

Icelandic public pensions: Why time is running out

Ólafur Ísleifsson, lektor við Háskólann í Reykjavík.

Abstract

The aim of this paper is to analyse the Icelandic public sector pension system enjoying a third party guarantee. Defined benefit funds fundamentally differ from defined contribution pension funds without a third party guarantee as is the case with the Icelandic general labour market pension funds. We probe the special nature of the public sector pension funds and make a comparison to the defined contribution pension funds of the general labour market. We explore the financial and economic effects of the third party guarantee of the funds, their investment performance and other relevant factors. We seek an answer to the question why time is running out for the country's largest pension fund that currently faces the prospect of becoming empty by the year 2022.¹

Keywords: Icelandic public pension funds, Actuarial deficit, Employer guarantee, Policy implications.

Introduction

In the Icelandic pension system a sharp distinction exists by way of the fact that the general labour market pension funds are largely characterised by being of the defined contribution type whereas the funds of the central government and the municipalities can broadly be classified as defined benefits pension funds. In this paper we first analyse the structure and properties of defined benefits pension funds and then turn our attention to analysing the Icelandic public sector funds within that framework. Our main focus will be the largest pension scheme in the country, i.e., the Pension fund of public employees, commonly referred to as the LSR.

The Icelandic literature on pension funds includes Ragnar Árnason (1988) that examines effects of different pension systems on total savings and pension systems as tools for economic management. Guðmundur Guðmundsson (1993) and (1998) discusses assumptions underlying the Icelandic pension system, including the actuarial discount rate. Már Guðmundsson (2004) provides an account of the structure of the Icelandic pension system. Guðmundur Guðmundsson and Kristína Baldursdóttir (2005) provide an analysis of possible future developments of the Icelandic pension system. Tryggvi Þór Herbertsson (2004) examines the effects of price indexation of

financial contracts for the finances of Icelandic pension funds. Gylfi Magnússon (2006) examines the LSR in the context of accountability and effects on the Icelandic financial markets. Ólafur Ísleifsson (2007) and (2009) examines the structure and finances of Iceland's general labour market pension funds. Hallgrímur Snorrason (1988) and (1993) and Jóhannes Nordal (1986) describe developments in the pension system in the first years after it was set up in 1970. Skýrsla til fjármálaráðherra (1985) as a report to the Minister of Finance provides an overview of the state of the Icelandic pension system at the time it was written.

Herbertsson, Orzag and Orzag (2000) provide an overview of the pension systems in the Nordic region. Stefán Ólafsson (1999) gives an account of pensions in Western societies. For an economic analysis of pensions see Barr and Diamond (2006 and 2008) and Blake (2006a). For finances of pension funds see Blake (2006b).

The structure of the paper is as follows. After the introduction section 2 deals with different types of pension funds and actuarial assessments and solvency requirements of pension funds. Section 3 deals with the system of public pension funds in Iceland with an emphasis on the LSR. Section 4 looks at what lies ahead for the public funds and in the final section we draw some conclusions.

2. Types of pension funds and actuarial assessments

2.1 Defined benefits vs. defined contributions pension funds

Pension funds are categorised depending on whether fund members enjoy a guarantee of pension benefits on the basis of a given formula or whether pension benefits depend upon the accumulated member contributions of premiums and the investment income of these balances in the fund. The first case is referred to as *defined benefit* (DB) pension funds and the second as *defined contribution* (DC) pension funds. In the first case the employer or a third party provides a guarantee for the pension benefits whereas in the second case no such guarantee applies. A pension fund without a third party guarantee provides its members with pension benefits solely on the basis of accumulated contributions to the fund and the returns of the funds accumulated in this manner. In this case the pensioner alone shoulders the risk of the amount of the pension benefits while this risk is carried by the employer or third party in case of a defined contribution fund. In the Icelandic context the pension funds of the general labour market fall under the second category.²

2.2 Actuarial assessments of pension funds

In a defined benefits pension plan rights are provided with benefits defined in terms of a member's final salary or career average salary and the length of membership in the plan.

A simple example of such a plan where N denotes the number of years of membership in the plan and it is assumed that 40 years of membership offers maximum benefits under the plan would be

$$\text{Annual pension} = \frac{N}{40} \times \text{final pensionable salary.}$$

By the *accrued obligation* of a pension fund we mean an assessment of the fund outlays due to the pension rights that the fund's members on the assessment date have earned by making contributions to the fund. By *future obligation* we mean an assessment of the fund outlays due to the pension rights that the fund's members will earn by their future contributions to the fund. The sum of these two constitutes the pension fund's *total obligation*. By actuarial custom in assessments of this kind only the pension fund members on the assessment date are taken into account.³ Thus, the assessment is based on the assumption of a constant number of pension fund members, even in the case where there is mandatory participation in the pension fund in its industry or geographical area.⁴

In the Icelandic context, by regulation no. 391/1998 on the operation of pension funds and mandatory pension insurance, cf. paragraph 19, actuarial assessments for the defined contribution general market pension funds are based on a discount rate of 3.5% on top of the CPI.⁵ The discount factor for pension funds that link pension benefits to wages is a 2% real rate. An assumption of a 1.5% real wage growth makes these two rates equivalent. The primary pension funds that link pension benefits to wages are the B division of the LSR and municipal pension funds. These pension schemes, however, no longer accept new members.

The choice of the discount rate has been the subject of increasing disagreement in recent years; should the discount rate reflect the liabilities to be paid, or should it reflect the pension fund's asset allocation? In other words, should the discount rate reflect the growth rate of liabilities or should it reflect the weighted-average expected return on the assets in the pension fund?⁶

The question naturally arises how sensitive a fund's actuarial balance is to the discounting rate. For a stylized pension fund it can be shown that relatively small changes in the rate can cause significant changes in the fund's balance. Thus, depending on assumptions on the average duration of pension assets and obligations a fully funded fund at the 3.5% rate would sink into an actuarial deficit of 8-10% by lowering the discount factor to 3.0%.⁷

An actuarial evaluation of a pension fund may be defined as an assessment of the fund's financial obligations to its members compared with the fund's asset position and estimated future flows of premiums paid by members as well as future capital gains. An actuarial evaluation is thus in essence a comparison between a fund's assets and liabilities. What characterizes a pension fund is that its obligations are essentially promises to its members regarding pension payments over an uncertain time period, which are determined by factors such as life expectancy and possible disabilities. These same factors cause uncertainty in the flows of future premiums and how long these premiums will remain under a fund's management. A long period of time may pass between a member's first premium payments and the date at which he receives pension payments.

By imposing assumptions on life expectancy and the frequency of disability, it is possible to estimate the number of members who will contribute premiums every year in the future, until all members on the evaluation date have reached their retirement age.

