

Title:           **“Risks and income adequacy for the individual in a notional defined contribution setting - the interaction of public pensions, public cash benefits to the elderly and occupational pensions - the case of Sweden”**

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## **Abstract**

Pension systems can be organized in numerous ways: pay-as-you-go vs. funded; defined-benefit vs. defined-contribution; with or without a tight connection between contributions and benefits; indexing by prices, growth or return in the capital market. Depending on the choices made and the mix between them, a pension system is, to different degrees, exposed to different risks. These risks can be economic, demographic and political. The entire Swedish pension system portfolio exhibits a large number of the above mentioned features. In this paper we analyse how different design features expose a pension system to risk using the Swedish system as an example. Does a specific combination of design features reduce overall risk or do they instead interact in a risk-increasing manner? In recent years the world has been introduced to new tools such as financial automatic balancing and notional defined contribution schemes as ways to prepare for an ageing society. It has been natural to focus on these new concepts. The effect of these concepts, however, cannot be separated from the broader pension picture. This paper aims to take a broader look at the entire pension picture in Sweden and addresses the complex interactions of public pensions (income pension, premium pension and guarantee pension), occupational pensions and transfers to the elderly (housing supplement) as well as the risks involved in each scheme.

Keywords:

Risk, Pay-As-You-Go financing, notional defined contribution, occupational pensions, defined benefit, defined contribution, cash benefits to the elderly

# 1. Introduction<sup>1</sup>

Pensions in Sweden consist of *public pensions*, *occupational pensions* and *private pensions*. In the Swedish pension reform of the public pensions in 1999 the government abandoned the old basic pension (*folkpension*) and the income related defined benefit pension (*allmänna tilläggs pension (ATP)*) and replaced them with a notional defined contribution pension, the *inkomstpension*<sup>2</sup>, and a new guarantee pension (*garantipension*) and a fully funded individual accounts scheme, the premium pension (*premiépension*).

The Swedish pension history may be characterized as a history where the political decisions are taken almost in unanimity. The exception is the pension reform preceding the current one, the ATP-reform; ATP was introduced in 1960 after a fierce debate, a referendum, and a general election to the Parliament and was finally passed with a margin of one vote. Contrary to the reform in 1960, the 1999 reform was supported by around 85% of the Parliament. However, even so, proponents of this new reform have clashed with its antagonists over the alleged shift that it imposes on the overall Swedish model. This paper addresses what is sometimes forgotten in these discussions; the Swedish system is a complex multi-pillar system where many very different pension systems interact in unison together with substantial cash benefits to the old in the form of the housing supplement to the elderly (*bostadsbidrag till pensionärer (BTP)*). The purpose of the paper is to investigate the risks in the different parts and whether these risks counterbalance each other and how income adequacy is maintained for the individual in this setting.

The purpose of a pension system is twofold: to even out consumption possibilities over the individual's life-cycle plus give an insurance against the risk of an extra-ordinary long life. The first purpose means (forced) life-cycle savings during the active years. The second one means that "the law of large numbers" is used, and that the individuals join in an insurance collective to

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<sup>1</sup> The usual disclaimer. Views in this paper do not represent the official views of the Swedish Social Insurance Agency or the Swedish Government. The eventual errors are authors own. The authors would like to thank the following...

<sup>2</sup> In Swedish the word *inkomst* means income. The name *inkomstpension* was chosen to point out that the indexation of this benefit (normally) follows the income development. Here we follow the somewhat conflicting conventions used in the Swedish Pension System Annual Report not to translate the name *inkomstpension* but to do so when we write about the premium pension and the guaranteed pension. in Swedish; *premiépension* and *garantipension*.

protect each other from the risk of outliving the accumulated savings at such an age that re-entry to the labour market is not an option. This risk is due to the uncertainty of the length of life.<sup>3</sup>

There is a plethora of ways of organizing the support in old age, the family, the market and the state being three main candidates. The family – even an extended one – is too small to form a “large number” to insure against risk, is excluded from further discussion. Pension systems can be obligatory or voluntary, public or private, pay-as-you-go or funded, defined benefit or defined contribution, used for redistributions within and between generations or designed with a tight connection between contributions and benefits. The specific design determines how the individual – and the system – is exposed to different kinds of risks, be they demographic, economic or political.

This paper highlights the interactions of the different parts of the Swedish pension system package with respect to the risks involved. The structure of the paper is as follows. The first section introduces the division of pensions in Sweden between the public pensions, occupational pensions and private pensions. The next one addresses the major risks involved in each major scheme, both for the individual as well as for the collective. Section three discusses the anticipated effects and interactions between the different schemes. The last section summarizes the previous discussion and concludes the paper.

