

# THE SWEDISH PENSION SYSTEM ANNUAL REPORT 2002

work, it will also be included in the calculation of your pension. In this estimate we have assumed that you have worked in line with the average income in the country. We have also assumed that you have had the same income you had in 2001, since this is the income that is used for the calculation available to us.

## Can you receive a pension from more than one source

In addition to the national pension, you may also receive pension benefits from other sources. This may be an occupational pension from your employer or perhaps a pension from your own private pension savings. Such benefits are not described here.

If you draw your national pension from

age 61: With 0% growth you receive SEK 7,321 per month    With 2% growth you receive SEK 10,278 per month

age 65: With 0% growth you receive SEK 9,374 per month    With 2% growth you receive SEK 14,272 per month

age 70: With 0% growth you receive SEK 13,270 per month    With 2% growth you receive SEK 22,368 per month

*Example:* Your national pension at age 65 and zero percent growth consists of: SEK 7,430 Inkomstpension and SEK 1,443 Premium Pension (for the calculation assumptions for Premium Pension, see *Estimate* in the Glossary).

## Make your own estimate on the internet

Go to [www.pension.mn](http://www.pension.mn) and use the amounts below, which come from page 2 och 3 of this annual statement:

SEK 454,037

SEK 11,665

## Would you like more information?

Visit [www.pension.mn](http://www.pension.mn) (the Insurance Office) or visit the Pension Authority. You can also phone the Insurance Office on 020 - 524 524.

Average Svensson  
Vägen 1  
123 45 Orten

## Account statement from the Insurance Office: your Inkomstpension

Changes in your pension account for Inkomstpension in 2002	Amount (SEK)	
Account balance on 31 December 2001	410,578	A
Inkomstpension entitlement 2001	+ 20,508	B
Inheritance gain	+ 1,059	C
Indexation	+ 22,877	D
Charge for administrative costs	- 237	E
Closing balance on 31 December 2002*	454,037	F

\* Since some insured have started to draw pension during the year, the closing balance does not correspond perfectly with the opening balance and movements on the account during the year.

### How to read the table:

The amount of *the account balance* on 31 December 2001 is in most cases the same amount reported as *Closing balance* on your value statement from the Insurance Office last year.

Your new *Inkomstpension entitlement* has been calculated based on your earnings in 2001.

*Inheritance gain* is your share of account balances of those in your age group who have died during the year. *Indexation* is the revaluation of your pension balance, a form of interest. In percent this interest is equal to the growth rate of the average of income in Sweden. We make a *charge for administrative costs*.

The last line of the table (*Closing balance in 2002*) tells you how much pension asset you have earned up until now for your Inkomstpension.

# THE SWEDISH PENSION SYSTEM ANNUAL REPORT 2002



Millions of SEK

2,564,618

A

128,099

B

6,617

C

142,897

D

-1,478

E

2,836,074

F

See table A  
page 21

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Further information on social security in Sweden is available on the RFV website, [www.rfv.se](http://www.rfv.se), and on [www.pension.nu](http://www.pension.nu). Information on the Premium Pension can be found on the website of the Premium Pension Authority (PPM), [www.ppm.nu](http://www.ppm.nu).

For information on the National Pension Funds, please see the websites of each fund: [www.ap1.se](http://www.ap1.se), [www.ap2.se](http://www.ap2.se), [www.ap3.se](http://www.ap3.se), and [www.ap4.se](http://www.ap4.se).

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## Preface

The Annual Report of the Swedish Pension System for 2002 presents the second income statement and balance sheet for the system. Now it is possible to compare the numbers in these financial statements for two different years. Hopefully this will also make the report easier to understand and interpret.

Without the measurements of flows and stocks furnished by the income statement and balance sheet, our knowledge of the pension system would have been incomplete. In a mechanical sense, the system would have functioned just as well without such knowledge. But pensions are not only, or even primarily, a matter of mechanics. To a large extent, pensions are a question of confidence. Probably the most effective way to create confidence in a financial relationship is through clear, transparent accounting. The aim of the Annual Report of the National Pension System is to inform the insured about their pensions and so earn their confidence.

Both knowledge and communicating it require simplification. Consequently, presenting financial information is a matter of finding the most satisfactory methods for achieving this simplification. One example of powerful simplification is the so-called balance ratio<sup>1</sup> used to describe the financial position of the *inkomstpension*<sup>2</sup> system. The special feature article entitled *The Balance Ratio – A Steady Gyroscope for the Inkomstpension?* discusses whether this simplification may also be considered "satisfactory".

### The Complexity of Pension Systems

To simplify is often surprisingly difficult and arduous. The problem of achieving simplification in the area of pensions is partly due to the large number of persons concerned and the high degree to which they are affected. Public pensions concern almost the entire population and are of major financial importance both to individuals and to society.

But what makes the mechanics and politics of pensions really complicated is that large-scale complexity is multiplied by the extraordinarily large role of the time dimension. Of course there is a time dimension to virtually all social issues, but often the time frame is so limited that present and future merge into one. Pensions do not fit this pattern, and the time axis, the life cycle, assumes the unaccustomed role of dominant factor.

### Conflicting Goals

Two desirable features of a public pension system are that the contribution rate and the level of pensions are constant in relation to the level of income. If the system successfully meets these criteria, it can claim to be fair between generations. Unfortunately, developments can sometimes make it impossible to maintain both constant pension levels and constant contributions. A choice, or compromise, must be made between these goals. Usually legislatures refrain from setting

<sup>1</sup> The balance ratio for 2004 refers to the system's financial position as of December 31, 2002

$$\frac{\text{Contribution asset + buffer fund asset}}{\text{Pension liability}} = 1.01$$

Amounts in millions of SEK.

<sup>2</sup> The Swedish name, *inkomstpension*, that have been given the notional defined contribution, pay-as-you-go financed, pension will not be translated in this report. The name refers to the fact that the indexation of this pension is a function of the growth in average income. The Swedish word for income is *inkomst*.

explicit priorities in advance between a constant pension level and a constant contribution rate in the event of a conflict between the two. The defined-benefit pension systems commonly found today may be viewed as open-ended contracts. They may force politicians to opt for higher contributions, a higher retirement age, or lower pensions, or to choose all three.

A unique feature of the Swedish pension system is that the legislature has decided to specify its priorities in advance. In the Swedish pension system the contribution rate is constant, and the level of pensions will be adjusted as necessary. For example, a higher average life expectancy will lead to an increase in the annuitization divisors for each birth cohort, resulting in a lower pension level unless the insured choose to work for a longer period of their lives – i.e., by retiring somewhat later. Furthermore, the pension level may decrease through automatic balancing. At the same time, the goal, within the framework of a fixed contribution rate, has been to give the inkomstpension maximum stability. This objective has been achieved by making the inkomstpension dependent on lifetime income, indexing it to the growth in average income, and giving the system a relatively large buffer fund at the outset. If a deficit should arise, in the sense that the liabilities of the system exceed its assets, it will be apportioned immediately over the entire pension liability. Through this rapid reaction and the broad base over which the deficit is allocated, annual deviations from the desired indexation are minimized. If the trend turns, indexation and pensions are restored by the same automatic mechanism. Moreover, the design of the guaranteed pension is such that the allocation of risk between the economically active population and retired persons is shifted to the benefit of those with low pensions.

Without knowledge of the economic and social context, it is impossible to judge whether one particular allocation of risk between payers of contributions and beneficiaries is better than another. On the other hand, there is a universally valid lesson for us to learn – from our own experience with the ATP system and the discussion on pensions in other countries – about the importance of not giving the insured the impression that the allocation of risks is different from the one actually chosen. Or that the risks do not exist.

### **New IT Structure**

The complexity arising both from the large scale of the pension scheme and from its long time horizon is reflected in the administrative systems for managing pensions. In 2002 the National Social Insurance Board (RFV) finished constructing the IT system to administer the inkomstpension. The system was Sweden's most comprehensive IT-development project in the 1990's and is probably the largest ever in Swedish government administration.



So vast are the size and complexity of the system that it was not always apparent during the course of its development that the Social Insurance Offices and the National Social Insurance Board would successfully complete their mission. But we did succeed, and everyone involved can be proud and pleased. The people insured also have good reason to be satisfied.

### Exploration and New Construction

There is a time to explore new land and a time to cultivate it. The process of pension reform has involved both intellectual exploration and the inspiring, demanding task of building a new system that will function in practice. The annual report is a recurring description of this structure and a step forward in its further development. With the same pleasure as last year, I invite you to study the report. For those interested in social issues and pensions, it is exciting reading, though digesting it may require some effort – in addition to the balance ratio, there are many other numbers packed with information.

Enjoy the report!  
Stockholm, April 2003

*Anna Hedborg*  
Director General

## Accounting for the Result of the Pension System in 2002

The inkomstpension is so designed that the change in the value of the pension liability is closely, but not entirely, linked to the change in the value of system assets. For this reason, the inkomstpension system can record both positive and negative results. Since the total assets and liabilities of the system are so sizeable – almost SEK 5,800 billion – the result will often be large in monetary terms. A positive result increases the accumulated surplus of the inkomstpension; a negative result decreases it. If the accumulated surplus turns into a deficit, automatic balancing is activated. Balancing steers the system toward a balanced surplus/deficit of zero by reducing the indexation of pensions and pension balances. Any surpluses arising after balancing has been activated are used directly to increase indexation and restore the value of pensions and pension balances to the extent possible.

The principal asset of the inkomstpension is the value of the system's claim to 16 percent of all future pension-qualifying earnings and amounts. The change in the value of this *contribution asset* is determined primarily by the growth in per capita income, by the number of persons of working age, and by their employment ratio. With the unusual surge in income in Sweden during the period 2000–2002, both the contribution asset and the pension liability of the system rose substantially in value in 2002. The value of the contribution flow increased by SEK 207 billion, or 4.1 percent. At the same time, the liability of the system was up by 5.5 percent. The principal explanation was that pension balances were increased by an income index of 5.3 percent, and pensions by this increase reduced by 1.6 percent, i.e. 3.6 percent. In addition, new pension credit was earned. Approximately 10 percent of the assets of the inkomstpension consist of the capital of the First–Fourth and Sixth National Pension Funds. In 2002, the value of this capital decreased by SEK 78 billion, or 14 percent.

Thus, in total the assets of the system increased by SEK 130 billion, whereas liabilities increased by SEK 297 billion – a loss of SEK 167 billion. On an overall basis, however, the loss for the year did not lead to a deficit in the system, which started the year with an opening surplus of SEK 218 billion. The loss sharply depleted that surplus to SEK 52 billion. In relation to the pension liability on the same date, this surplus is approximately 1 percent. The balance ratio of the system for 2004, which shows the financial position of the system as of December 31, 2002, is thus 1.01.

Half of the loss for the year and its negative effect on the balance ratio was due to the fact that the assets of the First–Fourth and Sixth National Pension Funds did not increase at the rate of interest on the pension liability, but decreased in value. The remaining half is explainable by the fact that the interest on the pension liability was higher than the growth in contribu-

tion revenue. This condition exist mainly for accounting reasons, which in turn is related to the fact that the rules of the reformed systems were not fully applicable in 2002.

The accounting factor with the greatest impact on the result for 2002 is that the contribution asset in the Annual Report of the Pension System for 2001 could not be calculated with the smoothing required for calculating the balance ratio.

### Key Numbers for the Inkomstpension in 2002

Millions of SEK

	2002	2001	Change	Change, %
First–Fourth and Sixth National Pension Funds	487,539	56,171	–77,632	–13.7
Contribution asset	5,292,764	5,085,252	207,512	4.1
Total assets	5,780,303	5,650,423	129,880	2.3
Pension liability	5,728,658	5,432,016	296,642	5.5
Surplus	51,645	218,407	–166,762	–76.4
Balance ratio	1.01	1.04	–0.03	–2.9

Furthermore, in the calculation of the balance ratio for 2003, a correction was made in estimated pay-in duration. The combined effect was that in the 2001 Annual Report the contribution asset as of December 31, 2001, was almost SEK 40 billion greater than the value subsequently calculated for the same date, an overestimate of some 0.7 percent. Moreover, transitional provisions setting the so-called norm for 2002 at 0.996 rather than 1.016 caused a nonrecurring increase in liabilities of almost SEK 24 billion in 2002.

Rather than adjusting the opening balances from the previous year for these two conditions, RFV decided to charge the result for 2002 with SEK 64 billion. If the opening balances had been adjusted instead, the accumulated surplus as of December 31, 2001 would have decreased from SEK 218 billion to 155 billion, and the loss in 2002 would have decreased from SEK 167 billion to 103 billion. With the adjusted values of the contribution asset and the pension liability, the balance ratio as of December 31, 2001 (the balance ratio for 2003) would have decreased from 1.04 to 1.03.

A further reason why liabilities increased more than assets – but one due more to the design of the system than to “start up problems” – is based on the correction factors used to adjust the income index for discrepancies between forecasts and outcomes; see *income index* in the List of Terms. About 0.7 percentage point of the 5.3-percent increase in the income index for 2003 is a correction, an adjustment for the fact that the National Institute of Economic Research underestimated the incomes that determined the income index for 2002. The higher actual figure for income had a positive effect on the contribution asset as of December 31, 2001, whereas the effect on liabilities – approximately SEK 18 billion – did not arise until 2002.

## The Premium Pension

The functioning of the premium pension is such that changes in the prices of fund shares have a direct and equal effect on the balances of the insured in the system. For this reason, the result of the premium pension system over time should in principle always be SEK 0. Since the full cost of administration is not borne by the insured during the phase-in of the system, but is financed by borrowing, the PPM is presently operating at a loss. In 2002 that loss was SEK 365 million.

The value of funded premium pension assets decreased during the year by SEK 26 billion, or 40 percent.

## Analysis of the Loss in 2002

Billions of SEK	
Change in fund assets	-78
Change in contribution asset	208
Change in pension liability	-297
= loss in 2002	-167
of which due to...	
"overly large" contribution asset Dec. 31, 2001	-40
"overly small" pension liability Dec. 31, 2001	-24
= loss adjusted for effects of phase-in	-103
of which due to...	
return on funds in 2001	-85
correction factor for the income index in 2003	-18
Total	0

### Counterparts in Other Forms of Insurance to the Terms Relating to the *Inkomstpension*

What is termed the contribution asset in the report is the value of the system's flow of contributions. This concept has no direct equivalent in funded insurance. However, if a comparison is to be drawn, the contribution asset corresponds most closely to the invested assets, or insurance capital, of funded insurance. In this comparison, the change in the value of the contribution asset corresponds most closely to the return on insurance capital. The value of the contribution asset is increased or decreased in part by changes in contribution revenue, in part by changes in turnover duration. The effects of these two factors on the value

of the contribution asset are shown separately in the income statement. Turnover duration is the time during which an average unit of currency (the Swedish krona, abbreviated SEK) is expected to remain in the system; the present turnover duration is about 32 years.

Other concepts used in the income statement and balance sheet of the *inkomstpension* system have more direct equivalents in conventional accounting for life-insurance businesses. *Contributions* correspond to the *premiums* of funded insurance; *pension disbursements*, to *insurance benefits paid*; *change in pension liability*, to *changes in insurance provisions*; *accumulated surplus/deficit*, to *profit/loss brought forward from the preceding year*.

## Inkomstpension, Income Statement and Balance Sheet

Income Statement, millions of SEK

<b>Change in fund assets</b>	<b>Note</b>	<b>2002</b>	<b>2001</b>	<b>Change</b>
Pension contributions	1	160,745	156,811	3,934
Pension disbursements	2	-151,757	-143,564	-8,193
Return on funded capital	3	-84,529	-25,035	-59,494
Costs of administration	4	-2,081	-1,943	-138
<b>Total change in fund assets (a)</b>		<b>-77,622</b>	<b>-13,731</b>	<b>-63,891</b>
<b>Change in contribution asset</b>				
Value of change in contribution revenue	5	224,275	405,877	-181,602
Value of change in turnover duration	6	-16,763	15,745	-32,508
<b>Total change in contribution asset (b)</b>		<b>207,512</b>	<b>421,622</b>	<b>-214,110</b>
<b>Change in pension liability<sup>3</sup></b>				
New pension credit and ATP points	7	-167,585	-138,627	-28,958
Pension disbursements	8	151,562	143,564	7,998
Indexation	9	-275,946	-116,287	-159,659
Value of change in average life span	10	-5,923	-18,728	12,805
Inheritance gains arising	11	6,389	5,476	913
Inheritance gains distributed	12	-6,617	-5,490	-1,127
Deduction for costs of administration	13	1,478	923	555
<b>Total change in pension liability (c)</b>		<b>-296,642</b>	<b>-129,169</b>	<b>-167,473</b>
<b>Net income/-loss (a)+(b)+(c)</b>		<b>-166,752</b>	<b>278,722</b>	<b>-445,474</b>

<sup>3</sup> A negative value (-) means that the pension liability increases, and a positive value ( ) that the pension liability decreases, by the amount shown.

Balance Sheet, millions of SEK

<b>Assets</b>	<b>Note</b>	<b>Dec 31, 2002</b>	<b>Dec 31, 2001</b>	<b>Change</b>
First-Fourth and Sixth National Pension Funds	14	487,539	565,171	-77,632
Contribution asset	15	5,292,764	5,085,252	207,512
<b>Total assets</b>		<b>5,780,303</b>	<b>5,650,423</b>	<b>129,880</b>
<b>Liabilities and Surplus</b>				
Opening surplus/-deficit	14	218,397	-60,315	278,712
Net income/-loss for the year		-166,752	278,722	-445,474
Total surplus/-deficit		51,645	218,407	-166,762
Pension liability	16	5,728,658	5,432,016	296,642
<b>Total liabilities and surplus</b>		<b>5,780,303</b>	<b>5,650,423</b>	<b>129,880</b>

## Premium Pension, Income Statement and Balance Sheet

Income Statement, millions of SEK

	Note	2002	2001	Change
<b>Change in fund assets</b>				
Pension contributions	1	20,404	18,314	2,090
Pension disbursements	17	-1	0	-1
Return on funded capital	18	-25,879	-5,670	-20,209
Costs of administration	19	-599	-499	-100
Debt-financed costs of administration	27	365	289	76
Total change in fund assets (a)		-5,710	12,434	-18,144
<b>Change in pension liability<sup>4</sup></b>				
New pension credit	20	-20,404	-18,314	-2,089
Pension disbursements	21	1	0	1
Change in value	22	25,879	5,670	20,209
Value of change in average life span	23	0	0	0
Inheritance gains arising	24	145	97	48
Inheritance gains distributed	25	-145	-97	-48
Deduction for costs of administration	26	234	210	24
Total change in pension liability (c)		5,710	-12,434	18,144
Debt-financed costs of administration (d)	19, 26	-365	-289	-76
Net income/-loss (a)+(c)+(d)		-365	-289	-76

<sup>4</sup> A negative value (-) means that the pension liability increases, and a positive value ( ) that the pension liability decreases, by the amount shown.

Balance Sheet, millions of SEK

Assets	Note	Dec 31, 2002	Dec 31, 2001	Change
Insurance assets	27	59,420	65,130	-5,710
Other assets	28	45,307	43,345	1,962
Total assets		104,727	108,475	-3,748
<b>Liabilities and Surplus</b>	<b>Note</b>	<b>Dec 31, 2002</b>	<b>Dec 31, 2001</b>	<b>Change</b>
Opening surplus/-deficit		-1,253	-964	-289
Net income/-loss for the year		-365	-289	-76
Total surplus/-deficit		-1,618	-1,253	-365
Pension liability	29	59,422	65,132	-5,710
Other liabilities	30	46,923	44,596	2,327
Total liabilities		106,345	109,728	-3,383
Total liabilities and surplus		104,727	108,475	-3,748

## Earnings Related Old Age Pension, Income Statement and Balance Sheet

### Inkomstpension and Premium Pension

Income Statement, millions of SEK

Change in fund assets	Note	2002	2001	Change
Pension contributions	1	181,149	175,125	6,024
Pension disbursements	2, 17	-151,758	-143,564	-8,194
Return on funded capital	3, 18	-110,408	-30,705	-79,703
Costs of administration	4, 19	-2,680	-2,442	-238
Debt-financed costs of administration	27	365	289	76
Total change in fund assets (a)		-83,332	-1,297	-82,035
<b>Change in contribution asset</b>				
Value of change in contribution revenue	5	224,275	405,877	-181,602
Value of change in turnover duration	6	-16,763	15,745	-32,508
Total change in contribution asset (b)		207,512	421,622	-214,110
<b>Change in pension liability<sup>5</sup></b>				
New pension credit and ATP points	7, 20	-187,989	-156,941	-31,048
Pension disbursements	8, 21	151,563	143,564	7,999
Indexation/change in value	9, 22	-250,067	-110,617	-139,450
Value of change in average life span	10, 23	-5,923	-18,728	12,805
Inheritance gains arising	11, 24	6,534	5,573	961
Inheritance gains distributed	12, 25	-6,762	-5,587	-1,175
Deduction for costs of administration	13, 26	1,712	1,133	579
Total change in pension liability (c)		-290,932	-141,603	-149,329
Debt-financed costs of administration (d)	19, 26	-365	-289	-76
Net income/-loss (a)+(b)+(c)+(d)		-167,117	278,433	-445,550

<sup>5</sup> A negative value (-) means that the pension liability increases, and a positive value ( ) that the pension liability decreases, by the amount shown.

Balance Sheet, millions of SEK

Assets	Note	Dec 31, 2002	Dec 31, 2001	Change
First-Fourth and Sixth National Pension Funds	14	487,539	565,171	-77,632
Insurance assets	27	59,420	65,130	-5,710
Other assets	28	45,307	43,345	1,962
Contribution asset	15	5,292,764	5,085,252	207,512
Total assets		5,885,030	5,758,898	126,132
<b>Liabilities and Surplus</b>				
Opening surplus/-deficit	14	217,144	-61,279	278,423
Net income/-loss for the year		-167,117	278,443	-445,550
Total surplus/-deficit		50,027	217,154	-167,127
Pension liability	17, 29	5,788,080	5,497,148	290,932
Other liabilities	30	46,923	44,596	2,327
Total liabilities and surplus		5,885,030	5,758,898	126,132

## Notes and Comments

Notes 2–16 related to the inkomstpension; Notes 17–30, to the premium pension. Note 1 applies to both parts of the earnings-related old-age pension system.

### Note 1 Pension Contributions

**Table A. Pension Contributions and Taxes, by Type of Contribution**

Millions of SEK

Contribution, etc., in the form of ...	Inkomst-pension	Premium pension	Tax	Total	of which contributions
Employer contributions	69,000	18,708	10,129	97,837	87,708
Self-employed pension contributions	2,848	757	395	4,000	3,605
Individual pension contributions	67,895	–	–	67,895	67,895
Central-government old-age pension contribution	19,967	2,983	–	22,950	22,950
Final settlement in 2002 for prelim. contributions in 2000	629	–2,003	1,374	0	–1,374
Loss in collection, settlement	–206	–	–	–206	–206
Adjustment for discrepancy between RFV accounting and the accounting of the Nat'l Pension Funds and PPM, respectively	612	–41	–	571	571
<b>Total</b>	<b>160,745</b>	<b>20,404</b>	<b>11,898</b>	<b>193,047</b>	<b>181,149</b>

The taxes reported are "pension contributions" in the form of employer and self-employed contributions for portions of income above the ceiling on pension-qualifying income. This ceiling is 8.07 income-related base amounts<sup>6</sup> before deduction of the individual pension contribution and 7.5 after this deduction. Since contributions on amounts above the ceiling do not give rise to pension credit, they are taxes and are thus transferred to the central-government budget.

