

New Use of an Old Italian Invention
– **The double-entry bookkeeping used to monitor and secure financial stability of the new Swedish pay-as-you-go pension plan**

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Organised

by

PIE and COE/RES, Hitotsubashi University

Hitotsubashi Collaboration Center, Tokyo, Japan, 1st-2nd November 2004

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1 Introduction

Public pension plans are probably the largest financial transaction systems that we have. In OECD countries their expenditure ranges from 5 to 15 percent, and their liabilities, as a rough estimate, from 150 to 300 percent of gross domestic product (GDP). For many governments, pension payments are the single largest expenditure. National pension plans also represent one of the most long-term commitments of governments. The size of these systems is of course reflected in their importance to insured citizens. For many, perhaps most, the claim of individuals on the public pension system represents their single largest “asset”.

In spite of the economic importance and long-term commitment of these pension plans, their financial reporting is essentially medieval. The first problem is that reporting is scarce, and that when it exists it is not infrequently of low quality. Here I will deal only with a second problem, which is that financial reporting on pay-as-you-go pension plans is based essentially on single-entry bookkeeping, statements of cash flows and projections of cash flows. The thirteenth-century invention of double-entry bookkeeping¹ which for centuries has been the preferred method for accumulating and presenting financial information in virtually all organisations but governments, has not been applied to national pay-as-you-go pension plans.

The various cash-flow measurements that are used to show the financial status of public pay-as-you-go pension schemes do not effectively answer the questions what *cause*, what *effect*, by what *means*, and at what *rate*. Thus, present financial reporting is weak in essential information. The single most important measure to enhance expert, public and policymaker knowledge of the workings of public pay-as-you-go pension plans would be to introduce double-entry bookkeeping for these systems. A plausible assumption is that only what is mentioned and measured exists in people’s minds. Thus, such improved reporting and knowledge may lead

¹ Sombart....

to better policy measures in the future, when present financial imbalances will make it necessary to take corrective action. However this second claim is much more doubtful than the first.

This paper is a brief introduction to the double-entry bookkeeping system that has been used for the essentially pay-as-you-go financed Swedish public pension system since 2001.² This bookkeeping system was developed for the new pension plan as an intermediate step to ensure automatic financial stability. The objective of the indexation of pensions and notional pension capital, including the so-called automatic balance mechanism, in this unorthodox public pension scheme was to minimise the volatility of the value of the average pension relative to the average income for people of working age, while adhering strictly to a fixed contribution rate, or payroll tax. Admittedly, the double-entry bookkeeping procedure was an unintentional spin-off from the research undertaken to achieve these policy aims.

2 The Swedish Context

The method used to prepare the balance sheet and income statement of the new Swedish public pension scheme the *inkomstpension* is based on insights gained from the work undertaken to ensure its financial stability.³ The founders of this unorthodox social insurance scheme sought to legislate a pension plan that would guarantee the financing of its obligations with a fixed contribution rate – 16% – and the resources available in the buffer fund of the system. One reason for this financial firmness was based on social policy. Financial stability is a matter of social policy since any imbalance will have to be paid by someone at some time.

In addition, financial sustainability was considered necessary to provide credible protection for the scheme against the daily governmental and parliamentary battle over resources. The founders were convinced that citizens would benefit if the new Swedish pension plan clearly determined who would pay for any financial imbalance, and when this burden would be borne. For this reason, they considered it necessary to insulate the old-age pension system from the national budget to the maximum extent possible. This separation could only be achieved by ensuring that the national budget would not be required to finance deficits in the pension system.

These ambitions are hardly astounding – the surprising feature of the Swedish pension reform is that they actually completed the long and arduous road to legislation.

Though possessing unusual personal qualities – at least for Swedish politicians – the seven members of the pension reform group were not immune to the common temptation of wanting to have their cake and eat it, too. Specifically, they sought to establish a pension system that was not just financially stable, but also designed to ensure that pensions would develop in line with average earnings, i.e. provide a stable replacement rate for different generations. Swedish economists, well versed in Samuelson's (1958) basic text, strongly urged reformers to index pensions and the pension liability to the growth of the contribution base, mistakenly believing that such indexation would guarantee financial stability. As for the reformers, they were concerned not only with financial stability, but also with the “content of the product”, i.e. the specific effects on pensions; thus, they advocated indexation of pensions and the pension liability according to the development of the average wage, rather than total wages.

The method of managing the conflicting goals of financial stability and a good insurance product – here, essentially indexation to the average wage – is perhaps of some general interest to scholars or to other countries. The dilemma in this case was “managed” not by a compromise, but through a design intended to maximize the likelihood of indexation at a rate equal to the growth in average income, with automatic exceptions to this indexation if the system would otherwise risk becoming financially insolvent. Whether the system can afford to index notional pension accounts and pensions with the growth in average income or not is determined by estimating the pay-as-you-go schemes assets and liabilities in a double entry bookkeeping

² See The Swedish pension System Annual Report 2003, pages 30 – 41 available at <http://www.rfv.se/english/pdf/arsred03e.pdf> or <http://www.rfv.se/english/pdf/2500word.pdf> for brief descriptions of this pension plan.

³ See the legislative history of the automatic balance mechanism.

system. Prior to the description of this bookkeeping a short discussion on conventional measures of actuarial balance in pay-as-you-go pension plans.

3 Conventional measures of actuarial balance in pay-as-you-go pension plans

For this writer, the most familiar measures of the financial status of public pension schemes are the one that was used in Sweden by Riksförsäkringsverket (RFV) prior to 2001⁴ and the central measure presently used by the US Social Security Agency (SSA).

In Sweden RFV was obliged to present an analysis every five years of the financial status of the public pension scheme and, in relation to this analysis, to propose a suitable contribution rate, or payroll tax. The analysis was presented mainly as a projection of buffer-fund development, in terms of fund ratio,⁵ assuming a fixed contribution rate and unchanged benefit provisions. Normally financial balance, i.e. a buffer fund that never dropped below a certain level in a specific scenario, would be secured by proposing an upward adjustment of the contribution rate. The range of these projections varied, but prior to 1990 they were never for longer than 50 years.

In several respects the financial analysis of the US Social Security system has been more advanced and systematic than was the case in Sweden. One reason has perhaps been the longer tradition of the large US public pension plan. The US Social Security system was introduced in the 1930's; in Sweden the earnings-related pension plan (ATP) was started in 1960. The US Social Security Administration (SSA) reports annually on the financial status of the Social Security system. In this report, it uses a similar but slightly more sophisticated, or dense measure of financial balance than the RFV previously used: a single figure called actuarial balance. Briefly, the actuarial balance -- deficit or surplus -- reflects how much the contribution rate must be increased (decreased), to ensure that the Social Security buffer fund, the trust fund, never drops below a stipulated level in the standard 75-year projection of the SSA.

As noted, the main drawback of these measures, aside from all the very difficult issues related to the preparation of these projections, is one of presenting the right information. To provide a clear picture of the interaction that exists, we would like to know the financial position that preceded the one presented. We would also like to know the reasons for the change in the preceding period and for each reason the magnitude of its effect on the change. This requirement can also be met for the conventional measures used in representing the financial position of pay-as-you-go pension systems, and it is indeed fulfilled occasionally for some change factors. But such figures do not come from the calculation of the actuarial balance measure itself, nor will such ad hoc analysis provide the self-controlling mechanism of double-entry bookkeeping. Thus, not even the public pension scheme probably best analysed by conventional methods – the US Social Security system – has provided regular information on such an interesting and elementary figure to show the cost of the annual change in life expectancy.

The double-entry algorithm is the standard, and so far the most efficient, way of simultaneously and consistently conveying financial position and changes in it. For this reason, double-entry bookkeeping ought to be our prime candidate as a way to improve financial reporting on pay-as-you-pension systems.

There are some additional reasons why it probably is better to go the full distance of establishing an income statement and balance sheet for national pay-as-you-go pension plans rather than trying to provide more measures and analysis along the conventional path. One is that the words used in income statements and balance sheets are more familiar to a wider circle of policy makers, journalists and informed members of the public than are the terms used in standard pay-as-you-go actuarial disclosure. The actuarial balance figure can also be criticised as unnecessarily abstract, since it does not explicitly mention liabilities, or assets to match them. However, the strength of this argument is questionable; with pay-as-you-go financing, the assets that should match liabilities are inherently abstract.

⁴ In english The National Social Insurance Board.

⁵ The market value of the fund divided by one year of pension disbursements. In Sweden this measure is usually referred to as “fund strength”.

4 Pay-as-you-go assets?

The idea that the financial position of a pay-as-you-go pension plan can be presented in the terms of assets and liabilities does not come naturally, and indeed it may need some getting used to. However, to most people it seems clear that a pay-as-you-go system has liabilities, both to retired persons and to those who at the time of measurement are working and have accrued some pension claim. Opinions differ on the choice of method to estimate the value of this liability, but not its existence.⁶

It is understandably more controversial to claim that the liabilities of a pay-as-you-go pension plan are fully or partially backed by something that we may call “assets”. A defining feature of pay-as-you-go financing is that it finances its payments not from pre-funded assets, but from current contributions. As a pay-as-you-go system has little or no tangible assets, it may be considered, by definition, to be in permanent deficit. While this view seems plausible, it may be impractical and perhaps even questionable on theoretical grounds.

For example, in the extremely unlikely event that a pay-as-you-go system with fixed contribution rate and benefit rules, contributions continuously and perpetually perfectly match pension payments, does this system have a deficit, or is it in financial balance? Reasonably, it can be considered to be in financial balance, i.e. have a net present value of zero. If a system with a liability of a defined and measurable size has a net present value of zero, it must also have assets equal to that liability. As opposed to a premium reserve plan, a pay-as-you-go pension plan is free to use contributions to pay off the pension liability, even when the contribution directly or indirectly is a source of a new pension liability. Thus, in a pay-as-you-go pension system, the contribution flow can and should be considered as the principal asset. The double-entry bookkeeping of the new Swedish pay-as-you-go pension plan is based on this reasoning. The Swedish concept of the value of the contribution flow is expressed in English as the *contribution asset*.⁷

It is surprisingly simple to calculate the value of the contribution flow: it is the product of the size of the flow per time unit, which in practice is a year, and the expected time between payment of contributions and receipt of pensions. The averages are weighted by the age-dependent amounts of expected contributions and pensions. In Sweden the expected contribution-weighted average age of contributors is about 42, and the expected pension-weighted age of retirees is about 74. Thus, the relevant time span is about 32 (74-42) years, and the contribution asset is 32 times one year's contributions. In the Swedish legislation on the automatic balance mechanism, this time span is called *omsättningstid* – expected turnover duration -- as it is a measure of the time required for a cycle of accumulation and depletion of the pension liability. Information on the expected turnover duration can be, and is in Sweden, annually retrieved from the records of the pension plan.