## **2. The Swedish pension package – a four tier system<sup>4</sup>**

*“Don’t put all your eggs in the same basket”*

- Swedish proverb

Pensions in Sweden consist of public pensions, occupational pensions and private pensions.

Table 1 shows the paid-in premiums, the capital managed and the disbursements of the income related public pensions, occupational pensions and the private pension’s schemes in Sweden as of the 31<sup>st</sup> of December 2005.

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<sup>3</sup> Although Gerolamo Cardano a 16<sup>th</sup> century mathematician is famous for doing just that, predicting the exact day of his own death, and being a man of consequence he committed suicide.

<sup>4</sup> For a fuller description of the Swedish system, see Kruse and Palmer (2007)

*Table 1: Public pensions, Occupational and Private Pensions, 2005, millions of SEK<sup>5</sup>*

	<i>Paid-in Premiums</i>		<i>Capital managed Dec. 31</i>		<i>Disbursements</i>	
	SEK	Share of wage sum	SEK	Share of wage sum	SEK	Share of wage sum
Public pensions	203 176	13.4 %	962 267*	63.2 %	169 323**	11.1 %
Occupational pensions	105 493	6.9 %	993 912	65.3 %	25 456	1.7 %
Private pension insurance***	14 540	1.0 %	373 203	24.5 %	16 532	1.1 %
Total	323 209	21.3 %	2 329 382	153.0 %	211 220	13.9 %

\* Does not include contribution asset.

\*\* Includes only income-related pensions. In addition there are the following disbursements by the central government: guarantee pension (SEK 22.4 billion), survivors pension (SEK 13.8 billion), housing supplement to pensioners (SEK 7.1 billion) and income support for the elderly (SEK 0.4 billion).

\*\*\* Includes IPS (Individual Pension Saving: SEK 4.6 billion in premiums, SEK 49.0 billion in managed capital, SEK 0.7 billion in disbursements). Capital pensions are not included in premiums and capital managed (SEK 22.6 billion and SEK 24.0 billion, respectively).

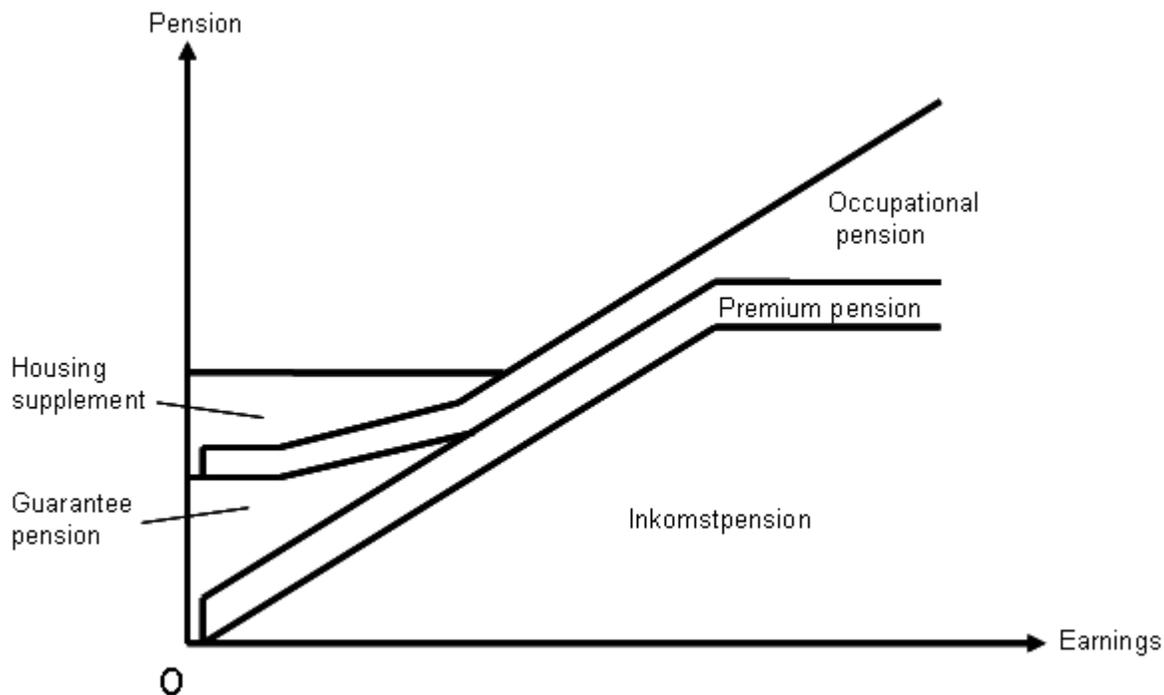
**Source: SSIA Orange report 2007, Statistics Sweden**