The discrepancy between the accounting of RFV and that of the National Pension Funds (612) is due primarily to differences in accounting principles for interperiod allocation. The discrepancy between the accounting of RFV and that of Premiepensionsmyndigheten (PPM, the agency administering the premium pension) (–41) is due largely to the fact that the contribution revenue of the premium pension system is for pension credit that was confirmed and transferred to the Premium Pension Administration (PPM) funds in 2002, whereas RFV accounting is for contribution revenue received in 2002 – pension credit for contributions received in 2002 is confirmed at the end of 2003 and invested at the outset of 2004.

**Table B. Pension Contributions by Type of Contribution Base**

Millions of SEK

	Employer, self-employment, and central govt. contr.	Individual contributions	Total
Earned income <sup>7</sup>	102,201	61,077	163,278
Transfer payments, see Table C	11,408	6,818	18,226
Pension-qualifying amounts, see Table D	11,543	–	11,543
<b>Total</b>	<b>125,152</b>	<b>67,895</b>	<b>193,047</b>

The allocation of the individual pension contribution to the two types of contribution base is estimated; it is not shown in the accounting systems.

<sup>6</sup> The income-related base amount for 2002 is SEK 38,800. The income-related base amount multiplied by 8.07 equals SEK 313,116 and by 7.5 equals SEK 291,000.

<sup>7</sup> Earned income, including sick pay and self-employment income, excluding transfer payments.

**Table C. Pension Contributions by Type of Pension Qualifying Transfer Payment**

Millions of SEK

	Central-govt. contributions	Individual contributions	Total
Sickness benefits	4,346	2,597	6,943
Rehabilitation benefits	187	112	299
Benefits to immediate relatives	6	3	9
Compensation for work-related injuries, etc.	1,392	832	2,224
Partial pension	21	13	34
Parental insurance	1,817	1,086	2,903
Care allowances	179	107	286
Unemployment compensation, etc.	3,185	1,903	5,088
Various forms of student allowances	217	130	347
Educational allowances	54	33	87
Daily allowances (Armed Forces)	0	0	0
Artists' Board	4	2	6
Allowances to disease carriers	0	0	0
<b>Total</b>	<b>11,408</b>	<b>6,818</b>	<b>18,226</b>

The allocation of individual contributions to the different types of transfer payments is estimated; it is not shown by the accounting systems.

**Table D. Pension Contributions by Type of Pension Qualifying Amount**

Millions of SEK

Disability pensions	5,259
Amounts credited for child-care years	3,669
Amounts credited for study	2,379
Amounts credited for compulsory national service	236
<b>Total</b>	<b>11,543</b>

## Note 2 Pension Disbursements

Millions of SEK

ATP pension <sup>8</sup>	151,326
Adjustment of premium pension contribution	195
Inkomstpension	236
<b>Total</b>	<b>151,757</b>

<sup>8</sup> Including disbursements of "Residence-based *folkpension* to *folkpension* recipients who also receive the ATP pension," approximately SEK 6,000 million.

The ATP pension is the designation for the combination of ATP pension and the so-called earnings-related *folkpension*. The ATP pension is calculated according to previous rules but is indexed according to the rules of the inkomstpension for adjustment indexation, see the List of Terms.

The oldest birth cohort that will receive an inkomstpension is the one born in 1938. For persons born in 1938, four twentieths of their pension is calculated according to the rules of the new system. The corresponding proportions for persons born in 1939 and 1940 are five and six twentieths, respectively. It is possible to receive a pension from the age of 61 on. Thus, persons in the birth cohorts born in 1938, 1939, 1940, and 1941 were eligible for an inkomstpension in 2002.

Since the National Pension Funds have chosen to report an adjustment of premium pension contributions as a pension disbursement, the same principle is followed here; however, this adjustment is not a true pension disbursement.



### Note 3 Return on Funded Capital

Millions of SEK

National Pension Fund:	First	Second	Third	Fourth	Sixth	*	Total
Stocks and shares	-21,151	-22,098	-19,897	-25,754	-4,805	-179	-93,884
of which: direct return	1,533	1,578	1,547	1,332	297	24	6,311
realized and unrealized capital gains	-22,684	-23,676	-21,444	-27,086	-5,102	-203	-100,195
Bonds and other interest-bearing securities	4,319	3,935	5,437	3,452	0	283	17,426
of which: direct return (net interest)	2,097	2,130	3,169	1,902	0	324	9,622
realized and unrealized capital gains	2,222	1,805	2,268	1,550	0	-41	7,804
Other items	-1,667	-3,045	-2,877	-514	0	32	-8,071
of which: direct return	1,280	1,063	-1,555	1,042	0	123	1,953
realized and unrealized capital gains	-824	-3,273	0	76	0	-89	-4,110
net foreign-exchange gain/-loss	-2,123	-835	-1,322	-1,632	0	-2	-5,914
Total return	-18,499	-21,208	-17,337	-22,816	-4,805	136	-84,529
Costs of administration	-166	-197	-177	-165	-302	-23	-1,030
Total return after costs	-18,665	-21,405	-17,514	-22,981	-5,107	113	-85,559

Sources: Annual reports of the First, Second, Third, Fourth and Sixth National Pension Funds for 2002.

\* Special administration of the First and Fourth National Pension Funds.

"Other items" consist primarily of derivatives.

### Note 4 Costs of Administration

Thousands of SEK

Tax administration (incl. Enforcement Service)	297,043
National Social Insurance Board (RFV)	453,016
Regional Social Insurance Offices	276,972
Natl. Govt. Employee Pensions Board, Local Govt. Pensions Institute (KPA), and National Institute of Economic Research	24,122
Total costs of insurance administration	1,051,153
First National Pension Fund	166,000
Second National Pension Fund	197,000
Third National Pension Fund	177,000
Fourth National Pension Fund	165,000
Sixth National Pension Fund	302,000
First and Fourth National Pension Funds, Special Administration	23,000
Total costs of National Pension Funds	1,030,000
Total costs of administration	2,081,153

The costs of insurance administration are shared equally by the First through the Fourth National Pension Funds. Each fund finances its own costs of administration by withdrawals from itself. The sum of both forms of administrative costs is financed in principle by a percentage deduction from the pension balances of the insured. As is shown in the income statement, however, pension balances were not charged with the full costs of administration in 2002 – the explanation is provided in Note 13.

#### Some Key Numbers for the Administrative Costs of the Inkomstpension

Costs as a ...	Insurance administration	Fund administration	Total administration
... percentage of the total pension liability	0.0183	0.0177	0.0353
... percentage of the liability for the inkomstpension to the economically active*	0.0388	0.0361	0.0750
... SEK per economically active person insured	183	179	362

\* The term *economically active* refers to insured persons aged 16–64, with pension balances or ATP points.

$$^9 \frac{32,32459 + 32,42918}{2} = 32,37688$$

## Note 5 Value of Change in Contribution Revenue

Turnover duration in years, contribution revenue in millions of SEK

Smoothed contribution revenue 2002	163,738
Contribution revenue 2001	-156,811
Change in contribution revenue	= 6,927
(Smoothed turnover duration 2001 + turnover duration 2000)/2 <sup>9</sup>	x 32.37688
Value of change in contribution revenue	224,275

**Table A. Basis for Calculating a Smoothed Value for Contribution Revenue, millions of SEK**

	1999	2000	2001	2002
Contributions received by National Pension Funds	105,204	144,275	156,811	160,745
Contribution deficit arising from contributions and contribution base not phased in	31,632	0	0	3,500
Accounting adjustment to obtain a correct value for contributions	3,970	3,583	-1,543	0
Basis for calculating a smoothed value for contribution revenue	140,806	147,858	155,268	164,245
Smoothed value of contribution revenue	-	-	-	163,738
Consumer price index, June	258.73	261.24	268.31	272.59

The method of calculating the smoothed value of contribution revenue is shown in the Technical Appendix, Section 1. In the accounts for 2001, no smoothed value has been calculated for either contribution revenue or turnover duration.

During a phase-in period extending through fiscal year 2004, adjustments are to be made so that the contribution amount used in calculating the contribution asset reflects the contribution flow as if the system were fully functioning. In 1999, the contribution was not 16 percent, and in 1999–2002 disability pensioners born in 1937 or earlier were not included in the base for the central-government old-age pension contributions. Even so, preliminary central-government old-age pension contributions were paid – erroneously – for these groups in 1999, 2000, and 2001. In 2002, central-government old-age pension contributions were reduced by SEK 3,292.9 million, excluding interest, to compensate the central government for the contributions mistakenly paid in 1999. In 2002, the system also received less contribution revenue than if it had been fully functioning, the reason being that no central-government old-age pension contributions were paid for persons born in 1937. Consequently, the flow of contribution revenue has been adjusted by a total of SEK 3,500 million.

**Table B. Basis for Calculating a Smoothed Value for Turnover Duration, Years**

	1998	1999	2000	2001	2002
Pay-in duration	21.86097	21.50279	21.99799	21.96768	-
Pay-out duration	10.00638	10.18358	10.32660	10.43119	-
Turnover duration, OT	31.86735	31.68637	32.32459	32.39887	-
Smoothed OT, OT median				31.86735	32.32459
Turnover duration used				32.42918	32.32459

The smoothed value for turnover duration is the median of the turnover duration for the past three years. Since pay-in duration cannot be determined until all pension credit has been confirmed, the latest year for which turnover duration is calculated is the one prior to the year of the financial statements. The pay-in duration shown here for 1998 and 1999 differs from that

shown in the Annual Report for 2001. In the determination of the balance ratio for 2003, pay-in duration was recalculated so that the retroactive pension credit for study for the years 1995–1999, all of which was included in pension credit for 1999, has now been allocated to the respective years. The revised values for pay-in duration have only affected the smoothed value for turnover duration for 2002. The manner of calculating turnover duration is described in the Technical Appendix, Section 3.

## Note 6 Value of Change in Turnover Duration

Turnover duration in years, contribution revenue in millions of SEK

Smoothed turnover duration 2002	32.32459
Turnover duration used in 2001	-32.42918
Change in (smoothed) turnover duration	= -0.10459
(Smoothed contribution revenue 2002 + contribution revenue 2001)/2 <sup>10</sup> x 160,275	
Value of change in turnover duration	-16,763

$$^{10} \frac{163,738 + 156,811}{2} = 160,275$$

The manner in which turnover duration and contribution revenue are calculated is described in Note 5.

## Note 7 New Pension Credit and ATP Pension Points

Millions of SEK

Pension credit earned in 2002, estimated value	136,522
ATP points earned in 2002, estimated value	8,344
Adjustment amount A for the inkomstpension, see Table A	-188
Adjustment amount B for the ATP pension, see Table B	22,907
Total	167,585

### Table A. Adjustment Amount A, New Pension Credit

Millions of SEK

Confirmed pension credit for inkomstpension earned in 2001	128,099
Estimated pension credit for inkomstpension earned in 2001	-128,181
Changes related to tax assessments, etc.	-106
Adjustment amount A	-188

Since the tax assessment for the year of the financial statements is not completed when the statements are prepared, the amount of pension credit earned that same year can only be estimated. In the Annual Report for 2001, the pension credit earned in 2001 was estimated at SEK 128,181 million. After the tax assessment for 2001 had been completed, the actual value turned out to be SEK 128,099 million.

### Table B. Adjustment Amount B, New ATP Points

Millions of SEK

Effect of difference between assumed value for 2002 and estimate for 2001, etc.	5,073
Paid-in pension contributions that have not increased the ATP liability	17,834
Adjustment amount B	22,907

The value of the inkomstpension credit and ATP points earned in 2002 has been forecast in RFV:s simulation model. The last year for which ATP points can be earned is 2017. This means that the yearly contributions will differ somewhat from the pension credit accrued until 2018.<sup>11</sup> From year 2018 yearly contributions should exactly match the pension credit accrued during the same year.

<sup>11</sup> In 2002, contributions for the ATP pension amounted to SEK 26.0 billion, whereas the value of new ATP-pension points that same year was only SEK 8.2 billion. Thus, contributions paid exceeded the value of ATP-pension points earned by SEK 17.8 billion. This situation is explainable by the fact that in the ATP-pension system, pension rights often accumulates relatively early in working life. An individual aged 55, who is already past his/her 15 years of maximum earnings (and has worked for at least 30 years), cannot increase his/her ATP pension at all, despite continuing to work and to pay contributions until age 65. The situation illustrates one of the negative incentives of the ATP-pension system for older members of the labor force.

## Note 8 Pension Disbursements

Pension disbursements reduce the pension liability by the amount paid out by the funds in pensions. The small transfer relating to an adjustment of premium pension contributions is thus not included. See Note 2.

## Note 9 Indexation

Millions of SEK

ATP-pension liability to the economically active	58,280
Inkomstpension liability to the economically active	142,897
ATP-pension liability to retirees aged 65 and above	73,649
ATP-pension liability to retirees below age 65	877
Inkomstpension liability to retirees	243
<b>Total</b>	<b>275,946</b>

The amount of indexation refers to the indexation affecting the pension liability as of December 31, 2002. The ATP-pension liability as of December 31, 2002, to the economically active and to retirees below age 65 has been indexed by the change in the price-related base amount between 2002 and 2003.

As for the inkomstpension liability to the economically active, the closing pension liability has been affected by the change in the income in the income index between 2002 and 2003.

Beginning January 1, 2002, both the ATP pension and the inkomstpension are to be indexed by the change in the income index less the so-called norm. Effective January 1, 2003, the norm will be 1.6 percent.

	2001	2002	2003
Price-related base amount	36,900	37,900	38,600
Change in price-related base amount, percent	0.8197	2.7100	1.8470
Income index	103.20	106.16	111.79
Change in income index, percent		2.8682	5.3033

## Note 10 Value of the Change in Average Life Span

Millions of SEK

ATP-pension liability to the economically active	273
Inkomstpension liability to the economically active	–
ATP-pension liability to retirees	–6,196
Inkomstpension liability to retirees	0
<b>Total</b>	<b>–5,923</b>

The term "life span" as used here refers to the assumed disbursement period of an average pension, discounted by the norm, the interest rate credited in the annuitization divisor of 1.6 percent. If there is a relationship between the size of pensions and the remaining life expectancy of pensioners, the average economic life expectancy and remaining life expectancy will differ.

The method of calculating economic life expectancy is described in the Technical Appendix, Section 4.

A higher average economic life expectancy will increase the pension liability for the ATP pension, both to the economically active and to retirees. In the inkomstpension system, only the liability to retirees aged 65 and above will be higher if the average life expectancy increases.

The effect of changes in average economic life expectancy is calculated by first determining the pension liability based on the average economic life expectancy that can be measured in the system in the year covered by the financial statements. This liability is thereafter reduced by the pension liability

ity that would have been calculated if the average economic life expectancy had remained unchanged from the previous year.

## Note 11 Inheritance Gains Arising

Millions of SEK

In regard to	persons born 1938–1942	1,297
In regard to	persons born in or after 1943	5,092
<b>Total</b>		<b>6,389</b>

For those born in 1938–1942, inheritance gains arising are the pension balances as of December 31, 2002, of persons (not retired) dying in 2001. For those born in or after 1943, inheritance gains arising are the pension balances as of December 31, 2001, of persons dying in 2001.

## Note 12 Inheritance Gains Distributed

Millions of SEK

In regard to	persons born in 1938–1942	2,010
In regard to	persons born in or after 1943	4,607
<b>Total</b>		<b>6,617</b>

Before the year when a birth cohort reaches the age of 60, the inheritance gains actually arising in the cohort are distributed among its surviving members. Beginning with the year when a birth cohort reaches 60, the estimated inheritance gains arising are distributed among the survivors in the cohort. Inheritance gains are estimated on the basis of the mortality observed by Statistics Sweden, the Swedish central office of statistics. Since this mortality will not be exactly the same as actual mortality, there will be certain differences between inheritance gains arising and gains distributed for ages 60–64.

The reason for the transition at age 60 to estimated inheritance gains, rather than actual gains arising, is that a pension may be withdrawn beginning at age 61. Thus, it is not possible to apply the procedure for distribution of inheritance gains arising that is used for ages up to 60.

## Note 13 Deduction for Costs of Administration

In 2002, 62 percent of the costs of administration were financed by a deduction for these costs from each pension balance. The proportion of the costs of administration financed by this deduction will increase by two percentage points each year; it will not reach 100 percent until 2021. The reason for phasing in the deduction is to avoid charging a disproportionately large cost to the younger birth cohorts during the period when the ATP system is being phased out.

The deduction for costs of administration is made by multiplying each pension balance by the number 1 reduced by the ratio between budgeted costs of administration and an estimate of the pension balance to which the costs are to be allocated. The difference between the deduction made in SEK and the actual cost is taken into account in the following year's deduction for costs of administration. This difference may be due partly to a discrepancy between actual and budgeted costs of administration, and partly to a discrepancy between actual and estimated pension balances.

The budgeted cost of administration for 2002 was SEK 1,941 million; 62 percent of this cost is SEK 1,203 million. The difference between this amount and the deduction of SEK 1,478 million actually made in 2002 is explained by the difference between the deduction in SEK made in 2001 and the actual cost that same year. As a percentage of the pension balance, the deduction for costs of administration was 0.052 percent in 2002.

## Note 14 First-Fourth and Sixth National Pension Funds

Millions of SEK

National Pension Fund:	First	Second	Third	Fourth	Sixth	*	Total
Stocks and shares **	65,021	61,037	64,316	69,078	8,806	1,332	269,590
of which: Swedish stocks and shares	16,047	26,421	23,072	27,727	8,806	1,272	103,345
foreign stocks and shares	48,974	34,616	41,244	41,351	0	60	166,245
Bonds and other interest-bearing securities	47,846	51,361	50,744	41,168	2,303	3,985	197,407
of which: Swedish issuers	21,556	28,781	26,258	18,060	2,303	3,985	100,943
foreign issuers	26,290	22,580	24,486	23,108	0	0	96,464
Other items	4,830	5,777	5,482	8,030	1,489	2,647	28,255
Total assets	117,697	118,175	120,542	118,276	12,598	7,964	495,252
Liabilities	-573	-1,085	-331	-4,671	-977	-76	-7,713
Total funded capital	117,124	117,090	120,211	113,605	11,621	7,888	487,539

\* Special administration of the First and Fourth National Pension Funds.

\*\* Stocks and shares are reported by marketplace of acquisition.

The accounting principles of the special administration were changed in 2002, reducing the opening balance of funded capital for 2002 by SEK 8 million compared to the closing balance for 2001. There was also an additional reduction of SEK 2 million due to rounding off. This explains why the opening surplus of the inkomstpension in 2002 is SEK 10 million lower than the closing surplus in 2001.

## Note 15 Contribution Asset

Millions of SEK, turnover duration in years

Smoothed contribution revenue, 2002	163,738
Smoothed turnover duration, 2002	x 32.32459
Contribution asset, 2002	5,292,764

See Note 5 and the Technical Appendix, Section 1, for the values and formulas used in calculating contribution revenue and turnover duration.

## Note 16 Pension Liability

Millions of SEK

	Economically active	Retired	Total
ATP pension, Dec. 31, 2002	1,183,128	1,566,203	2,749,331
Inkomstpension, Dec. 31, 2002	2,973,893	5,434	2,979,327
Total	4,157,021	1,571,637	5,728,658

The pension liability to retirees is calculated in the same manner for the ATP pension and the inkomstpension. The first step in the calculation is to total the pension disbursements in December to each birth cohort. This total is multiplied by 12 to obtain an annual amount, and then by the economic annuitization divisor for each birth cohort, thus resulting in the pension liability to each birth cohort. Thereafter, the pension liabilities to each retired age group are summed up. The method of calculating the pension liability and the economic annuitization divisor is shown in the Technical Appendix, Section 4.

The inkomstpension liability to the economically active consists of the total pension balances of all persons insured as of December 31, 2002, with the addition of the estimated pension credit earned in 2002.

The ATP-pension liability to the economically active cannot be calculated directly from the data in the records on earned pension credit. This li-

ability is estimated in the pension model of the RFV. This calculation is performed for the birth cohorts of 1938–1953 – that is, those whose pensions will be calculated in part by ATP rules. The ATP-pension liability is calculated by estimating the ATP pension for each birth cohort in the month when its members reach the age of 65. This amount is then multiplied by the expected number of disbursements of an average pension amount, discounted by the norm of 1.6 percent. The pension liability so calculated is thereafter discounted by the assumed future increase in the income index and reduced by the assumed future contributions to the system by that cohort.

In these calculations, the general development of incomes is assumed to follow the forecast in December 2002 by the National Institute for Economic Research for 2003–2007; for 2008–2018, the average income is assumed to increase at an annual rate of 2 percent. The year 2018 is the final one in the calculation since the annual cohort born in 1953 reaches the age of 65 that year.

**Table A. Analysis of Change Inkomstpension Liability to Economically Active Persons**

Millions of SEK

Pension liability, December 31, 2001	2,697,997	
of which estimated pension credit for inkomstpension earned in 2001	-128,181	
Pension balance, December 31, 2001	= 2,569,816	
Inheritance gains arising	-5,092	
Changes in tax assessments affecting pension balances	-106	
Opening pension balance 2002	= 2,564,618	A
Confirmed inkomstpension credit earned in 2001	128,099	B
Inheritance gains distributed	6,617	C
Income indexation by the income index 2002/2003	142,897	D
Deduction for costs of administration	-1,478	E
Pension withdrawn, 2002	-3,455	
Pensions revoked	73	
Pension balances of persons deceased after age 60	-1,297	
Pension balance, December 31, 2002	2,836,074	F
Dormant inheritance gains	1,297	
Estimated inkomstpension credit earned in 2002	136,522	
Inkomstpension liability to the economically active, December 31, 2002	2,973,893	

**Table B. Analysis of Change in ATP Pension Liability to the Economically Active**

Millions of SEK

Pension liability, December 31, 2001	1,244,876
Effect of difference between assumption for 2002 and estimate in 2001, etc.	5,073
Pension withdrawn, 2002	-151,006
Opening ATP-pension balance, 2002*	= 1,098,943
Change in value (change in incomes and prices)	58,280
Value of ATP points earned in 2002	8,344
Value of paid-in contributions that have not increased ATP pensions	17,834
Effect of change in average economic life span	-273
ATP-pension liability to the economically active, December 31, 2002	1,183,128

\* Concerns persons who had not begun to withdraw their pension during 2002.

**Table C. Analysis of Change in ATP and Inkomstpension Liability to Retirees**

Millions of SEK

	ATP	Inkomstpension	Total
Pension liability, December 31, 2001	1,481,059	2,054	1,483,113
Net addition from the economically active	155,748	3,373	159,121
Pensions disbursed	-151,326	-236	-151,562
Indexation	74,526	243	74,769
Increase in liability, increase in average economic life span	6,196	0	6,196
Pension liability to retirees, December 31, 2002	1,566,203	5,434	1,571,637

Of the indexation of ATP pensions by SEK 74,526 million, SEK 23,889 million was due to using 0.996 instead of 1.016 as the norm for indexation as of January 1, 2002.

## Notes and Comments on the Premium Pension

### Note 17 Pension Disbursements

Thousands of SEK

Pension disbursements from fund insurance	1,309
pension disbursements from conventional insurance	128
<b>Total<sup>12</sup></b>	<b>1,437</b>

<sup>12</sup> Including pensions that have been granted but not disbursed.