The contribution asset, that is, contributions times turnover duration, tells us the size of the pension liability that would result in a steady state determined by demography, i.e. nativity, age-related net migration and mortality, and the economy of the country, i.e. the size of the contribution base and the age-related average incomes, at the time of measurement.⁸ The turnover duration measures informs, in a single figure, the effect that changes in fertility⁹ and age-related income patterns and mortality have on the capacity of the contribution flow to finance pension liability.

5 Swedish use of an Italian device

The income statement and balance sheet of the *inkomstpension* plan for the years 2001, 2002 and 2003 are “reproduced” below. However, to facilitate international comparison, the amounts here are expressed in percent of GDP for each year, the appendix gives the original amounts in Swedish currency. The income statement consists of 13 genuine entries, of which only the four cash-flow statements were disclosed prior to 2001. The balance sheet consists of five genuine entries, of which only one – the market value of the buffer

⁶ The preferred method depends partly on the objective of the liability estimation.

⁷ R. Lee, an economic demographer has published considerable work relating to the value of the contribution flow in pay-as-you-go financing; Lee uses the term *transfer wealth* for what in Sweden has been termed the contribution asset .

⁸ For details on turnover duration and the contribution asset, see the legislative history of the automatic balance mechanism, Settergren (2001), Settergren and Mikula 2002 and Settergren and Mikula 2003. R. Lee deals extensively with the concept.

⁹ In the legislation on the Swedish scheme, the effects of fertility changes on turnover duration are disregarded.

fund -- was disclosed prior to 2001. For each of the entries, there is a note with detailed information; here the notes will not be considered.¹⁰

The income statement is divided into three sections. Section (a) *Change in funded assets* deals with the cash flows of the scheme, i.e. those flows that have changed the value of the buffer fund. This section contains no new information relative to what always has been reported. Noticeable is the – for a European context – low level of contributions and pension disbursements, around 7 percent of GDP. This is explained largely by the fact that the *inkomstpension* deals exclusively with earnings related old-age pensions. Thus disability pensions, the guarantee-pension and survivors benefits, which is slowly being phased-out of Swedish social security, are not included in the income statement nor in the balance sheet. Would those benefits be included expenditure would be around 10 percent of GDP. Presently contributions are larger than pension disbursements, a situation that is projected to continue up until around year 2010. From that time on pension disbursements are projected to surpass contributions, the deficit will be financed with the return on the assets in the buffer fund and also, according to projections, part of its capital. The buffer fund is valued at market prices the last trading day of the accounting period. As the buffer fund to 60 percent is invested in equities the sharp decline in prices on that market has fed into significant buffer fund losses in 2001 and 2002, losses that were partly regained by a positive development in 2003.

Section (b) *Change in contribution assets* deals with how much the contribution asset has changed due to change in contribution flow (revenue) and due to change in turnover duration respectively. As the contribution asset is calculated as the contribution flow (C) times the turnover duration (TD) the separation of the effects from changes in two components imply that the *Value from change in contribution revenue* is:¹¹

$(C_t - C_{t-1}) \times \frac{TD_t + TD_{t-1}}{2}$. The *Value from change in turn over duration* is similarly calculated as

$(TD_t - TD_{t-1}) \times \frac{C_t + C_{t-1}}{2}$. There is a positive trend in turnover duration, due to the persistent increase in life

expectancy, this tendency has only been partly offset by the tendency to delay entry into the labour force, due to prolonged time spent in education.¹² In a steady state the *Value of change in turnover duration* is zero and *Total change in contribution asset* assets will grow only as a function of the growth in the contribution flow. The contribution flow grows with increases in average incomes times the number contributors, essentially the number of gainfully employed.¹³

Box 1. Income statement of the *Inkomstpension* as a percent of GDP¹⁴

	2003	2002	2001
<i>GDP, millions of SEK (1 Euro ≈ 9 SEK)</i>	2,440,058	2,347,400	2,266,387
Change in funded assets (a)			
Pension contributions	6.8	6.8	6.9
Pension disbursements	-6.4	-6.5	-6.3
Return on funded capital	3.4	3.6	-1.1
Costs of administration	-0.1	-0.1	-0.1
<i>Total change in funded capital (a)</i>	3.7	-3.3	-0.6
Change in contribution assets (b)			
New Value of change in contribution revenue	6.6	9.6	17.9
New Value of change in turnover duration	0.5	-0.7	0.7
<i>Total change in contribution asset (b)</i>	7.1	8.8	18.6

¹⁰ The full reports 2001 and 2002 and 2003 report can be downloaded free of charge from www.rfv.se/english/publi/index.htm

¹¹ Trough out this paper the different kinds of smoothing that is done according to the legislation is disregarded, for details see the technical appendix of *The Swedish Pension System Annual Report 2002*.

¹² See the special feature article in *The Swedish Pension System Annual Report 2002*.

¹³ In the Swedish scheme the government finances with general tax revenue the contributions for unemployed persons, sick persons etc., thus the contribution flow depends on more factors than the number of gainfully employed.

¹⁴ Source for the numerators are *The Swedish Pension System Annual Report 2001, 2002 and 2003*. The GDP denominator used are from Konjunkturinstitutets konjunkturrapport, in March 2004.

Change in pension liability* (c)				
New	New Pension credits and ATP points	-7.1	-7.1	-6.1
(New)	Pension disbursements	6.4	6.5	6.3
New	Indexation	-9.4	-11.8	-5.1
New	Value of change in life-expectancy	-0.5	-0.3	-0.8
New	Inheritance gains arising	0.3	0.3	0.2
New	Inheritance gains distributed	-0.3	-0.3	0.0
New	Deduction for costs of administration	0.1	0.1	0.0
	<i>Total change in pension liability (c)</i>	<i>-10.5</i>	<i>12.6</i>	<i>-5.7</i>
(New)	Net income/ -loss (a)+(b)+(c)	0.3	-7.1	12.3

*A negative value (-) means that the pension liability increases, and a positive value () that the pension liability decreases, by the amount shown.

Section (c) *Change in pension liability* informs of the reasons and magnitudes of changes in the size of the pension liability. The pension liability:

- Increases as *new pension credits* has been earned during the accounting period. When the new pension system has been fully phased in 2018, i.e. when no ATP points any longer can be earned, *New pension credits* will equal *Pension contributions*. That pension credits earned are equal to contributions paid is one criterion for a pension scheme to be defined-contribution.
- Decreases as part of the liability has been paid off as *pension disbursements* have been made.
- Increases with the interest paid on the liability, i.e. the *indexation*. When the new system has been fully phased in this interest will by default be equal to the change in average income in Sweden. Only if the automatic balance mechanism is activated the indexation will deviate from the change in average income.
- Increases (decreases) with the *Value of changes in life-expectancy*. Even in the Swedish pension plan, which to my knowledge is the world's best financially insulated pension scheme relative to changes in life expectancy¹⁵ the economic impact from such demographic changes are important. The annual increase in pension liability due to changes in life-expectancy varies from 0.3 in 2002 to 0.8 percent of GDP in 2001.
- Decreases with the *Inheritance gains arising* that is the value of the pension claims of persons that have died before beginning to draw a pension,
- Increases with *Inheritance gains distributed* that is the survivor bonus distributed to those non retired and finally the pension liability,
- Decreases with the reduction for administrative costs made of the insured's claim on the system.

Box 2. Balance sheet of the *Inkomstpension* as a percent of GDP

		Dec. 31 2003	Dec. 31 2002	Dec. 31 2001
Assets				
	National Pension Funds	23.6	20.8	24.9
New	Contribution asset	224.0	225.5	224.4
	<i>Total assets</i>	<i>247.6</i>	<i>246.2</i>	<i>249.3</i>
Liabilities and surplus				
New	Opening surplus/-deficit	2.1	9.3	-2.7
	Net income / -loss for the year	0.3	-7.1	12.3
New	Total (closing) surplus /-deficit	2.4	2.2	9.6
New	Pension liability	245.2	244.0	239.7
	<i>Total liabilities and surplus</i>	<i>247.6</i>	<i>246.2</i>	<i>249.3</i>

The assets of the balance sheet are the market value of the buffer fund and the contribution asset, calculated as $C_t \times TD_t$. Even though the Swedish national pension plan has one of the largest buffer funds of any national pay-as-you-go pension plan it represents less than 10 percent of the pension liability.

¹⁵ Viewed from another angle this efficient insulation can be view as efficiency in passing on the economic effects from increases in life expectancy to the insured.

The opening surplus is, naturally, the closing surplus of the preceding accounting period, as the GDP denominator changes between the years this important relationship is obscured. The opening surplus/-deficit plus the net income/-loss for the year gives the closing surplus for the accounting period. The fundamental accounting equality states that:

$$\text{Opening balance} + \text{net income/loss} + (\text{Pension}) \text{ liability} = \text{Total assets.}$$

If one single financial indicator of financial position is sought the natural, most information dense, is total assets divided by pension liability. In the translation of the Swedish accounting this figure is called *balance ratio*. If this ratio is less than one (1) the system has a deficit, a negative net present value, if it is above one the system has a surplus, a margin. In the Swedish system legislation stipulates that if the balance ratio is below one the balance mechanism is triggered.

Box 3. The balance ratio – Summarising the accounting in one figure

	Dec. 31 2003	Dec. 31 2002	Dec. 31 2001
Total assets	247.6	246.2	249.3
./. Pension liability	245.2	244.0	239.7
= <i>Balance ratio</i>	1.0097	1.0090	1.0400

When the balance mechanism is triggered the indexation of the pensions and pension credits will be effectuated by the change in average income adjusted by multiplying the index with the balance ratio, starting of a new index series. The balancing of the system means that an amount equal to the closing deficit in the balance sheet will be eliminated. If the balance ratio after being triggered grows bigger than one the closing balance surplus is automatically distributed by increasing the indexation. This continues until the balance index reaches the level of the income index.

In some respects the balance ratio resembles the actuarial balance measure that SSA uses, but the income statement and balance sheet that comes with the balance ratio, and the notes tied to their entries, incorporates details on what *cause* provokes what *effect*, by what *means*, at what *rate*. Thus it is better at supplying the essentials of knowledge.

It is clear that if other administrators of national pension plans were to present their financial position the individual entries of their income statements and balance sheets, and the associated notes, need to be modified. This to comply with the specific demands of each plan, but the general outline should be possible to follow. However the work required in each case to be able to present a complete income statement and balance sheet should not be underestimated, neither should the rewards from a successful such effort.