As can be seen in table 1 public pensions constitute by far the largest share of disbursements. Also note that although public pensions are almost entirely pay-as-you-go there is a large buffer fund. Figure 1 gives a description of pension benefits from the public, occupational and private pensions systems in relation to earnings.

<sup>5</sup> The exchange rate between the \$ and the SEK was 7.95 on the 30<sup>st</sup> of December 2005. The total sum of all wages for people living in Sweden the 31<sup>st</sup> of December in million SEK 1 521 828.3.

The schematic figure below captures the interaction between the pensions and cash benefits for the elderly as a function of earnings. For most people the inkomstpension will be the largest part of all pensions. On top of it there is the premium pension which is a fully funded individual accounts scheme. The Inkomstpension and the premium pension are income related public pensions. From the figure it is easy to see how the guarantee pension works as a top up, up to a guaranteed minimum level of the public pensions. On top of these public schemes there are occupational pension schemes. These are more important in higher income brackets as they replace income above the ceiling in the public systems. For persons with low pensions the housing supplement for the elderly constitutes an additional means-tested top up.

Figure 1: The Swedish pension's schemes portfolio



### ***Inkomstpension***<sup>6</sup>

The inkomstpension is a pay-as-you-go notional defined contribution scheme. The contribution rate is 16 percent of pensionable earnings and all contributions are recorded as pension credit. Savings in this notional “bankbook” accumulate over the years with contributions and “interest”. Each year an annual statement is sent out to all insured participants where the insured can follow

<sup>6</sup> [http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra\\_sprak/p\\_inkp\\_eng.pdf](http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra_sprak/p_inkp_eng.pdf)

the evolvement of their public pension account, the statement also includes the premium pension (find more about the premium pension below). The “interest” in the inkomstpension is equal to the growth in average wages (the so called income index). At the time of retirement the yearly benefit from the inkomstpension is calculated by dividing the accumulated pension balance by an annuity divisor. The annuity divisor is calculated with unisex mortality and an interest rate of 1.6 percent.

### **Inkomstpension and financial stability**

The inkomstpension has been designed to be financially stable. Regardless of economic or demographic development it will be able to finance its obligations with a fixed contribution rate and fixed rules for calculating benefits. This aim has been reached by;

- i. tying the pension entitlement (pension credit) almost completely to the contributions (tax) paid,
- ii. indexing contributions and pensions with the change in average income,
- iii. converting the accumulated notional capital with the current remaining life expectancy at retirement,
- iv. including a buffer fund in the system to which all contributions are paid, and from which all benefits are paid,
- v. financial imbalances that remain in spite of, or are caused by, i-iv, are dealt with the automatic balancing mechanism.

“Rules” i.-iii. can perhaps be considered to summarize the essential aspects of so-called notional defined contribution systems. The choice of changes in average wages in comparison to changes in the wage sum as an index opens up for financial instability. However the political argument was that pensions should follow the workers' standard of living. In order to achieve financial stability an automatic balance mechanism is used (see for example Settergren 2001, 2003a and 2003b). The practical application of the balance method can be studied in The Annual Reports of the Swedish Pension System 2001-2006.<sup>7</sup>

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<sup>7</sup> Settergren and Mikula (2005) attempt to give the balance method a formal explanation and generalise it to include also defined benefit pay-as-you-go pension plans (Settergren Ole and Mikula D. Boguslaw 2005).

## ***Premium pension***<sup>8</sup>

The *premium pension* is a funded defined contribution system with individual accounts organised as a unit-link life insurance. All contributions are allocated to the Premium Pension Authority (PPM) and invested in funds selected by the individual. The contribution rate is 2.5 % of pensionable earnings. The premium pension depends on the size of individual pensionable earnings, the fund portfolio performance, the net administrative costs, and the length of participation (i.e. the absolute difference between pension age and entry age to the labour market).