Like the inkomstpension, the premium pension can be withdrawn from the age of 61. One option for the pension saver is to retain his/her accumulated balance in fund insurance, which means that the amount of the pension will depend on the change in the value of the funds in which the saver has invested. The other option is to switch to conventional insurance. A change-over to conventional insurance can be made at the time of retirement or subsequently. With conventional insurance, the pension is disbursed as a fixed monthly amount – including a guaranteed nominal return that is presently 3 percent. If PPM capital management achieves a return exceeding the guaranteed rate on the conventional insurance, a bonus is provided in the form of a supplement to the pension received, which may vary from year to year. In 2002 the supplement paid was SEK 9,000.

### Note 18 Return on Funded Capital

Thousands of SEK

	Fund Insurance	Conventional Insurance	Total
Stocks and shares	-25,354,601	-108	-25,354,709
of which: direct return	928,662	133	928,795
realized and unrealized capital gains	-26,283,263	-241	-26,283,504
Bonds and other interest-bearing securities	6,720	30	6,750
of which: direct return (net interest)	6,720	-41	6,679
realized and unrealized capital gains	0	71	71
Net foreign-exchange gain/-loss	-531,398	0	-531,398
<b>Total return</b>	<b>-25,879,279</b>	<b>-78</b>	<b>-25,879,357</b>

The return earned includes realized and unrealized foreign-exchange gains and losses. The average fund-management fee after the rebate is 0.44 percent.



## Note 19 Costs of Administration

Thousands of SEK

Operating expenses	-368,946
Return on capital, cost	-73,336
Item preventing comparison	-157,165
<b>Total</b>	<b>-599,447</b>

The costs of administration include the (net) cost of interest on loans taken to finance the PPM, and for other purposes. Costs of fund management are defrayed directly from insurance assets. See also Note 26.

A dispute with a former system supplier was settled by arbitration on October 31, 2002. The decision provides that PPM is to pay SEK 116 million and interest. The total amount has been set aside and is reported in the income statement as an item preventing comparison.

## Note 20 New Pension Credit

In the premium pension system, the total of all new pension credit including interest will be equal to the contribution revenue during the period when the contribution moneys are managed by the PPM. The amount also includes changes in positive pension credit earned in previous years and rebates of fund-management fees.

## Note 21 Pension Disbursements

Pension disbursements reduce the pension liability; see Note 17.

## Note 22 Change in Value

The pension liability changes with the return on the premium pension funds; see Note 18.

## Note 23 Value of Change in Average Life Span

There has been no change during the year in the assumptions made by the PPM about life span.

## Note 24 Inheritance Gains Arising

What is termed "inheritance gains arising" in regard to the inkomstpension is called "Allocation to capital on death" in the premium pension system. This item also includes certain decreases arising from the reduction of premium pension credit when premium pension is transferred between spouses. The present decrease in transferred capital is 14 percent. The percentage may be changed, but this change will affect only capital that has been subsequently transferred.

## Note 25 Inheritance Gains Distributed

Inheritance gains are set aside for the benefit of pension savers; however, as of the balance-sheet date, they had not been allocated individually to the accounts of each pension saver.

## Note 26 Deduction for Costs of Administration

The amount of SEK 234 million is for the PPM fee of 0.3 percent withdrawn in 2002 to help finance the operating expenses of the PPM. During the build-up phase and until 2018, the authority will be financed through a combination of fees charged and interest-bearing loans from the National

Debt Office to meet the need for working capital. The authority is permitted to withdraw annual fees equivalent to a maximum of 0.3 percent of the aggregate balances of pension savers. During the build-up phase, these withdrawals will be less than the costs sustained by the PPM; the difference is to be financed by loans. This will be done to avoid charging disproportionately high fees to persons currently insured at a time when their premium pension capital is limited.

## Note 27 Insurance Assets

Thousands of SEK

Fund insurance	59,416,359
Conventional life insurance, PPM management	3,947
<b>Total</b>	<b>59,420,306</b>

## Note 28 Other Assets

Thousands of SEK

Temporarily managed preliminary contributions	45,040,612
PPM's administrative inventory of fund shares (trading inventory)	19,277
Other assets	246,860
<b>Total</b>	<b>45,306,749</b>

The PPM is responsible for temporarily managing the preliminary contributions transferred monthly by RFV until pension credit has been determined and the moneys have been invested in the insurance alternatives of the PPM. Preliminary contributions are contributions that have been paid-in but not yet invested. These moneys are invested by the PPM in an account with the National Debt Office, where they are managed for an average of 18 months. The moneys managed in 2002 were for pension credit earned in 2000–2002. The moneys for credit earned in 2000 were invested in February 2002.

## Note 29 Pension Liability

Thousands of SEK

Pension liability, fund insurance	59,417,864
Pension liability, conventional life insurance	4,124
<b>Total</b>	<b>59,421,988</b>

## Note 30 Other Liabilities

Thousands of SEK

Liabilities related to preliminary contributions paid	45,020,603
Other liabilities	1,903,873
<b>Total</b>	<b>46,924,476</b>

## Accounting Principles and Related Matters

*By decision of the Swedish Parliament (Riksdagen), a report is to be prepared each year on the financial position and development of the Earnings-Related Old Age Pension System. The reasons for this decision and the accounting principles used in the report are described in this section.*

### Reasons for the Report and Its Objectives

The size of pension benefits in the two parts of the earnings-related pension system, the inkomstpension and the premium pension, is flexible, or changeable, in relation to the demographic and economic conditions that determine the financial development of the system. The size of an individual's pension is governed by the sum of paid-in contributions and the return earned on them, together with the current average life expectancy and the age of the insured when he/she begins to withdraw a pension. Since the size of pensions is dependent on factors that include the financial position and development of the pension system, the *Riksdag* has considered it important to prepare annual reports on the system. The purpose of the report is to make it possible to follow and understand the financial development of the pension system, and to explain each of the factors that determine the size of both the inkomstpension and the premium pension.

One primary objective of the report is thus to provide information on the processes that may affect the pensions of the insured. This means that the report should seek to present clearly the demographic, economic, and behavioral risks and opportunities that determine the financial position of the system and that directly affect or may subsequently affect the value of pensions. A further ambition is that the report should conform as much as possible to generally accepted accounting principles for insurance companies.

### Where Do the Figures Come From?

The information in this report concerning the First–Fourth and Sixth National Pension Funds is taken entirely from the annual reports of these funds for 2002. The contribution revenue and pension disbursements of the inkomstpension have also been taken from the reports of the Funds. In other respects, the reporting for the inkomstpension is based on data from RFV records on pension credit earned and pension disbursements – within the system there is no accounting in a conventional sense.

The preparation of an annual report for the premium pension system is the responsibility of the Premium Pension Authority (PPM). The PPM prepares the annual report in accordance with the Law (1995:1560) on Annual Reports of Insurance Companies.

The annual report of the pension system has been prepared as a set of consolidated financial statements that also include the premium pension system. In the consolidated financial statements, the accounting for the PPM has largely followed the PPM annual report; however, certain items have been simplified and aggregated for purposes of clarity.

## Principles for Calculating Assets and Liabilities of the Inkomstpension

The distinguishing feature of a pay-as-you-go pension system is that its expenditure is financed more or less directly by current contribution revenue. Since the liability of the inkomstpension system is financed primarily by current contribution revenue, the flow of contributions may be regarded as the principal asset of the inkomstpension system – in other words, it may be treated as a *contribution asset*.

The method of calculating the assets and liabilities of the inkomstpension is regulated by law. The applicable legislation provides, among other things, that the contribution asset be valued according to the amount of the pension liability that can be financed by the flow of contributions under the conditions prevailing at the time of valuation. This hypothetical pension liability is equal in amount to the contribution revenue multiplied by the so-called turnover duration of the system.<sup>13</sup>

The actual pension liability is also valued on the basis of the conditions prevailing at the time of valuation.<sup>14</sup> This means that the inkomstpension liability to persons who have not yet begun to withdraw their old-age pensions is reported at its nominal value. In other words, the liability is valued as the aggregate of the amounts specified in the pension statement contained in the orange envelope sent annually to each insured. In addition to this amount, there is estimated pension credit for inkomstpension earned during the year covered by the report. The pension liability to retirees is also presented at its nominal value. This is done by multiplying pensions granted by the expected number of times that the amount will be disbursed, with the number of disbursements discounted (reduced) by the norm of 1.6 percent. The number of expected disbursements is calculated from measurements of the length of time that the pension amounts in RFV records are paid out. See the Technical Appendix, Section 4.

The assets of the National Pension Funds are reported at their so-called true value. This means that the assets are valued at the latest price paid on the final trading day of the year, or otherwise at the latest price bid.

### Calculating Assets and Liabilities Is Easy

The assets and liabilities of the inkomstpension are valued solely according to what is observable at the time of valuation. For example, the normal assumption that contribution revenue increases at the rate of economic growth is not explicitly considered in the calculation of the contribution asset. Nor is the assumption that pension disbursements, because of factors like indexation, will increase in the future considered in the valuation of the pension liability. The main reason why it has been deemed reasonable to value assets and liabilities solely according to what can be observed is that the financial position of the system is not dependent on the amount of assets and liabilities *taken separately*. The financial position of the system is determined exclusively by the *relationship* between assets and liabilities, in other words, by the so-called *balance ratio*.

<sup>13</sup> The calculation of turnover duration is described in the Technical Appendix, Equation 3; see also the List of Terms.

<sup>14</sup> As explained below, this is not fully applicable until ATP-pension credit can no longer be earned, i.e., beginning in 2018.

The inkomstpension is designed so that there is a strong link between the development of the assets and liabilities of the system. In cases where the balance ratio exceeds one (1), however, liabilities and assets will develop at somewhat different rates. In cases where the balance ratio is less than one, the provisions for automatic balancing establish an absolute link between the rates of growth in liabilities and assets. Taken as a whole, this means that valuing the assets and liabilities of the system solely on the basis of conditions observable at the time of valuation entails no risk of overestimating assets in relation to liabilities in the long run.<sup>15</sup> The provisions for automatic balancing have eliminated the need for assumptions about future economic and demographic developments in order to ensure the financial stability of the system.

It is apparent from the above that the method for valuing the assets and liabilities of the inkomstpension system is implicitly based on the assumption that assets and liabilities grow at the same rate after each valuation. To put it another way, it is assumed in the method of valuation that the indexation of the system will always be the same as the internal rate of return of the pension liability, even though this outcome is certain only if balancing has been activated. When balancing has not been activated, the indexation can be either greater or less than the internal rate of return of the pension liability.

### ATP an Exception: Not So Easy

One central accounting principle for the inkomstpension is that the report shall be based only on events or transactions that have occurred and been recorded. Since pension credit will be earned also according to ATP rules, i.e. the rules of the old scheme, through the year 2017, this accounting principle cannot yet be fully applied. It is impossible to determine the size of the pension liability calculated by ATP rules to persons who have not begun to receive their pensions as of the date of the financial statements (the ATP liability to the economically active) without making assumptions about future economic and demographic developments. That portion of the pension liability has been estimated according to the principles set forth by the Government in its bill (2000/01:70) on Automatic Balancing in the Old Age Pension System. In brief, these principles provide that the ATP liability to the economically active is to be calculated on the assumptions of the same average life expectancy used in determining the inkomstpension liability and of two-percent annual real growth in the income index.

As of December 31, 2002, the ATP liability to the economically active amounted to some 20 percent of the total pension liability. This proportion will decrease rapidly in the future.

<sup>15</sup> The manner of calculating turnover duration involves an implicit assumption that the population growth is zero. Thus, turnover duration will be (slightly) overestimated in cases where the working-age population is decreasing. This entails a risk that the calculations will (slightly) overestimate the system's assets in relation to its liabilities. However, it is reasonable to assume that the population decline will cease at some point. If so, the deficit will be temporary.

## How the Pension System Work

The Swedish public pension consists of the *inkomstpension* and the *premium pension* – and if the sum of these two is below a certain level, the *guaranteed pension* as well. On average, for persons with incomes up to the so-called *ceiling on earnings*, the public pension will provide the equivalent of some 50–60 percent of the average earned income of the economically active.

### Almost Like Saving in the Bank

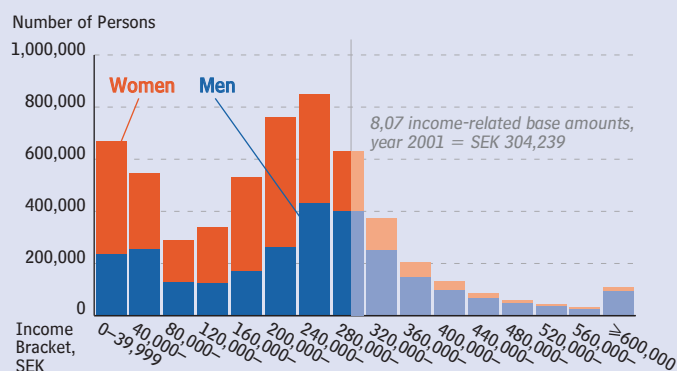
The earnings-related pension system works mostly like ordinary saving in the bank. The comparison applies to both parts of the system, the *inkomstpension* and the *premium pension*. Each year pension contributions for this insurance are paid by the insured, their employers, and in certain cases the central government. The contributions are recorded in the “bankbook” of the insured – i.e., the respective accounts for the *inkomstpension* and the *premium pension*. The savings grow over the years with the flow of contributions and with the “interest” accumulated on each form of insurance.

The orange envelope sent out each year contains information that enables the insured to watch their own *inkomstpension* and *premium pension* accounts grow from year to year. On retirement, the stream of payments is reversed, and the *inkomstpension* and *premium pension* are paid out for the remaining lifetime of the insured.

### Entirely Pension Insurance

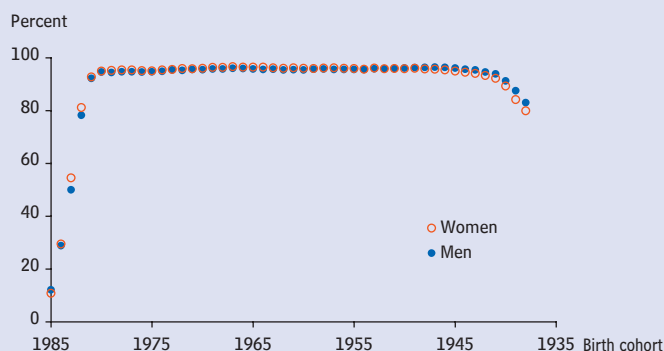
One feature of pension insurance is that the savings are blocked; it is impossible to withdraw any part of them before the minimum age for receiving a pension. This age is 61 years for both the *inkomstpension* and the *premium pension*. Moreover, savings can only be withdrawn in the form of a pension – i.e., as a monthly amount for the lifetime of the insured. Thus, the capital saved cannot be withdrawn all at once. Nor can it be inherited by relatives – it can only be inherited by all insured persons as a group (inheritance gains).

Distribution of Income in 2001



In 2001, more than 800,000 persons had incomes between SEK 240,000 and 279,999 – the “most common” income bracket. Women are overrepresented in the low-income brackets, men in the high-income brackets. The proportion of individuals with incomes above the ceiling of 8.07 income-related base amounts was 23 percent. Incomes exceeding 8.07 income-related base amounts correspond to 10 percent of total income.

Proportion of the Population Aged 16–64 Earning Pension Credit in 2001



Nearly 95 percent of the population aged 25–61 (in 2001, birth cohorts 1976–1940) are earning pension credit. One reason for this high proportion is that pension credit is granted not only for earnings, but also for transfer payments such as disability pensions, sickness benefits, parental allowances, and unemployment compensation. Beginning around age 61, the proportion earning pension credit declines, owing primarily to retirement on occupational pensions and early withdrawal of the public old-age pension.

The premium pension insurance, however, can cover two lives. This means that the premium pension is paid out to either of two spouses or cohabitants as long as one of them is living. If the premium pension insurance is on two lives, the monthly pension will be lower.

One purpose of pension insurance is to redistribute assets – consumption – from individuals with shorter-than-average life spans to those who live longer. Consequently, before withdrawal of the old-age pension, there is an annual redistribution of the pension balances of persons who have died – the so-called inheritance gain – among the surviving insured.

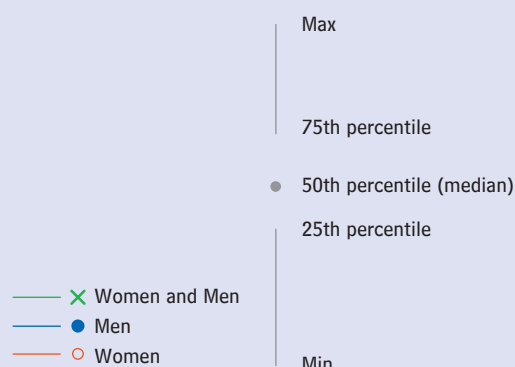
The pension savings, or the balance of the insured's pension account, consist of the sum of that individual's pension credit (contributions), the interest earned, and inheritance gains. The account is charged each year with a fee for costs of administration. The balance of the inkomstpension account is called the individual's pension balance, whereas the balance of the premium pension account is called premium pension capital.

During the time when the pension is withdrawn, assets are also redistributed from those with shorter-than-average life spans to those who live longer. The redistribution is done by calculating the monthly pension on the basis of an average life expectancy but paying it out for as long as the insured lives. Consequently, the total pension disbursements to persons who live for only a short time after retirement are less than their pension savings plus "interest" and previous inheritance gains. Those who live longer than average receive more than the value of their pension balances and premium pension capital.

## One Krona of Pension Credit for Each Krona Contributed

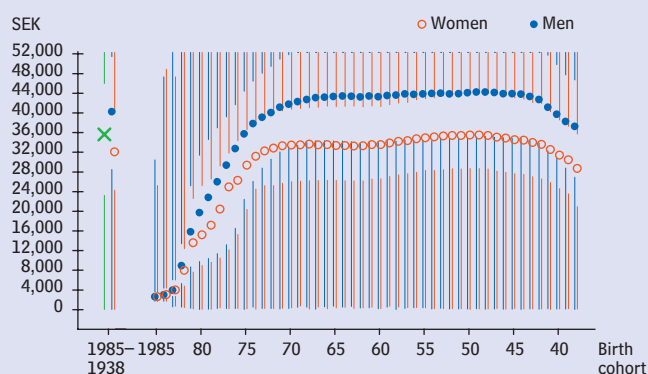
The pension contribution is 18.5 percent of the pension base. The pension base consists of pension-qualifying income and amounts. Income consists of the insured's earnings and social-insurance benefits. Pension-qualifying amounts are a basis for imputing income, rather than actual income. Pension credit for pension-qualifying amounts is granted for disability pensions, child-care years, study, and compulsory national service. Pension credit accrues at 16 percent for the inkomstpension and at 2.5 percent for the premium pension.

### Guide to the diagrams



The median is the number in the middle when numbers are arranged from lowest to highest. A line marks the interval for the lowest and highest quartile, respectively, in the distribution of the insured. The two empty spaces between these lines and the median show the interval for the quartiles of the insured closest to the median.

### Pension Credit Earned in 2001, Median and Measures of Variation



The median income of each birth cohort in a particular year also provides a picture of the expected average lifetime-income profile. There is a substantial difference in income between men and women. The median for men is at the same level as the 75<sup>th</sup> percentile for women. In other words, the pension credit that puts a man in the 50<sup>th</sup> percentile of all men is enough to put a woman in the 75<sup>th</sup> percentile of all women. The difference is explainable primarily by the lesser amount of time devoted by women to gainful employment.



An example: For an insured individual with a pension base of SEK 100, both the pension credit and the contribution paid are SEK 18.5. The inkomstpension account is then increased by a pension credit of SEK 16, and the premium pension account by pension credit of SEK 2.5.

### Who Pays the Contribution?

The insured pays an individual pension contribution to the pension system of 7 percent of his/her earnings and of any social-insurance benefits received. The contribution is paid on incomes up to 8.07 income-related base amounts.<sup>16</sup> The individual pension contribution of 7 percent is not included in the pension base.

For each employee, employers pay a pension contribution to the pension system of 10.21 percent of that individual's earnings.<sup>17</sup> This contribution is also paid on earnings exceeding 8.07 income-related base amounts. Since there is no pension credit for earnings above 8.07 income-related base amounts, these contributions are in fact a tax.<sup>18</sup> They are therefore treated as taxes to the central-government budget and are not transferred to the buffer funds of the pension system.

For recipients of social-insurance benefits, the central government pays a contribution of 10.21 percent of these benefits to the pension system. For persons credited with pension-qualifying amounts, the central government pays a contribution of 18.5 percent of the pension-qualifying amount. These central-government contributions to the old-age pension system are financed by general tax revenues.

The total pension contribution paid is thus 17.21 percent, while the pension credit and the pension contribution itself are 18.5 percent of the pension base. The difference is due to the fact that the individual pension contribution of 7 percent is deducted from the pension base when pension credit is calculated.<sup>19</sup> This means that the maximum pension base is 93 percent of 8.07, or 7.5 income-related base amounts. The maximum contribution to the system and pension credit thereby accrued was SEK 53,887 in 2002.

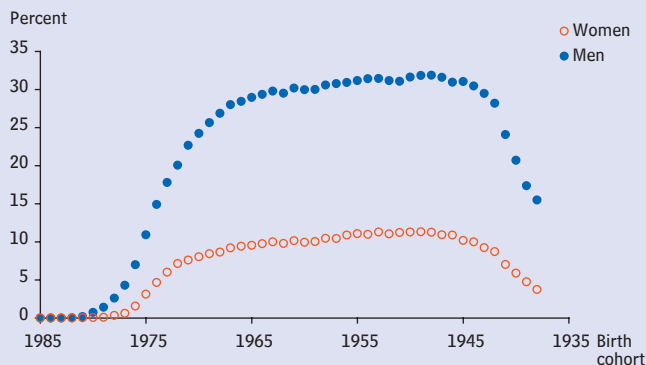
<sup>16</sup> In 2002, 8.07 x SEK 38,800 = SEK 313,116.

<sup>17</sup> Self-employed persons pay an individual pension contribution of 7 percent and a self-employment contribution of 10.21 percent.

<sup>18</sup> In Note 1 it is shown that this tax amounted to SEK 11.9 billion in 2002.

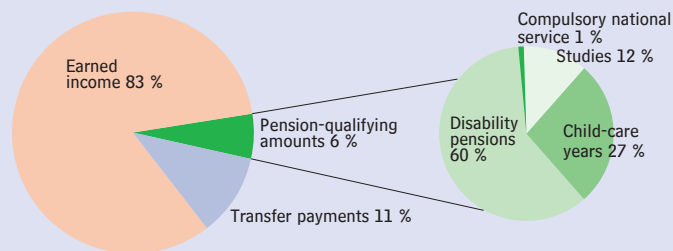
<sup>19</sup>  $\frac{0.1721}{0.93} = 0.185$

**Proportion Earning Pension Credit in 2001 with Incomes at or Above the Ceiling**



Beginning in 2002, the ceiling is indexed by the change in income as measured by the income index. In the future, the proportion of income above the ceiling of 8.07 income-related base amounts will be held constant. However, the proportion of persons with incomes above the ceiling may still vary.

**Pension Credit Base for 2001**



The public earnings-related pension system is defined-contribution in the sense that for every krona of pension credit an equally large contribution is paid, and that for every krona paid into the system an equally large amount of pension credit is earned. However, pension credit is granted not only for earned income. It is also granted for all taxable social insurance benefits – other than pensions. In addition pension credit is granted for some "activities", an example is the pension qualifying amount for child-care years.