A pension fund's financial position is heavily influenced by demographic factors such as life expectancies and disability frequencies. Regulation no. 391/1998 on the operation of pension funds and mandatory pension insurance provides general assumptions for the actuarial appraisal of pension funds. The regulation stipulates, cf. paragraph 14, the use of the most recent data on death frequencies as published by the Icelandic Actuarial Society. Actuaries Bjarni Guðmundsson and Helgi Bjarnason have made the case that given that life expectancy is generally believed to be increasing implying increases in future assessments of pension obligations actuarial assessments of pension funds should be based on life expectancy predictions rather than historical data. By applying Statistics Sweden predictions of the yearly reduction of mortality rates for men and women by age for different periods for the period 2009-2060⁸, indicating, for example an increase in life expectancy for males aged 20-40 years of 3.6-4.7 years compared with the historical Icelandic data currently applied, on a fully financed "typical pension fund" they conclude that these new demographic assumptions would render the fund in a close to 10% deficit.⁹

Presumably, the most natural response to increased life expectancy would be to extend the retirement age. In the absence of such an option changes in premiums and benefits would have to be considered. Given that the size of the deficit of this typical fund amounts to roughly one third of the present value of its future premiums it may be concluded that the 12% premium rate would need to increase by one third to about 16% to balance the fund by a premium increase alone. Given that the deficit amounts to about one tenth of total liabilities, it may be concluded that, given unchanged premiums, pension benefits would need to be cut by up to 10%. It has been estimated that extending the retirement age by one year lowers pension obligations by 5-6%.¹⁰ Hence, an extension of the retirement age by two about years would seem to be in order if such a course were to be taken. The high increase in premiums necessitated by the change is explained by the fact that current fund members, having paid premiums that have been too low in view of increased life expectancy, not only for the current accumulation of pension rights but also for the pension rights already accumulated in the fund, will be paying premiums only for the remaining part of their working life and pensioners, of course, will not be paying any additional premiums at all.¹¹

A pension fund's financial strength is by nature heavily affected by the risk it assumes due to the evolution of the wage index. In the absence of such a risk, pension benefits would be determined solely by the stream of premium payments and investments returns, as well actuarial assumptions on life expectancy and mortality rates. Such a fund would fall close to a defined contribution scheme. Pension funds of the general labour market mostly abandoned the wage index reference around 1990 and instead began using a credit terms index, but they eventually adopted the general consumer price index as their reference. However, it should be noted that the credit terms index was computed by using the wage index with a total weight of one third and that the wage index was further influenced by the building cost index, which comprised a further one third of the credit terms index. In Scandinavia, these matters are arranged as follows: In Denmark, the appropriate reference is agreed upon by the

major parties of the general labour market. In Finland, pension funds use 80% of the general consumer price index and 20% of the wage index. In Norway, funds use the wage index but subtract 0.75%. In Sweden, funds use the wage index but subtract 1.6%.¹²

A general model of the actuarial balance of a pension fund can be constructed using simple accounting identities. A is net assets available for payments of benefits, L is accrued liabilities, C is pension contributions and B pension benefits. A and B denote stock variables for a given time period, C and B are flow variables for a given time interval, for example one year. At each time interval, pension contributions C evolve according to $C = W$ where α is the ratio of contributions, now 12% or 0.12 for the general labour market pension funds and 15.5% or 0.155 for the public funds, and W represents total wages earned by employed fund members during the time interval under consideration.

A fund's accrued position U may now be expressed as

$$U = A - L \quad (1)$$

where U defines a fund's assets in excess of its liabilities. A fund's total position U* can now be expressed as

$$\begin{aligned} U^* &= A + PV(C) - [L + PV(B)] \\ &= A + F - L^* \end{aligned} \quad (2)$$

Where $L^* = L + PV(B)$ represents total liabilities, that is, accrued liabilities and all future liabilities that will arise from members' future contributions, F is the present value of future contributions and PV is the present value of future benefits at a given discount rate.

A fund's actuarial position, defined as assets in excess of liabilities, in proportion to the fund's total liabilities, is denoted by J* where

$$J^* = U^* / L^* \quad (3).$$

When a fund's actuarial position is discussed in what follows, it generally refers to the ratio J*. This ratio indicates whether a fund has the capacity to meet its total obligations as comprised of accrued obligations on the date of appraisal and future obligations that arising from the flow of future contributions.

2.3 Solvency requirements

The Act on mandatory pension insurance and the operations of pension funds requires that a fund make special arrangements and changes to its benefits if an actuarial appraisal reveals a difference between assets and liabilities exceeding 10%. This benchmark applies in the short run. The same principle applies if actuarial appraisals reveal a difference exceeding 5% between assets and liabilities for five con-

secutive years; this principle may thus be considered a long term benchmark for the financial position of a pension fund. These provisions refer to the difference between assets and liabilities as a fraction of liabilities. It refers to a fund's total position, i.e. the difference between assets in addition to the value of contributions and total liabilities. The provision thus refers to J^* as defined in equation (3) above.

After the financial collapse of 2008, changes were made in the benchmarks mentioned above as by a change in the Act pension funds were temporarily permitted to run deficits of up to 15%, based on actuarial appraisals, without having to make amendments to fund benefits.

In this context, it should be noted that general labour pension fund regulations generally include provisions on how funds should react with respect to members' pension rights when assets exceed liabilities, but they generally do not include provisions on how to react when liabilities exceed assets. The contribution rate is usually determined through collective wage agreements or otherwise legally binding. This implies that, in the case of a deficit, funds generally have no alternatives to cutting members' pension rights, unless future returns on assets can be expected to suffice to cover the fund's deficit.

On the other hand, the assumptions presented above imply that funds have important obligations regarding their capability of meeting obligations at each period of time; that is, the market value of assets should suffice to cover the rights that current members have accumulated, according to the fund's regulations. This implies that younger fund members will not see their contributions flow to older members, in case the fund is not financially able to meet its obligations to those older members.

2.4 International Practice

A detailed overview of the methodology and other considerations when performing actuarial assessments may be found in Colbran (1982), Trowbridge (1989) and Pugh (2006).

No cross-country standard has emerged regarding the appraisal of accrued liabilities. Individual countries within the OECD have thus pursued their own methodology when tackling the issue. Furthermore, no standard has emerged regarding the valuation of pension funds' assets, even though the fundamental idea across countries remains the same; that funds should have the financial capacity to meet any obligations they have assumed by collecting contributions from members. The basic idea is that accrued liabilities are defined and then a suitable discount factor is agreed on for the purpose of computing the present value of these obligations. An estimation of such obligations can include approximations of pension benefits paid to members once they reach retirement age, as well as approximations of how much members were to receive if the fund were dissolved. An appropriate discount factor can be obtained through (i) a predetermined discount rate, (ii) current market rates of some specified securities or (iii) the discount rate proposed by insurance companies inherent in an annuity equivalent to the accrued liabilities. In Iceland, as previously discussed, the discount rate is predetermined by government regulation.

Pugh's overview on pension schemes within the OECD states that legislation, for example labour market laws or other social laws, often includes requirements on minimum financing of pension funds. These especially include requirements on those who act as funds'

guarantors, as his overview mostly focuses on funds operating under a defined benefits scheme. This is natural as for such funds both the guarantor and pension contributions are the two major pillars of their operations. However, within several OECD countries, there are more important requirements relating to different asset/liability measures.