A less ambitious endeavour, but a still worth while financial indicator, would be to start to annually publish the change, most likely increase, of the pension liability caused by changes (increases) in life expectancy.¹⁶

A note on the particular simplicity of the new Swedish pension plan

The double entry bookkeeping of the new Swedish essentially pay-as-you-go financed pension plan has been much facilitated by the design of the *inkomstpension*. Very briefly these design features implies that the present value of pension liabilities in the pension scheme can be approximated to equal the nominal value of the pension liability. Further the nominal value of the pension liability to persons that have not yet started to draw a pension is much simpler to calculate in a (notional) defined-contribution pension plan, such as the Swedish is, than it is for a traditional defined-benefit plan. The *inkomstpension* liability to persons who have not yet begun to persons still economically active is valued as the aggregate of the amounts on each individuals so-called “notional” account. This calculation entails a simple aggregation of account balances in RFV registers. 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. The number

¹⁶ If this is done the positive effect on the expected turnover duration from increases in life expectancy should be deducted.

of expected disbursements is calculated from annual measurements of the length of the time that pension amounts in RFV records are paid out.

The nominal valuation of assets and liabilities of the Swedish pension plan imply that all valuations are made 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*.

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 ration exceeds on (1), however, liabilities and assets will develop at somewhat different rates. In cases where the balance ration 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.¹⁷ Together with other design features the provisions for automatic balancing have eliminated the need for making explicit assumptions about future economic and demographic developments in order to ensure the financial stability of the system.

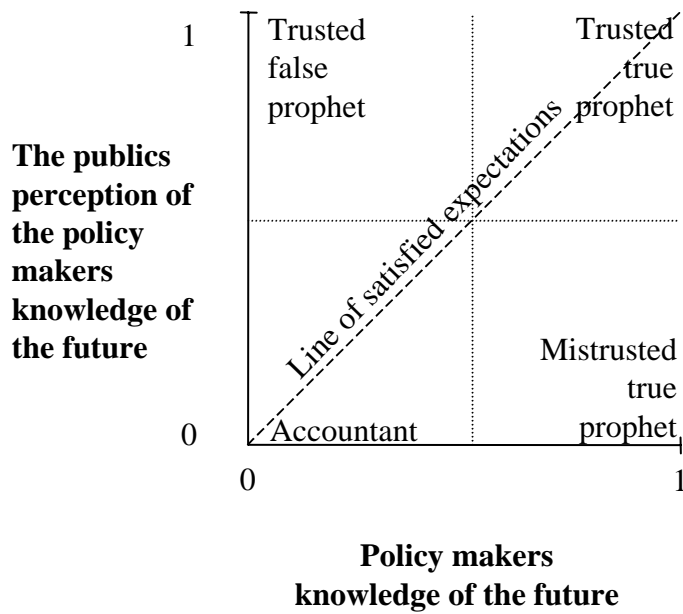
It is apparent from the above that the method for valuing the assets and liabilities of the *inkomstpension* system is implicitly based on the assumption that assets and liabilities grow at the same rate after each valuation. To put it another way, it is assumed in the method of valuation that the indexation 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.

6 Does it matter?

Will it make any difference if governments continue to furnish us with projected cash flows, perhaps boiled down to a figure reflecting “actuarial balance” as done in the US, or if they would start to present income statements and balance sheets and summarise them in a “balance ratio”? I believe it would make a difference. A “normalised”, double entry, way of reporting on financial position of national pension plans provides more detailed information – presented in a more comprehensible way – to both policy makers and the insured than do discounted cash flows. And the balance ratio is, in my opinion, a better summary of the financial situation in a pay-a-s-you-go pension plan. Such improved information has the potential to promote better policies when it comes to stabilise the finances of national pension plans.

¹⁷ The manner of calculating turnover duration involves an implicit assumption that the population growth is zero. Thus, turnover duration will be (slightly) over estimated 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.

Figure 1 Four stylised policy makers – which one are you?¹⁸



Applying double entry bookkeeping might also promote a debate on to what extent the financial stability of national pay-as-you-go pension schemes ought to rely on future development of the demographic and economic factors that in a defined benefit plan decide the plans financial development. And to what extent their financial stability should be less dependent of such demographic and economic factors by transferring risks and opportunities to the pension benefit-level, as is done in a defined-contribution plan. The *inkomstpension* is radical in that it transfers all demographic and economic risks to the insured. This has made the accounting simpler than it will be in systems that instead, implicitly or explicitly places the risks on the contribution rate, or splits the risk between contribution rate and pension level.¹⁹ In defined benefit pension plans the accounting will need explicit assumptions of the future. Doing this contains risks and opportunities – illustrated in figure 1 – that the accounting provisions for the Swedish pension keep away from.

¹⁸ The essentials of this image came out of a discussion with Boguslaw D. Mikula at RFV.

¹⁹ The risks that the insured are exposed to is reduced by the existence of the so-called guaranteed pension. This benefit is financed by general tax revenue, not contributions to the *inkomstpension* system. In a sense, the guarantee pension can be considered to have the effect of splitting the risk between contributors/tax payers and retirees, however retirees with (relatively) low pension benefits are beneficiaries of this tax financed insurance.

Appendix: Income statement and balance sheet of the *inkomstpension*

Income statement, millions of SEK²⁰

	2003	2002	2001
Change in funded assets (a)			
Pension contributions	165,107	160,745	156,811
Pension disbursements	-155,410	-151,757	-143,564
Return on funded capital	82,060	-84,529	-25,035
Costs of administration	-2,359	-2,081	-1,943
<i>Total change in funded capital (a)</i>	<i>89,398</i>	<i>-77,622</i>	<i>-13,731</i>
Change in contribution assets (b)			
Value of change in contribution revenue	159,964	224,275	405,877
Value of change in turnover duration	12,346	-16,763	15,745
<i>Total change in contribution asset (b)</i>	<i>172,310</i>	<i>207,512</i>	<i>421,622</i>
Change in pension liability (c)			
New Pension credits and ATP points	-172,567	-167,585	-138,627
Pension disbursements	155,410	151,562	143,564
Indexation	-228,288	-275,946	-116,287
Value of change in life-expectancy	-11,045	-5,923	-18,728
Inheritance gains arising	7,090	6,389	5,476
Inheritance gains distributed	-7,616	-6,617	-5,490
Deduction for costs of administration	1,475	1,478	923
<i>Total change in pension liability (c)</i>	<i>-255,541</i>	<i>-296,642</i>	<i>-129,169</i>
Net income/ -loss (a)+(b)+(c)	6,167	-166,752	278,722

Balance sheet, millions of SEK

	Dec. 31 2003	Dec. 31 2002	Dec. 31 2001
Assets			
National Pension Funds	576,937	487,539	565,171
Contribution asset	5,465,074	5,292,764	5,085,252
<i>Total assets</i>		<i>5,780,303</i>	<i>5,650,423</i>
Liabilities and surplus			
Opening surplus/-deficit	51,645	218,397	-60,315
Net income / -loss for the year	6,167	-166,752	278,722
Total (closing) surplus /-deficit	57,812	51,645	218,407
Pension liability	5,984,199	5,728,658	5,432,016
<i>Total liabilities and surplus</i>	<i>6,042,011</i>	<i>5,780,303</i>	<i>5,650,423</i>

²⁰ Source *The Swedish Pension System Annual Report 2001, 2002 and 2003*.

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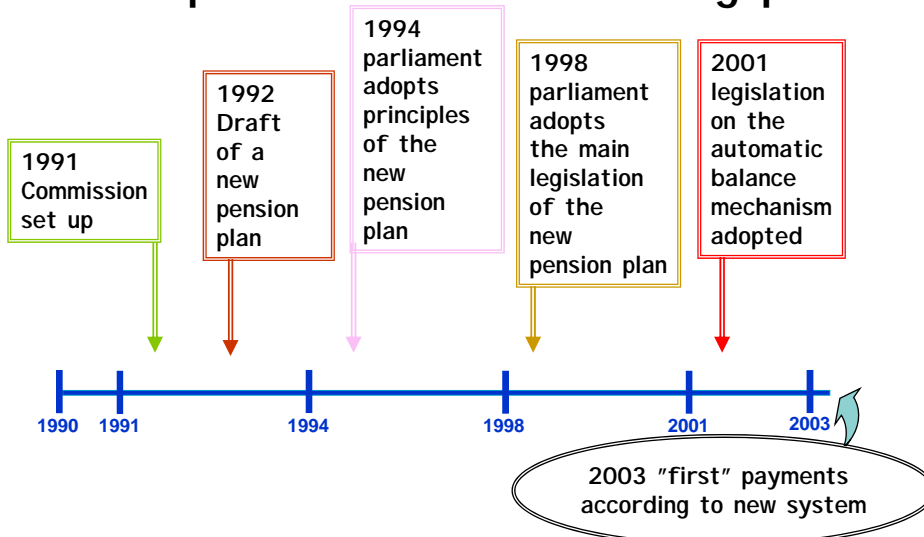
Sombart...(?)

*The legislative history of the Income Index and the Automatic Balance Mechanism
Penmed by Ole Settergren*

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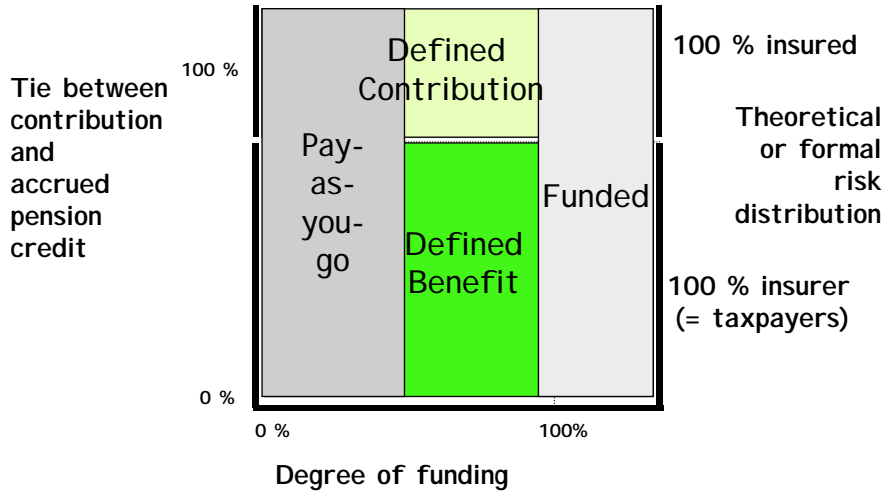
The Balance Sheet of the Swedish National Pension System

Swedish pension reform - a long process



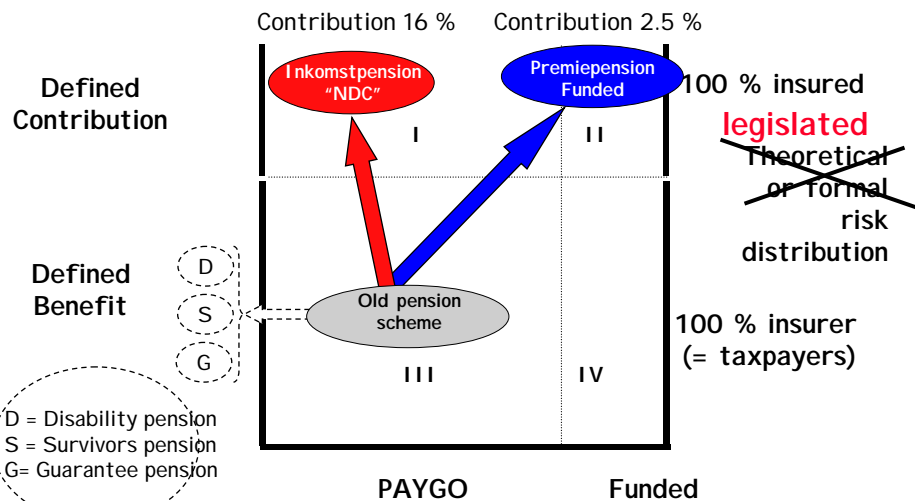
But transition to new system is relatively quick!