## Where Does the Contribution Go?

Inkomstpension contributions are deposited in the four buffer funds of the system, the First, Second, Third, and Fourth National Pension Funds.<sup>20</sup> Each fund receives one fourth of the contributions and finances one fourth of pension disbursements. The monthly pension disbursements of the inkomstpension system are thus made with money from the buffer funds. In principle, more or less the same moneys that were paid in during the month are paid out in pensions to the recipients. Thus, there is virtually no saving in the pension system for the economy as a whole. For the insured, however, the pension contribution can be considered a form of saving.

The premium pension contribution paid each month is invested by the Premium Pension Authority (PPM) in interest-bearing assets until the final tax assessment is complete. Only then does the PPM know how much premium pension credit has been earned by each insured. When this amount has been determined, the PPM purchases shares in the funds selected by the insured. At the end of 2002, the premium pension system included 644 funds, administered by 87 different fund managers. Contributions of insured persons who do not select a fund are invested in the Seventh National Pension Fund. When a pension is to be disbursed, the PPM sells shares in the recipient's funds, and the proceeds are paid out as a pension. The money for these pensions is provided by those who purchase the fund shares that were sold.

<sup>20</sup> The assets of the inkomstpension system also include the Sixth National Pension Fund, which however does not receive any contributions or pay any pensions.

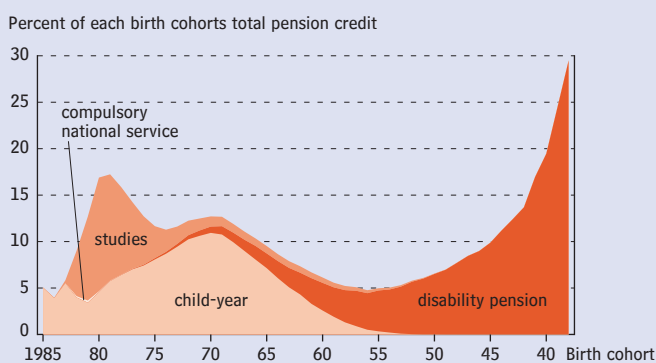
## Interest on the Contributions that Provided Pension Credit

Savings in a bank account earn interest, and the pension system works in the same way.

The interest on the inkomstpension account is normally determined by the growth in average income. If the average income in Sweden increases by three percent, for example, the rate of interest will also be three percent. The average income is measured by the *income index*. The interest on the premium pension account is determined by the change in the value of the premium pension funds chosen by the insured.

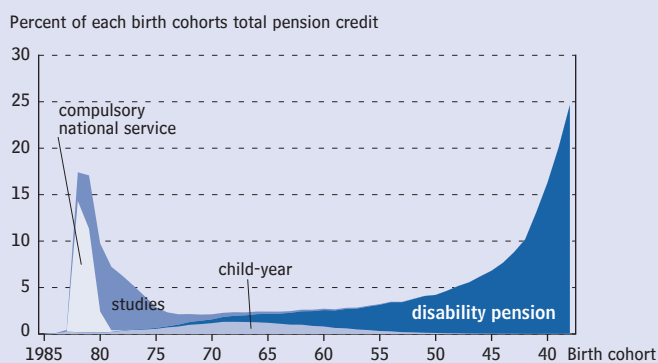
Thus, the interest earned on pension credit depends on what happens in different areas of the economy. The inkomstpension account earns interest at the rate of increase in wages and salaries – the price of labor, in other words. The premium pension account, by contrast, earns interest according to the

**Pension Credit for Pension Qualifying Amounts in 2001, Women**



Pension credit is earned for pension-qualifying amounts in particular phases of a person's life, such as times when one is caring for small children or performing compulsory national service. The most extensive pension-qualifying amounts, however, are for disability pensions. For women aged 64, disability pensions account for almost 30 percent of pension credit earned.

**Pension Credit for Pension Qualifying Amounts in 2001, Men**



Men: more compulsory national service, fewer child-care years, and a somewhat smaller proportion of pension-qualifying amounts for disability pensions compared to women.

tendency of the capital market, which depends on business profits and the cost of capital. Neither of these rates of interest is guaranteed; they may even be negative. By apportioning contributions between separate subsystems where the rate of return is determined by somewhat different circumstances, the risks are spread to a certain extent.

### A Rate of Interest Other Than the Income Index – Automatic Balancing

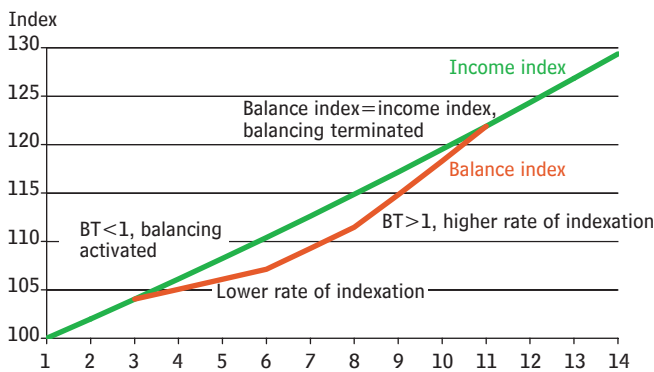
Given certain demographic and economic developments, it is not possible to earn interest on the inkomstpension account and the inkomstpension at a rate equal to the growth in average income and at the same time finance payments of the inkomstpension with a fixed contribution rate. In order to maintain the contribution at a level of 16 percent, income indexation is suspended in such a situation, and automatic balancing is activated. Automatic balancing provides rules for calculating the assets and liabilities of the system, and for when and by how much the rate of interest will differ from growth in average income.

If the assets of the system is divided by the pension liability, we obtain a measure of the financial position of the system, the *balance ratio*. If the balance ratio exceeds one (1), assets are greater than liabilities; if the balance ratio is less than one, liabilities exceed assets. Balancing is activated when the balance ratio drops below one. Pension balances and pensions will then be indexed by the change in a *balance index* instead of the change in the income index. The balance index changes as a function of the change in the income index and the size of the balance ratio.

An example: If the balance ratio falls below 1 to 0.99 while the income index rises from 100 to 104, the balance index is calculated as the product of the balance ratio (0.99) and the income index (104), for a balance index of 103.<sup>21</sup> The indexation of pension balances will then be at 3 instead of 4 percent; the indexation of pensions will be at 1.4 instead of 2.4 percent.<sup>22</sup>

If the balance ratio exceeds 1.00 during a period when balancing is activated, pension balances and pensions will be indexed at a rate higher than the increase in the income index. This will continue until pensions regain the value that they would have had if they had been adjusted solely by the

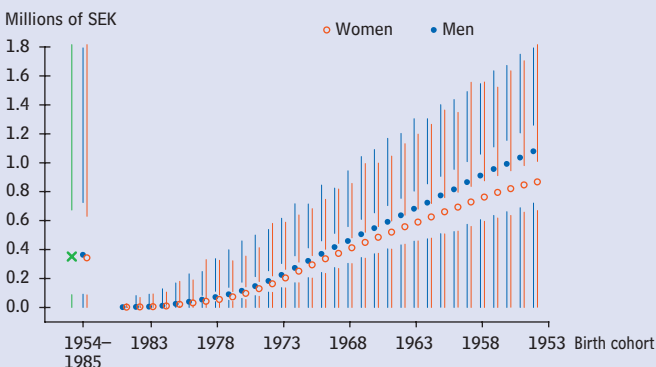
Automatic Balancing



<sup>21</sup> More precisely, the balance index is 102.96.

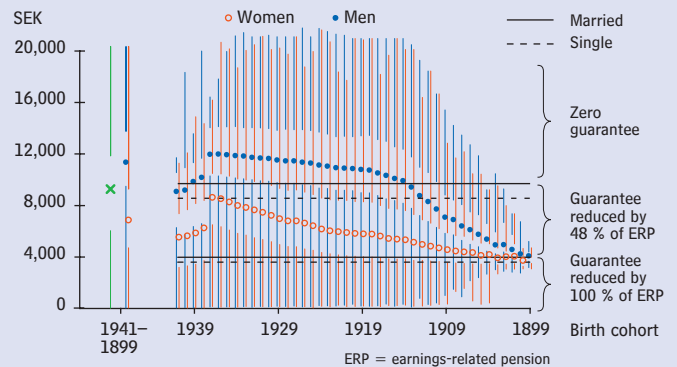
<sup>22</sup> The balance index for following year is calculated by multiplying the balance index (103) by the ratio between the new and old income indices, multiplied by a new balance ratio.

Pension Balance, December 31, 2002



Here the pension balance is shown, i.e., the balance of the pension account, for the birth cohorts fully covered by the rules of the new system. The reason why the smallest pension balance is close to zero for all birth cohorts is that at every age some persons have just entered the labor market, among them immigrants.

Payments of ATP and Inkomstpension in December 2002



In an earnings-related pension system where pensions are indexed to the development of prices, as was previously the case with ATP, younger birth cohorts will have a higher average pension than older pensioners. This holds true provided incomes are increasing more rapidly than prices. The new form of indexation of pensions from the pay-as-you-go system, which also applies to ATP, with the change in nominal average wage "minus" 1.6 percent also means that the average pension of younger pensioners will be higher than that of older ones.

income index. When the balance index reaches the level of the income index, balancing is deactivated, and the system returns to one of adjustment only by the change in the income index.

## Pensions Reduced by Costs of Administration

The costs of administering the inkomstpension are deducted annually from pension balances by the same percentage for all insured. In 2002 the deduction for costs of administration was 0.052 percent. This deduction is made only until the insured begins to withdraw a pension. At the current level of costs, the deduction for costs will reduce the inkomstpension by approximately 1 percent compared to what it would be if the costs of administration were 0 percent.<sup>23</sup>

The costs of administering the premium pension are deducted in a similar manner from the premium pension capital; in this case, however, the deduction continues to be made after the insured begins to withdraw a pension. In 2002 the deduction for costs was 0.3 percent. This deduction does not include the costs of fund administration, which instead reduce the value of fund shares. The average cost deduction for fund managers in 2002, after discounts, was 0.44 percent. At the current average level of costs for administering the premium pension, the average premium pension will be about 22 percent less than if the costs were 0 percent.<sup>24</sup> However PPM estimates that the annual cost will fall sharply as the system matures. In a mature phase the total annual cost is estimated to be at 0.25 of capital and for persons starting to save at that point in time to cause an average reduction of the premium pension of 9 percent relative to what it would have been with zero costs.

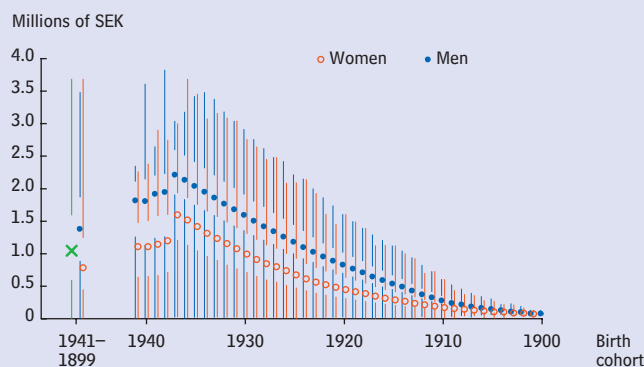
## How is The Inkomstpension Calculated?

The inkomstpension is calculated by dividing the pension balance by a so-called annuitization divisor. The annuitization divisor reflects both the remaining life expectancy at the time the individual begins to withdraw a pension, and an interest rate of 1.6 percent. The remaining life expectancy is an average for men and women and is calculated solely on the basis of the observed mortality of the immediately preceding five years. With the interest rate of 1.6 percent, the annuitization divisor is less than the average life expectancy, and the monthly pension will initially be greater than it would have been otherwise.

<sup>23</sup> On average, a pension balance remains in the system until retirement for 22 years, i.e., the pay-in duration of the system. With annual costs of administration of 0.052 percent, the inkomstpension is reduced by these costs to  $(1-0.00052)^{22} \approx 99$  percent of what it would have been without the deduction for costs.

<sup>24</sup> On average, premium pension capital remains in the system for 22 + 11 years; i.e., the sum of pay-in and pay-out duration is 33 years. With annual costs of administration of 0.74 percent, the premium pension is reduced to  $(1-0.0074)^{33} \approx 78$  percent of what it would have been without the deduction for costs.

Pension Liability to Retirees, December 31, 2002



The median pension liability to a man of 65 is approximately SEK 2.2 million and to a woman, SEK 1.6 million. In the diagram, however, the pension liability has been calculated as if both sexes were expected to live equally long. Since the liability is calculated on the basis of the unisex average life span, the difference between the "pension liability" of the sexes reflects differences in monthly pension, not in lifetime pension. At 65 years of age, the remaining unisex life expectancy is 18.5 years.

Pension Credit Earned in 2001, Statistical Summary

SEK	Women	Men	Total	Total 2000
25th percentile	24,290	28,508	25,234	24,179
Median	32,042	40,237	35,612	34,095
75th percentile	39,960	51,448	45,991	43,900
Mean	31,231	37,033	34,177	32,858
Standard deviation	12,989	14,688	14,178	14,024

<sup>25</sup> It may be somewhat misleading to use the word less; the inkomstpension is recalculated by the ratio between the new and the old income index divided by 1.016.

<sup>26</sup> More precisely, the rate of indexation is calculated as  $(1.02/1.016)-1 = 0.3937\%$ .

<sup>27</sup> More precisely, the rate of indexation is calculated as  $(1.01/1.016)-1 = -0.59056\%$ .

An example: If an insured person has a pension balance of SEK 1.8 million and begins to withdraw a pension at age 65, and the annuitization divisor is 16, the annual pension will be SEK 112,500 and the monthly pension, SEK 9,375.

The inkomstpension is recalculated annually by the change in the income index less the 1.6 percentage points credited in the annuitization divisor.<sup>25</sup> This means that if wages and salaries increase by exactly 1.6 percent *more* than inflation, as measured by the consumer price index, pensions will increase at just the rate of inflation. Thus, pensions will be unchanged in constant prices only if wages increase by precisely 1.6 percent *more* than the inflation rate. If, for example, wages and salaries increase by 2 percent *more* than inflation, pensions will increase by 0.4 percent in constant prices.<sup>26</sup> If, on the other hand, wages and salaries increase by 1 percent *more* than inflation, pensions will decrease by 0.6 percent in constant prices.<sup>27</sup>

## How is the Premium Pension Calculated?

The premium pension can be withdrawn either as *fund insurance* or as *conventional insurance*.

In both forms of insurance, the value of the pension benefit is determined through dividing it by an annuitization divisor based on the average life expectancy. The annuitization divisor of the premium pension, however, is based on forecasts of future life spans, and interest is credited at 3 percent before the deduction of PPM costs – after this deduction the interest rate is 2.7 percent.

If the premium pension is withdrawn in the form of conventional insurance, the pension is calculated as a guaranteed life-long annuity payable in nominal monthly amounts. In this case the PPM sells the insured's fund shares and bears the responsibility and the financial risk of investing the proceeds. The pension is calculated with an assumed nominal return that is presently 3 percent. The amounts disbursed may be greater if the return on the capital invested by the PPM is higher than the assumed return.

Fund insurance means that the savings of the insured remain in freely chosen PPM funds. If fund insurance is elected, the size of the premium pension is recalculated once each year on the basis of the value of fund shares in December. In each month of the following year, a sufficient number of fund shares are sold to finance the calculated premium pension. If the value of the fund shares increases, fewer shares are sold; if the value decreases, more shares are sold. The variations in prices affect the value of the following year's premium pension.

As noted previously, the premium pension insurance can cover the lives of two persons if the insured so desires.

## Income Statement and Balance Sheet of the Inkomstpension as a Percentage of GDP

Income Statement, percentage of GDP. In 2002, 100 = SEK 2,340 billion; in 2001, 100 = SEK 2,169 billion

	2002	2001	Change
<b>Change in fund assets</b>			
Pension contributions	6.9	7.2	-0.3
Pension disbursements	-6.5	-6.6	0.1
Return on funded capital	-3.6	-1.2	-2.4
Costs of administration	-0.1	-0.1	0.0
Total change in fund assets (a)	-3.3	-0.6	-2.7
<b>Change in contribution asset</b>			
Value of change in contribution revenue	9.6	18.7	-9.1
Value of change in turnover duration	-0.7	0.7	-1.4
Total change in contribution asset (b)	8.9	19.5	-10.6
<b>Change in pension liability *</b>			
New pension credit and ATP points	-7.2	-6.4	-0.8
Pension disbursements	6.5	6.6	-0.1
Indexation	-11.8	-5.4	-6.4
Value of change in average life span	-0.3	-0.9	0.6
Inheritance gains arising	0.3	0.3	0.0
Inheritance gains distributed	-0.3	-0.3	0.0
Deduction for costs of administration	0.1	0.0	-0.1
Total change in pension liability (c)	-12.7	-6.0	-6.7
Net income/-loss (a)+(b)+(c)	-7.1	12.9	-20.0

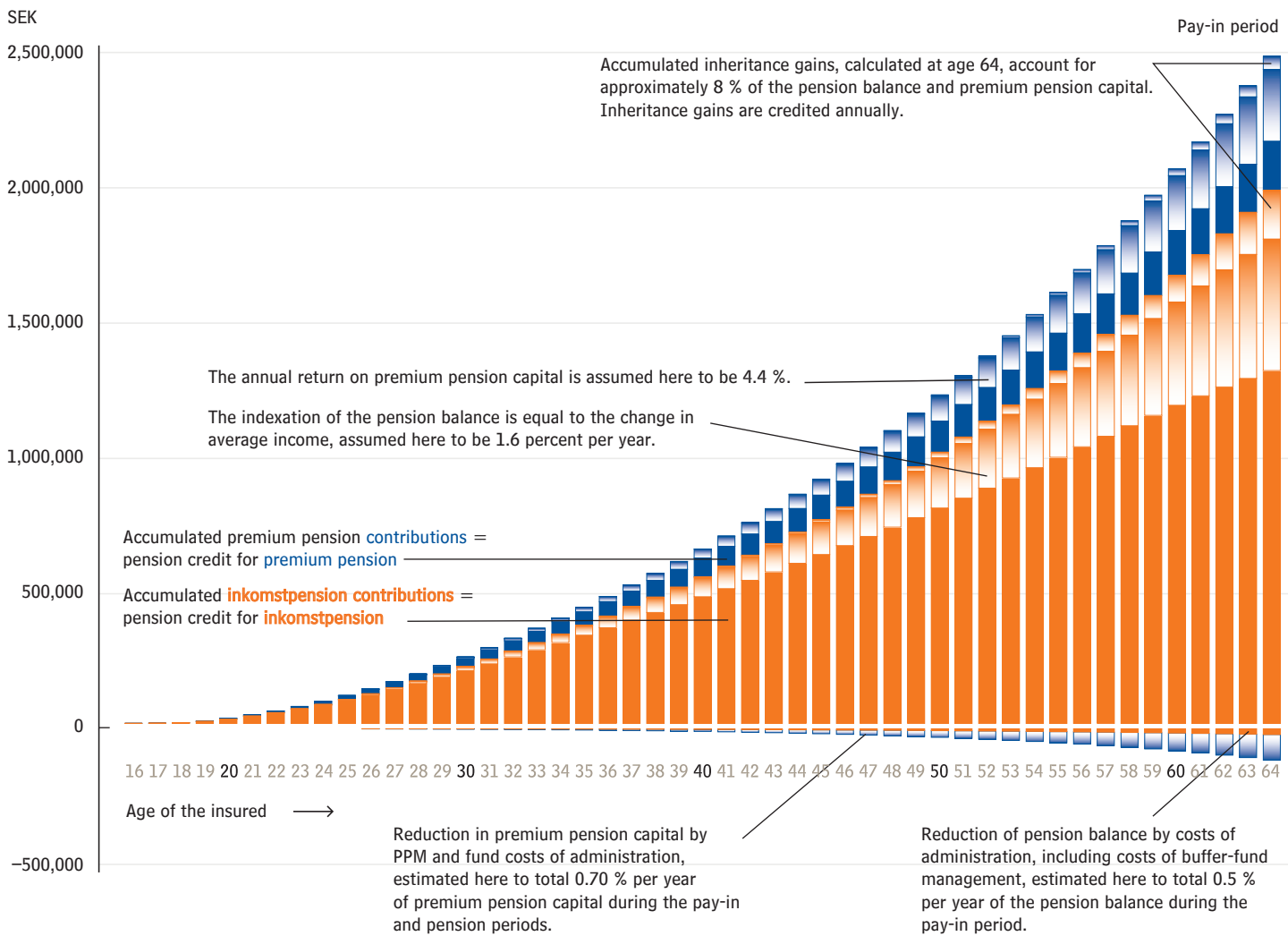
\* A negative value (-) denotes an increase in the pension liability; a positive value ( ) denotes a decrease.

### Balance Sheet, Percentage of GDP

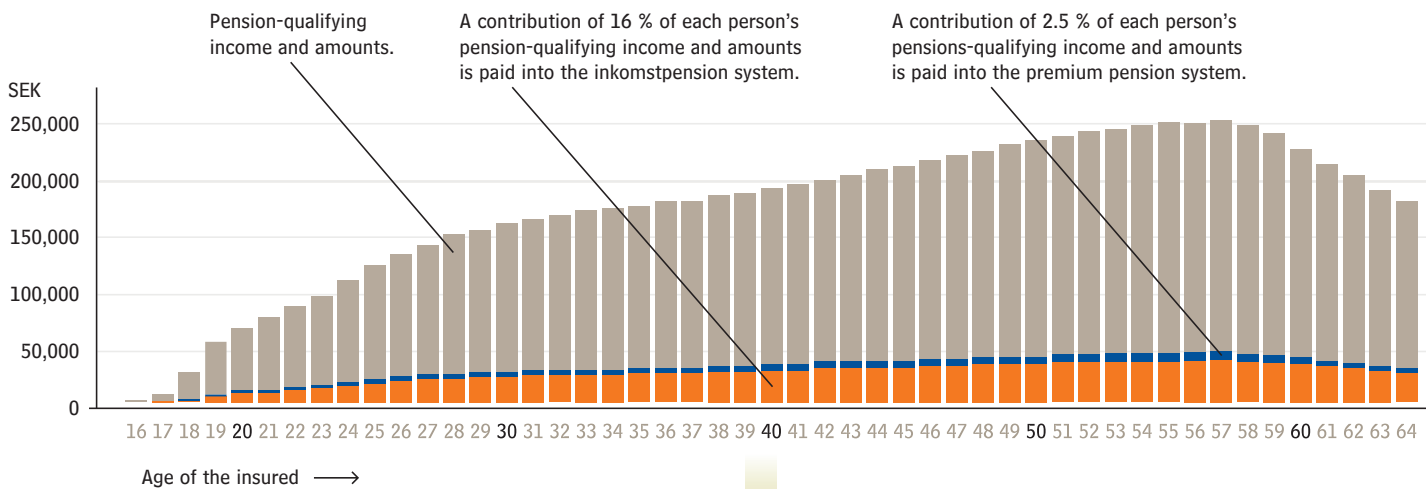
Assets	Dec. 31, 2002	Dec. 31, 2001	Change
First-Fourth and Sixth National Pension Funds	20.8	26.1	-5.3
Contribution asset	226.2	234.6	-8.4
Total assets	247.0	260.7	-13.7

Liabilities and Surplus	Dec. 31, 2002	Dec. 31, 2001	Change
Opening surplus/-deficit	9.3	-2.8	12.1
Net income/-loss for the year	-7.1	12.9	-20.0
Total surplus/-deficit	2.2	10.1	-7.9
Pension liability	244.8	250.6	-5.8
Total liabilities and surplus	247.0	260.7	-13.7

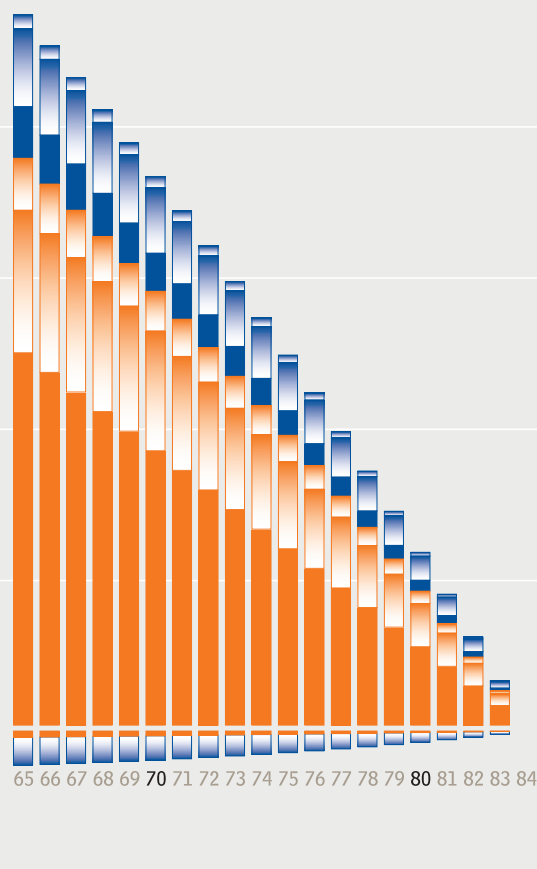
## Earning and Calculation of the Inkomstpension and Premium Pension for a Typical Insured Individual



## Annual Pension Qualifying Income and Amounts, and Contribution and Pension, for a Typical Insured Individual



Pension period

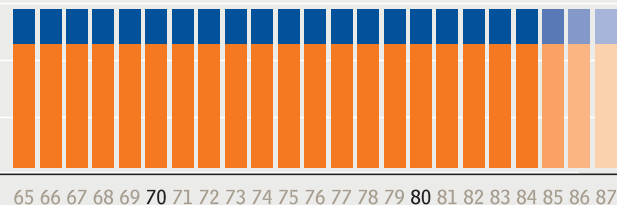


Withdrawal of inkomstpension. The inkomstpension is calculated by dividing the pension balance by a so-called annuitization divisor. The annuitization divisor is a reflection of remaining average life expectancy and an interest rate of 1.6 %.