3. Defined benefits pension funds in the Icelandic context

3.1 A general overview of the public funds

Over time the government has operated pension funds for its employees that ensure significantly better pension rights than the general labour market pension funds have been able to offer their members at unchanged premiums. This has been confirmed in a study on the different pension rights in pension funds within the aegis of the Federation of Labour (ASÍ) and the A division of the LSR.¹³ Based on comparisons of rights earned for given pay levels this study concludes that the LSR A division members' pension rights are about 60% better than the minimum rights in the general labour market pension funds, 50% better than the most common rights available and 35% better than the best rights in the general labour market.

There is an overwhelming difference between basing pensions only on premiums and returns on accumulated funds and basing pensions on a wage index or the pay of a job successor. This difference is ensured by an employer guarantee, i.e. the central government, municipalities or banks, respectively. In the latter case, the employer carries no risk related to changes in actuarial factors, whether these relate to higher longevity probabilities, increased incidence of disability, a changed age distribution or other such factors. In the same vain, in this case the employer carries no risk related to returns on accumulated funds as this risk is entirely assumed by the employer by virtue of his granting of the guarantee.

In order to analyse the part of the pension system that enjoys a guarantee on pension benefits we present the table below of the main statistics of the Icelandic pension funds according to whether a pension benefits guarantee applies or not. As will be noted more extensively below the pension funds with a guarantee are generally funds for state and municipal employees.

Table 1 Icelandic pension funds 2010 with and without guarantee

| | Amounts (billion krónur), numbers | | | Percentages, % | | |
|------------------------|-----------------------------------|-------------------------------------|---------|----------------------------------|-------------------------------------|-------|
| | Funds with third party guarantee | Funds without third party guarantee | Total | Funds with third party guarantee | Funds without third party guarantee | Total |
| Premiums | 28,2 | 83,1 | 111,3 | 25,3 | 74,7 | 100,0 |
| Benefits | 26,1 | 35,2 | 61,3 | 42,5 | 57,5 | 100,0 |
| Net assets | 280,5 | 1.438,4 | 1.718,9 | 16,3 | 83,7 | 100,0 |
| Number of fund members | 7.153 | 175.846 | 182.999 | 3,9 | 96,1 | 100,0 |
| Number of pensioners | 16.503 | 65.901 | 82.404 | 20,0 | 80,0 | 100,0 |

Source FME, author's calculations

Thus, the assets of pension funds with a guarantee amount to less than one fifth of the total assets of Icelandic pension funds. The 25.3% share of contributions to funds with a guarantee are roughly in harmony with the relative size of the group of funds with guarantee in terms of net assets (16.3%) and number of pensioners (20%). The pension benefits of funds with guarantee, however, constitute over 40% of total benefits. This fact suggests looking closely at differences in the benefit structure of the funds according to the guaranty scheme and other relevant differences between government funds and the pension funds of the general labour market. We note in passing that the relative numbers of fund members and pensioners indicate how the two systems of guaranteed funds and unguaranteed funds are at different lifetime phases with the former being in a highly progressed state having for a number of years been closed to new members. In contrast, for the general market funds there are on average 2.5 members paying into the fund for each pensioner receiving benefits from the fund.

First, to view the scope of the group of funds with guarantee we list in the following table the relevant funds and rank them according to the size of their net assets. In addition, we state each fund's actuarial position.

Table 2 Actuarial deficit of pension funds with employee guarantee 2010, millions of krónur¹⁴

| Data as of 31.12.2010 | Net assets | Actuarial position | Actuarial position % |
|---------------------------------------|------------------|--------------------|----------------------|
| Pension Fund for State Employees | | | |
| Division-A | 154,510 | -47,360 | -12.0% |
| Division-B | 186,979 | -350,453 | -62.1% |
| City of Reykjavík pension fund | 54,376 | -14,994 | -20.3% |
| Pension fund for nurses | 21,654 | -42,403 | -64.0% |
| Akureyrarbær pension fund | 7,643 | -4,524 | -34.3% |
| Reykjanesbær pension fund | 2,899 | -3,100 | -48.5% |
| Kópavogsbær pension fund | 2,974 | -4,849 | -57.1% |
| Hafnarfjardarkaupstadur pension fund | 1,830 | -8,963 | -78.8% |
| Akraneskaupstaður pension fund | 916 | -4,520 | -81.6% |
| Húsavíkurkaupstadur pension fund | 584 | -1,764 | -74.2% |
| Neskaupstadur pension fund | 503 | -1,333 | -71.8% |
| Vestmannaeyjabær pension fund | 85 | -3,600 | -94.8% |
| Retirement fund of the Fisheries Bank | 28 | -4,199 | -99.3% |
| Funds with guarantee, total | 434,981 | -492,064 | -42.6% |
| All pension funds, total | 1,909,517 | -651,275 | -18.1% |

Source: FME, author's calculations.

All figures in millions of krónur

According to the figures in the table the combined actuarial deficit of the Icelandic pension funds amounts to over 42% of 2010 GDP. For the LSR and LH taken together this ratio amounts to 25.6-28.6% of GDP depending on whether the LSR A division is included or not. These statistics can act as reminder of the fact that often cited figures of internationally high Icelandic pension assets in relation to GDP have, taken in isolation, only a limited value as a measure of the financial soundness of the pension system.

These figures suggest we look primarily at the structure and finances of the LSR as the principal source of the overall actuarial deficit in the pension system. As we will see, there exists a close link between the LSR and the pension scheme for nurses (in Icelandic,

Lífeyrissjóður hjúkrunarfræðinga, formerly Lífeyrissjóður hjúkrunarkvenna, commonly referred to as the LH) and, hence, we will analyse the two concomitantly. Indeed, 90% of the combined actuarial deficit of guaranteed funds is accounted for by the LSR and the LH. Most of the other defined benefit pension schemes with employer guarantee are quite small in size and, hence, for the purposes of this study can be ignored.

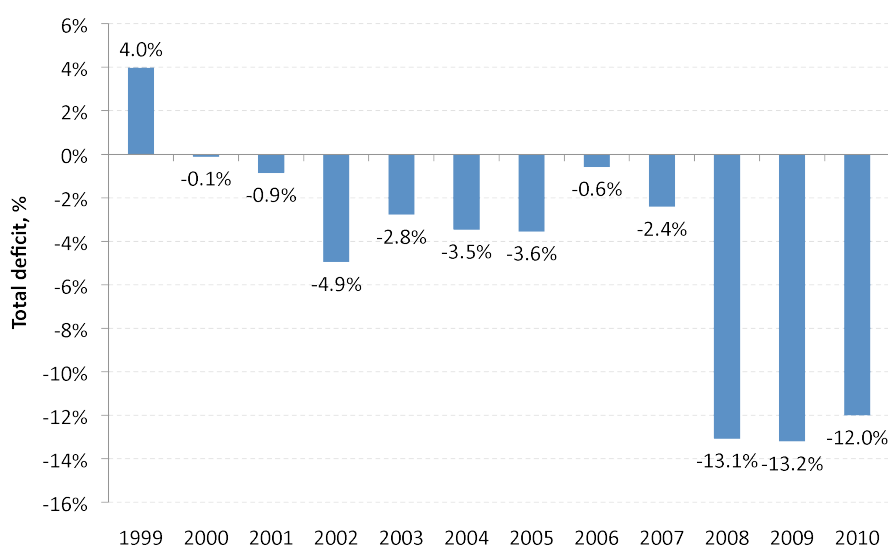
The FME classifies the A division of the LSR and the A division of the Pension fund for municipal employees along with non-guaranteed pension funds. The boards of these funds shall each year decide on an appropriate employer contribution for the scheme to be able to meet its obligations as assessed by an annual actuarial survey.