To date there are around 750 funds available within the premium pension system with varying investment strategies and risk. When the individual enters retirement he or she can choose a variable annuity or a with profit annuity. With a variable annuity the accumulated fund capital remains in the selected funds, with a profit annuity the money is withdrawn from the funds and managed by the PPM. The downside risk is transferred to PPM and a guaranteed amount will be paid out each month. If PPM's management achieves a return higher than the guaranteed rate, a bonus can be paid out in form of a supplement. Premium pension also allows for survivors' coverage, which can be subscribed to for a spouse or registered partner in connection with the pension application.

## ***Occupational pensions***

There are four major agreement-based occupational pension's schemes; privately employed blue-collar workers, privately employed white-collar workers, workers in municipalities and city councils and central government employees (Sjögren and Wadensjö 2006). The contribution rate varies between 2.5 and 4.5 percent. These systems are obligatory, i.e. the individual can not choose not to join. All of them replace 10% of the income below the ceiling in the public system and all but the one for blue-collar workers in the private sector replace approximately 60% of the income above the ceiling. This makes the occupational pensions more important for high income earners than for low income earners.

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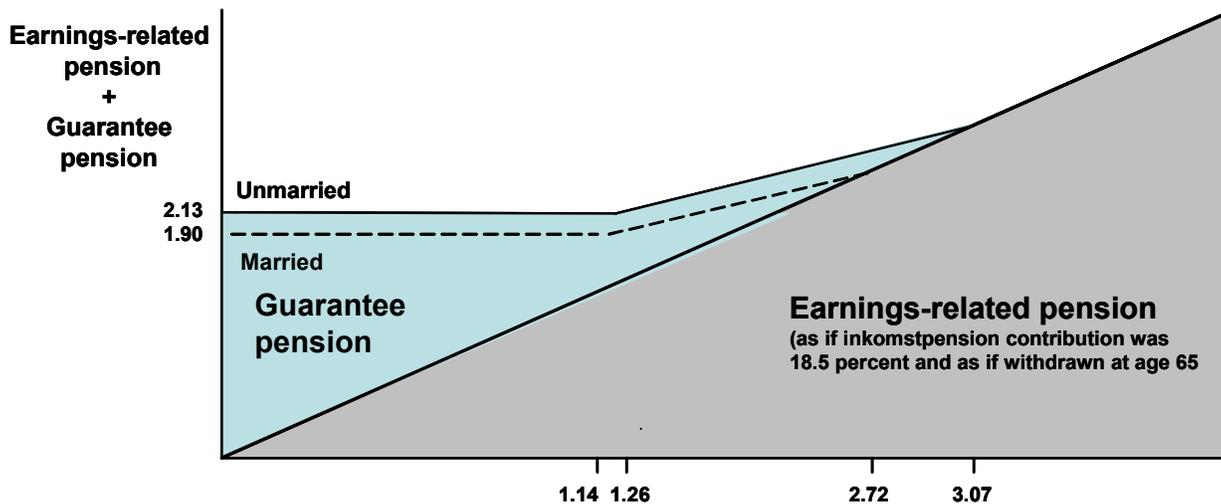
<sup>8</sup> <http://www.ppm.nu/WhatIsPremiumPensionENG.html>  
<http://www.ppm.nu/download/18.46c59d12112092c88ac800015920/this-is-ppm.pdf>

The tendency has been to change these schemes from defined benefit schemes to a defined contribution structure.

### **Guarantee pension<sup>9</sup>**

Pensioners' with low or no income during their working life may be entitled to guarantee pension.<sup>10</sup> To qualify, a pensioner must have been a resident in Sweden for at least three years. To qualify for full guarantee pension, the pensioner must have been a resident in Sweden for 40 years. An exception is made in the case of refugees. Guarantee pension is payable from the age of 65. A foreign pension and widow's pension can affect the guarantee pension entitlement. The guarantee pension is income-tested against benefits from the other two parts of the public pension system (see figure 2). The guarantee pension is financed by general tax revenues in the state budget. The system is defined-benefit and price-indexed.

*Figure 2: The interaction of the guarantee pension and the inkomstpension (scale price base amounts in 2008 SEK 41 000)*



### **Housing supplement for the elderly<sup>11</sup>**

The housing supplement for the elderly is a means-tested supplement. This means that the amount payable depends on the pensioners' housing costs and income (see formulae). If a

<sup>9</sup> [http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra\\_sprak/garantip38\\_eng.pdf](http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra_sprak/garantip38_eng.pdf)

<sup>10</sup> The actual benefit formula is presented in formulae.