Withdrawal of premium pension. In principle, the premium pension is calculated like the inkomstpension, except that the annuitization divisor of the premium pension is based on forecasts of future life expectancy, and the interest rate credited is 3 percent before deduction of PPM costs; after this deduction, the interest rate is 2.7 percent. The premium pension can be withdrawn in the form of conventional insurance or fund insurance.

The premium pension and the inkomstpension are paid out over the remaining lifetime of the insured. Persons living longer than the average life expectancy receive pension disbursements that exceed their accumulated pension balance. This deficit is financed by the unused pension balances of those living for less than the average life expectancy.

Lifetime pensions



If the premium pension is withdrawn in the form of conventional insurance, the insured receives a guaranteed amount with the possibility of a bonus. If the premium pension is withdrawn in the form of fund insurance, it will be recalculated each year according to the change in the value of the funds.

The inkomstpension is recalculated annually, or indexed, by the change in average income less interest of 1.6 percent credited in the annuitization divisor. In the illustration, the value of a pension is constant in real terms.

## Three Scenarios for the Future of the Pension System

*By Government decision, RFV is to prepare a projection of the long-term financial development of the pension system as a supplement to the annual report on the system. The purpose of these projections is to show how different developments can effect the financial position of the pension system and the size of pensions.*

Three different projections of the financial development of the inkomstpension system are presented below. They are referred to as the *base*, *optimistic*, and *pessimistic* scenarios. The base scenario can be said to describe the RFV estimate, or best guess, concerning the financial development of the system. In the other scenarios, assumptions have been made about a more positive and a more negative development, respectively, for the financial position of the inkomstpension system. The projections have been prepared in a so-called deterministic model. This means that in each scenario the respective assumptions are in principle constant for the entire calculation period. The scenarios do not reflect actual cyclical patterns in relation to subsequently determined mean values.

### Net Contribution 2003–2078

The size of pension disbursements is a function of the rules of the system and their interaction with demographic and economic developments. Since the birth cohorts of the population are unequal in size, and to some extent will have worked to different degrees, the contribution revenue and pension disbursements of the system will vary over time. During certain periods, contributions will exceed disbursements; at other times, the opposite will be true. Surpluses and deficits are managed through the buffer funds of the system.

#### Base Scenario

The demographic trend in the base scenario follows the 2002 population forecast of Statistics Sweden, in which it is assumed that nativity rises from its present level of about 1.7 children per woman to 1.8. It is further assumed that the average life expectancy for individuals reaching age 65 increases by 33 days per year on average until 2010 and by 20 days per year thereafter. Beginning in 2012, net immigration to Sweden is assumed to stabilize at 20,000 per year, equivalent to the average for the period 1980–2001. The proportion of persons aged 16–64 with a calendar-year income exceeding one (1) income-related base amount is assumed in the base scenario to be 77 percent, roughly equal to the employment ratio as defined in the Labor Force Surveys, the so-called AKU definition. The proportion of persons aged 16–64 with an income exceeding one income-related base amount was 78 percent in 2001. Real annual growth in average income is assumed to be 1.8 percent, and the real annual return on funded assets, 3.25 percent. With costs of premium

pension administration at present equivalent to some 0.7 percent, the assumption in the scenario is that the gross real return in the premium pension system is 3.95 percent. The difference between the assumed return of the National Pension Funds and the assumed gross return of the premium pension funds may, perhaps, be defensible in view of the higher proportion of equity investments in the premium pension system – 90 percent compared to 60 percent for the National Pension Funds.

#### Optimistic Scenario

Demographically, the optimistic scenario is identical to the base scenario; the two scenarios differ only in respect to economic factors. In the optimistic scenario, the proportion of persons aged 16–64 with calendar-year incomes exceeding one income-related base amount is 80 percent; real growth in average income is 2.8 percent, and the real annual return on the buffer fund is 5 percent. The real rate of return in the premium pension system is also assumed to be 5 percent, after deduction of

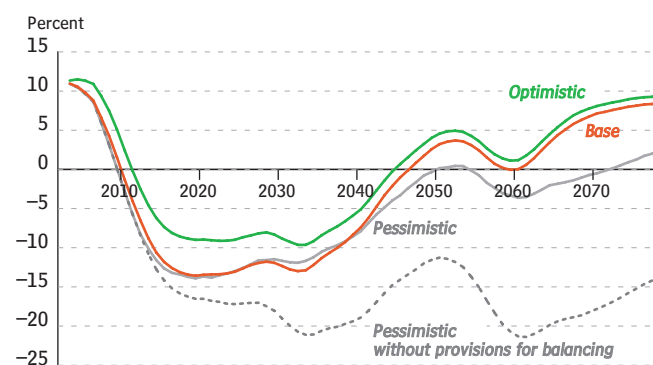


To allow comparison of the net contributions (contribution revenue minus pension disbursements) in the three scenarios, the net contribution in each scenario has been divided by the contribution revenue of that scenario. The volume effect of different growth rates on net contribution is thus eliminated.

As in the RFV calculations throughout the work on the pension reform, the net contribution will turn negative around 2010 and will be negative as the year 2050 approaches. This tendency will be due mainly to the retirement of the large birth cohorts of the 1940's.

Only in the pessimistic scenario is automatic balancing activated. One way to describe the size of the deficit that would arise if there were no balancing is to calculate the net contribution without rules for balancing. In the pessimistic scenario, the net contribution in 2050 is 0.2 percent of contribution revenue; with no provisions for automatic balancing, it would have been minus 11.3 percent. The reduction of the pension level resulting from balancing in this case is described below in the section "Development of Pension Levels for Birth Cohorts 1938–1990".

Contributions Minus Pensions a Percentage of Contribution Revenue



## The Buffer Fund 2003–2078

The size of the buffer fund can be expressed in terms of fund strength. Fund strength shows how many years of pension disbursements can be financed by the fund, without additional contributions or return on assets. At the end of 2002, fund strength was 3.2; in other words, the fund could have financed 3.2 years of pension disbursements of the same amount as in 2002. The year before, fund strength was 3.9. The varied development of the buffer fund in the three scenarios is due to differences both in net contributions and in the assumed return on the buffer fund assets.

**In the optimistic scenario**, there is a substantial increase in fund strength. The explanation lies in the limited contribution deficit and the high rate of return (5 percent) in relation to the growth of the income index (1.8 percent). In 2050, fund strength will be 6.3; in 2078, it will be 13.6. In

costs of administration. The assumed rate of growth is high, or very high, by historical standards. On the other hand, the rate of return is not particularly high, but in line with the historical average. One purpose of the optimistic scenario is to provide a general view of the system in a possible surplus situation.

### *Pessimistic Scenario*

Nativity is assumed to be 1.5 children per woman, i.e. about the same as in the past 10 years. Net immigration is assumed to be 12,000, the basic assumption of the Statistics Sweden population forecasts in the 1990's. The average life expectancy is assumed to develop as in the other two scenarios. The assumed rate of labor-force participation is the same as in the base scenario, but real growth in average income is 1 percent. The real return on the buffer fund and the premium pension funds, after deducting costs of administration, is also 1 percent. In principle, a return on the buffer fund equal to growth in average income will provide no contribution to the long-term financing of pensions. The

buffer fund then becomes a demographically determined repository for pension capital and has a neutral impact on the financing of the system. Under the assumptions of the pessimistic scenario, contribution revenue increases more slowly in relation to the desired indexation of average income. One purpose of the pessimistic scenario is to illustrate the risks managed by balancing and the effects of a prolonged negative tendency on pensions.

the optimistic course of development, the fund of the system in 2078 would be equivalent to over 38 percent of the pension liability.

**In the base scenario**, with its initially positive net contribution and relatively high rate of return (3.25 percent) in relation to the income index (1.8 percent), the fund grows until 2010. Thereafter, the contribution deficits gradually sap fund strength, around 2040 it is half of its present level.

**In the pessimistic scenario**, the buffer fund is exhausted by 2038 and is negative thereafter. Fund strength stabilizes just over minus 2. The fund is depleted and becomes negative even though balancing is activated in 2012. In the Annual Report for 2001, balancing was activated in 2016 in the pessimistic scenario. Balancing was deliberately designed not to eliminate the risk of exhausting the buffer fund. This risk has been addressed by authorizing the funds to borrow money. Any borrowing is to take place via the National Debt Office.

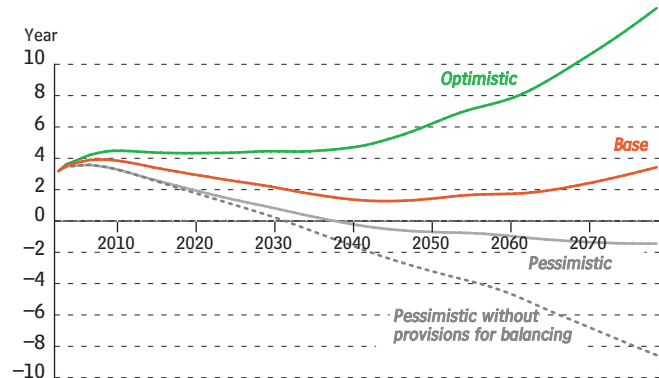
The principal reason<sup>28</sup> why balancing will not stabilize the fund at fund strength zero is that turnover duration is calculated on the implicit assumption of a constant population. With a declining trend in the working-age population, turnover duration will be somewhat overestimated under this assumption. When the population stops decreasing – as it must at some point if it is not to disappear entirely – the system will tend toward a fund strength

<sup>28</sup> One contributing cause is a marginal lag – in principle six months – between the time when the net asset deficit arises and the time when balancing corrects this deficit.

of at least zero. In cases where the fund is negative, interest is paid on the loans; in the diagram, the rate of interest is assumed to equal the rate of return – i.e., 1 percent.

With balancing initiated so early, 26 years before the fund is exhausted (19 years before it would have been exhausted with no provisions for balancing), the annual reduction in pension levels relative to growth in average income will be very modest. Over time, however, the effect on pension levels will be substantial – see the section “Development of Pension Levels for Birth Cohorts 1938–1990”.

**Size of Buffer Fund in Terms of Fund Strength.** Size of buffer fund at year-end divided by pensions for the year.



### Specification of the Assumptions in the Scenarios

	2003–2010			2011–2078		
	Base	Optimistic	Pessimistic	Base	Optimistic	Pessimistic
Nativity, children per woman	1.74	1.74	1.53	1.8	1.8	1.5
Increase in average life span at age 65, days/year	33	33	33	20	20	20
Proportion of persons aged 16–64 with incomes over 1 inc-rel. base amount	0.77	0.79	0.77	0.77	0.80	0.78
Annual net immigration	25,000	25,000	22,000	20,000	20,000	12,000
Growth in average income/year	2.0 %	2.2 %	1.8 %	1.8 %	2.8 %	1.0 %
Real annual return on the buffer fund/PPM funds	3.25 %	5.00 %	1.00 %	3.25 %	5.00 %	1.00 %

## Financial Position of the Inkomstpension System 2003–2078

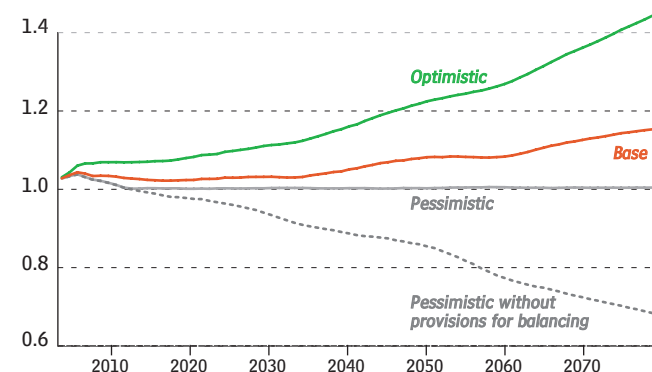
The diagram shows the development of the financial position of the inkomstpension system in the three scenarios and in the negative scenario without balancing. The financial position is expressed in terms of balance ratios. With a balance ratio of 1.0, assets and liabilities of the system are equal; with a ratio of 2.0, assets are twice as great as liabilities. In principle, a balance ratio of 2 means that the system is fully funded.

In the optimistic scenario, the solvency of the system increases for almost the entire period. By 2078, the system has a balance ratio exceeding 1.4 and, as mentioned previously, a buffer fund equivalent to more than 38 percent of the pension liability.

In the base scenario, the balance ratio remains virtually constant at around 1.02–1.03 in the first half of this century, meaning that the estimated assets of the system then exceed its liabilities by 2–3 percent.

In the pessimistic scenario, the balance ratio drops below 1 in 2012; consequently, balancing is activated. With balancing, the liability of the system accrues interest at the growth rate of the system's assets. As a result, the balance ratio tends to stabilize around 1.0.

**Financial Position of the Inkomstpension in Terms of the Balance Ratio.** (contribution asset + buffer fund)/pension liability



## Development of Pension Levels for Birth Cohorts 1938–1990

The pension level is defined here as the average public pension at age 65 in relation to the average income for the economically active aged 16–64. For this level to be constant, one requirement is that the relationship between the number of economically active years and years of retirement be unchanged. If this requirement is to be met when the average life expectancy is increasing, the retirement age must be raised; alternatively, the age of entry into working life must be lowered. Moreover, for the value of pensions to remain constant in relation to incomes, automatic balancing must not be activated.

### Summary of Certain Results of the Projections

	2003–2010			2011–2078		
	Base	Optimistic	Pessimistic	Base	Optimistic	Pessimistic
Annual addition of 16-year-olds	110,000	110,000	103,000	110,000	110,000	90,000
Number of persons aged 16–64 who at any time resided in Sweden	6,067,000	6,067,000	6,063,000	6,182,000	6,182,000	5,559,000
of which living in Sweden	5,900,000	5,900,000	5,890,000	5,793,000	5,793,000	5,075,000
of which with pension-qualifying income	4,933,000	5,053,000	4,923,000	4,846,000	4,985,000	4,253,000
Number of persons older than 64	1,732,000	1,732,000	1,732,000	2,839,000	2,839,000	2,799,000
Number of persons with income/number of persons older than 64	2.85	2.92	2.84	1.71	1.76	1.52
Sum/average ratio *	0.32 %	0.76 %	0.14 %	–0.02 %	–0.01 %	–0.48 %

\* The sum/average ratio shows the relationship between the annual growth rate of the contribution base and that of average income. The ratio is calculated as  $[(1 + \text{percentage increase in contribution base}) / (1 + \text{percentage increase in average income}) - 1] \times 100$ . With a positive sum/average ratio, contributions to the system are growing at a higher rate than the indexation of system liabilities.

In all scenarios it is assumed that the average life expectancy will increase substantially, as shown in the table. As a result, the annuitization divisor will rise from 15.7 for persons born in 1940 to 18.2 for persons born in 1990. With the higher annuitization divisor, the monthly pension for birth cohort 1990 will be 13 percent lower than for cohort 1940, provided those born in 1990 begin withdrawing their pensions at age 65 despite the increase of 3.4 years in their life span. To compensate for the negative effect of this longer life expectancy on the pension level, those born in 1990 will have to work 26 more months, retiring shortly after their 67<sup>th</sup> birthday. The table below shows how either pension levels or the retirement age must change in order to offset the forecast increase in life expectancy for different birth cohorts.

**Average Life Expectancy and Retirement Age**

Cohort born in	reaches 65 in	Forecast annuitization divisor at 65	Effect of change in life expectancy on pension at 65	Retirement age to neutralize effect of life expectancy on pension	Remaining life expectancy at 65, women and men
1940	2005	15.7	–	65 years	18 years, 6 months
1945	2010	16.1	–2 %	+ 4 months	+ 6 months
1950	2015	16.4	–4 %	+ 7 months	+ 11 months
1955	2020	16.7	–6 %	+ 10 months	+ 16 months
1960	2025	17.0	–7 %	+ 13 months	+ 20 months
1965	2030	17.2	–9 %	+ 16 months	+ 24 months
1970	2035	17.5	–10 %	+ 18 months	+ 28 months
1975	2040	17.7	–11 %	+ 21 months	+ 32 months
1980	2045	17.9	–12 %	+ 23 months	+ 35 months
1985	2050	18.0	–13 %	+ 25 months	+ 38 months
1990	2055	18.2	–13 %	+ 26 months	+ 41 months

The average pension at 65 in percent of the average income is shown in the following three staple diagrams.

**In the base scenario**, the average pension level at age 65 drops from 69 percent for birth cohort 1938 to 55 percent for birth cohort 1990. Half of this decrease, or 7 percentage points, is due to the expected increase in

### Calculation of the Pension Level

The calculation of pensions includes only individuals with at least 30 years of pension credit. The reason is to eliminate the effects of immigration and emigration on the calculation of the average pension. Since the portions of income above 8.07 income-related base amounts are not covered by the public pension system, they are not included in the income to be compared. Furthermore, the general pension contribution of 7 percent is deducted from the income to be compared since it is not paid by pensioners.

At present, the average income for persons aged 64 is somewhat lower than the average income for persons aged 16–64. This means that the pension level shown in the staple diagram is a few percentage points less than it would have been if the average pension had been compared to the incomes of 64-year-olds.

### Other Assumptions in the Calculations

For the period 2003–2006, RFV has followed the economic forecast of the National Institute of Economic Research in December 2002. The assumptions on which the scenarios are based do not apply until after 2006, except for the assumptions about the return on the funds, which apply beginning January 2003.

Since the guaranteed pension is price-indexed, the lowest pensions will thus decrease in relation to average income and the tax component of the pension contribution for persons with low incomes will also decrease. The effect over a 75-year period is extremely powerful. If the average income increases by 1.8 percent per year, it will be almost three times as great in 2078 as in 2003. Consequently, the guaranteed pension becomes insignificant long before the end of the calculation period.

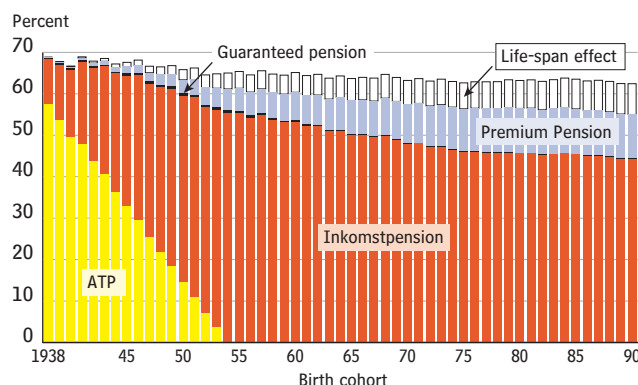
With the pension liability indexed by the growth in average income, it may seem unnecessary to vary the growth in average income in the scenarios. However, since the ATP liability to the

average life span. If the number of working years is increased to neutralize the effect on the pension level, the latter will stabilize at about 60 percent of the average income. The rest of the decrease is due in part to the fact that the calculations are for persons with 30 or more years of work in Sweden. Compared to the new system, the ATP system is particularly generous toward persons who have worked only 30 years.

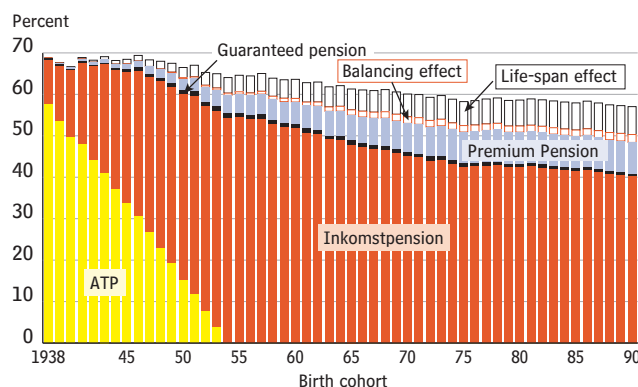
In the base scenario, the rate of return in the premium pension system, 3.25 percent after costs of administration, exceeds the assumed growth rate of 1.8 percent in average income. As a consequence, the premium pension will account for a higher share of the public pension in proportion to its contributions. For birth cohort 1990, the premium pension will average 11 percent of the average income, and the inkomstpension, 44 percent. Thus, the premium pension will account for 20 percent of the total public pension, but only 14 percent of the total contribution. For birth cohort 1938, the guaranteed pension of persons who have worked at least 30 years will be only 0.3 percent of the average income. Since the guaranteed pension is assumed to remain unchanged in constant prices, its relative importance will decrease each year with the growth in income. The realism of this assumption is open to question.