The V division of the Pension Fund for Municipal Employees carries no third party guarantee while the scheme's A division in this regard is comparable to the LSR A division.

3.2 The actuarial deficit of the LSR A and B divisions

Looking at the LSR A division we see that the current state of the scheme's actuarial deficit derives from the effects of the 2008 economic collapse. Before 2008 the A division deficit was within the 5% limits prescribed by the FME. As the Act on the LSR does not include cuts in benefits as an option to counter an actuarial deficit, the FME in 2011 has, as we will look at more closely, demanded that premiums to the scheme be raised from 15.5% to 19.5%. A 12% deficit falls outside of the range that could possibly be covered by investment returns, not least in the light of rather unfavourable investment prospects domestically in the years ahead and investments abroad being precluded by currency controls. Apart from raising premiums, as dictated by the FME, the remaining policy options would be Treasury injections of funds and a cut in pension rights or a combination of these.

Chart 1 LSR A division total actuarial position 1999-2010

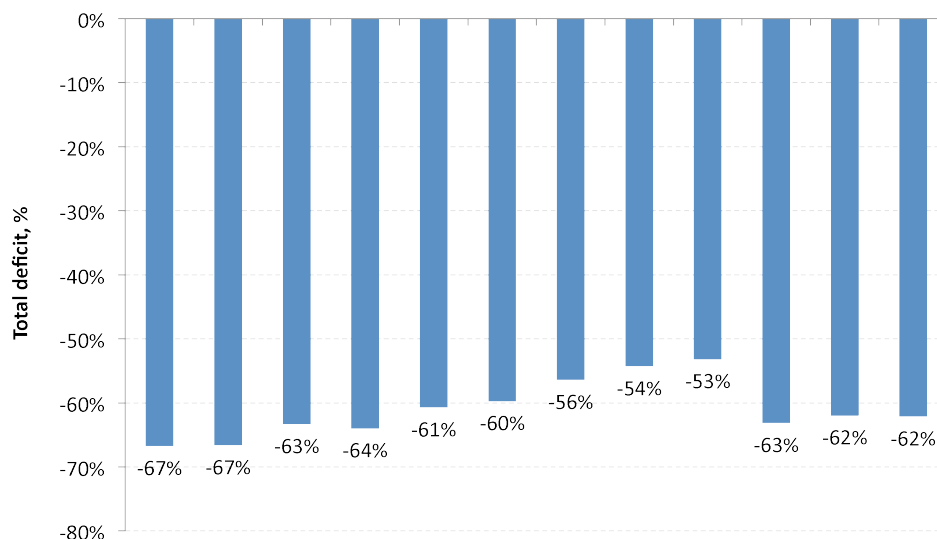


Source: The Pension fund for state employees, www.lsr.is

Turning to the B division we see that for the period shown the scheme has been largely unfunded. Although ad hoc Treasury payments into the B division, to be looked at

closer below, have had the effect of significantly improving the actuarial position, the effects of the 2008 economic collapse brought the actuarial position back by some 10%, from a 53% deficit to a 63% deficit.

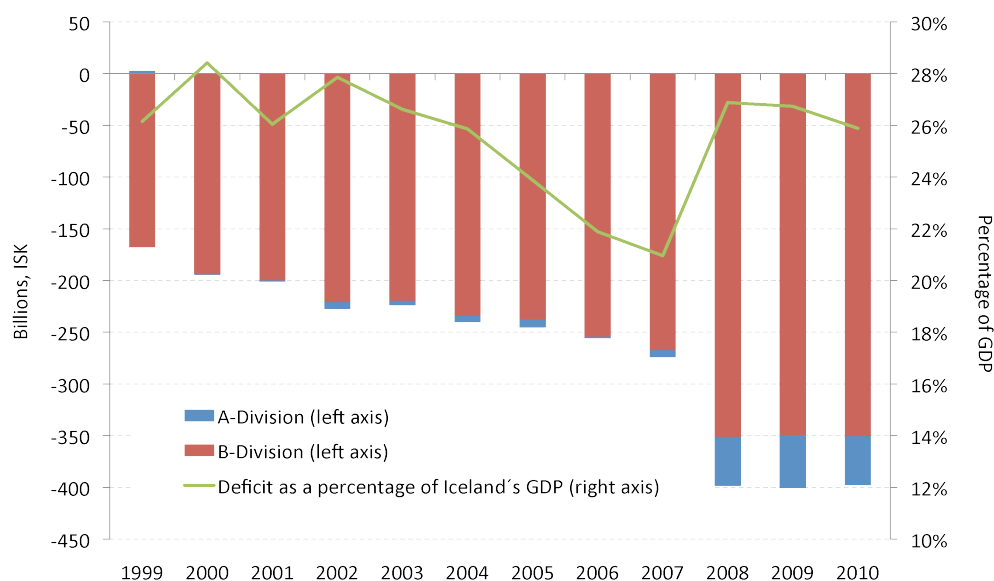
Chart 2 LSR B division total actuarial deficits 1999-2010



Source: The Pension fund for state employees, www.lsr.is

Viewing the LSR as a whole we next show the fund's combined total actuarial deficit. In macro-economic terms the deficit, amounting in 2010 to 440,000 million krónur, measures as roughly one quarter of 2010 GDP. The B division 2010 350,000 million krónur deficit measures as roughly 75% of 2010 Treasury revenues.

Chart 3 LSR combined A and B division total actuarial deficit 1999-2010



Source: The Pension fund for state employees, www.lsr.is and Statistics Iceland, www.hagstofa.is

3.3 The legal basis of the LSR and the LH

The LSR and LH have operated in their current form since 1997 on the basis of Act no. 1/1997 and Act no. 2/1997, respectively, cf. Act no. 141/1996 that brought extensive changes to the structure of the funds.¹⁵ At this time, the LSR was split into two financially separate divisions known as the A division and B division. At the same time the LSR and LH were closed for new members and new schemes set up for new employees. The members of LSR and LH at the time were given a choice to stay in the old scheme or opt for membership in the new one. New members of both funds, however, became members in the A division of the LSR. The LSR and the LH cooperate extensively and outwards operate largely as one pension fund.¹⁶

3.4 Objectives of the reformation of the LSR

Very briefly, the main objectives of the 1997 reformation of the LSR, as stated in the notes to the Bill that became Act no. 141/1996 are broadly as follows:

1. Current employees would be allowed to stay in the previous pension scheme while also given the option of a transfer into the new scheme.
2. New employees would only have access to the new pension scheme.
3. The total value of pension rights in the new system would be comparable to the current value of pension rights in the LSR.
4. Premiums would be payable out of total salaries.
5. The pension rights of members would be based on paid premiums.
6. Rules on pension rights would have the force of law while employers' contributions would be subject to changes.
7. The relative share of old age and disability pension rights would be increased.
8. Pension rights would be indexed to the CPI.