<sup>11</sup> [http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra\\_sprak/BTP\\_eng.pdf](http://www.forsakringskassan.se/pdf-broschyr/faktablad/andra_sprak/BTP_eng.pdf)

pensioner has a low income he or she may be eligible for maintenance support for the elderly if this is due to a short period of residence in Sweden.

### **Private pensions**

Private pensions in Sweden are mainly driven by tax incentives as premium as deductible and makes it possible for high income-earners to reduce high marginal taxes. As can be seen in table 1 private pension is not a very important source of income. The tendency is, however, that more people save in private pensions (Svensk försäkringsårsbok (2006)).

## **3. Risks in different parts of the Swedish pensions package**

*“But in this world nothing can be said to be certain, except death and taxes.”*

- Benjamin Franklin (1706 - 1790), Letter to Jean Baptiste Le Roy (1789)

Following Franklin, life is risky. However, one of the most important inventions is insurance.

With insurance the risks are pooled and the individual is sheltered – economically – from devastating events. The Swedish pension reform has been highly criticized for shifting the overall risk from the collective to the individual. Are the critics right?

What kind of risks does the individual encounter? And how are they insured in the different parts of the Swedish system? Table 2 summarises the risk management in the different schemes. The DC feature in the inkomstpension and the premium pension makes the life cycle approach natural. The life cycle approach makes us focus on the rate of return and on the ability to earn income as the major risks. The way individual mortality risk as well as overall longevity has been taken care of is also shown.

*Table 2: Risks and the distribution of risks in each scheme*

	Inkomstpension, NDC; contribution rate = 16%	Premium pension, the funded part; contribution rate = 2.5%	Occupational pensions; contribution rate = 2.5 to 4.5%	Guarantee pension, housing supplements; tax financed
Rate of return, indexing	<u>Earnings period:</u> average wages. Co-living generations share the fruits of good	Investment risk borne by the individual	Investment risk borne by the individual	Indexed by prices. Co-living generations do not share the fruits of

	<p>years and the burden of lean years.</p> <p><u>Retirement period:</u> “adjustment” index: average wage minus 1.6% due to front-loading</p> <p>If financial stability threatened: automatic balance mechanism activated for a period during which rate of return is lowered.</p>			<p>good years or the burden of lean years. With a positive rate of growth in the economy, the guarantee pensioners’ standard of living falls behind that of the rest of the population, and the other way around in case of a negative rate of growth.</p>
<p>Low earnings capacity due to</p> <ul style="list-style-type: none"> <li>- unemployment</li> <li>- sickness/ disability</li> <li>- child rearing</li> <li>- conscription</li> <li>- higher education</li> </ul>	<p>Contributions are paid on remunerations from social insurance; debited respective social insurance</p> <p>Non-contributory benefits are credited to the individual accounts; paid by the state budget</p>	<p>Contributions are paid on remunerations from social insurance; debited respective social insurance</p> <p>Non-contributory benefits are credited to the individual accounts; paid by the state budget</p>		<p>Income tested benefit aiming at poverty protection</p>
<p>Mortality risk, individual longevity</p>	<p>Annuities obligatory; unisex life tables used</p>	<p>Annuities obligatory; unisex life tables used</p>	<p>Annuities “obligatory”; (uni)sex life tables used</p>	<p>Life-long benefits if own pension is below threshold</p>

over-all (cohort) longevity	Increased longevity decreases yearly benefit. Borne by the insured, not the working generation; increases in cohort's longevity after retirement: no direct effect on yearly benefit; may however trigger the automatic balance mechanism	Increased longevity decreases yearly benefit. Borne by the individual, not the working generation		
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**Individual risks with the inkomstpension:**

From the individual's point of view there might be a risk of a low pension benefit from the income pension. The tight connection between contributions and benefits means that low income during working years also gives low pension benefits. This outcome will be judged differently depending on the reason behind the low income. An individual who chooses to work short hours in order to enjoy much leisure time is in quite another situation than a person having a low productivity or having abilities that have become obsolete. To the extent that the low productivity is caused by a voluntary choice of not engaging in higher education, on the job training or some other device to become more productive the outcome with low benefits may be seen as a fair outcome.

In other words, the effort is, as always, private information and the Swedish pension system is not able to discriminate between some of the reasons behind differences in income, quite in line with all other tax and benefit systems. However, some of the (involuntary) reasons for low income are compensated for. That goes for all income losses that are covered by the social security system. Sickness, disability and unemployment insurance are all pension-qualifying income; contributions are paid into the individual accounts and will result in pension benefits. Also, interrupted working careers, for example due to child rearing is partly compensated for, as well as delayed entrance into the labour market due to higher education.