Four basic design options



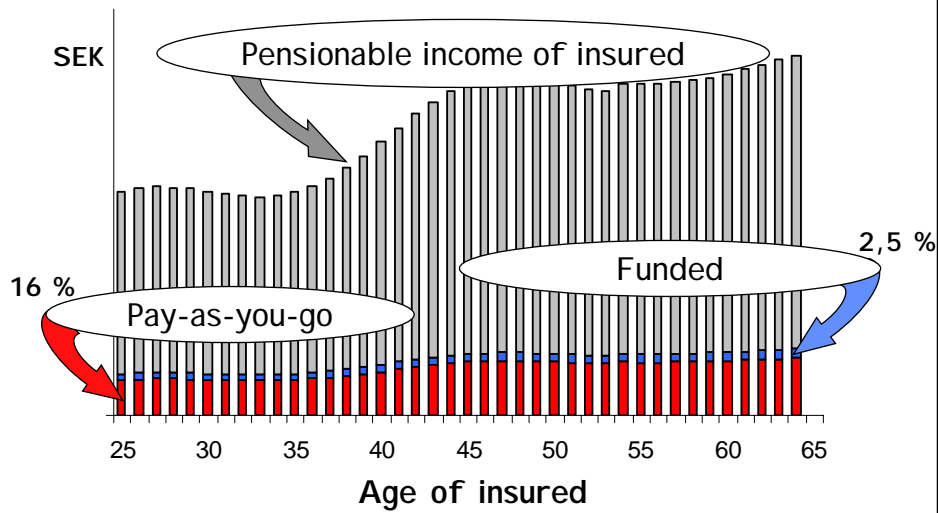
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Swedish Reform Strategy



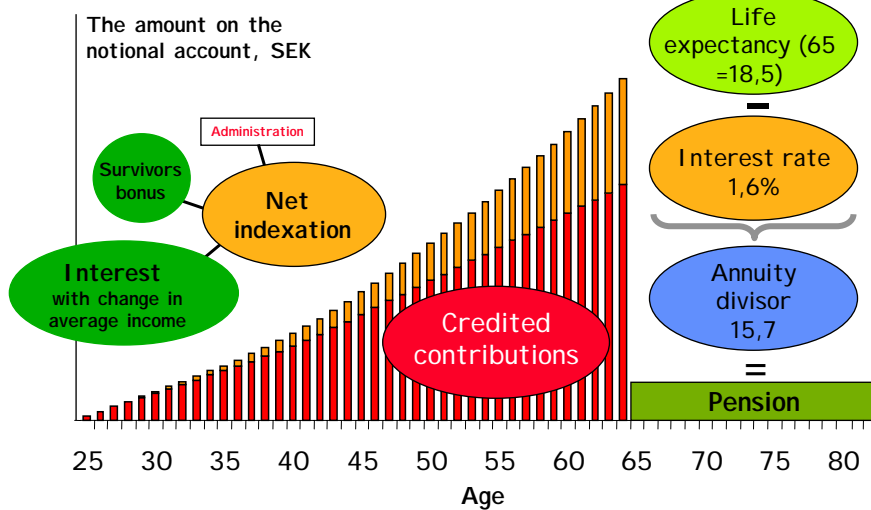
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Each crown paid during life result in the same amount of pension credit



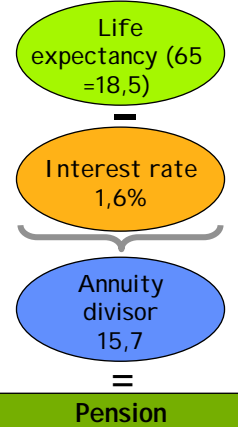
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Development of notional account



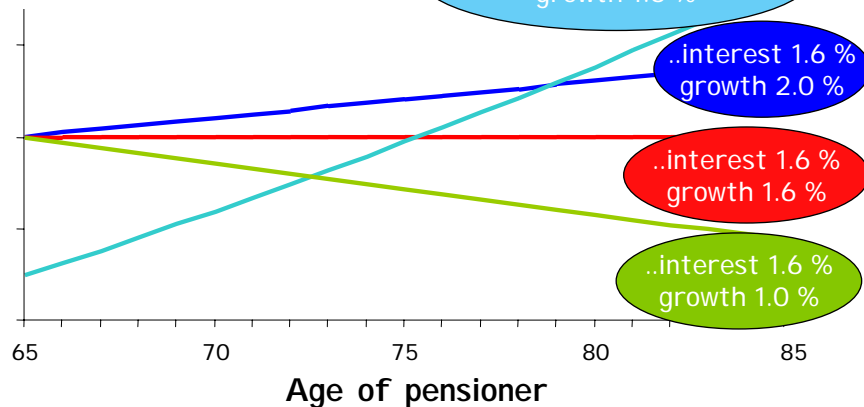
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Conversion to an annuity



Pension as an annuity

Real value of pension



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Traditional social security indicators of financial balance (single entry)

versus

The double entry bookkeeping indicators of financial balance developed for the Swedish NDC scheme

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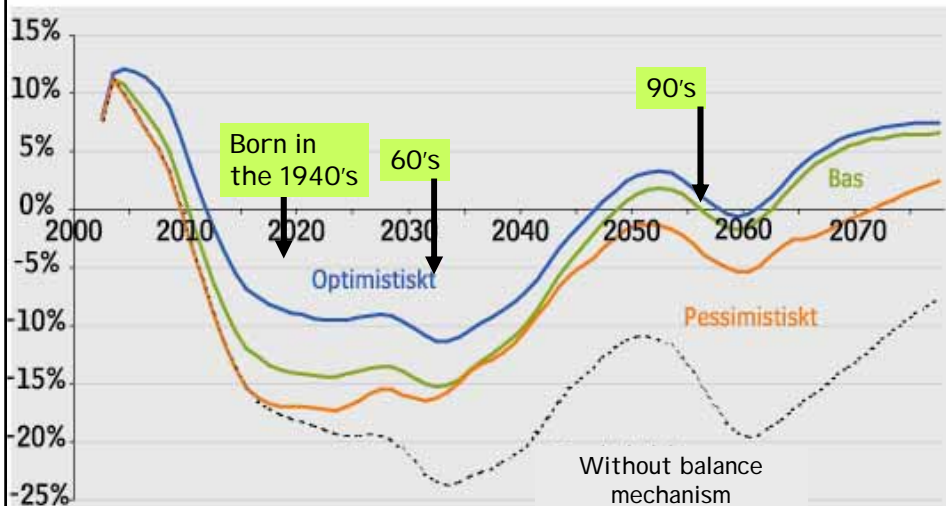
Traditional social security indicators of financial balance (single entry)

Examples from the Swedish NDC system:

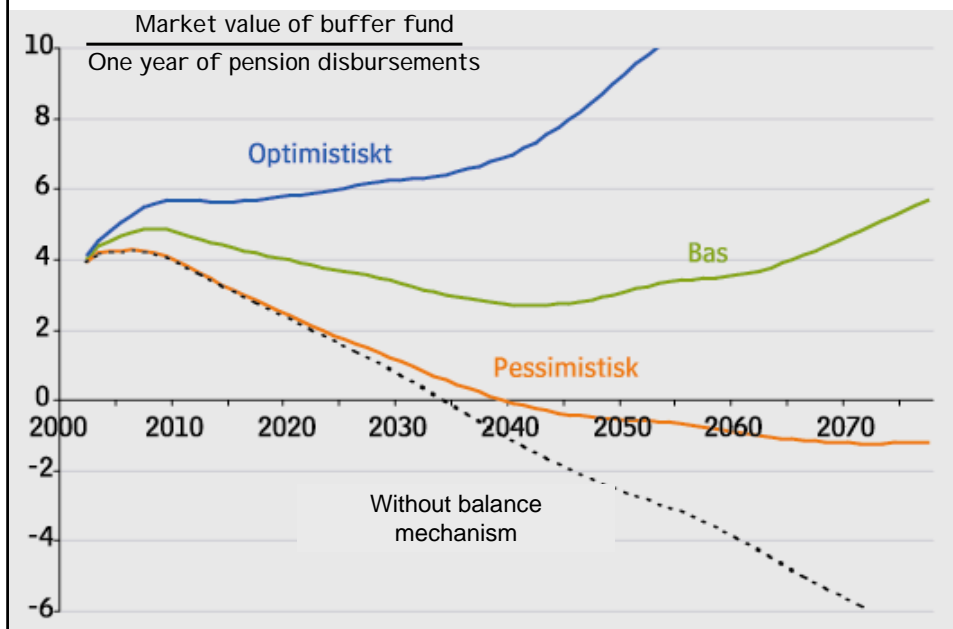
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Simulations of net contribution 2002-2077

in percent of total contributions



Simulations of fund ratio, 2002-2077



The double entry bookkeeping indicators of financial balance developed for the Swedish NDC scheme

To get the net present value of pensions, contributions must be deducted from the expected flow of pensions...

Which flow of pensions?	Which flow of contributions?
A. All individuals that at time of measurement have entered work force (closed group defi.)	Contributions from the same individuals
B. During a 75 year period, as the US SSA does	All contributions during the 75 years
C. Infinite time horizon	Infinite time horizon
D. The flow of pensions that derive from pension credits accrued at the time of measurement.	No contributions

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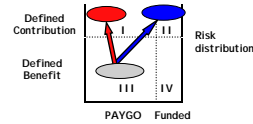
Which discount factor?

- A. The expected capital market return?
- B. The expected growth in average income?
- C. The expected internal rate of return of the public pension system?