3.5 Member premiums and employer contributions

Turning to member premiums and employer contributions we first note the overall 4% member premium as is prevalent in the general labour market funds. However, in regard to employer contributions we detect a clear difference between the LSR A division on one hand and the B division and LH on the other. In the B division and LH the employer contribution amounts to 8% with a total contribution of 12% as in case of the general labour market pension funds. In the A division on the other hand the employer contribution amounts to 11.5% giving a total contribution of 15.5%.

3.6 The nature of the employer guarantee of the LSR B division and the LH

We now turn our attention to the nature of the employer guarantee extended to the respective pension schemes. Act no. 1/1997 governing the LSR states that the Treasury guarantees payments of pension benefits according to the Act. This state guarantee is given in paragraph 32 that is placed in the section of Act termed *The B division of the pension fund*. The Act governing the LH, paragraph 18, states that the Treasury and other entities insuring nurses in this fund each for their respective groups guarantee

payments out of the fund. In case an entity that has insured nurses in the fund proves to be unable to fulfil its guarantee obligation the Treasury assumes the guarantee by backing the original guarantee. Hence, we can conclude that the LSR B division and the LH, two closed pension schemes for public employees, enjoy an unconditional guarantee by the Treasury.

3.6.1 Additional feature of the employer guarantee of the LSR B division and the LH

The Acts on LSR and LH include provisions to the effect that the employer guarantees financing of increases in pension benefits, cf. paragraph 33 in the Act on the LSR and paragraph 20 in the Act on LH. The substance of these provisions is that in case there is an increase in old age, disability and spouse benefits due to a general increase in wages of public employees then the Treasury and other employers redeem to the schemes the increase thus induced on pension payments. In case a member has paid premium to the schemes by virtue of employment with more than one employer these pension increase obligations fall proportionately on respective employers.

3.6.2 The nature of the guarantee of the LSR A division

This leaves us with the question on the nature of the A division of the LSR. In the section of the Act no. 1/1997 governing the LSR termed *The A division of the pension fund* Paragraph 13.3 states that members of the pension fund and their employers do not assume responsibility for the obligations of the division in excess of their premiums. It is interesting to note that the limitation of employer responsibility was added in the course of the legislative process by a proposal submitted by a parliamentary committee. by a parliamentary committee.¹⁷ Thus, it would appear that a Treasury guarantee of pension obligations only applies to the obligations of the B division of the LSR.

The matter, however, does not rest there. In a May 2011 statement¹⁸ the FME demanded that the LSR trustees revise the total contribution to the A division of the LSR from 15.5% (of which employees pay 4%) to 19.5%.¹⁹ This demand is made in view of Paragraph 13 of the Act governing the LSR that states that the employer contribution at any time be made so that it suffices for the scheme to meet its total obligation. Thus the FME stands in contrast with the view presented by the LSR in 2009 that the LSR can avail itself of the paragraph of the Act on mandatory insurance of pension rights and operations of pension rights that governs the general labour market pension funds that allows these funds to temporarily maintain a 10% difference between total assets and pension obligations and the temporary provision allowing this difference to amount to 15% in the years 2008-2010.²⁰ The FME bases its decision on the view that the Act governing the LSR constitutes a special legislation on the fund that ranks higher than the general provision of the Act on mandatory insurance of pension rights and operations of pension rights.²¹

We conclude that despite the wording of the LSR Act pertaining to a non-guarantee of the A division other paragraph(s) cast a doubt on the stated non-guarantee. The Treasury, however, finding it unable at the present time to meet this demand for increased contributions, sought parliamentary revision of the Act so that notwith-

standing the nature of the guarantee of the scheme the LSR A division unambiguously falls under it.

3.7 Pension rights

In the Act on the LSR that effectively closed the B division and opened the new A division, pension rights in the B division were mainly kept intact with a notable exception in regard to the calculation of pension benefits. Previously, pension benefits were based on a successor rule by being linked to the last particular position the member occupied. The Act brought in a new rule by which pension benefits are linked to an index of the average salary public employees receive for their daytime work. Since 1997 this index has been published monthly by Statistics Iceland. Based on pension outlays in December 2010 72.3% of pensioners received benefits from the LSR B division according to the average rule compared with 51.4% of LH pensioners.²²

Looking more closely at pension rights accumulation we note that in the B division the amount paid out in old age pension is a percentage of the fixed salary for day time work, personal supplement and holiday supplement according to wage agreements that at the termination of employment applied to the post for a full job last filled by the member. This percentage depends on the number of years the member paid premiums to the fund and the member's employment ratio and amounts to 2% for each year in full time employment and lower, respectively, for a lower employment ratio. For each year in full employment after the termination of premium payments by the member and until the member acquires the right to leave his post to receive old age pension an additional 1% of fixed annual salary for full time employment applies. For each year in full employment after the termination of premium payments by the member and the member has acquired the right to leave his post to receive old age pension an additional 2% of fixed annual salary for full time employment applies. As previously stated, members of the LSR and LH were given the option of choosing between staying in the successor scheme and opting for public employees' pension average salary index. The LH system of pension rights accumulation in most parts is the same as the LSR B division, as is evident by comparing the relevant clauses of the respective Acts governing these pension funds.

The main rule for pension age in LSR, A and B divisions, and in LH is that members are entitled to old age benefits upon reaching 65 years of age. In the A division members can opt for retirement upon reaching 60 years of age at a cost of 0.5% of accumulated pension rights for each month falling short of 65 years of age. In the same vein a member of the A division can delay retirement thus adding 0.5% to accumulated rights for each month after reaching 65 years of age but no longer than until reaching 70 years of age. We note two particular rules pertaining to accumulation of pension rights in the LSR B division and the LH, the 95 year and 32 year rules, respectively.

3.7.1 Accumulation of rights through a point accumulation system

Old age pension benefits of the A division are based on a point accumulation system, comparable to what historically applied for the pension funds of the general labour

market before the age-dependent creation of pension rights became widespread in these funds. In the A division old age pension benefits are calculated as a percentage of a prescribed base salary. The sum of premiums paid by a member of the A division is transformed into points that enter the calculation of pension rights. The foundation for this system is the sum total of each calendar year's basis salary. The basis salary is fixed for January 1996 at 49,084 krónur and changes monthly in accordance with the rise in the CPI. For each year points are calculated as the result of dividing into the member's annual pensionable salary by the basis salary of that year. Old age pension then amounts to a percentage of the basis salary of any given time. This percentage amounts to the accrued total points the member has earned multiplied by a factor of 1.9.

We note a stark contrast between the point accumulation system described here and the point accumulation system that for decades characterised the pension funds of the general labour market.

One, points are calculated each month.

Second, the old age pension comes as a percentage of each month's base salary compared to a 5 year average in the general labour market.

Also, it merits mentioning again, that pension rights in this system accrue without dependence on the member's age at the time of the premium paid to the fund despite the fact that a premium paid by a young fund member will accumulate returns in the fund for a longer period than a premium paid by an older member.

In sum, for the public funds 1.9% of wages form a lifelong pension right from the age of 65; for the general labour market funds the objective is that at least 1.4% of average wages form a lifelong pension right from the age of 67 with rights accumulation mostly being age-dependent.