Another risk, totally outside the individual's control, is the risk of a low rate of return on contributions, i.e. low rate of growth in average wages, giving rise to a low pension benefit. As is

pointed out in table 2, this risk is shared by all co-living generations. However, a low rate of growth in the economy may be a hidden high rate of growth; hidden due to substitution between leisure and working time by the working generation.

### **Individual risks with the funded DC schemes**

In individual financial accounts schemes the individual bears the investment risk. This will undoubtedly lead to very different outcomes for persons with the same characteristics. Also, women as a group tend to be more risk averse than men as a group.

Theory is rather straightforward. Evidence that equities on average give a higher rate of return than riskless assets is strong.<sup>12</sup> But an average is always an average and if we assume that there exists some riskless rate of return then the difference between the assumed market rate of return and this riskless rate equals a rate of return under risk. When simulating the effects for an 25 year old in a high risk fund within the premium pension the monthly pension has a distribution of SEK 500 (5<sup>th</sup> percentile) and SEK 22 500 (95<sup>th</sup> percentile) (SOU 2005:87).<sup>13</sup>

### **Risks with the guarantee pension and income supplement for the elderly**

The design of the guarantee pension gives a marginal effect of 100% up to own pension of 1.26 price base amounts (unmarried persons), and a marginal effect of 52% in the interval 1.26 to 2.13 (unmarried person). Thus, in the lower range of the income scale the system gives no or a low incentive for work and “the tight connection between benefits and contributions” does not exist. This means that in the lower income brackets there is – as always with means-tested or income-tested benefits – a risk of being caught in a poverty trap. A low rate of return reduces the outcome. Thus, if so, there is an increased risk of being eligible for (“falling down to”) guarantee pension. As this system is price indexed, the guarantee pensioner does not take part in the economic development.

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<sup>12</sup> The evidence for the equity premium is presented in (Mehra, R. and E.C. Prescott (1985) and an overview of the market return in investments is made by (Queisser and Whitehouse (2006)).

<sup>13</sup> Statement made by Daniel Barr and Annika Sundén to the Government Inquiry (2005:85).

## Expected outcome

*‘Whatever actuaries may say’, ‘there is no way by which the burden of pensions can be transferred from one period to another. All pensions have to be provided from the present national income. Even funded schemes can only give rights to a share of this year to another 40 years a way. The economic reality is that today’s workers pay and contribute to pay for today’s pension on the understanding that the next generation of workers will do the same for them’*

- Sir Samuel Brittan, Financial Times, the 26<sup>th</sup> of February 1996

Outcome is determined by the factors listed in table 2. Will expected outcome be acceptable? In this section we show some results. In table 3 outcome is measured by replacement rate.

Furthermore, due to the annuity divisor, longevity influences yearly benefits; this influence can, however, be mitigated by delaying retirement as shown in table 4. As women have different working patterns than men, outcome is also shown for women compared to men. Here three measures are used: yearly benefit, replacement rate and rate of return.

## Replacement rates

Table 3 Replacement rate at ages 65-69 and 70-74 in relation to average income during ages 60-64 for different cohorts and income groups. Percentiles below 25, 25-75 and above 75.<sup>14</sup>

Cohort	Income group	65 – 69 years of age				70 – 74 years of age			
		Percent of total income	of which public pension	occupational benefit	private pensions	Percent of total income	of which public pension	occupational benefit	private pensions
1940	< p25	112	<b>84</b>	8	18	98	<b>85</b>	7	4
	p25-p75	74	<b>54</b>	10	9	67	<b>55</b>	8	1
	> p75	67	<b>37</b>	17	11	57	<b>37</b>	15	3
1950	< p25	87	<b>63</b>	12	11	76	<b>64</b>	10	1
	p25-p75	68	<b>46</b>	13	7	59	<b>47</b>	10	1
	> p75	57	<b>27</b>	22	7	46	<b>27</b>	17	1
	< p25	79	<b>57</b>	13	7	69	<b>57</b>	10	0

<sup>14</sup> The result in table 3 is derived by the use of a micro simulation model, SESIM, at the Swedish Ministry of Finance.

1960	p25- p75	65	<b>44</b>	15	6	55	<b>44</b>	10	0
	> p75	59	<b>29</b>	24	5	48	<b>29</b>	18	0

*Source:* Flood, 2004, p. 25.