**In the pessimistic scenario**, the growth in average income is lower than in the base scenario – 1 percent instead of 1.8. The rate of return is also lower – 1 percent instead of 3.25. In principle, the lower rate of growth in average income has no impact on pension levels. However, in this scenario, due mainly to low nativity and low return on the buffer fund the balance mechanism will reduce the pension level. For the cohort born in 1990 balancing has reduced the inkomstpension by 2.5 percent of average income to 40 percent of average income. With the lower rate of return, the premium pension is less both in amount and in proportion to the average income. For birth cohort 1990, the premium pension

**Average Pension at Age 65 as a Percentage of Average Income, Base Scenario**



**Average Pension at Age 65 as a Percentage of Average Income, Pessimistic Scenario**

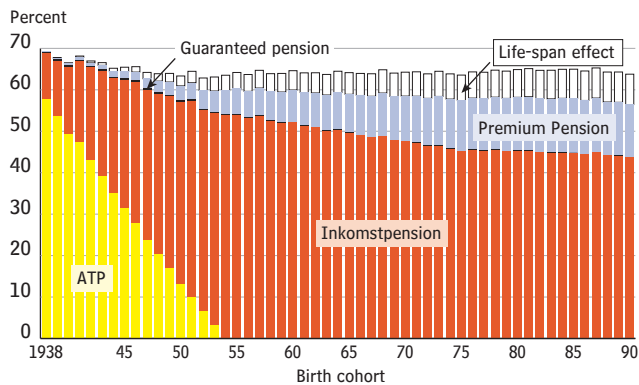


economically active is indexed by the rate of increase in prices, the financial position of the pension system is still influenced by the rate of growth in average income. Moreover, the relationship between the increase in average income and the return on the buffer fund is significant for the financial development of the inkomstpension system. The relationship of the rate of return to growth in average income also affects pension levels via the premium pension. In each of the three scenarios, the buffer fund contributes to a different extent to the financing of the inkomstpension. In the base scenario, the return on the buffer fund exceeds the growth in average income by 1.45 percentage points (3.25–1.8). In the optimistic scenario, the rate of return is 2.5 percentage points higher than the growth in average income. In the pessimistic scenario, the two rates are equal.

### Checkpoint in 2004

Government Proposal 1999/2000:46, "The National Pension Funds in the Reformed Pension System," provided for a "checkpoint" in 2004. This means that in 2004 there will be a new analysis of the possibility of compensating the central-government budget for the initial costs that the pension reform caused. Only after this analysis will the amount to be transferred from the National Pension Funds to the central-government budget be definitely established. If the financial position of the pension system so permits, an additional transfer to the central-government budget will be made on January 1, 2005. This review is to be conducted on the assumptions in the base scenario in the most recent Statistics Sweden population forecast and with assumptions of 2-percent annual growth in pension-qualifying income per person and a real return of 3.25 percent on the assets of the buffer fund. However, the total definitive transfer is not to exceed an amount whose impact on the balance of the National

**Average Pension at Age 65 as a Percentage of Average Income, Optimistic Scenario**



<sup>29</sup> In a study by Elroy Dimson, Paul Marsh, and Mike Staunton, "Triumph of the Optimists", it is shown that the weighted average annual return on capital during the period 1900–2000 was 3.96 percent in real terms for a portfolio of 60 percent stocks and 40 percent bonds invested as a weighted global portfolio on the 16 different capital markets included in the study.

will average 7.6 percent of average income. Given the lower earnings-related pensions in comparison to the base scenario, the guaranteed pension assumes a larger role.

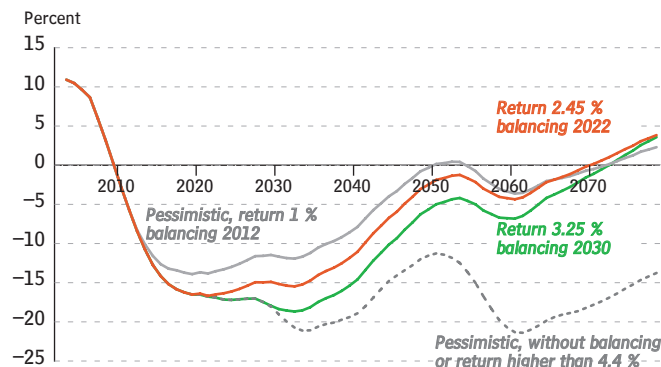
**In the optimistic scenario**, the growth in average income is 2.8 percent, and the rate of return for the premium pension is 5 percent after costs of administration. Since the inkomstpension is indexed by the growth in average income, the inkomstpension is larger in amount if the growth rate for incomes is high, though in proportion to the average income, the inkomstpension is not affected by variations in the growth of income. However, with the return on the premium pension almost twice as high in relation to growth in income, the pension level can resist some of the effect of the longer life span. For birth cohort 1990, the premium pension will average 13.1 percent of the average income, and the inkomstpension 45 percent of average income. If the retirement age were to be raised as the average life expectancy increased, the pension level would increase beginning with the cohorts born around 1950.

increase beginning with the cohorts born around 1950.

### Balancing, Rate of Return, and Guaranteed Pension

A demographic or economic trend with a negative impact on the pension system can be offset by a higher return on the buffer fund. In the pessimistic scenario, balancing is not activated if the real return on the buffer fund is at least 4.4 percent. In the Annual Report for 2001, the corresponding required return was lower, 4.1 percent. At any rate of return between 1.0 and 4.4 percent, balancing will be activated, but later than 2012. A higher rate of return means that the system can afford larger negative net contributions.

**Net Contribution at Different Rates of Return, Pessimistic Scenario**



To illustrate the severity of the strain on the system in the pessimistic scenario the assumed rate of return is varied in this scenario. Instead of 1.00 percent, the real annual rate of return is set at 2.45 or 3.25 percent. The rate of 2.45 percent means that the contribution of the return to the financing of pension disbursements – which is largely determined by the relationship of the rate of return to the growth in average income – is the same as in the base scenario. The rate of 3.25 percent is the same as the return in the base scenario, but it provides a larger contribution to financing pensions than in the base scenario since the growth in average income is only 1 percent in the pessimistic scenario.

From the diagram showing net contribution, it is evident that a real annual rate of return of 4.4 percent is sufficient to

Pension Funds would be equivalent to a one-time transfer of SEK 350 billion on January 1, 1999. In nominal terms, the transfers made so far total SEK 245 billion. In the present projections, the possibility of a further transfer to the central-government budget has not been considered.

#### Managing Possible Surpluses

In Government Proposal 2000/01:70 *Automatic Balancing of the Old Age Pension System*, it was noted that in certain circumstances a surplus would arise in the inkomstpension system. The

Government proposed, and the Swedish Parliament adopted, the guideline that any distributable surpluses are to be allocated to the insured by additional indexation corresponding to the surplus. The Government has appointed a study to generate proposals on the manner of determining distributable surpluses and allocating them among the insured. The findings of the study are to be presented by March 31, 2004. In the present projections, RFV has not considered possible future provisions for managing the surplus.

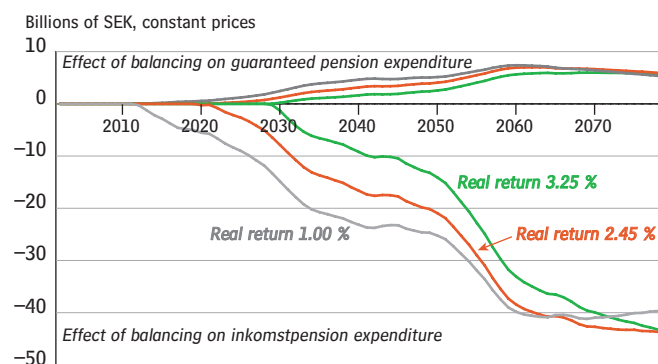


obviate any need to activate balancing.<sup>29</sup> With growth of 1 percent in average income, this rate of return compensates for the strain on the system imposed by a nativity rate of 1.5 children per woman and for the rather substantial increase in average life expectancy assumed in all three scenarios. With an assumed return of 3.25 percent, balancing will be activated in 2030 and will thereafter reduce inkomstpension disbursements by a maximum of 18 percent. With a return of 2.45 percent, balancing will be activated in 2002, and inkomstpension expenditure will decrease by a maximum of 17 percent. With a return of 1 percent, as noted above, balancing will be activated in 2012, and inkomstpension expenditure will be lowered by a maximum of 15 percent. Note that these figures result from calculations where no assumptions are made about annual variations in growth or rate of return. Thus, they understate the risk that balancing will be activated for brief periods.

If balancing is activated, indexation is reduced, as is the pension level in relation to average income. Through the design of the guaranteed pension, individuals with earnings-related pensions of 0–1.26 price-related base amounts (0–1.14 for married persons) will be unaffected by balancing, in fact this groups total pension (earnings-related and guaranteed pension) is not at all related to the development of the indexation of the inkomstpension. The guaranteed pension provides, for these insured, full compensation for the reduction in the inkomstpension due to balancing or a growth in the income index less than 1.6 percent more than the CPI. Pensioners in the income bracket between 1.26 and 3.07 price-related base amounts (1.14–2.72 for married persons) will receive compensation for 48 percent of the reduction in their earnings-related pensions caused by balancing, or a “slow” income index growth. Other categories will receive no compensation at all. With the compensation provided by the guaranteed pension, the central-government budget will partly finance the reduction in the inkomstpension resulting from a negative tendency. Thus, with developments that normally involve contraction in the resources of the economy, there will be a larger element of income redistribution in the overall public pension system.

The higher cost of the guaranteed pension is equivalent to 10 to 20 percent of the saving by the pension system when it is balanced. As mentioned previously, this increased cost is borne by the central-government budget, not by the inkomstpension system.

#### Effect of Balancing on the Inkomstpension and the Guaranteed Pension, Pessimistic Scenario



## Special Feature Article: The Balance Ratio – A steady Gyroscope for the Inkomstpension?

*One innovative feature of the pension reform is that the financial position of the pay-as-you-go system is described in terms of assets and liabilities. Through dividing assets by liabilities, a measure of the financial position of the system – a balance ratio – is obtained. Only with knowledge about the future can we tell whether a shift in the value of the factors determining the balance ratio is the effect of temporary variation or long-term change. Automatic balancing functions as if each change were due to long-term causes. This makes for simple decision rules, but also entails a risk that balancing will be allowed to affect indexation of pensions and pension balances in a way that with hindsight may prove unjustified. This article explores the risk that the inkomstpension will be affected by temporary changes in the value of the factors determining the balance ratio.*

### Introduction

The inkomstpension system is financially stable in the sense that it can finance its pension commitment with a fixed contribution rate. Thus, with a fixed contribution the system will always be able to finance pensions based on rules that are also fixed. To put it more technically, the system is financially stable since it has been so designed that the present value of its buffer fund and the net present value of contributions and pensions can not be negative.

The foundation of the system's financial stability is that for each krona of pension credit earned in the system, one krona is paid into the system. In the work on the pension reform, this feature of the system has been taken to mean that the system is defined-contribution. The fact that pension credit earns a return equal to the growth in average income also contributes to the financial stability of the system. Probably the most important stabilizing feature designed into the system, however, is that pensions are calculated on the basis of the current life span. This is done by means of so-called annuitization divisors. Nevertheless, these three stabilizing properties do not give the system complete financial stability. For the system to be fully stable financially, there are provisions for so-called automatic balancing.

The balancing provisions are activated if the so-called balance ratio drops below 1.00. The balance ratio can be regarded as the counterpart to the *solvency ratio* of funded systems. But while the solvency ratio of a funded system indicates the value of funded assets in relation to the pension liability, the balance ratio shows the total value of the contribution flow and the assets of the buffer fund in relation to the pension liability. The buffer fund is always substantially less than the pension liability; currently it is equivalent to approximately 9 percent of that liability. For a funded system, the solvency of a pay-as-you-go system is by definition insufficient. The principal "asset" of a pay-as-you-go system is the value of future contributions.

If the balance ratio is less than 1.00, the financial stability of the system is assured by special provisions for indexation, so-called automatic balancing. The mechanics of the rules for balancing are explained on page 32. With



these rules, there is a risk that changes in the value of the factors determining the balance ratio will affect the size of pensions. In financial economics, the term “volatility” is customarily used for the degree of variation from the average trend, as measured by the standard deviation (the square root of the average of the squared deviations from the mean).

The historic development of proxies for the four factors determining the balance ratio is described below. The development thus described is then used to reconstruct annual changes in what is termed a theoretical balance ratio for the period 1981–2001. The article concludes with a discussion on the question whether the balance ratio can be regarded as a stable gyroscope for the inkomstpension system.

The presentation below is intended primarily for readers thoroughly familiar with the reformed system. Readers not interested in following this rather technical discussion can go directly to the conclusions in the section “Has the Question Been Answered?” on page 55.

## Growth in Total Earnings – the Return on the Contribution Asset

The contribution to the inkomstpension has been set at 16 percent. In a pay-as-you-go system with a fixed contribution, the contribution revenue varies with the size of the contribution base. Thus, the so-called contribution asset of the inkomstpension also varies at the same rate. In Sweden, the principal component of the contribution base is total earnings. Since pensions are largely financed directly by contribution revenue, variations in total earnings affect the capacity of the system to finance pensions. Changes in total earnings reflect the number of employees, average hours worked per employee, and the development of productivity that results in rising or falling hourly earnings. The number of employees varies with the number of persons of working age, which in turn is dependent on the birth rate, migration, and the proportion of employees of working age. The development of nominal total earnings also includes inflation.<sup>30</sup>

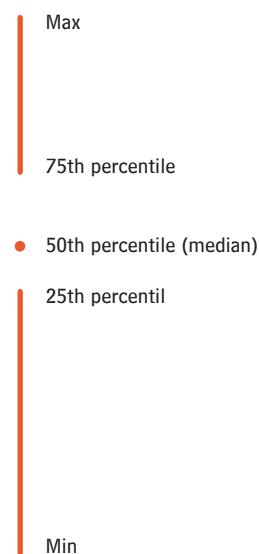
During the period 1964–2001, the average annual increase in nominal total earnings was 8.2 percent (median 7.9). The corresponding increase in the consumer price index was 5.9 percent. The annual increase in real total earnings has thus averaged 2.3 percent.

## Growth in Earnings per Employee – the Return on the Pension Liability

The inkomstpension liability is compounded by a return equal to the income index, as long as the balance mechanism is inactive. The principal component of the income index is earnings per employee. During the period 1964–2001, earnings per employee increased by an annual average of 7.5 percent (median 7.4). Adjusted for inflation, the annual increase was 1.6 percent. Thus, real annual earnings per employee increased by an average of 0.7 percent less than total earnings. If other determinants of the balance ratio are disregarded, this means that the balance ratio on average would have increased by about about 0.7 percent per year. This strong growth is explained by the increasing population of working age and the rising numbers of gainfully employed women during the period.

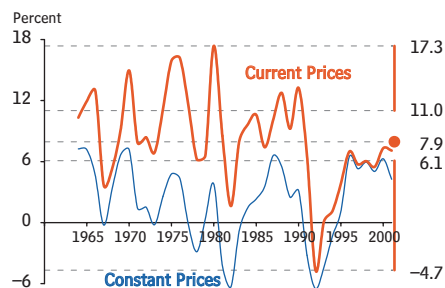
Growth in earnings per employee has been more stable than total earnings. This is shown both by the “spread illustrations” on the right hand side of the diagrams and by the smaller standard deviation of earnings per employee – 3.4 percentage points – compared to 4.5 for total earnings.<sup>31</sup>

How to read the diagrams



### Annual Percentage Change in Total Earnings 1964–2001

Three-year moving average



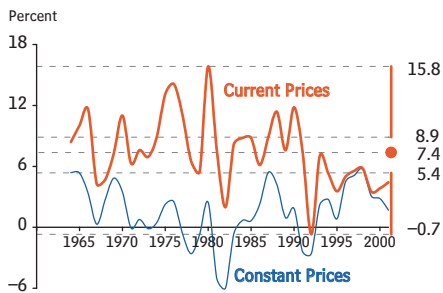
Source: National Accounts, adapted by Hans Olsson

<sup>30</sup> The contribution asset in the balance ratio is calculated on the basis of nominal contribution revenue. The pension liability is also expressed in nominal terms. Thus, it is the nominal development of the contribution base that is of interest in analyzing the expected volatility of the balance ratio.

<sup>31</sup> The standard deviation would have been lower if the income index had not been designed to speed up the compensation for changes in the CPI. See “income index” in the List of Terms and Equation 1.2 in the Technical Appendix.

### Annual Percentage Change in Earnings per Employee 1964–2001

Three-year moving average



Source: National Accounts, adapted by Hans Olsson

<sup>32</sup> Change in sum/average ratio

$$= \frac{1 + \text{percentage change in income index}}{1 + \text{percentage change in contribution base}} - 1$$

### The Sum/Average Ratio

The increase in the contribution asset is determined primarily by the growth of the contribution base. The increase in the liabilities of the pension system, by contrast, depends largely on the growth in average income as measured by the income index. If the growth of the contribution base (sum) is higher than the growth in average income (average), the contribution asset of the system will increase more rapidly than its liabilities. The financial position of the system will be strengthened, and the balance ratio will rise. On the other hand, if the growth of the contribution base is less than that of average income, the financial position of the system will weaken, and the balance ratio will fall.

This relationship – the sum/average ratio – is central to the balance ratio and is described in the diagram on page 49.<sup>32</sup> Since total earnings and earnings per employee are used here, the sum/average ratio is the same as the change in the number of employees. The latter, in turn, is an accurate indicator of the number of persons with employment. In reality, however, the sum/average ratio will not directly reflect changes in employment since transfer payments and so-called pension-qualifying amounts are included in the contribution base.

As noted previously, the rise in the working-age population and in the number of women gainfully employed led to an increase in total earnings that exceeded the increase in earnings per employee by an annual average of 0.7 percent. The average change in the sum/average ratio is therefore 0.7 percent (median 1.2). The standard deviation is 1.9 percentage points.

The crisis years of 1991–1994 had a very negative impact on the sum/average ratio because of the sharp drop in employment. Unemployment was increasing, while the supply of labor was decreasing. People of working age were leaving working life, one reason being to study. In the crisis year of 1993, total earnings increased by 0.1 percent, whereas earnings per employee went up by 7 percent. As a result, the sum/average ratio dropped by a full 6.5 percent, the most negative figure of the entire period. If the decreases in the sum/average ratio in 1991–1994 are totaled, it can be seen that unless the balance ratio had exceeded 1.10–1.15, balancing would have been activated during the crisis of the 1990’s. The interval is dependent among other things on the size of the buffer fund in proportion to the “total assets” of the system.

### How the Balance Ratio is Calculated

The balance ratio, *BR*, is determined by contribution revenue, *C*, turnover duration, *T*, the buffer fund, *F*, and the pension liability, *D*, and is calculated as follows:

$$BR = \frac{(C \times T) + F}{D}$$

See the Technical Appendix for detailed information on the calculation of the balance ratio.

#### Contributions and Turnover Duration

The value of the flow of contributions is the product of the contribution revenue, *C*, and turnover duration, *T*. The product is called the contribution asset, *CA*. *C* is calculated as an average of the contribution revenue for the most recent three years. In the calculation of the three-year moving average, inflation is managed in the same way as in the income index. *T* is calculated as a three-year moving median. The corresponding smoothing has been done in the calculations.

Since the contribution rate is fixed at the level of 16 percent, contribution revenue is determined solely by the development of the contribution base. Turnover duration is determined by the development of the age-related income and mortality patterns.

#### Buffer Fund

The First–Fourth National Pension Funds constitute the buffer fund of the system. The Sixth National Pension Fund is also a form of buffer fund and is included in *F*. The buffer fund is valued at market prices as of December 31 each year. The change in the value of the buffer fund consists partly of the difference between the contributions paid into the system and the pensions paid out, and partly of the return on the fund.

#### Pension Liability

The pension liability, *D*, comprises the system’s commitment to the insured. The value of this commitment is calculated as of December 31 each year. The rules for this calculation are described in Section 4 of the Technical Appendix. The pension liability is increased by the new pension credit earned and decreased by the payment of pensions. In addition, the pension liability is

In contrast to the crisis of the 1990's, it is interesting to review what happened in the early 1980's. The decline in total earnings at that time was generally just as dramatic as in the early 1990's. However, the high inflation rate in the 1980's meant that the drop in total earnings was followed by a decrease in the real value of earnings per employee. This change in earnings, which was larger in real terms, may have tended to limit the decrease in employment. With the lower inflation rate established in the early 1990's, substantial nominal reductions in earnings would have been required for the same downward adjustment in real earnings as in the crisis of the 1980's.

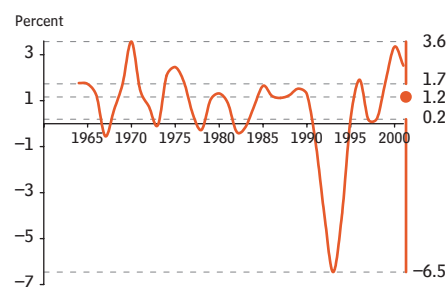
## Turnover Duration – the Key to Understanding Pay-As-You-Go Financing

Turnover duration is the average expected length of time between the payment of a contribution to the system and its repayment in the form of a pension. Turnover duration can also be described as the difference between the average age of pensioners during the period of disbursement and the average age during the period of contribution. The ages are weighted by the relative size of each age group's expected contribution and pension.

Turnover duration is used for valuation of the flow of contributions. This involves multiplying contribution revenue by turnover duration; the product is termed the contribution asset.<sup>33</sup> The availability of data has limited the calculation of the average contribution and disbursement ages to the period 1980–2002. During this time, the average disbursement age has gone up from about 72 to about 75 as a result of the longer average life span. At the same time, the average contribution age has remained stable at around 43. "Pay-in duration" is the term for the period between the average contribution age and the average age – currently 64.8 years – when persons begin to withdraw their pensions. The period from the latter point to the average disbursement age is called "pay-out duration".<sup>34</sup>

### Annual Percentage Change in Sum/Average Ratio\* 1964–2001

Three-year moving average



\* Equal here to the percentage change in number of employees.

<sup>33</sup> The present value of an infinite annual revenue of SEK 1 is equal to 1 divided by a discount factor. The inverse of turnover duration is the discount factor of the flow of contributions.

<sup>34</sup> The calculation of pay-in and pay-out duration is shown in the Technical Appendix, Equations 3.1 and 3.2.

affected by the compounding (indexation) of pension balances and pensions. Finally, the pension liability to retirees is influenced by changes in average life span. If the average life expectancy increases, so does this portion of the pension liability. The effect of changes in life expectancy on the pension liability and thus on the balance ratio are disregarded throughout this article.

### Changes in the Balance Ratio

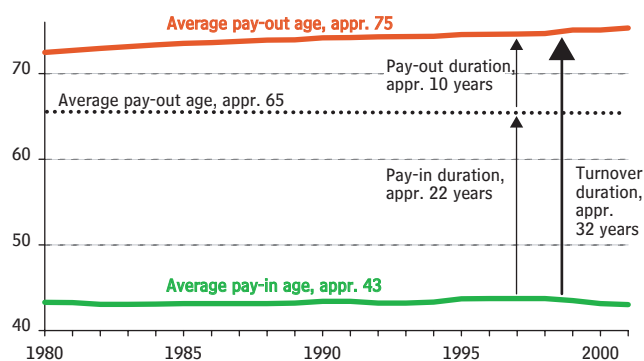
The change in the value of the buffer fund resulting from the flow of contributions and pensions in the system also changes the pension liability by exactly the same amount. The reason is that each contribution to the system results in an equivalent amount of pension credit, and that no pension credit is earned without a contribution. Consequently, for balance ratios close to 1.00, flows of contributions and pensions can be ignored when changes in the balance ratio are to be analyzed. If the balance ratio is greater than 1.00, however, the balance ratio will be affected by changes in assets and liabilities that are equal in monetary amount.

For balance-ratio levels close to 1.00, changes in the balance ratio are thus due solely to the following factors: changes in total earnings, changes in turnover duration, the return on the buffer fund, and changes in the income index. Moreover, the change in the balance ratio is affected by the relative amounts of the contribution asset and the buffer fund at the beginning of each year.