3.7.2 Spouse benefits

The rules on spouse benefits for the A division of the LSR are based on the rules prevalent for the general labour market pension funds. The main rule is that spouse benefits are limited in time. In calculating spouse benefits pension rights accruing in the future are added to already accrued rights in the same manner as in the case of disability pensions. In calculating the amount of the spouse pension the total of accrued points and future points is multiplied by a factor of 0.95, compared to a factor of 1.90 in calculating disability benefits. This renders the spouse pension as one half of the disability pension that would have accrued to the fund member.

For the B division, however, spouse benefits continue for the lifetime of the spouse unless the spouse remarries which would trigger a discontinuation of spouse benefits. Spouse benefits amount to one half of the accumulated rights of a deceased fund member. These rights are supplemented by 20% of the relevant reference pay subject to certain conditions.²³

To sum up the LSR spouse benefits: In the A division spouse benefits are structured along general labour market pension funds. In the B division the main factors are:

Spouse benefits continue for the lifetime of the spouse unless the spouse remarries.

Spouse benefits amount to one half of the accumulated rights of a deceased fund member.

These rights are supplemented by 20% of the relevant reference pay if the deceased fund member met at least one of three conditions.

It is natural in light of the above examination of spouse benefits to focus our attention on the relative shares of different benefit classes as is done in the table below.

Table 3 Relative shares of pension benefits 2010; guaranteed funds vs. unguaranteed funds

| | Funds guaranteed by others | Funds not guaranteed by others |
|-------------------------------|----------------------------|--------------------------------|
| Old-age pension | 78.0 | 65.7 |
| Disability pension | 5.5 | 23.9 |
| Pension to surviving spouse | 16.4 | 9.0 |
| Pension to surviving children | 0.1 | 1.4 |
| Total | 100.0 | 100.0 |

Source: FME

The relatively high share of pension payments to surviving spouse in funds guaranteed by others, almost double the share of funds not guaranteed by others can be seen in the light of the rules and regulations of the respective funds. In particular, it appears that the explanation for this high share is mainly to be sought in the rules for pension benefits of a surviving spouse in the B division of LSR. The relatively low share of disability pension payments in funds guaranteed by others does not come as a surprise, given that the members of these funds are largely clerical government employees with a presumably low rate of disability incidence.

3.8 Explaining the actuarial deficit

When investigating a pension fund deficit one needs to examine both sides of the balance sheet, i.e., assets and obligations. The 2008 economic collapse has scathed the LSR assets just as it did to other pension funds in Iceland and abroad.

The adversities of the economic collapse are clearly revealed by the fact that the Icelandic pension funds, having enjoyed an average modest positive real return of 0.3% in 2007, with a negative real return on assets in 2008 of 25.3% were hit somewhat harder than the average of OECD pension funds which suffered a negative real return of 22.7%. Only two OECD countries suffered higher losses: The United States, with average negative returns of 25.8%, and Ireland, with an average negative return of 33.4%. The huge loss incurred by the pension systems in these two countries arises from the large proportion of pension funds' holdings in equities.²⁴As a result of the

2008 economic collapse the Icelandic pension funds irrevocably lost at least 90% of their domestic equity holdings in an equity price decline far exceeding the average of a celebrated historical comparison compiled by Reinhart and Rogoff (2009).

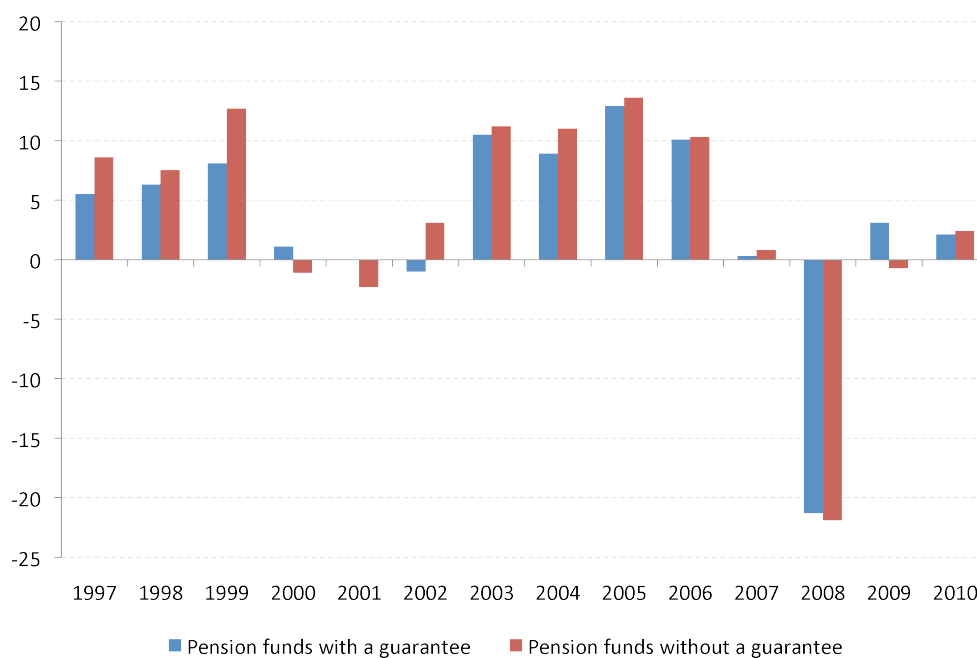
An even bleaker picture emerges for the relative performance of the Icelandic pension fund in the aftermath of the economic collapse. The real 3-year weighted average pension fund annual returns in the period 2008-2010 for 26 selected OECD countries amounts to a negative 1.4%. For the same period, however, Iceland has the lowest score in the sample with a negative average pension fund annual return of 8.4%.²⁵ We note in this regard that at the end of 2010 the combined foreign assets portfolio of the Icelandic pension funds has a bond-equity ratio of 1:4.²⁶

Further, given that pension fund performance is assessed in domestic currency, in light of the fall of the Icelandic króna of close to 50% it should be kept in mind that in terms of, e.g., a trade weighted basket of foreign currencies the value of pension benefits of the Icelandic pension funds has taken a hit that clearly would exceed similar losses incurred by most OECD countries.²⁷

3.8.1 The asset side: Returns on investments

It is natural to ask whether there is a significant difference between the returns obtained on the assets of the public funds compared with the general market pension funds. We depict below for the period indicated real returns on pension funds enjoying a guarantee compared with funds where no such guarantee applies.

Chart 4 Returns on assets; guaranteed funds vs. unguaranteed funds 1997 - 2010



Source: FME

The geometric averages of returns over this period are 3.0% and 3.5% in favour of the funds not enjoying a guarantee. Over the given time span this difference amounts to total real returns of 7.2%. Looking at the 10 year period 2001-2010, however, the performance of the two groups of funds is virtually equal at 1.2%. Thus, as the graph suggests differences in returns on investment does not show up as a significant explanatory factor for the different actuarial position between funds with a guarantee and funds not enjoying such a guarantee. We note, however, that the unguaranteed funds achieved a higher return before the 2008 economic collapse but in the aftermath of the collapse the guaranteed funds have performed somewhat better.