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Imagine a defined contribution pension system,
i.e. a pension system where

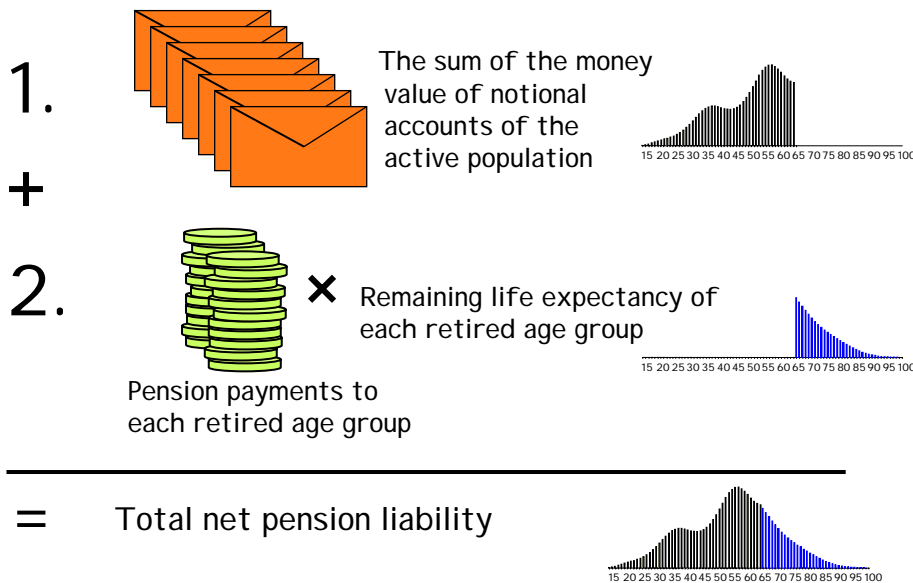
- A. The annual pension credit = annual contribution
- B. The "return" (indexation) of pension credit & pension benefit = internal rate of return of the system



What is the net present value of the pension liability of such a system?

$$\begin{aligned}
 &\text{accumulated contributions} \\
 &+ \text{accumulated return} \\
 &- \text{accumulated paid pensions} \\
 \hline
 &= \text{net present pension liability}
 \end{aligned}$$

More simply calculated as...



The super simple, legislated, rule for calculating the Swedish pension liability (implicitly) implies that the:

- A: relevant pension flow is that which derive from pension credits already earned at the time of measurement
- B: internal rate of return of the public pension system is the relevant discount factor.
- C: notional pension capital and pensions are indexed at the same rate as the internal rate of return of the pension system. (Which is only true if and when the automatic balance mechanism is active.)

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The defined contribution design eliminates - **by definition** - the need to consider the future, when estimating pension liability.

Thus no projected cash flows, no assumed discount rate.

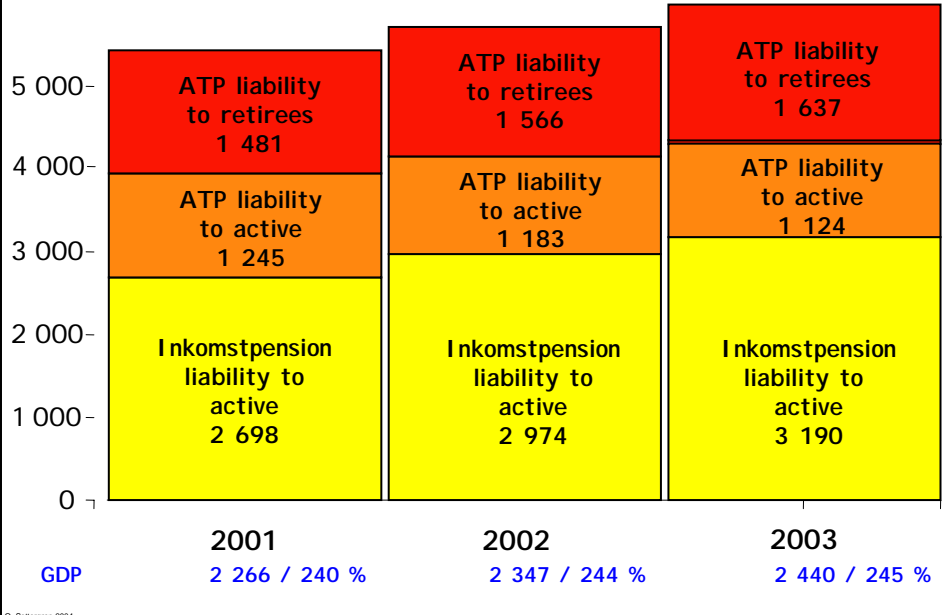
This is equally true for a (true) NDC scheme as for a funded DC.

WYSIWYG
What You See Is What You Get

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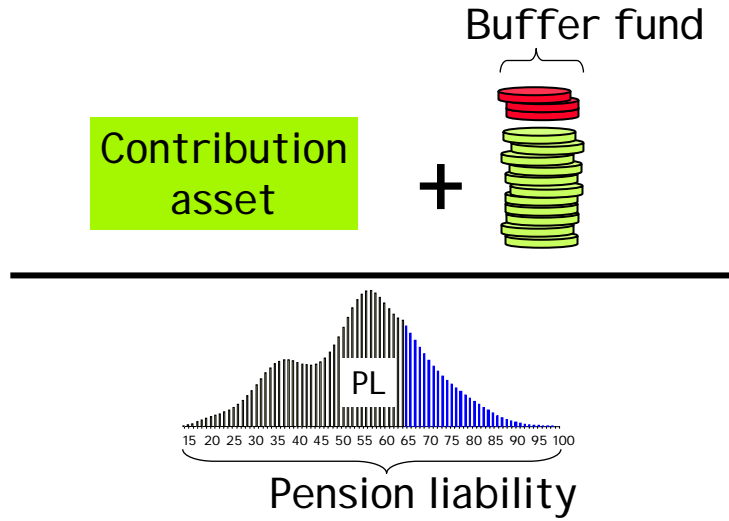
What did we get? Some real and big numbers

Billions of SEK (1 Euro = 9 SEK)



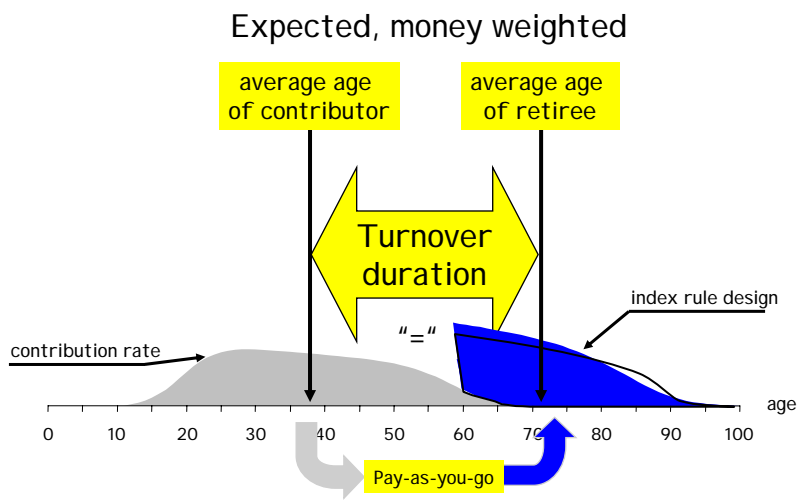
Does a PAYG pension system have Assets?

Balance Ratio



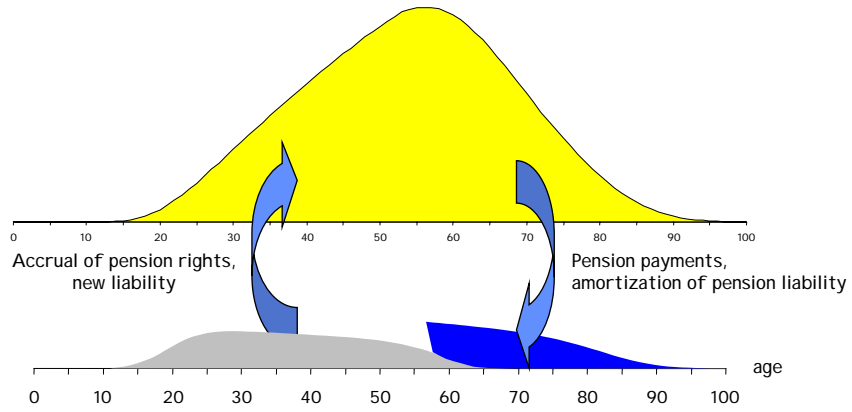
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Expected contributions & pensions



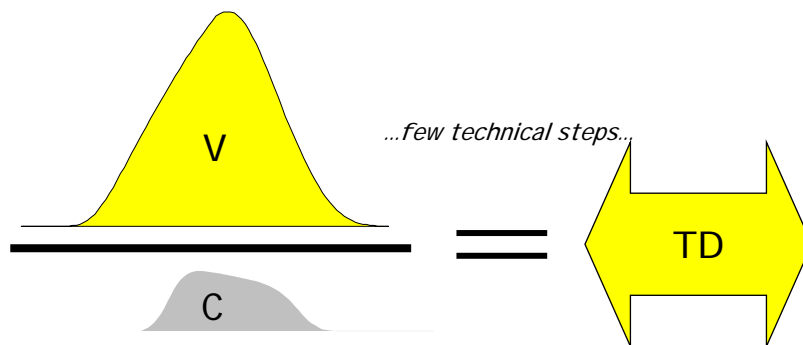
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Expected Pension Liability