In the calculations of annual changes in a theoretical balance ratio during the period 1981–2001, it has always been assumed that the balance ratio is one (1) at the outset of the year for which the calculation is made. This method has been chosen partly because changes in the level of the balance ratio are most interesting when the balance ratio is close to 1.00, and partly because the method makes it possible to study the volatility of the balance ratio without considering the actual assets and liabilities of the system or its flows of contributions and expenditure. Since the balance ratio at the outset of each year is assumed to be 1.00, the averages for the change in the determining factors are arithmetic means. In the article, no consideration is given to the fact that the balance ratio will be affected by a number of factors

### Pay In and Pay Out Duration, etc. 1980–2001

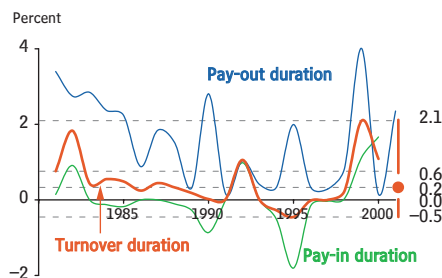
Three-year median



<sup>35</sup> The effect of the increasing turnover duration can also be expressed by stating that the discounting factor for calculating the present value of the flow of contributions has decreased from 3.6 percent ( $=1/28$ ) to 3.1 percent ( $=1/32$ ).

### Annual Percentage Change in Turnover Duration 1981–2001, etc.

Three-year median



As a consequence of longer pay-out duration, turnover duration has increased from 29 to 32 years. Thus, the greater average life expectancy has increased the capacity of the contribution flow to finance the pension liability by the equivalent of three years of contribution revenue, or approximately 12 percent.<sup>35</sup> It may seem illogical that with a higher average life expectancy the flow of contributions can finance a larger pension liability. The explanation is that the disbursement rate decreases when the average life expectancy increases. In a pay-as-you-go system, the flow of contributions can then finance a larger pension liability. Normally, however, a longer average life expectancy means that the pension liability rises by more than the increase in the capacity of the contribution flow to finance the pension liability. Consequently, a longer average life expectancy will normally weaken the financial

position of a pension system.

On average, turnover duration increased by 0.45 percent per year (median 0.2), with a standard deviation of 0.6 percentage points. The spread illustration shows that 50 percent of the annual variations lie within the interval between 0 and 0.6 percent. The largest annual variation, 2.1 percent, is in 1999. The degree of volatility in turnover duration reported here has probably been overestimated, the reason being that the contribution base was redefined in 1998/1999 in conjunction with the transition to the new system. The picture of the volatility in turnover duration would probably be more accurate if the years 1998–2001 were excluded from the calculation period. In this case the standard deviation would be less than 0.5 percentage points.

During the crisis of the 1990's, pay-in duration decreased substantially, by almost 3 percent. In this same period, the rate of labor-force participation decreased more for younger persons than for older ones, probably a typical pattern in economic downturns and recessions. If older persons earn a larger share of pension credit, the average contribution age increases, thus shortening pay-in and turnover duration.

during the phasing out of the ATP-system, which continues until 2018.

### Factors Used – Proxies

The factors that determine the balance ratio cannot be re-established exactly for past years. For this reason, the calculations must be based on proxies for these four factors. As a proxy for the contribution base, total earnings are used for the period 1964–2001. The development of earnings per employee in 1964–2001 is used as a proxy for the income index. The return on the buffer fund is estimated from the yields of shares listed on the Stockholm Stock Exchange and the returns on Swedish government bonds. Turnover duration is calculated from largely the same data that would have been used if turnover duration had been calculated in the years 1981–2000, and from the turnover duration actually used for the years 2000 and 2001.

The contribution base differs from total earnings, and the income index differs from earnings per employee. For instance, the contribution base includes transfer payments to replace lost earnings in certain situations. This is the case, for example, with

unemployment compensation, which becomes more prevalent when employment declines. Quite likely, therefore, the ratio between the change in total earnings and the change in earnings per employee is more variable – in other words, has a higher standard deviation – than the corresponding ratio for the contribution base and the income index. The figure to the right shows the contribution base and the incomes used for the income index and indicates their relationship to total earnings and earnings per employee.

### Contribution Base and Income Index

By using total earnings and earnings per employee as proxies for the contribution base and the income index, respectively, the calculations presented here probably overstate the volatility of the balance ratio. Also tending to exaggerate balance-ratio volatility is that the trend of the Stockholm Stock Exchange is the sole proxy for the return on stocks.

## The Buffer Fund Volatility

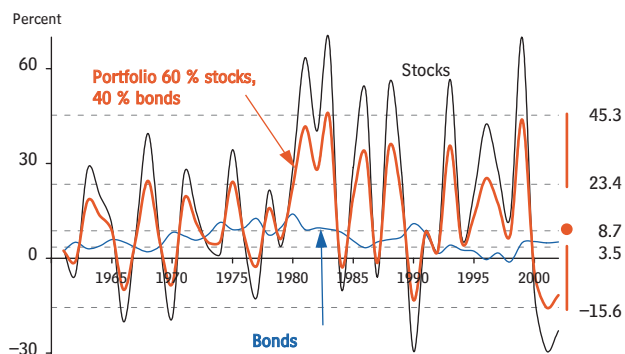
In order to calculate the volatility of the balance ratio, it is necessary to make assumptions about the size of the buffer fund in relation to the pension liability and the contribution asset and about the way in which the buffer funds have invested their capital.<sup>36</sup> Here, however, the contribution of the buffer fund to the volatility of the balance ratio is estimated solely from historical share prices on the Stockholm Stock Exchange and the prices of Swedish government bonds. This is done for practical reasons – it would be preferable to choose a global yield series for stocks and bonds, but unfortunately no such series was available for the period from 1960, for which estimates have been made.

The annual nominal return on stocks was 16.7 percent. The standard deviation was also high, 26.6 percentage points.<sup>37</sup> Particularly after 1980, the return on stocks has been high and irregular. The stock-market plunge since March 2000 brought the yield index at the end of 2002 down to its 1997 level. The average nominal return on bonds was 6.2 percent per year, barely more than the inflation rate. The standard deviation for bonds was 3.5 percentage points.

It is assumed here that the buffer fund at the outset of each year invests 60 percent of its assets in stocks and 40 percent in bonds. With this kind of investment strategy, the average annual nominal return is 12.4 percent (median 8.7), and the standard deviation is 15.8 percentage points.

### Annual Nominal Return, Stocks and Government Bonds 1961–2002

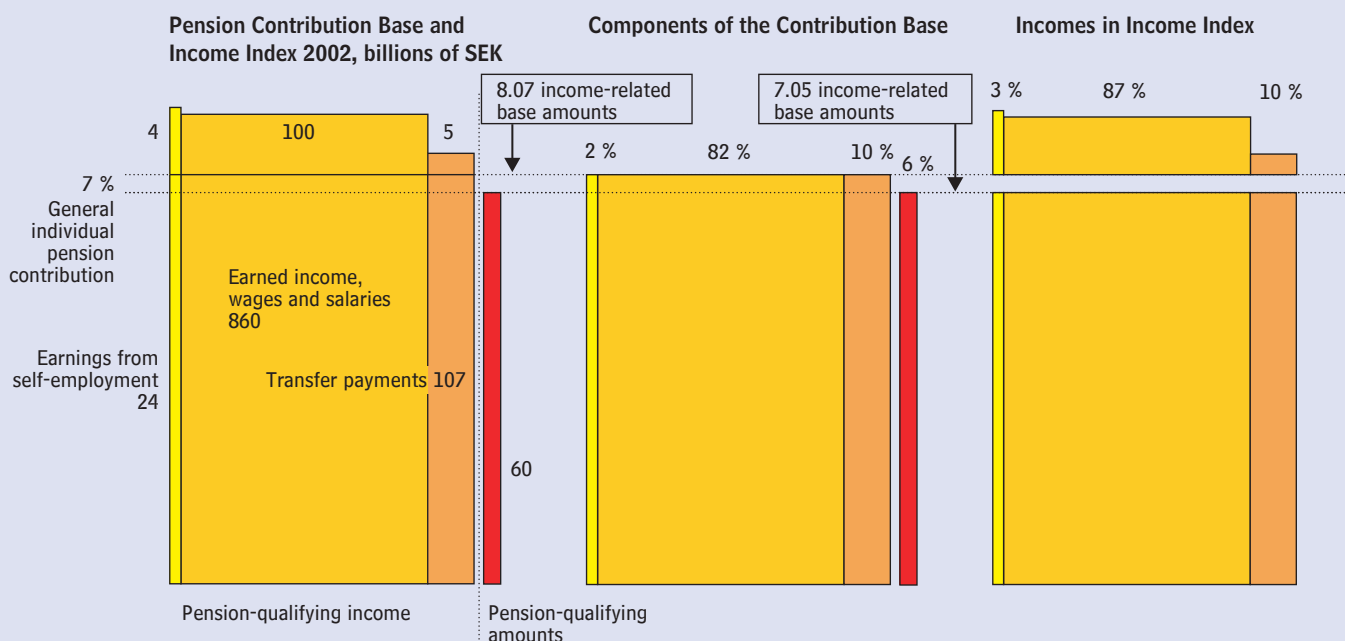
Shares listed on the Stockholm Stock Exchange and Swedish government bonds



Source: Frennberg and Hansson

<sup>36</sup> As stated in Note 14 to the financial statements, 60 percent of the assets of the buffer fund are invested in equities and 40 percent in interest-bearing securities. Almost 40 percent of the equity portfolio consists of Swedish stocks, and approximately half of the interest-bearing portfolio is made up of bonds with Swedish issuers.

<sup>37</sup> The standard deviation in the annual yield of a global stock portfolio is customarily held to be 16–18 percentage points.

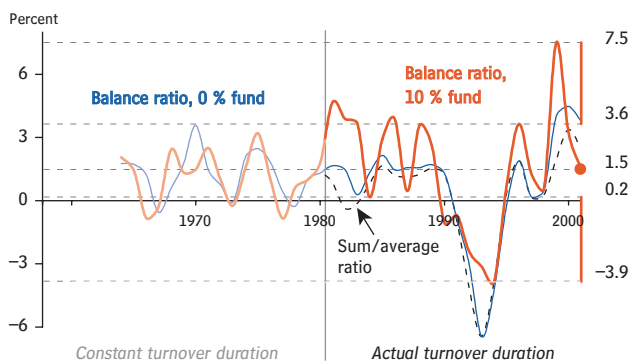




## Putting the Numbers Together – Volatility in a Theoretical Balance Ratio

If the changes in the different variables affecting the balance ratio are taken together, it is possible to calculate a series of annual changes in percent for a theoretical balance ratio. The result of such calculations is presented in the diagram. There the volatility of the balance ratio has been calculated under two different assumptions about the size of the buffer fund in proportion to total assets – 0 percent and 10 percent. The level of 10 percent was chosen because it roughly represents the current size of the buffer fund in relation to the pension liability. In the "0 % fund" calculation, the movements in the balance ratio are of course independent of the stock and bond markets. Regardless of the assumed size of the fund, the balance ratio at the outset of each year is set at 1.00.

Annual Percentage Change in a Theoretical Balance Ratio



The base alternative in the diagram is "10 % fund", 1981–2001, the period for which turnover duration has been calculated. In the period 1981–2001, the average increase in the balance ratio is 1.6 percent (median 1.5), and the standard deviation is 2.7 percentage points.

The difference between the balance ratio for 0 % fund and the balance ratio for 10 % fund shows how much the buffer fund contributes to the volatility of the balance ratio. The buffer fund increases this volatility, but it also tends to make the balance ratio grow more rapidly than it would without the fund. Since it has only been possible to calculate the change in turnover duration from 1981 on, it has been assumed that turnover duration was constant in the period 1964–1980. Thus, the change in the balance ratio is exactly the same as the change in the sum/average ratio in the 0 %-fund calculation for the period 1964–1980. Beginning with 1981, the balance ratio for 0 % fund (blue curve) differs marginally from the sum/average ratio (dashed black curve). The reason why the difference is so small is that the volatility in turnover duration is quite limited.

Moreover, it is apparent that the dramatic plunge of the sum/average ratio in 1993 does not fully impact the balance ratio in the case of 10 % fund. The buffer fund reduces the drop in the balance ratio by more than 3 percentage points even though the fund in this case only accounts for 10 percent of assets. The explanation for the strong influence of the fund on the balance ratio is that in 1993 the return was a full 37 percent.

The distribution of the annual changes in the proxies for the underlying factors of the balance ratio, and in the theoretical balance ratio, is shown in the diagram on the following page. The diagram supplements the information on volatility provided by the standard deviation. The negative skew of the sum/average ratio, and the greater depth of the drop in this ratio compared to the height of its peak, are reflected in the long lower line for the sum/average ratio (quartile 1); also the distance between the median and the 25<sup>th</sup> percentile is greater than between the median and the 75<sup>th</sup> percentile. The distribution of the percentage changes in the balance ratio in the case of 0 % fund is quite similar to that of the sum/average ratio, but the values are somewhat higher since turnover duration is increasing during the period. In the case of 10 % fund, the distribution of the percentage changes in the balance ratio is different; the distribution becomes symmetrical around the median.

### Statistical Summary, Percent

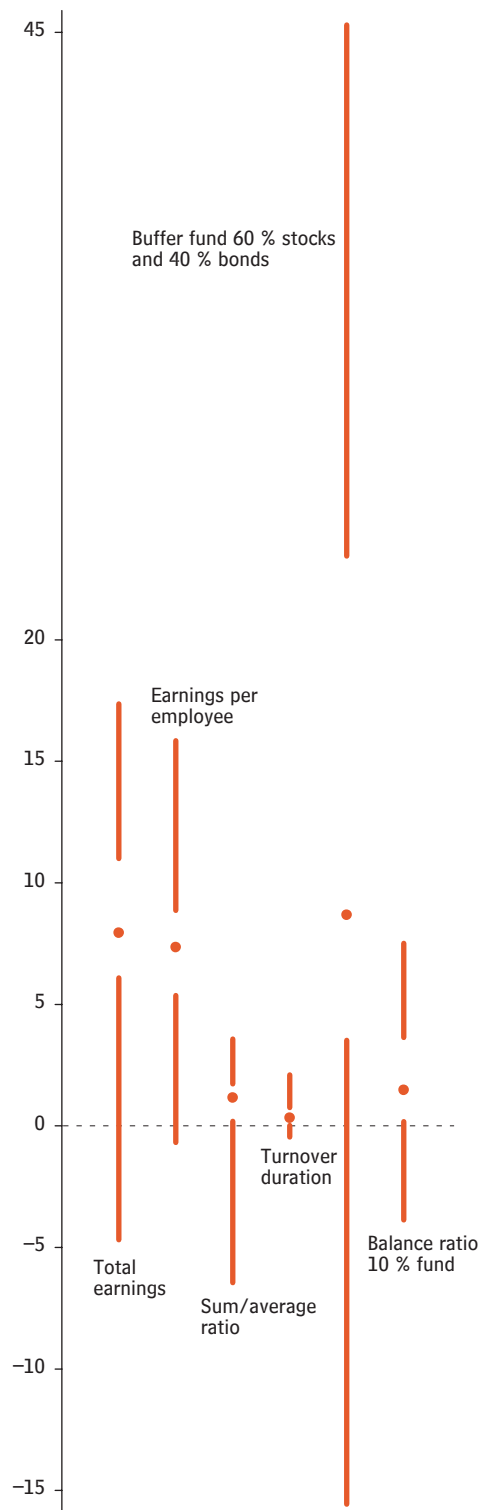
	Mean, arithmetic		Standard deviation, percentage points	
	1964–2001	1981–2001	1964–2001	1981–2001
Consumer price index	5.9	5.1	3.7	3.9
Total earnings	8.2	6.4	4.5	4.2
Earnings per employee	7.5	6.3	3.4	2.9
Sum/average ratio	0.7	0.1	1.9	2.3
Turnover duration	0.3*	0.5	0.5*	0.6
Buffer fund	12.5	18.0	15.8	18.2
Balance ratio, 0 % fund	0.9*	0.5	2.0*	2.6
Balance ratio, 10 % fund	1.4*	1.6	2.2*	2.7

\* Calculated as if turnover duration were constant in the period 1964–1980.

In the 10 %-fund alternative, the standard deviation of the balance ratio has been calculated at 2.7 percentage points. It has also been calculated that the standard deviation would have decreased to 2.4 percentage points if it had been possible to calculate turnover duration beginning in 1964. If the return on a global portfolio had been used instead of the return on Stockholm Stock Exchange equities, the standard deviation would have decreased by an estimated additional 0.2 percentage point. No calculation has been made of the reduction in standard deviation that would have resulted if the contribution base and the income index could have been used in the analysis, instead of total earnings and earnings per employee. It is estimated, however, that such a change would have reduced the standard deviation to about 2 percentage points. This estimate applies when the balance ratio is close to 1.00.

### Variation of Annual Percentage Changes in the Balance Ratio and Its Underlying Factors

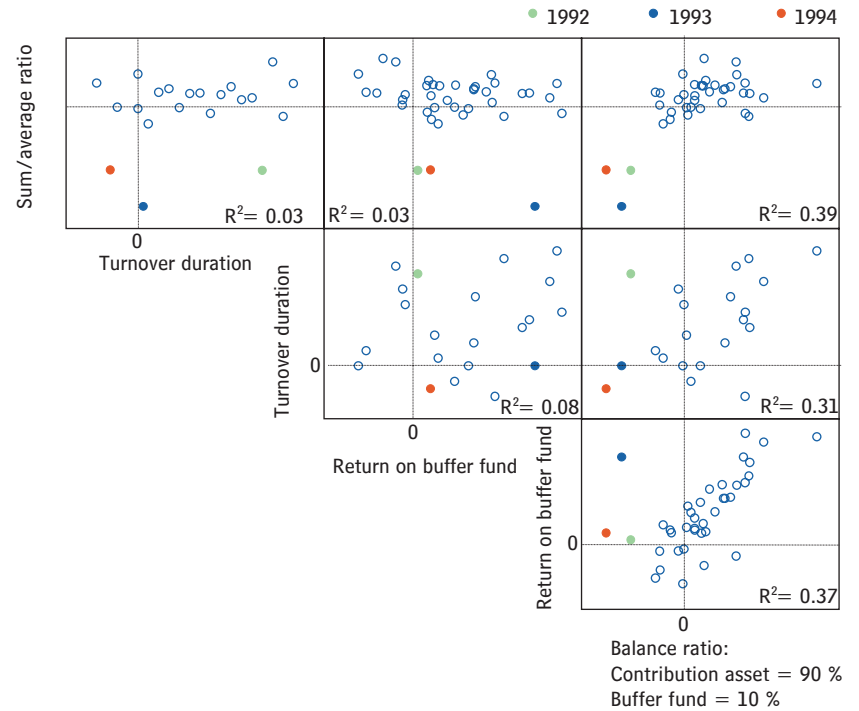
Summary of the spread illustrations  
Percent



### Contribution of Each Factor to the Balance Ratio Volatility

In the diagram below, each year's change in the underlying factors is shown together with the same year's change in the theoretical balance ratio; see the three boxes at the far right. The same has been done for each factor in relation to every other factor. The three years with the greatest reduction in the balance ratio – 1992, 1993, and 1994 – are shown in color.

Scatter Diagram Matrix, Annual changes



Turnover duration is calculated for the period 1981–2001, or with 21 observations. For other underlying factors, the period is 1964–2001, with 38 observations. Turnover duration has been assumed constant in 1964–1980 in cases where the change in the sum/average ratio and the return on the fund are shown together with the change in the balance ratio.

In the box at the upper left, the change in the sum/average ratio is shown together with the change in turnover duration that same year. It is apparent here that there is generally no correlation between the changes in these two factors. In principle, it is reasonable to imagine that the sum/average ratio would be correlated with turnover duration since pay-in duration probably decreases in economic downturns. As is evident, however, no correlation can be found between the sum/average ratio and turnover duration. To determine whether the lack of correlation is an effect of pay-out duration on turnover duration, the correlation between sum/average ratio and pay-in duration was tested. However, no correlation could be found in this case, either. The absence (if that is the case) of covariation between the sum/average ratio and turnover duration is positive since the volatility of the balance ratio is thereby diminished. Furthermore, it has not been possible to find any correlation between the change in turnover duration and the return on the buffer fund, or between the return and the sum/average ratio. On the other hand, the lack of correlation between the changes in these factors is not surprising.

The R2 values in the diagram indicate how large a proportion of the variation in one underlying factor may be regarded as dependent on the variation in the other. Thus, changes in the sum/average ratio account for some 39 percent of the change in the balance ratio. The liaison between changes in the sum/average ratio and the balance ratio is surprisingly low. Moreover, the liaison found is rather heavily dependent on the rather sharp decrease in



the sum/average ratio in 1992–1994. The relationship between the change in the sum/average ratio and the balance ratio is not linear.

## Has the Question Been Answered?

Is the balance ratio a steady gyroscope for the inkomstpension system? An informative, though not fully satisfactory answer is that if the future volatility of the underlying factors that determine the balance ratio is similar to the historical pattern, the balance ratio will have a standard deviation of about 0.02 balance-ratio units. What this volatility means for pensions, however, will depend on the level of the balance ratio. If the balance ratio is sufficiently high, temporary negative tendencies will not affect the indexation of pensions or pension balances. For this reason, the average trend in the underlying factors of the balance ratio will determine whether temporary variations in these factors will affect indexation. In the table below, the risk that balancing will be activated, and activated with a certain intensity, is estimated for different opening levels of the balance ratio; here the standard deviation is assumed to be 0.02 balance-ratio units regardless of the level of the balance ratio.

### Probability in Percent that Balancing Will Be Activated With a Certain Intensity\*

Given a balance ratio in year 0 of	... the probability is that balancing will reduce indexation in year 1 relative to income indexation with...				
	0 % or more	1 % or more	2 % or more	3 % or more	4 % or more
1.00	50	31	16	7	2
1.01	31	16	7	2	1
1.02	16	7	2	1	0
1.03	7	2	1	0	0
1.04	2	1	0	0	0

\* The effect of the rules for rounding off the balance ratio has not been considered in the calculation.

During the period 1964–2001, the balance ratio would have increased strongly, primarily from the growth in the labor supply resulting partly from a larger number of women gainfully employed. The high rate of return on stocks would also have led to a strong increase in the balance ratio. With this historical average, the balance ratio would soon have been so high that in principle none of the movements observed in the factors determining the balance ratio would have activated balancing. However, if the measurement period is limited to the years 1981–2001, the annual growth rate of the sum/average ratio decreases – in this case by the same rate as the increase in the number of persons employed – from 0.7 percent to 0.1 percent.

In the population forecasts of Statistics Sweden, which RFV uses in its projections for the pension system, the number of persons presently considered to be of working age (16–64 years) will be more or less constant in the period ahead. An assumption that immigration will remain substantial is one reason why the population in this age interval does not decrease in the forecast. In RFV's base scenario, the employment ratio, approximately 78 percent, remains largely constant in the future. The annual return on the buffer fund is assumed in the base scenario to be 3.25 percent in real terms, about half of the historical average of some 6 percent that has been calculated for a fictitious buffer-fund portfolio. If turnover duration and average life expectancy are assumed to be constant, only the assumed return on the buffer fund will contribute to a systematic strengthening of the balance ratio. More precisely, the system will be bolstered by the return in excess of the assumed

<sup>38</sup> As the balance ratio increases, the contribution of the return on the fund to the strengthening of the balance ratio changes.