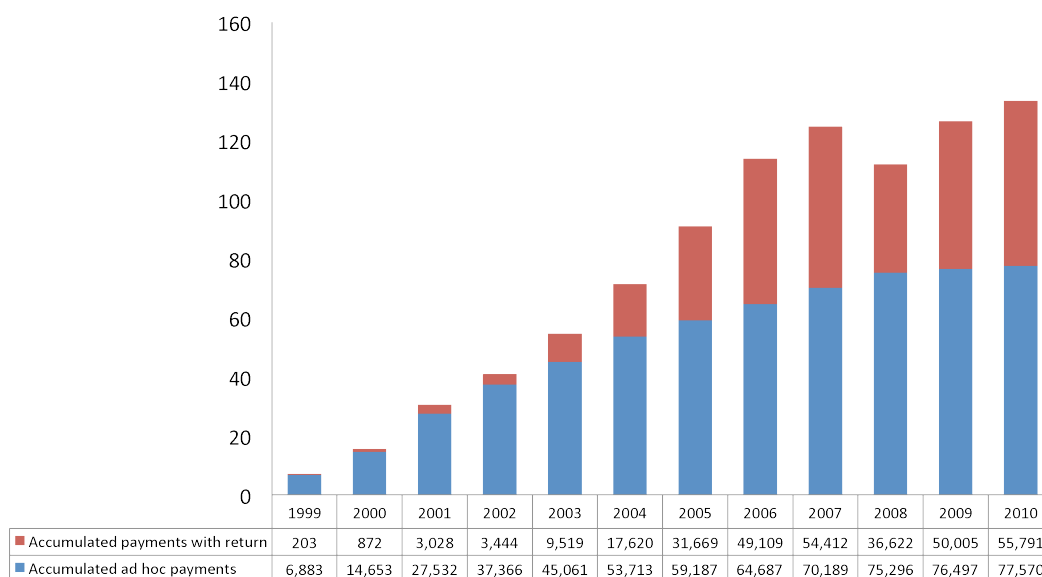
3.8.2 The asset side: Ad hoc payments into the LSR

In view of the dire actuarial position of the LSR the Treasury in 1999 decided that it would commence ad hoc payments into the B division of the LSR and the LH in excess of the legal duty in this regard. These extraordinary payments have been made in view of the Treasury's financial position in each case but did not show up in the 2009 fiscal budget due to huge fiscal stress created by the economic collapse. To date no new decisions have been made in regard to resuming extraordinary payments into the funds in excess of legal stipulations.

We note that in the LSR annual accounts the Treasury extraordinary payments are scaled up annually in accordance with the increase in the CPI and the net returns on fund assets. As such the accumulated Treasury payments constitute a deposit with the funds and lower in equal magnitude the Treasury obligations to the funds. These payments into the funds have taken a number of forms, the most important being:

- Direct extraordinary payments into the funds.
- Additional contributions from government agencies.

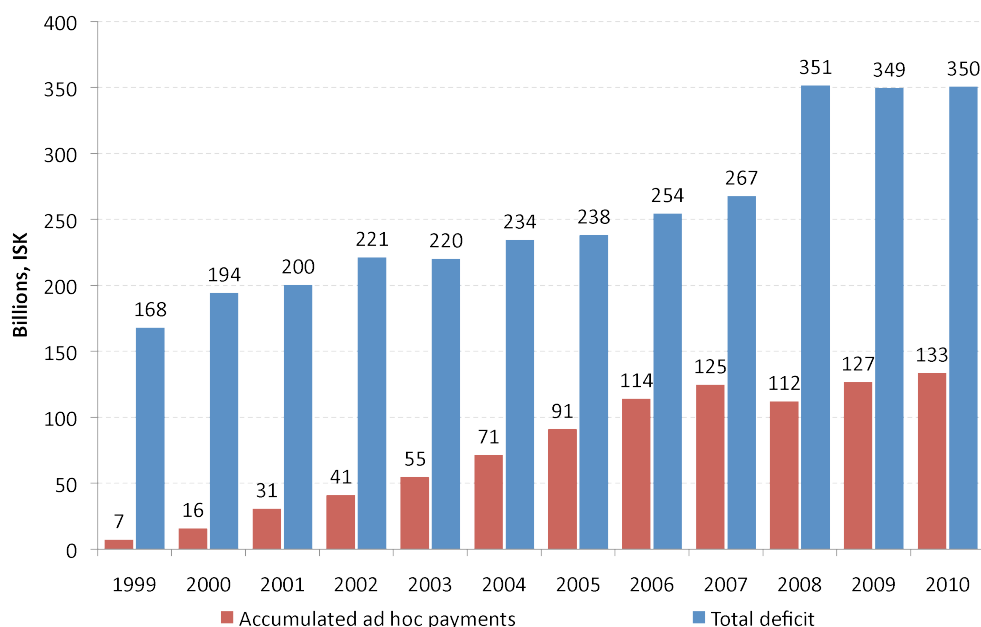
Chart 5 Ad hoc Treasury payments into the LSR B division and returns, 1999-2010



Source: The Pension fund for state employees, www.lsr.is

We next depict the accumulated ad hoc payments together with returns in comparison to the B division.

Chart 6 Accumulated ad hoc Treasury payments into the LSR B division compared to the B division actuarial deficit, 1999-2010



Source: The Pension fund for state employees, www.lsr.is

In 2010 ad hoc Treasury payments amounted to 1,100 million krónur compared to 1,200 million krónur in 2009 and 5,400 million krónur in 2008. At the end of 2010 total Treasury ad hoc payments amounted to 133,400 million krónur or close to 22% of 2010 Treasury expenditure and 9% of 2010 GDP. In the LSR accounts this amount is revalued on the basis of CPI increases and returns on fund assets.¹⁹

3.8.3 The liability side: Growth of obligations in light of a special indexation of benefits

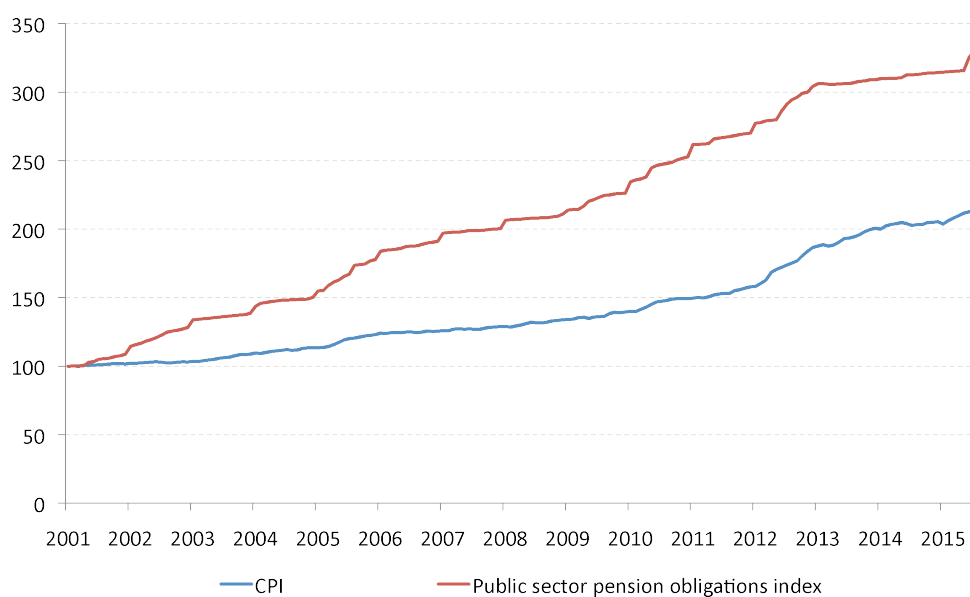
The obligations of the funds are derived from the rights granted to members. We have already dealt with rights pertaining to the main classes of benefits. There is, however, one aspect of the rights that deserves to be analysed in a special section. This aspect is the promise given by the Act on the LSR on the indexation of the amount of pension benefits.²⁸

In fact, in the A division of the LSR the amount of old age benefits is given as a percentage of base wages as determined at any given point in time. The base wage changes over time at the same rate as the CPI. This is in line with the general practice in the general labour market pension funds.