Those born in 1940 belong almost entirely to the old pension system, while those born in 1950 almost entirely belong to the new system. Low income earners will always get a higher replacement rate from the public system. It is also evident that occupational pensions are more important in high income brackets, as said before.

Benefits from the public system will decrease for younger cohorts compared to those born in 1940. This, however, is due to the annuity divisor being determined by expected remaining life time.

### **Longevity and pension age**

The effect of increased longevity in comparison with persons born in 1930 is shown in table 4 below. The reason why all cohorts are compared with persons born in 1930 is that they were turning 65 at the time when the decision in principle was made to reform the public pension system. According to the prognoses made by Statistics Sweden (the governmental agency providing official statistics in Sweden) longevity is increasing in Sweden, and rapidly. The increased longevity will increase the remaining expected lifespan for a 65 year old from 17 years and 5 months for those born in 1930 to 22 years and 1 month for those born in 1990. This equals an increase of the expected remaining lifespan by 4 years and 8 months for those born in 1990 compared to those born in 1930.

If the persons born in 1990 want to have the same relative pension level as those born in 1930 they will have to use some of their increased lifespan to work more (or to save more i.e. decrease overall consumption when active). If the persons born in 1990 increase their working life by 38 months they can achieve the same pension levels as their peers born in 1930, and at the same time enjoy an extra 2 years in retirement compared to those born in 1930.

In comparison to these results the first birth cohorts to enjoy a mandatory pension age at the age of 65 was those born in 1911. The cohort born in 1911 turned 65 in 1976, the year when government change the mandatory public pension age from 67 to 65 and had an expected remaining time of about 16 years.

*Table 4: Expected unisex lifespan and the pension age needed to compensate for increased longevity within the inkomstpension system*

<b>Cohort born</b>	<b>...turns 65 in</b>	<b>Life-expectancy effect on retirement at age 65</b>	<b>Expected life at 65</b>	<b>Pension age needed</b>	<b>Time as pensioner</b>	<b>Comparison of expected time as pensioner</b>
1930	1995	0 %	82 y. 5 m	65 y.	17 y. 5 m.	0
1938	2003	-5 %	83 y. 4 m.	65 y. 8 m.	17 y. 8 m.	+3 m.
1940	2005	-5 %	83 y. 7 m.	65 y. 9 m.	17 y. 10 m.	+5 m.
1945	2010	-9 %	84 y. 3 m.	66 y. 3 m.	18 y.	+7 m.
1950	2015	-11 %	84 y. 10 m.	66 y. 7 m.	18 y. 3 m.	+10 m.
1955	2020	-13 %	85 y. 3 m.	66 y. 11 m.	18 y. 4 m.	+11 m.
1960	2025	-14 %	85 y. 7 m.	67 y. 2 m.	18 y. 5 m.	+1 y.
1965	2030	-15 %	86 y. 11 m.	67 y. 5 m.	18 y. 6 m.	+1 y. 1 m.
1970	2035	-16 %	86 y. 3 m.	67 y. 7 m.	18 y. 8 m.	+1 y. 3 m.
1975	2040	-17 %	86 y. 7 m.	67 y. 10 m.	18 y. 9 m.	+1 y. 4 m.
1980	2045	-18 %	87 y. 10 m.	68 y.	18 y. 10 m.	+1 y. 5 m.
1985	2050	-19 %	87 y.	68 y. 2 m.	18 y. 10 m.	+1 y. 5 m.
1990	2055	-19 %	87 y. 1 m.	68 y. 2 m.	18 y. 11 m.	+1 y. 6 m.

Source: Swedish Social Insurance Agency

The “risk” of longevity, or should it be called a chance?, is thus borne by those living longer and not by the contemporary workers. The choice for the individual at the verge of retirement is a choice between consumption of goods or of leisure. Only the individual knows the optimal trade-off and is free to do the choice.

### **The outcome for women**

Women have different labour market behaviour than men; they use more time in caring for children and thus have more often interrupted working careers and work more often shorter hours in paid work. DC pension systems is therefore often said to be disadvantageous to women. In Ståhlberg et al. (2005) this is analysed and table 5 gives a comprised result of that analysis. In table 5 the outcome for women is compared to that of a man. Three definitions of outcome are used: annual annuity; replacement rate, defined as pension benefit in relation to final salary; and

rate of return, calculated as present value of expected lifetime benefits divided by present value of lifetime contributions. The table shows the outcome for women in five educational classes – from no upper secondary school to postgraduate education – and with different labour market behaviour, etc., compared to a man working full time for all his life. All women are assumed to get two children and stay home with parental leave. Four types of careers are assumed: i) full career women having the same behaviour as a man (apart from parental leave); ii) full time/part-time: the woman works full time until the arrival of the children, works part-time when the children are young and then returns to full-time work; iii) works 10 years when young and does not return to the labour market after having children; iv) the part-time women works part-time most of her life.