<sup>39</sup> The standard deviation of 0.02 has been estimated on the assumption that the balance ratio is 1.00 at the beginning of the year. At other levels of the balance ratio, the standard deviation changes, but the change is marginal as long as the difference between the balance ratio and 1.00 is not excessively large.

increase in the income index, 1.8 percent. Given a buffer fund equivalent to some 10 percent of the pension liability and a balance ratio of 1.00, the fund will contribute to an annual increase of 0.15 percent in the balance ratio.<sup>38</sup>

One point of departure for the estimate in the table is that the average increase in the balance ratio is zero instead of the historically measured increase of 0.5–1.6 percent per year noted above. The principal assumption underlying the risk assessment, however, is that the standard deviation of the annual change in the balance ratio is 2 percentage points.<sup>39</sup> The table hopefully conveys a certain sense of the probability that balancing will be activated and by how much. The volatility to be expected in the balance ratio, however, should be explored more thoroughly than space permits in this article. One problem that has been virtually ignored relates to the risk that the balance ratio will decrease for several years in a row, as it would have in the period 1990–1994. Another critical question is how much the volatility of the sum/average ratio is actually diminished by the broader contribution base in relation to total earnings. These and other relevant issues are being analyzed in the study currently in progress on surpluses in the old-age pension system; the report on this study is to be presented to the Government no later than March 31, 2004.

In summary, it can presently be noted only that the balance ratio appears to be a guidance mechanism that is reasonably capable of keeping the pension system on a steady course. It is perhaps clearer that the balance ratio is the most effective instrument identified so far for ensuring the financial stability of a pension system of the pay-as-you-go variety. It is important, however, not to exaggerate the significance of the balance ratio for the development of the inkomstpension system. The primary factor affecting the growth in the value of pensions is the rate of increase in incomes in Sweden. Second most important is the development of the relationship between the average life expectancy and the retirement age. The balance ratio ranks third in importance among the determinants of growth in the level of pensions.

### Is the Price for Financial Stability High?

To ensure financial stability involves a difficult trade-off between decision rules simple enough to be legislated and thus capable of functioning automatically, on the one hand, and the risk of welfare losses if these simple decision rules come into play "unnecessarily," on the other. The alternative of rules would have been some sort of elaborate judgment and, reasonably, political decision-making. Such type of piloting of the pension system would, however, have the drawback of creating uncertainty about the reaction to a particular course of demographic or economic development. That form of uncertainty may be greater and more harmful than the uncertainty resulting from the volatility of the factors affecting the outcome of a simple and legislated decision rule.

In a discussion on the design of the system in this regard, it is important to remember that the design is intended to ensure the financial stability of the system. If the design of balancing is to be evaluated, there must be a comparison with alternative ways of achieving the same end. The alternative considered during the course of the study was to index the pension liability to the growth in the contribution base. It is a common misconception that indexation to the growth in the contribution base guarantees financial stability in the type of unfunded but defined-contribution system represented by the inkomstpension.<sup>40</sup> One reason for this erroneous belief appears to be that the existence of the turnover duration and its importance have not been considered.

Not only is indexation to the development of the contribution base inadequate to guarantee financial stability, it is also volatile. The more limited volatility of average income compared to total earnings is in itself an argument for designing the indexation in the manner adopted, i.e. an index reflecting average income growth in combination with a limitation provision.

Even more important, the chosen design means that the system will accumulate surpluses when the demographic and economic tendency is favorable. Consequently, a negative trend, such as declining employment, will not necessarily affect the indexation of pensions and pension balances. The effect of declining employment will depend on the level of the balance ratio before the economy is subjected to strain. If a contribution base index had been chosen, pensions would always be affected by variations in the contribution base due to changes in employment. With the chosen design, only if and when balancing is activated does the greater volatility of total earnings in relation to average income have any negative consequences for the insured.

<sup>40</sup> In this connection there are many possible references. Here are two examples: "As Paul Samuelson showed 40 years ago, the real rate of return in a mature pay-as-you-go system is equal to the sum of the rate of growth in the labor force and the rate of growth in productivity." [Orsag and Stiglitz (1999)]. "The rate of return in a notional system can only be the rate of growth of the tax base that results from rising real wages and increasing numbers of employees (Samuelson 1958)" [Feldstein (1999)].

## List of Terms

### adjustment indexation

recalculation of pensions by the income or balance index minus the interest of 1.6 percent credited in the *annuitization divisor*. If the income index for year  $t$  is designated by  $I(t)$ , the adjustment indexation is calculated as:  $[I(t)/I(t-1)]/1.016$ . Note that there is no adjustment index, only adjustment indexation.

### annuitization divisor

a number that reflects the average remaining life expectancy at retirement, taking into account an imputed “interest” rate of 1.6% on the pension to be paid. In the calculation of the annual inkomstpension, which is made at the time when this pension is first withdrawn, the individual’s pension balance is divided by the annuitization divisor. Because of the interest credited at 1.6 percent, the annuitization divisor at the time of retirement is always less than the remaining average life span.

### ATP

Allmän Tilläggs Pension (national supplementary pension), the name of the pension benefit and system being phased out by the inkomst- and premium pension.

### automatic balancing

method of indexing the pension liability to ensure that the disbursements of the inkomstpension system will not exceed its revenue in the long run. If balancing is activated, the *pension liability* increases at a compounding rate approximately equal to the system’s *internal rate of return*.

### average income

here, income as measured by the income index. The incomes in the income index consist of pension-qualifying income (incl. income in excess of the ceiling on pension-qualifying income), less the national pension contribution, earned by persons aged 16–64. The sum of these incomes is divided by the number of persons who have earned them.

### balance ratio

the assets of the pay-as-you-go system – i.e. the *contribution asset* and the *buffer fund*, divided by the *pension liability* of the system. The balance ratio can be considered equivalent to the *consolidation ratio* of a funded system. Unlike the consolidation ratio, however, the balance ratio provides no information on the amount of funded assets in relation to the pension liability.

### buffer fund

absorbs interperiod discrepancies between pension contributions and pension expenditure in a pay-as-you-go system. The primary purpose of a buffer fund is to stabilize

pension levels and/or pension contributions against economic and demographic fluctuations.

### the buffer fund

of Sweden's national pension system comprises the First, Second, Third, Fourth, and Sixth National Pension Funds. Legally and administratively, the buffer fund of the pay-as-you-go system thus consists of five different funds. Pension contributions are apportioned equally to the First–Fourth National Pension Funds, which also contribute equally to the payment of pensions. The Sixth National Pension Fund receives no pension contributions and pays no pensions. From the standpoint of the pay-as-you-go system, the five buffer funds may be viewed in some respects as a single fund.

### compounding

in this report, synonymous with *indexation* – that is, recalculation of pension balances for the changes in the income or balance index and the recalculation of pensions by adjustment indexation.

### contribution asset

the value of the contributions to the inkomstpension. It is calculated by multiplying contribution revenue by *turnover duration*.

### contribution base

the pension-qualifying income and amounts of imputed pension-qualifying income for which a pension contribution is to be paid. Consists primarily of earned income, but also of sickness benefits, unemployment compensation, etc., and amounts of imputed pension-qualifying income for sickness and activity allowances, pensions, child-care years, study, and compulsory national service.

### defined-benefit pension systems

pension systems in which the insurer bears the financial risk of possible variations over time in mortality and the rate of *return* on the assets of the system. In a public pension system, the insurer is the contributors or taxpayers, which means that the contribution/tax rate to the system may vary. In practice both the contribution/tax rate and the value of benefits have been subjected to adjustments in defined-benefit systems.

### defined-contribution pension systems

pension systems in which the insured bears the financial risk of possible variations over time in mortality and the rate of *return* on the assets of the system. Consequently, the value of pensions may fluctuate. A supplementary definition is that in a defined-contribution pension system pension credit accrues by the same nominal amount as the contributions paid by or for the individual. In principle, pension credit accrues at the time when a contribution is paid into the system.

**earnings-related old-age pension**

the inkomstpension together with the premium pension, as well as the ATP through 2017.

**fund strength**

the monetary amount of the buffer fund at the end of a given year divided by the pension disbursements of the same year. A measure of the size of the buffer fund in relation to the flow of payments.

**guaranteed pension**

that portion of the national pension that provides basic retirement protection for individuals with little or no public earnings-related pension. To receive a guaranteed pension, an individual must have reached the age of 65. Moreover, the recipient must have resided in Sweden or another EU/EES country with which Sweden has a reciprocity agreement. To receive a full guaranteed pension, an individual must in principle have resided in Sweden for 40 years after reaching age 25.

The guaranteed pension is calculated as a supplement to the public earnings-related pension. For single persons with no public earnings-related pension, the guaranteed pension is 2.13 price-related base amounts. For married couples it is 1.90 price-related base amounts per person. The supplement provided by the guaranteed pension is reduced by 100 percent of the public earnings-related pension up to 1.26 price-related base amounts. For married persons the corresponding limit is 1.14 price-related base amounts. The reduction of the guaranteed pension decreases to 48 percent of the public earnings-related pension in excess of 1.26 price-related base amounts (1.14 for married persons); thus, the guaranteed pension is reduced to zero for an individual with a public earnings-related pension of 3.07 price-related base amounts (2.72 for married persons).

In determining the guaranteed pension, the amount of the public earnings-related pension is calculated as if the inkomstpension had been earned at 18.5 percent, not 16 percent. In addition, no consideration is given to the actual amount of the premium pension. One reason for these provisions is that they facilitate administration of the guaranteed pension. When the premium pension has assumed a larger place in the pension system, these provisions may be reviewed.

**growth**

here, the annual percentage change in average income.

**income index**

if the income index for year  $t$  is designated  $I(t)$ , then  $I(t)$  is calculated as follows:

$$I_t = I_{t-1} \times \left[ \frac{(U_{t-1})}{(U_{t-4})} \times \frac{(CPI_{t-4})}{(CPI_{t-1})} \right]^{\frac{1}{3}} \times \left( \frac{CPI_{t-1}}{CPI_{t-2}} \right) \times k_1 \times k_2$$

$U_{t-1}$  = estimate of the *average income* for year  $t-1$

$U_{t-4}$  = settled average income for year  $t-4$

$CPI_{t-1}$ ,  $CPI_{t-2}$ ,  $CPI_{t-4}$  = consumer price index for June in years  $t-1$ ,  $t-2$ , and  $t-4$

$k_1$  = correction factor for subsequent (more exact) estimated of average income in year  $t-2$

$k_2$  = correction factor for difference between settled and estimated average income in year  $t-3$ .

### income-related base amount

the base amount adjusted by the income index. For 2001, the income-related base amount was set to equal the price-related base amount (SEK 37,700) for that year. The income-related base amount is SEK 38,800 for 2002 and SEK 40,900 for 2003. The income-related base amount is used primarily to calculate the ceiling on pension-qualifying income. Before deduction of the employee pension contribution of 7 percent, this ceiling is 8.07 income-related base amounts. After deduction of the general pension contribution, the ceiling is 7.5 income-related base amounts. The income-related base amount is *not* used to recalculate pension balances or pensions.

### indexation

here the term indexation is used synonymously with *interest rate*.

### individual pension contribution

a pension contribution of 7 percent paid by the insured. The national pension contribution is withdrawn together with the preliminary income tax and is paid on incomes up to 8.07 income base amounts.

### inheritance gains

survivors bonus, i.e. the pension balances or premium-pension capital of deceased persons, distributed to all insured survivors. Inheritance gains are allocated as a percentage increase of the pension balances or premium-pension capital of all insured survivors in each birth cohort. At age 65, the inheritance gains are estimated at about 8 percent of the pension balances and premium pension capital.

### inkomstpension

a pension calculated according to the rules for the inkomstpension. Here the term is also used to designate the inkomstpension subsystem of the national public pension system.

**internal rate of return**

here, compounding of the pension liability so that it increases at the same rate as the assets of the system. The internal rate of return is determined by the change in the contribution revenue of the system and the change in the extent to which these contributions can finance the pension liability – in other words, the change in *turnover duration* – and the return on the buffer fund, in addition to the cost (gain) due to changes in average life span. If balancing is activated, the pension liability is compounded at a rate approximately equal to the internal rate of return of the system.

**national public pension**

Sweden's national pension system. The national public pension consists of the *inkomstpension*, the *premium pension*, and the *guaranteed pension*. During a transition period that last to 2017 also ATP is a benefit in the national public.

**pay-as-you-go pension system**

pension system which do not require that the pension liability be backed by a certain amount of funded assets. A pay-as-you-go system is often described as a system where contribution revenue is used directly to finance pension disbursements. This description is inaccurate in the case of a pay-as-you-go system with a buffer fund.

**pension balance**

the sum of the annually determined pension credit, which is successively recalculated in accordance with the income index, or alternatively the balance index, inheritance gains, and costs of administration.

**pension base**

the total of pension-qualifying income and the imputed income in the form of pension-qualifying amounts.

**pension credit**

an individual's pension credit is 18.5 percent of his/her pension qualifying incomes and amounts and is equal to the pension contribution. Accrual of pension credit increases the individual's pension balance and premium pension capital.

**pension level**

here, the average pension in relation to the average pension-qualifying income.

**pension liability**

in this report, the financial commitment of the pension system at the end of each year. The pension liability to economically active persons is the sum of the pension balances of all individuals. Through 2017 a pension liability will also be calculated for the ATP points earned by the economically active. The liability to retirees is calculated by



multiplying the amount of the pension of each birth cohort by the average remaining (economic) life expectancy of that cohort.

### **pension-qualifying amounts**

a basis for granting pension credit aside from taxable income or any actual earned income. Pension-qualifying amounts, or imputed pension-qualifying income, can be credited for sickness and activity allowances, child-care years, study, and compulsory national service.

### **pension-qualifying income**

the income used in calculating the pension credit of the insured. In principle, it consists of annual earnings reduced by the general individual pension contribution. Before deduction for this contribution, the maximum pension-qualifying income is 8.07 income-related base amounts; after this deduction, the maximum pension-qualifying income is 7.5 income-related base amounts.

### **premium pension**

the pension calculated according to the rules for the premium pension. The premium pension can be withdrawn in the form of fund insurance or conventional life insurance. Here the term is also used to designate the premium pension subsystem of the national public pension system.

### **price-related base amount**

an amount used in the national pension system only for calculating the guaranteed pension and for indexation of the ATP pension of persons younger than 65. For 2003 the price-related base amount is SEK 38,600. The price-related base amount is recalculated each year according to changes in the consumer-price index (in June).

### **return**

here the concept refers to the direct return plus the increase in value of the *buffer fund* and the premium-pension funds.

### **turnover duration**

the expected time from when pension credit has been earned until the pension is paid out in the form of inkomstpension, measured as a average weighted for pension credit and pension amounts. Turnover duration is calculated annually and is used for valuation of the flow of contributions. The calculation of turnover duration is performed according to the same principle and method as in the calculation of average life expectancy; in other words, it is assumed in the calculation that the relevant age-determined conditions observed will be unchanged in the future. Turnover duration depends on the provisions for earning pension credit and disbursement of pensions and on the age-related income and mortality patterns of the insured population.

# Technical Appendix: Mathematical Description of the Balance Ratio

## Excerpts from Regulation 2002:780 on the Calculation of the Balance Ratio

For each year the National Social Insurance Board is to calculate the balance ratio according to Chapter 1, §§ 5 a and 5 b of the National Income Replacement Pension Act (1998:674) in accordance with the following formula:

### 1. Balance ratio, *BR*,

$$BR(t) = \frac{CA(t-2) + F(t-2)}{D(t-2)} \quad (1.0)$$

$$CA(t) = \bar{C}(t) \times \bar{T}(t) \quad (1.1)$$

$$\bar{C}(t) = \frac{C(t) + C(t-1) + C(t-2)}{3} \times \left( \frac{C(t)}{C(t-3)} \times \frac{CPI(t-3)}{CPI(t)} \right)^{1/3} \times \left( \frac{CPI(t)}{CPI(t-1)} \right) \quad (1.2)$$

$$\bar{T}(t) = \text{median} [T(t-1), T(t-2), T(t-3)]$$

where

- t* = calendar year if the variable refers to flows, end of calendar year if the variable refers to stocks
- CA* = contribution asset
- F* = buffer fund, the aggregate market value of the assets of the First–Fourth and Sixth National Pension Funds. By market value is meant the value which in accordance with Ch. 6, § 3 of the National Pension Funds Act (2000:192) and Ch. 4, § 2 of the Sixth National Pension Fund Act (200:193) is to be shown in the annual reports of these funds.
- D* = pension liability
- $\bar{C}$  = smoothed value for the contribution to the pay-as-you-go system
- $\bar{T}$  = smoothed value for turnover duration
- C* = contributions to the pay-as-you-go system
- T* = turnover duration
- CPI* = consumer-price index for June

### 2. The average retirement age, *R*, is calculated as

$$\bar{R}(t) = \frac{\sum_{i=61}^{R^*(t)} P_i^*(t) \times G_i(t) \times i}{\sum_{i=61}^{R^*(t)} P_i^*(t) \times G_i(t)}, \bar{R} \text{ rounded off to nearest whole number} \quad (2.0)$$

where

- i* = age at end of a calendar year, age group
- $R^*(t)$  = the oldest age group for which pensions have been granted in year *t*
- $P_i^*(t)$  = total of pensions granted monthly in year *t* to persons in age group *i*
- $G_i(t)$  = annuitization divisor in year *t* for age group *i*

### 3. Turnover duration, $T$ ,

$$T(t) = ID(t) + OD(t) \quad (3.0)$$

#### 3.1 Pay-in duration, $ID$ ,

$$ID(t) = \frac{\sum_{i=16}^{\bar{R}(t)-1} \bar{E}_i(t) \times L_i(t) \times (\bar{R}(t) - i - 0.5)}{\sum_{i=16}^{\bar{R}(t)-1} \bar{E}_i(t) \times L_i(t)} \quad (3.1.1)$$

$$\bar{E}_i(t) = \frac{\frac{E_i(t)}{N_i(t)} + \frac{E_{i+1}(t)}{N_{i+1}(t)}}{2} \text{ for } i = 16, 17, \dots, \bar{R}(t) - 2 \quad (3.1.2)$$

$$\bar{E}_{\bar{R}(t)-1}(t) = \frac{E_{\bar{R}(t)-1}(t)}{N_{\bar{R}(t)-1}(t)} \quad (3.1.3)$$

$$L_i(t) = L_{i-1}(t) \times h_i(t) \text{ for } i = 17, 18, \dots, \bar{R}(t) - 1 \text{ there } L_{16}(t) = 1 \quad (3.1.4)$$

$$h_i(t) = \frac{N_i(t)}{N_{i-1}(t-1)} \text{ for } i = 17, 18, \dots, \bar{R}(t) - 1 \quad (3.1.5)$$

where

$E_i(t)$  = the sum of 16 % of pension-qualifying income calculated in accordance with Ch. 2 of the National Income Replacement Pension Act (1998:674) and 16 % of imputed pension-qualifying income calculated in accordance with Ch. 3 of said act in pay-in year  $t$  for age group  $i$

$N_i(t)$  = number of individuals in age group  $i$  who at any time from pay-in year  $t$  on have been credited with pension-qualifying income or imputed pension-qualifying income and who have not been registered as deceased

**3.2 Pay-out duration, OD,**

$$OD(t) = \frac{\sum_{i=R(t)}^{R(t)} 1.016^{-(i-\bar{R}(t)+0.5)} \times L_i^*(t) \times (i - \bar{R}(t) + 0.5)}{\sum_{i=R(t)}^{R(t)} 1.016^{-(i-\bar{R}(t)+0.5)} \times L_i^*(t)} \quad (3.2.1)$$

$$L_i^*(t) = L_{i-1}^*(t) \times he_i(t), \quad L_{60}^*(t) = 1 \quad (3.2.2)$$

$$he_i(t) = \frac{P_i(t)}{P_i(t) + Pd_i(t) + 2 \times Pd_i^*(t)} \quad \text{for } i = 61, 62, \dots, R(t) \quad (3.2.3)$$

where

$R(t)$  = the oldest age group receiving a pension in year  $t$

$P_i(t)$  = total pension disbursements in December of year  $t$  to age group  $i$

$Pd_i(t)$  = total of the last monthly pension disbursements to persons in age group  $i$  made in December of year  $t-1$  but not in December of year  $t$

$Pd_i^*(t)$  = total of the last monthly pension disbursements to persons in age group  $i$  with pensions granted in year  $t$  and not receiving a pension in December of year  $t$

**4. The pension liability, D,**

$$D(t) = AD(t) + DD(t) \quad (4.0)$$

$$AD(t) = K(t) + E(t) + ATP(t)$$

$$DD(t) = \sum_{i=61}^{R(t)} P_i(t) \times 12 \times \left( \frac{Ge_i(t) + Ge_i(t-1) + Ge_i(t-2)}{3} \right) \quad (4.2)$$

$$Ge_i(t) = \frac{\sum_{j=i}^{R(t)} \frac{1}{2} \times (L_j^*(t) + L_{j+1}^*(t)) \times 1.016^{i-j-1}}{L_i^*(t)} \quad (4.3)$$

where

$AD$  = pension liability in regard to pension commitment for which disbursement has not commenced (pension liability to the "economically active")

$DD$  = pension liability in regard to pensions currently being disbursed to retired persons in the pay-as-you-go system

$K$  = total of pension balances according to Ch. 5, § 2 of the National Income Replacement Pension Act (1998:674)

$E$  = pension credit for the inkomstpension according to Ch. 4, §§ 2–6 of said act

$ATP$  = estimated value of the ATP pension for persons who have not yet begun to receive this pension.

The Insurance Office

DECISION 2002-12-15

Average Svensson  
Vägen 1  
123 45 Orten

## Decision: your earned pension entitlement for 2001

The Tax Authority has determined your pension qualifying income (income after deduction of national pension fee) for 2001 as follows:

Income from employment	SEK 115,531
Income from other occupation	SEK 3,328

The Insurance Office has determined your pension qualifying amounts for 2001:

Disability pension	SEK 5,543
Military service	SEK 135
Studies	SEK 151
Child years	SEK 2,482
Pension qualifying income and amounts	SEK 149,987

On the basis of your pension qualifying income and amounts, the Insurance office has determined your pension entitlement as follows:

### Inkomstpension entitlement 2001

SEK 20,508

### Premium Pension entitlement 2001

SEK 3,204

### More information on our decision regarding your pension entitlement

You can find explanations of how we calculate your pension qualifying income and amounts on page 6, where you also can find more information where to address questions or what to do if you want the decision to be reviewed. the glossary may be useful when you read about how we made the calculations.

## The Swedish Pension System Annual Report 2002

National pension systems of the pay-as-you-go type are among the largest financial-transaction systems in the world. In Sweden the public pension system represents the biggest single financial commitment of the central government. In addition to the one and a half million Swedes already receiving their pensions, more than six million persons of working age have earned pension credit in the system. Presently the average insured, at age 65, has accumulated pension credit of nearly two million SEK. The total financial commitment of the pension system is SEK 5,800 million – the value of Sweden's total production for two and a half years.

Despite the magnitude of public pension systems and their long-term commitment, neither the liabilities nor the assets of these systems have been reported previously. The Annual Report of the Swedish Pension System, makes Sweden the first, and so far the only, country in the world to apply the principles of double-entry bookkeeping to a national pension system of the pay-as-you-go variety. This new application of classical accounting clearly presents the economic and demographic relationships and processes that determine society's capacity to provide a financially and socially durable system of pension insurance. For this reason, the Annual Report of the Swedish Pension System should be interesting reading for everyone interested in issues of social and economic policy.