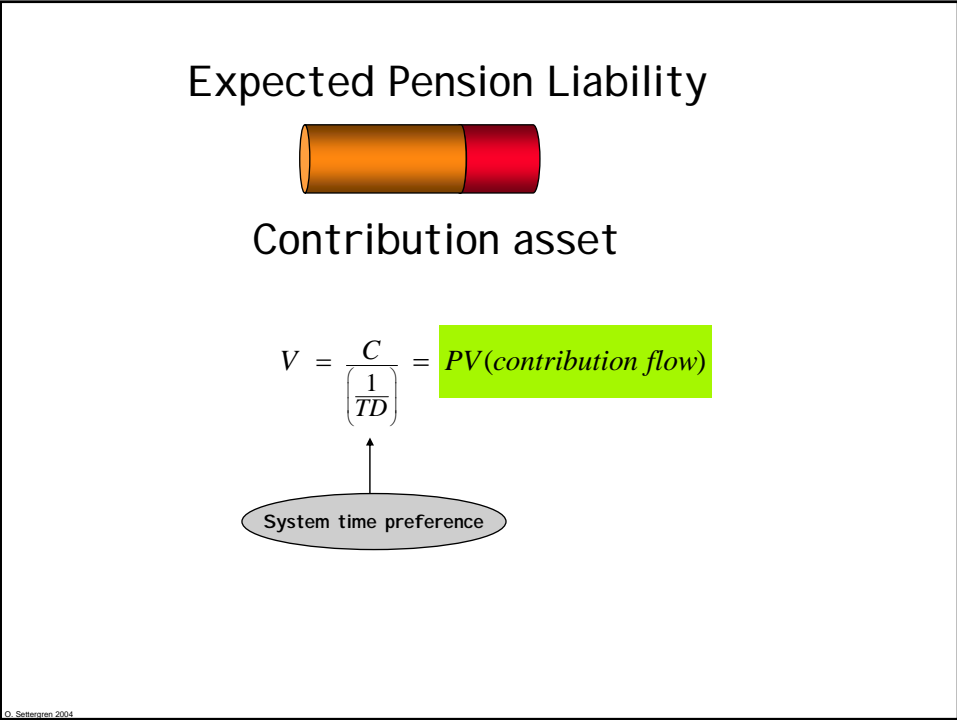
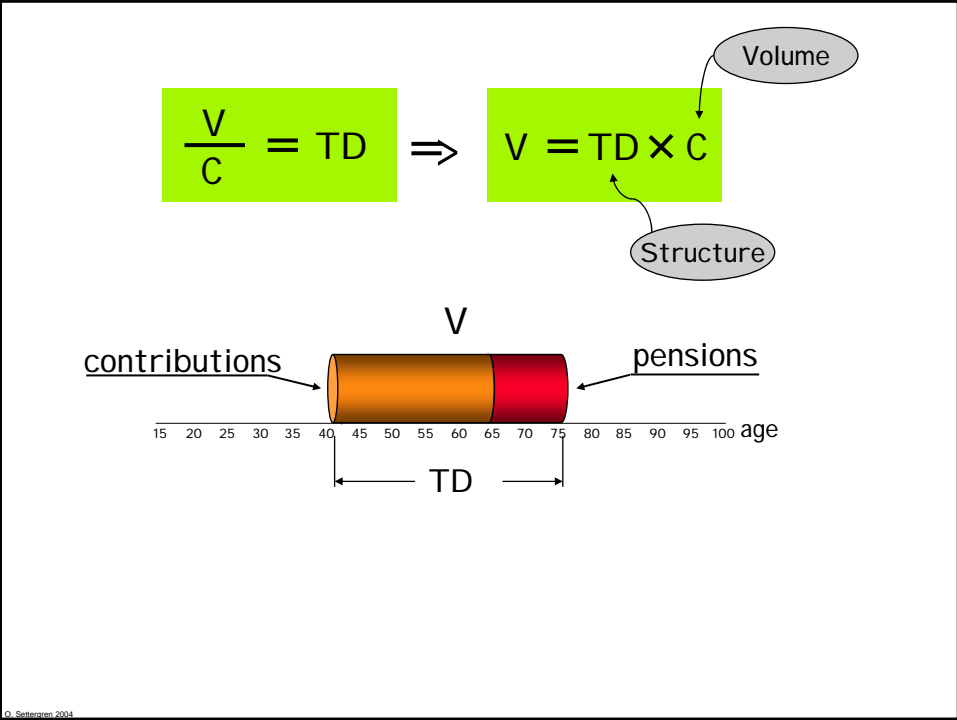


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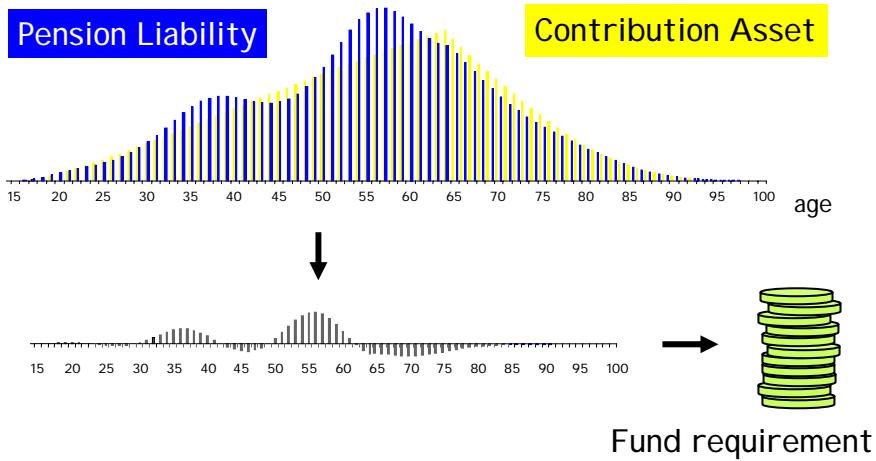
$\frac{\text{Expected Pension Liability}}{\text{Expected Contributions}}$



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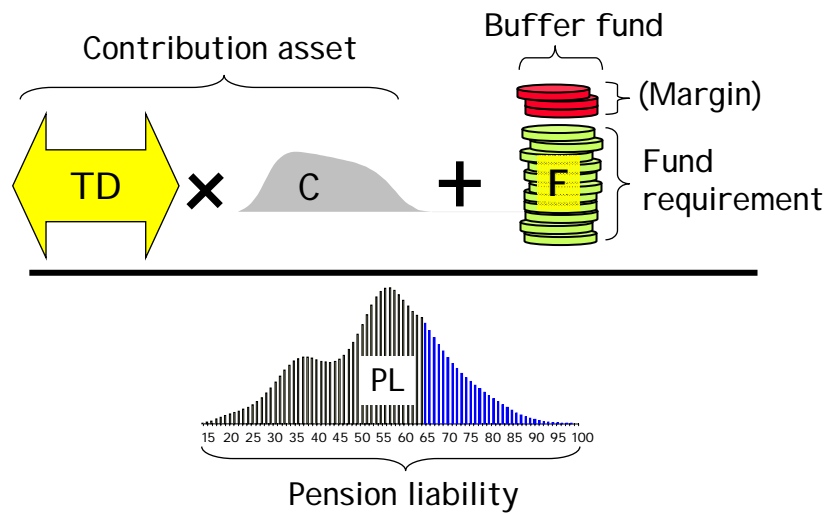


Pension Liability and the Fund

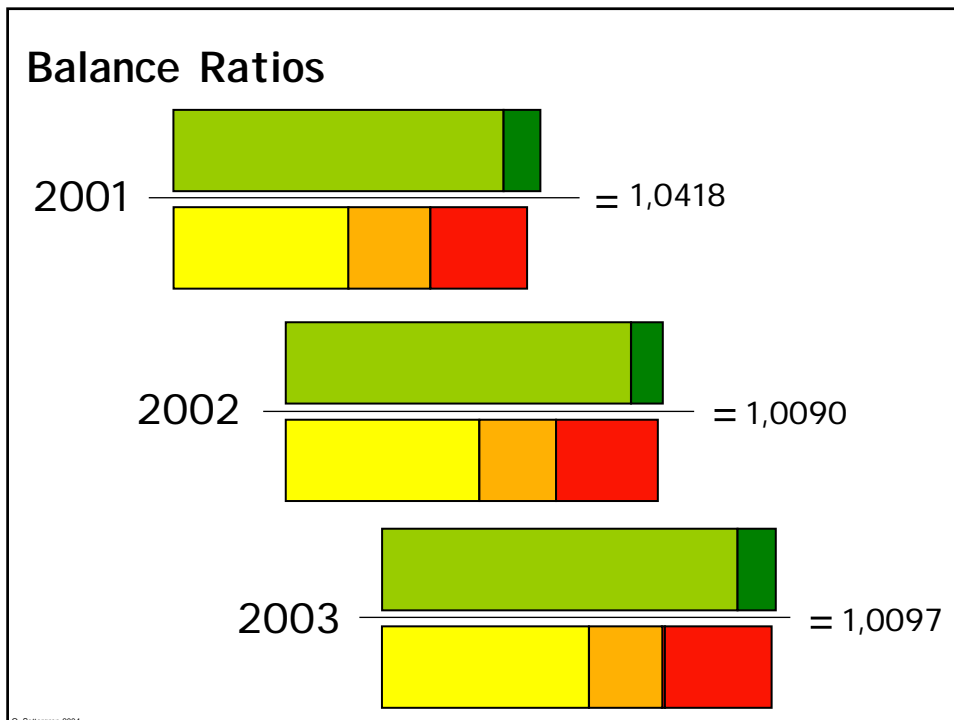
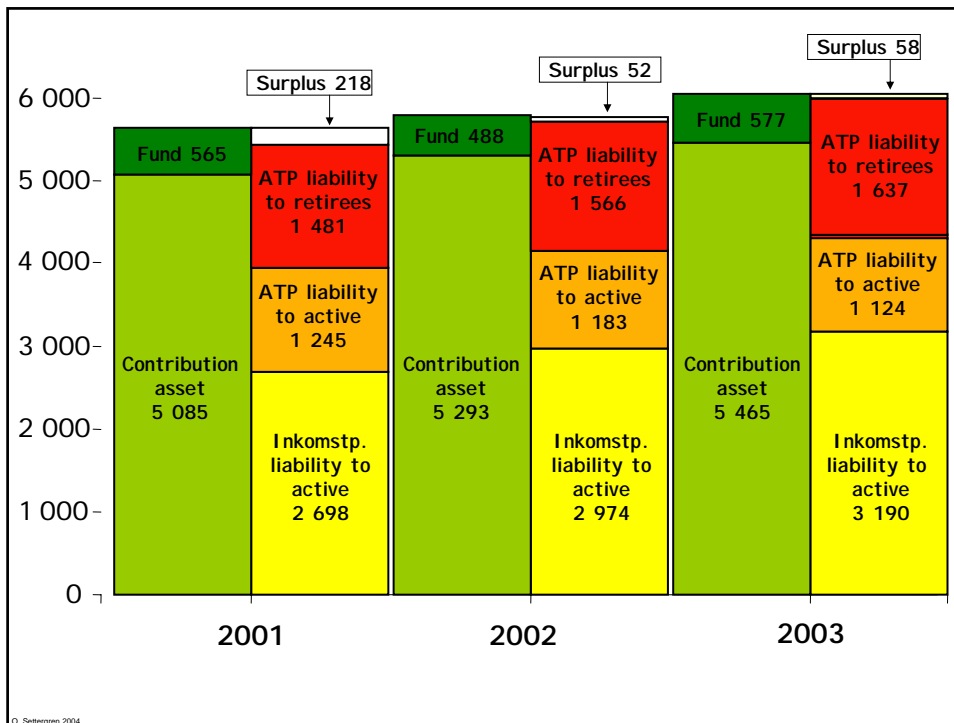


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Balance Ratio



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Income Statement, in percent of GDP

	2003	2002	2001
<i>GDP, millions of SEK (1 Euro » 9 SEK)</i>	2,440,058	2,347,400	2,266,387
Change in funded assets (a)			
Pension contributions	6.8	6.8	6.9
Pension disbursements	-6.4	-6.5	-6.3
Return on funded capital	3.4	-3.6	-1.1
Costs of administration	-0.1	-0.1	-0.1
<i>Total change in funded capital (a)</i>	<i>3.7</i>	<i>-3.3</i>	<i>-0.6</i>
Change in contribution asset (b)			
Value of change in contribution revenue	6.6	9.6	17.9
Value of change in turnover duration	0.5	-0.7	0.7
<i>Total change in contribution asset (b)</i>	<i>7.1</i>	<i>8.8</i>	<i>18.6</i>
Change in pension liability (c)			
New Pension credits and ATP points	-7.1	-7.1	-6.1
Pension disbursements	6.4	6.5	6.3
Indexation	-9.4	-11.8	-5.1
Value of change in life-expectancy	-0.5	-0.3	-0.8
Inheritance gains arising	0.3	0.3	0.2
Inheritance gains distributed	-0.3	-0.3	0.0
Deduction for costs of administration	0.1	0.1	0.0
<i>Total change in pension liability (c)</i>	<i>-10.5</i>	<i>12.6</i>	<i>-5.7</i>
Net income/ -loss (a)+(b)+(c)	0.3	-7.1	12.3