*Table 5* Pension outcome for women with varying behaviour profiles in relation to a full career man.

	Full Career Woman/ Full Career Man	Full time/Part time Woman/ Full Career Man	10-year Woman/ Full Career Man	Part-time Woman/ Full Career Man
Annual own annuities	80-100	80*	35-40	60-70
Replacement rate	100-120	100-120	120-145	100-125
Rate of return	115-130	120*	310-400	120-130

*Note:* The first figure in the interval shows those with no upper secondary school, the last figure those with postgraduate education.

\* the outcome is the same for all educational groups.

*Source:* Ståhlberg, et al. (2005)

It turns out that replacement rates are fairly similar between men and women; women get a slightly higher replacement rate due to the fact that men have higher wages and thus hit the ceiling in the public system more often than women do. Women get a higher rate of return but a lower own annual benefit. The outcome for the “10-year-women” shows the outcome for those with no or very low own income; it thus shows the result of the guarantee pension.

*Table 6: The effect of unisex life tables and child credits on the ratio of the compensation rate for women working full-time in relation to men working fulltime.*

	<i>Women/Men working full time</i>			
	Unisex life tables	Different life tables for men and women	Child care credits	Without child care credits SEK Share of wage sum
Women working full time	1.02-1.21	0.89-1.04	1.02-1.21	1.02-1.21
Full time /part time working women	0.98-1.17	0.86-1.00	0.98-1.17	0.94-1.14
Women working part	1.04-1.25	0.98-1.03	1.04-1.25	1.00-1.22

Note: The lower interval is for the individuals with the lowest education and the higher is for the higher education.

Source: Kruse, Ståhlberg and Sundén (2004)

The use of unisex tables is very important for women, increasing their compensation rate with more than 10 percentage points. The child care credits are in comparison with the unisex tables by far less important.

#### 4. Concluding comments

*“If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts he shall end in certainties.”*

- Sir Francis Bacon (1561 - 1626)

The Swedish pension system is a multi-tier system. The different tiers have different designs; the major part is pay-as-you-go defined-contribution, indexed by growth. Other parts are defined benefit and price-indexed and defined-contribution and “indexed” in the capital market. In our opinion the diversification in design reduces over-all risk. Also, as has been shown both theoretically and empirically (see Browning (1975), Breyer and Craig (1997), Galasso (2006)) pay-as-you-go systems have risk of expanding beyond an optimal level, increasing the risk of the system becoming unsustainable. This political risk is reduced in a pay-as-you-go system organised as a defined-contribution system, reducing the over-all risk even further.

A low rate of return reduces the outcome. Thus, if so, there is an increased risk of being eligible for (“falling down to”) guarantee pension. In addition to this the housing supplement works as an additional top-up.

There are no other ways to opt out from lower benefit levels than expected due to longevity than to increase the pension age i.e. increases the time at work. From table 4 it is clear that if one could choose ex ante which cohort to belong to it would be rational to choose the latest cohort born in 1990 before any other.

Politically it might be possible for some groups to form coalitions to “pass the buck around” but in the longer run these efforts will without doubt backfire and create a larger loss in overall utility.

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## **Formulae**

### **Guarantee pension**

If own pension  $\leq 1.26$  price base amounts ( $pba=40\ 300$ SEK in 2007;  $1.26=50\ 778$ SEK) then

$$GP = 2.13\ pba - \text{own pension}$$

If own pension  $> 1.26\ pba$ , then

$$GP = 0.87\ pba - 0.48(\text{own pension} - 1.26pba)$$

where the price base amount ( $pba$ ) is changed once a year in response to inflation (consumer price index).

### **Housing supplement for the elderly**

Price base amount =  $Pba$

Exemt amount= $2,17*Pba$

Monthly housing cost ( $Hc$ )

Pension ( $P$ )

$$BTP\_max = \min(0.93*5000*12; 0.93*(Hc)*12)$$

$$BTP = \max(0; BTP\_max - (\min(0.62*Pba; 0.62*(Pension - (\text{Exemt amount})))) + \max(0; 0.5*(Pension - (\text{Exemt amount}) - Pba)))$$