestöennuste kunnittain 1998–2030 (Population forecast per municipality 1998–2030). Väestö 1998/6 (Population 1998/6), Helsinki.

Tuomikoski J. (1999) Lakisääteisen työeläkevakuutuksen vakuutustekniikkaa (Insurance techniques of statutory earnings-related pension insurance). The Central Pension Security Institute, Reports n.o. 15, Helsinki.

Tuomisto T. (1999) The Finnish earnings-related pension scheme for the private sector). The Central Pension Security Institute. Reports n.o. 14, Helsinki. (forthcoming)

Työeläke, the journal (1999) Eläkkeellesiirtymisikä - mitä se on? (Effective retirement age - what is it?). Publications 1999/2 of the Central Pension Security Institute, Helsinki.

Työeläke, the journal (1998) Alaikärajan alentaminen antoi potkua osa-aikaeläkkeelle (Lowering the lower age limit increased the popularity of the part-time pension). Publications 1998/4 of the Central Pension Security Institute, Helsinki.

Työministeriö (Ministry of Labour) (1998) Employment and Welfare in Finland in the years 1860–2030. Labour Policy Study no. 211, Sulkava.

Valtiovarainministeriö (Ministry of Finance) (1998) Julkisen talouden näkymiä ja haasteita (Prospects and challenges of the public economy). Reviews No. 1998/3 on the economy and economic policy, Helsinki.

APPENDIX

1. Pension expenditures, contributions and funds in the basic alternative as a percentage of wages in the private sector*

Year	TEL	private sector	sum of earned income (private sector), billion FIM
1998	16.7	18.6	185
2000	17.2	18.8	203
2005	18.9	20.4	233
2010	21.6	22.8	260
2015	25.2	26.1	277
2020	28.1	28.7	291
2030	32.8	33.0	324
2040	34.6	34.4	368
2050	36.2	35.9	410

Year	TEL contribution	employer's contribution	employee's contribution	funds
1998	21.5	16.8	4.7	132
2000	21.5	16.8	4.7	138
2005	22.6	17.4	5.2	157
2010	22.9	17.5	5.4	171
2015	24.7	18.4	6.3	184
2020	26.6	19.2	7.2	196
2030	30.1	21.1	9.0	211
2040	31.4	21.8	9.6	217
2050	32.5	22.3	10.2	223

- *Assumptions:
- real growth in earnings 1.5% annually
 - real fund yield 3% annually
 - funds include TEL, LEL, MEL and TaEL funds
 - inflation 2% annually
 - unemployment rate 5% in 2015
 - total birth rate 1.75
 - net immigration 5,000 persons annually
 - continually increasing longevity

In the alternative calculations, the assumptions correspond to the basic alternative, except on the points mentioned. The amounts in FIM are expressed in the level of 1999.

2. Population alternatives, pension expenditure percentage*

Year	reproductive population		increased longevity broken off	
	TEL	private sector	TEL	private sector
1998	16.7	18.6	16.7	18.6
2000	17.2	18.8	17.8	18.8
2005	19.0	20.5	18.9	20.4
2010	21.8	23.1	21.6	22.8
2015	25.6	26.5	25.1	26.0
2020	28.5	29.2	27.8	28.4
2030	33.0	33.1	31.7	31.8
2040	33.9	33.7	32.2	32.0
2050	34.0	33.8	33.0	32.7

*Assumptions: In the reproductive population alternative, the total birth rate will rise to 2.1 as of 2010. In the life expectancy alternative, the increase in longevity will cease as of 2010.

3. Economic alternatives, pension expenditure percentage*

Year	low employment rate		higher earnings level	
	TEL	private sector	TEL	private sector
1998	16.7	18.6	16.7	18.6
2000	17.2	18.9	17.2	18.8
2005	19.3	20.8	18.6	20.0
2010	22.5	23.8	21.0	22.2
2015	26.9	27.9	24.2	25.0
2020	30.1	30.8	26.7	27.3
2030	35.1	35.2	30.9	30.9
2040	36.6	36.3	32.2	31.9
2050	37.9	37.6	33.6	33.2

*Assumptions: In the alternative with low employment rates, the unemployment rate is 10% as of the year 2000. In the alternative with higher earnings level, the annual real growth in earnings is 2.0 per cent.

4. Pension policy alternative, pension expenditure percentage*

Year	postponed effective retirement	
	TEL	private sector
1998	16.7	18.6
2000	17.2	18.8
2005	18.9	20.4
2010	21.1	22.4
2015	23.6	24.5
2020	25.7	26.3
2030	27.5	27.6
2040	29.4	29.2
2050	30.8	30.5

*Assumptions: Effective retirement decreases gradually by three years by the year 2025.

5. Funds in the different alternatives in the level of 1999 from the year 2000 onwards, billion FIM*

Year	basic	4% yield
1998	215	215
2000	243	245
2005	312	327
2010	380	412
2015	438	488
2020	489	560
2030	585	695
2040	681	828
2050	784	962

*Assumptions: The funds include the technical provisions on the part of basic security.

6. Contribution alternatives

Year	4% yield		3-year postponement	
	TEL contribution	employee's contribution	TEL contribution	employee's contribution
1998	21.5	4.7	21.5	4.7
2000	21.5	4.7	21.5	4.7
2005	22.4	5.1	22.6	5.2
2010	22.5	5.2	22.8	5.3
2015	24.0	5.9	23.3	5.6
2020	25.5	6.7	24.7	6.3
2030	28.1	8.0	25.2	6.5
2040	29.0	8.4	26.6	7.2
2050	29.4	8.6	27.6	7.7

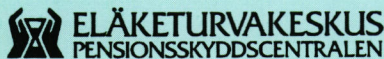


Eläketurvakeskus on Suomen työeläkejärjestelmän lakisääteinen keskuslaitos. Sen tutkimustoiminta koostuu pääasiassa sosiaaliturvaan ja eläkejärjestelmiin liittyvistä aiheista. Tutkimuksissa pyritään monipuolisesti ottamaan huomioon sosiaalipoliittiset, sosiologiset ja taloudelliset näkökulmat.

Pensionsskyddscentralen är lagstadgat centralorgan för arbetspensionssystemet i Finland. Forskningsverksamheten koncentrerar sig i huvudsak på den sociala tryggheten och på de olika pensionssystemen. Målet för forskningsprojektet är att mångsidigt belysa aspekter inom socialpolitik, sociologi och ekonomi.

The Central Pension Security Institute is the statutory central body of the Finnish employment pension scheme. Its research activities mainly cover the fields of social security and pension schemes. The studies aim to paint a comprehensive picture of the sociopolitical, sociological and financial aspects involved.

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