0. September 2004

Balance sheet of the *Inkomstpension* as a percent of GDP

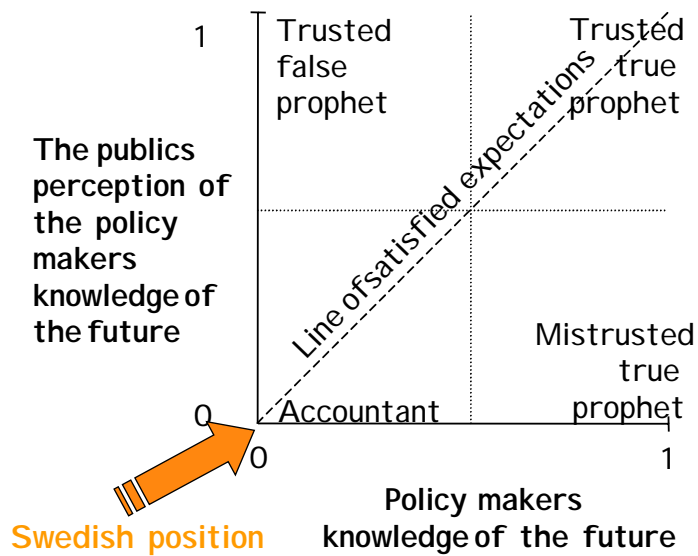
	Dec. 31 2003	Dec. 31 2002	Dec. 31 2001
Assets			
National Pension Funds	23.6	20.8	24.9
Contribution asset	224.0	225.5	224.4
<i>Total assets</i>	<i>247.6</i>	<i>246.2</i>	<i>249.3</i>
Liabilities and surplus			
Opening surplus/-deficit	2.1	9.3	-2.7
Net income / -loss for the year	0.3	-7.1	12.3
Total (closing) surplus /-deficit	2.4	2.2	9.6
Pension liability	245.2	244.0	239.7
<i>Total liabilities and surplus</i>	<i>247.6</i>	<i>246.2</i>	<i>249.3</i>

0. September 2004

Does measures matter?

O. Settergren 2004

Four stylised policy makers - which one are you?



O. Settergren 2004

International Workshop on
The Balance Sheet of Social Security Pensions

**Accounting for the New Swedish Old-age Pension Scheme:
A Comment**

by

Krzysztof Hagemeyer
Email: hagemeyer@ilo.org

Organised
by
PIE and COE/RES, Hitotsubashi University

Hitotsubashi Collaboration Center, Tokyo, Japan, 1st-2nd November 2004

Accounting for the new Swedish old-age pension scheme. A COMMENT

International Labour Office has always been putting sound financial governance of social security schemes as one of the main prerequisites to ensure that benefits are adequate and sustainable. ILO Convention no 102 on Minimum Standards in Social Security (art. 71 p.3) explicitly requests the governments to monitor closely financial equilibrium of the social security schemes and links this requirement to the overall responsibility of the state for providing benefits at the adequate level:

- *The Member shall accept general responsibility for the due provision of the benefits provided in compliance with this Convention, and shall take all measures required for this purpose. It shall ensure, where appropriate, that the necessary actuarial studies and calculations concerning financial equilibrium are made periodically and, in any event, prior to any change in benefits, the rate of insurance contributions, or the taxes allocated to covering the contingencies in question.*

The Swedish new legislation requires a pre-defined “balance ratio” of the old-age pension system to be calculated annually and links automatically indexation of past contributions (“notional rate of return”) and indexation of benefits to the financial position of the system (as reflected by the “balance ratio” indicator). It certainly strengthens further the long-term financial sustainability of the Swedish old-age pension system. It is also innovative, similarly like the overall NDC design which links automatically benefit accrual rates in the PAYG system to changing life expectancy¹.

New accounting rules, “balance ratio” indicator linked to this accounting rules and automatic balancing mechanism are advantageous as being simple, more easily understandable to politicians and the general public and as such helpful in improving governance of the Swedish pension system. But is the Swedish approach really “insulating” pension system from the state budget and making it truly sustainable? Does the new accounting approach really fully replace the need for actuarial and other projections using explicit assumptions about future demographic, labour market and economic developments? Finally: is the approach applicable in pension systems designed differently than according to principles of the Notional Defined Contribution?

¹ For a discussion of relationship between NDC and traditional defined benefit scheme see: Cichon, Michael (1999), Notional defined-contribution schemes: Old wine in new bottles? *International Social Security Review* 52 (4), pp. 87-105

Accounting approach and balancing mechanism do not cover financial liabilities resulting out of the existing minimum pension guarantee. More often balancing mechanism will be activated; lower will be the pension levels and thus higher costs for public budgets to finance minimum pension guarantee and additional social assistance benefits necessary to keep pensioners out of poverty. Tough eligibility rules in the pension system may lead also to increased expenditure on other social protection schemes (disability benefits, unemployment benefits). Old-age pension schemes are often utilized by workers (and their employers) as vehicles to relatively securely leave labour market in the unfavourable circumstances (like high unemployment, restructuring etc.) Tightening eligibility conditions for retirement (what NDC scheme does) may in some circumstances lead to increases in the number of beneficiaries of other benefit schemes if they are more favourable. Balancing mechanism may thus “insulate” finances of the old-age pension scheme from the budget but not *vice versa*: the overall finances of the whole pension system (and overall system of social protection) may appear to be not financially sustainable and financial sustainability of the NDC pension scheme may appear to be achieved just by pushing the costs of social security outside the pension scheme and increasing the financial burden of other parts of the overall social protection system. This shows that additionally to sound accounting and budgeting of individual schemes one always needs « social budgeting » of the overall social protection system².

There is also a question of balance between financial sustainability and adequacy of the benefit scheme. Benefit adequacy defines “social” sustainability of a social security scheme. Social sustainability means that eligibility conditions and benefit levels are such that social policy objectives of a scheme are effectively achieved. In case of old-age pension system it means providing (agreed as) adequate income after retirement at a reasonable, universally accepted, age. Failing to provide adequate benefit levels usually undermines financial sustainability by weakening incentives to contribute and political (and thus fiscal) support. Financial and social sustainability should thus go hand in hand, together they both make any social protection scheme viable. The Swedish system ensures to a large extent financial sustainability of a scheme but at the cost of benefit adequacy. One should admit that – with respect to balancing financial sustainability and benefit adequacy - design of the new Swedish pension system compares positively to outcomes of similar pension reforms implemented in some other countries of the region. However, if demographic and labour market circumstances will force using balancing mechanism too often and too long, benefit adequacy will be in serious danger and thus also viability of a scheme. Ideally, one would need another balancing mechanism preventing benefit levels to fall below social accepted levels.

Accounting principles of the new Swedish pension system go well beyond pure accounting: many implicit assumptions about the future are involved. These implicit assumptions include those related to unchanged demographic and labour market conditions. One can argue that it is not posing any problem as exercise is repeated every period and thus every period it takes into accounts new current demographic and labour circumstances as reflected by a high quality scheme’s data. But while this accounting approach can be seen as a very prudent way to monitor scheme’s finances, it does not replace the need for actuarial valuations and actuarial/economic projections. Even if working of the automatic balancing mechanism does not require it, the social policy making does. Policy analyst needs to know how finances of the system will develop depending on different demographic, labour market and economic scenarios and how benefit levels and benefit distribution will develop under these scenarios.

One of the major advantages of the Swedish new pension system is quality of data available to the policy analyst, policy maker, and all those responsible for sound governance of the scheme. Public pension systems (and defined benefit schemes in particular) need extremely prudent actuarial appraisals. However: the data necessary are often not in place.

Actuaries are not prophets but their work still can be trusted when it meets certain standards and is based on sound database. ILO since years, in cooperation with ISSA and International Actuarial Association, aims at

²For a discussion of social budgeting concept see: Scholz, Wolfgang; Cichon, Michael; Hagemeyer, Krzysztof, Social Budgeting, Geneva 2000: ILO/ISSA

developing standards of practice for social security actuaries covering required knowledge (more than pure actuarial), method and models and reporting standards³.

ILO develops sets of tools for sound financial governance (like projection and simulation models, performance indicators), organizes training (like master degree courses developed jointly with universities in Maastricht and Lausanne) and publishes textbooks (like “Quantitative Methods in Social Protection” series). It also develops reporting standards and sets statistical requirements (basic set of data and information necessary for actuarial valuation and of monitoring performance of the social protection scheme).

A « powerful simplification » of the accounting approach associated with a new Swedish pension system has to be highly appreciated as an excellent way to monitor pension scheme’s finance in an easy understandable way. All countries adopting notional defined contribution schemes should be advised to adapt similar approach. Unfortunately, Swedish accounting approach is not directly applicable to pension schemes other than NDC. Switching to NDC is not necessary an acceptable policy option for all the countries as not everybody wants to give up contribution rate as a policy instrument and income redistribution via the pension system (and NDC means exactly giving up these two things). There exists however a number of other indicators that can be used to monitor financial position of defined benefit, PAYG schemes. One could develop a standard set of assumptions necessary for required actuarial valuations to be done on a regular basis, every year – similar to the implicit assumptions governing the “accounting” approach. Like with the accounting approach, this will be very demanding with respect to the data availability. Data gaps and low data quality are in most of the social security schemes the main reason preventing actuarial valuation to be done often and regularly, it is also the main reason why actuaries have to make heroic and thus questionable assumption. Major improvement in the scope and quality of statistics available on social protection schemes is certainly a first step to be taken on the way to improve their financial governance. In this respect Swedish “best practice” example should be followed with no hesitation.

³ Plamondon, Pierre; Drouin, Anne; Binet, Gylles; Cichon, Michael; McGillivray, War-ren; Bédard, Michel; Perez Montas, Hernando, Actuarial Practice in Social Security, Geneva 2002: ILO/ISSA

International Workshop on
The Balance Sheet of Social Security Pensions

On A Columbus's Egg: A Comment on Settergren's Paper

by

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Organised

by

PIE and COE/RES, Hitotsubashi University

Hitotsubashi Collaboration Center, Tokyo, Japan, 1st-2nd November 2004

1. Introduction

In the last few years, Sweden's new pay-as-you-go pension scheme has attracted much interest as a model of public pension reform. In Japan, where public pension reform had been on the political agenda for the last two years, Professor Takayama has been very effective in educating our politicians, bureaucrats and general public in the new Swedish system. As a matter of fact, the new Japanese public pension system has a similar, albeit limited, built-in stabilized as the balance mechanism.

Today, I was very impressed by Mr. Settergren paper. Mr. Settergren was one of the prime architects of the new Swedish plan and his paper explains why the new Swedish plan is not just an innovative reform, but a beautiful new system that are comprehensive and stable. I am convinced that the Swedish plan is an important turning point in the history of public pension reforms. Rather than giving my superficial comments, I will try to do my best to rephrase what Mr. Settergren has written, hoping to reach and inform a wider audience on what the new Swedish plan stands for.

2. The Nature of the Problem

In his introduction, Mr. Settergren argues quite persuasively that in most countries, in spite of its importance, financial reporting on public pension suffers from two shortcomings, namely, scarcity and low quality;

Public pension plans are probably the largest financial transaction systems that we have. In OECD countries their expenditure ranges from 5 to 15 percent, and their liabilities, as a rough estimate, from 150 to 300 percent of gross domestic product (GDP). For many governments, pension payments are the single largest expenditure. National pension plans also represent one of the most long-term commitments of governments. The size of these systems is of course reflected in their importance to insured citizens. For many, perhaps most, the claim of individuals on the public pension system represents their single largest "asset". In spite of the economic importance and long-term commitment of these pension plans, their financial reporting is essentially medieval.

According to Mr. Settergren, the best way to improve the quality of reporting of public pension schemes is to discard the traditional single-entry bookkeeping, or statements and projections of cash flows, and adopt double-entry bookkeeping, as Sweden did in 2001.

The various cash-flow measurements that are used to show the financial status of public pay-as-you-go pension schemes do not effectively answer the questions what cause, what effect, by what means, and at what rate....The single most important measure to enhance expert, public and policymaker

knowledge of the workings of public pay-as-you-go pension plans would be to introduce double-entry bookkeeping for these systems.

As examples of such reporting, Mr. Settergren takes Sweden before the 2001 reform and compares it with the United States which he considers has the best reporting among single-entry bookkeeping countries;

In Sweden, RFV was obliged to present an analysis every five years of the financial status of the public pension scheme and, in relation to this analysis, to propose a suitable contribution rate, or payroll tax. The analysis was presented mainly as a projection of buffer-fund development, in terms of fund ratio,¹ assuming a fixed contribution rate and unchanged benefit provisions. Normally financial balance, i.e. a buffer fund that never dropped below a certain level in a specific scenario, would be secured by proposing an upward adjustment of the contribution rate. The range of these projections varied, but prior to 1990 they were never longer than 50 years.

The US Social Security Administration (SSA) reports annually on the financial status of the Social Security system. In this report, it uses a similar but slightly more sophisticated, or dense measure of financial balance than the RFV previously used: a single figure called actuarial balance. Briefly, the actuarial balance -- deficit or surplus -- reflects how much the contribution rate must be increased (decreased), to ensure that the Social Security buffer fund, the trust fund, never drops below a stipulated level in the standard 75-year projection of the SSA.

3 Construction of Pay-as-you-go Balance Sheet Conceptual Problem

There is, however, some conceptual difficulty in constructing a balance sheet for a pay-as-you-go pension plan. On one hand, few would question the notion that a pay-as-you-go system has liabilities, both to retired persons and to those who are working and paying the contributions. Hence, it is clear that we should be able to measure these liabilities at any given time. On the other hand, it is far more difficult to claim that these liabilities are fully or partially covered by something that we may call “assets”, as a pay-as-you-go plan usually holds very little “tangible” assets.

In contrast to a funded plan, however, a pay-as-you-go plan is free to use anyone’s contributions to pay off its pension liabilities. Thus, in a pay-as-you-go pension system, the contribution flow should be considered as its principal asset². The double-entry bookkeeping of the new Swedish pay-as-you-go pension plan is based on this reasoning.

Pension Liabilities: Simplicity in Swedish Notional Account

In the Swedish defined-contribution plan, the present values of pension liabilities are considered to be equal to their nominal values. In the first place, the pension liabilities to retirees are simply obtained as the product of their pension amounts and the expected numbers of years the amounts will be paid. Secondly, the present values of the pension liabilities to persons who are still active are simply given by the balances in their “notional” accounts. Thus the sum of the two stands for what the pension owes at any given year.

Contribution Asset: A Columbus’s Egg

In the Swedish scheme, the value of the contribution flow is termed as the contribution asset³ and it is obtained as follows;

¹ The market value of the fund divided by one year of pension disbursements. In Sweden this measure is usually referred to as “fund strength”.

² Of course, the contribution is a source of a new pension liability which is taken care of on the liability side.

³ R. Lee, an economic demographer uses the term *transfer wealth* for what in Sweden has been termed the contribution asset .

It is surprisingly simple to calculate the value of the contribution flow: it is the product of the size of the flow per time unit, which in practice is a year, and the expected time between payment of contributions and receipt of pensions. The averages are weighted by the age-dependent amounts of expected contributions and pensions. In Sweden the expected contribution-weighted average age of contributors is about 42, and the expected pension-weighted age of retirees is about 74. Thus, the relevant time span is about 32 (74-42) years, and the contribution asset is 32 times one year's contributions.

Why is it a useful way to see if the contribution flow is sufficient or not, given the existing pension liability? Consider a demographic steady state where any difference in any two cohorts is due to their biological ages, including mortality risks. The contributors as a group are paying x dollars a year, and “on the average”, they are a_1 years old. The pensioners as a group are receiving x dollars a year, and “on the average”, they are a_2 years old. We can think of an alternative hypothetical funded plan in which a single (giant) worker starts paying x dollars once he reaches age a_1 , and stop paying it once he reaches age a_2 , when he starts receiving the pension. How much pension can he expect to receive throughout his retirement? It should be what he has paid in and, if there is no interest on saving, it is x dollars/year times $(a_2 - a_1)$ years, or $(a_2 - a_1)$ times x dollars. If he is promised to be paid more than the amount in his retirement, he is over-paid: if he is promised to be paid less than the amount, he is under-paid. A steady-state pay-as-you-go plan cannot be distinguished from this hypothetical single worker plan, and hence, the same conclusion holds.

Thus, the (expected) turnover duration becomes the key parameter that determines the size of the contribution asset of the plan. Since it is the difference in the (weighted) average contributor's age and the (weighted) average pensioner's ages, where averages are computed by using the age-specific contributions or pensions as weights, it can be easily computed from the annual report of the pension plan.

The turnover duration measures inform, in a single figure, the effect that changes in fertility⁴ and age-related income patterns and mortality have on the capacity of the contribution flow to finance pension liability.

4 Income Statement: The Bottom Line

In any double-entry bookkeeping, income statements are derived from the entries of the balance sheets. The income statement in the Swedish system is explained in detail in Sttergren's paper, but it is clear that all the entries in the income statements should belong to one of the following three groups; namely,

- (1) change in fund assets,
- (2) change in contribution asset, and
- (3) change in pension liability.

To obtain (1), the contribution (+), the disbursement (-), the return on investment (+), and the cost of administration (-) are added with appropriate signs. In the Swedish statement, however, most of the return on investment is due to the value of the funded *premium pension*, which is not relevant to the analysis of the paper. To obtain (2), the value of change in contribution revenue (+) and the value of change in turnover duration (+) are added⁵. There are seven entries in (3), but the first three entries, namely, new pension liability (-), pension disbursements (+), and change in value (-), are the same as the first three entries in (1), meaning that they are simply the liability side of the net cash inflow. Among the other entries, the real interesting entry is the fifth entry (the decedents' capital) (+) which is analogous to the undistributed asset belonging to the deceased pension receiver, and the sixth entry (the inheritance gains distributed) (-) standing for the transfer of the asset to the pension savers as a group⁶. Summing the entries of these three groups, we obtain the net income of the pension for a given year, or the bottom line. What this bottom line

⁴ In the legislation on the Swedish scheme, the effects of fertility changes on turnover duration are disregarded.

⁵ Since the contribution asset is calculated as the contribution flow (C) times the turnover duration (TD), *the value of change in contribution revenue* is computed as $(C_t - C_{t-1}) \times (TD_t + TD_{t-1}) / 2$, **while the value of change in turn over duration** is calculated as $(TD_t - TD_{t-1}) \times (C_t + C_{t-1}) / 2$.

⁶ The computation methods are explained in detail in the Swedish Pension System Annual Report 2003.

tells us is whether the asset and liability of the pension are growing together or not, but each entry above the bottom line gives us information on whether or not each factor is putting pressure on the financial position.

5. Balance Sheet in Action: Balance Ratio and Balance Mechanism

The nominal valuation of assets and liabilities of the Swedish pension plan imply that all valuations are solely based on 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 (...) is that the financial position of the system is not dependent on the amount of assets and liabilities (...). 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.

Thus, if we have to select one single financial indicator of financial position of the Swedish pension, it is total assets divided by pension liability, or its *balance ratio*, rather than the bottom line. If this ratio is less than one (1) the system has a deficit, or a negative net present value: if it is above one, the system has a surplus, or a margin. In the Swedish system, if the balance ratio is below one, the balance mechanism is triggered.

When the balance mechanism is triggered the indexation of the pensions and pension credits will be effectuated by the change in average income adjusted by multiplying the index with the balance ratio, starting of a new index series. The balancing of the system means that an amount equal to the closing deficit in the balance sheet will be eliminated. If the balance ratio after being triggered grows bigger than one the closing balance, surplus is automatically distributed by increasing the indexation. This continues until the balance index reaches the level of the income index.

If the *balance ratio* falls below one, the pension liability exceeds the total asset and the *balance mechanism* kicks in. By reducing the indexation adjustment downward, it will eventually reduce the pension liability to the same level as the total asset, if not in a single year. If the balance ratio exceeds one, liabilities will be augmented to the same levels as the total assets and absorb the surpluses. Thus, a very close link between the assets and liabilities is always maintained by the *balance mechanism*, and, Settergren concludes, valuing the assets and liabilities of the system solely on the basis of directly observable variables at the time of valuation involves little or no risk of overestimating assets in relation to liabilities in the long run.⁷

Together with other design features the provisions for automatic balancing have eliminated the need for making explicit assumptions about future economic and demographic developments in order to ensure the financial stability of the system.

If a national pension plan other than Sweden's wants to prepare income statements and balance sheets, it should be able to do so. However the amount of work involved to prepare a complete income statement and balance sheet for a given defined-benefit plan should not be underestimated. A less ambitious endeavour, but a still worth while financial indicator, would be to start to annually publish the change, most likely increase, of the pension liability caused by changes (increases) in life expectancy.⁸

⁷ The manner of calculating turnover duration involves an implicit assumption that the population growth is zero. Thus, turnover duration will be (slightly) over estimated 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.

⁸ If this is done the positive effect on the expected turnover duration from increases in life expectancy should be deducted.

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