In the B division of the LSR things are materially different. As stipulated by the Act on the LSR changes in pension benefits are determined as the rate of change of average

public sector employees fixed daytime salaries. These changes are calculated by Statistics Iceland, as stipulated by the Act, and presented as the public sector pension obligations index.²⁹ This rather peculiar index has been calculated since January 1997 with a base December 1996=100. The question immediately arises how the two indices used in the LSR for calculating amounts of pension benefits compare. We see that for the whole period since 1997 the public sector pension obligations index has increased in excess of the CPI. Thus, in rough terms, in the period January 1997 to August 2011 the value of public sector pension obligations index has more than tripled while the CPI has more than doubled. When considering these relative changes one should, however, keep in mind that in the period in question a systemic change took place in the composition of public employee salaries when a part of their other salaries was made a component of day time salaries. This resulted in day time salaries increasing in excess of total public salaries.³⁰ We depict the changes in the two indices in the charts below.

Chart 7 Public sector pension obligations index compared to the CPI 1997- 2011³¹



Source: The Pension fund for state employees, www.lsr.is

Given that the B division old age pension is a percentage of the fixed salary for day time work, this systemic change in the structure of salary composition with its significant increase in day time wages, was bound to increase the obligations of the LSR B division and the LH. This imposed heavy costs on these schemes on top of what would have been effected by general changes in the public salary level, and resulted in windfall gains for B division pensioners in terms of substantially more generous increases in payments than to any other public employees, still earning wages or receiving pensions from the A division. It might therefore be considered appropriate had the Treasury as a guarantor with a significant vested interest in pension

commitments challenged these effects of the application of the public sector pension obligations index in this regard. Neither is the Treasury seen to have taken measures in the form of increased contributions to the schemes or a downward revision of pension rights.

3.9 Measures to respond to an actuarial deficit

We note that whereas the public sector pension funds respond to actuarial imbalances by cutting rights to benefits such measures do not appear to be an option when it comes to the public funds considered here. Indeed, the legislative framework of these funds does not contain pension rights as a variable to apply in face of lacking investment performance or actuarial deficits. In light of the 2009 view of the LSR that the fund fell under the temporary provision of a 15% deficit the greatest perceived beneficiary of that legislation may have been the public sector pension funds.

Given, however, that the LSR and LH legislative framework does not allow for cuts in pension rights as a measure to respond to lacklustre investment performance or actuarial deficits it is instructive to consider the reaction of the private sector pension funds to the shock to the funds incurred by the 2008 financial crisis.

Chart 8 Cuts in benefits in private sector pension funds 2008-2010



Source: Funds' Annual Reports and websites

Sources: Funds' Annual Reports and websites

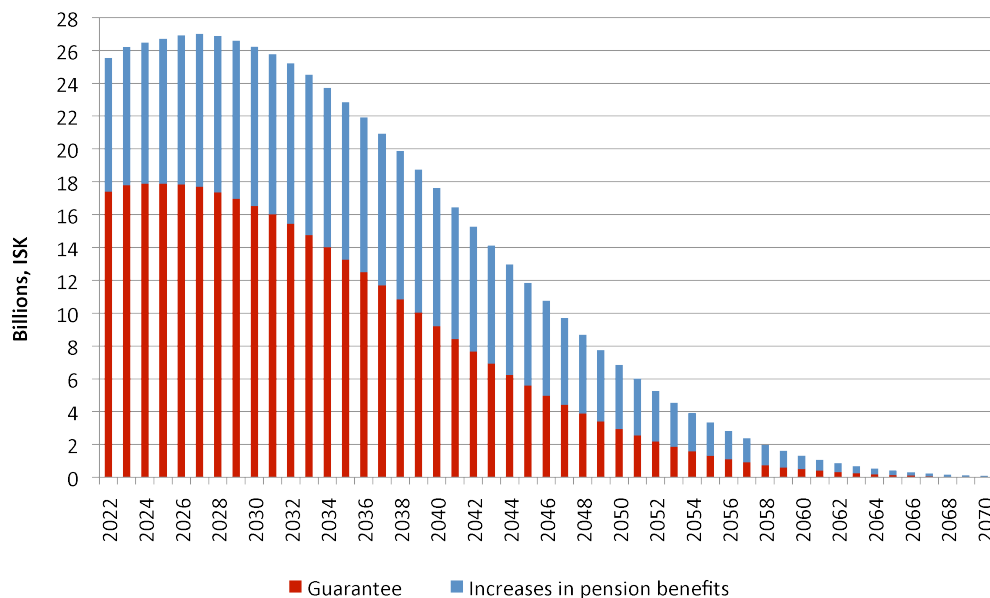
The chart reveals swift measures, in some cases iterated actions as the need became increasingly clear by the unfolding of investment results, undertaken by the private funds in response to poor investment performance in the aftermath of the 2008 economic collapse.

4. What lies ahead for the LSR and LH?

For a number of years the actuarial assessment section of the LSR and LH Annual Report has stated an estimate of what year the LSR B division and the LH will become empty of funds. These points in time have varied, in particular depending on investment performance and ad hoc Treasury injections into the funds. Clearly, the effects of the 2008 economic collapse have moved these points up in time. Above we have discussed ad hoc Treasury injections into the funds and they clearly have the effect of extending the period where these schemes are able to meet their obligations to fund members. The 2010 Annual Report states that based on an actuarial assessment of the state of assets and obligations at the end of 2010 the LSR B division will become empty in 2022 and the LH will become empty in 2027.

It is natural to ask about the dimensions of the problem at hand in terms of added payments into the B division of the LSR to balance the scheme's assets and liabilities. Based on a cash flow analysis and assuming a 3.5% real return over the remaining lifetime of the B division the LSR has concluded that an annual injection of 7.8 billion krónur would be needed for the period 2012-2051.³² This amounts to 1.3% of 2010 total Treasury expenditures. It should be noted that the assumption of the relatively high annual real return of 3.5% for the period indicated suggests that the figure for the balancing injection may be an underestimate.

Chart 9 Treasury obligations due to the LSR B division after the scheme is emptied in 2022



Source: The Pension fund for state employees, www.lsr.is

As shown in the graph annual Treasury payments into the B division are at a maximum in the ten year period 2022 to 2031. In this period annual guarantee payments average 17.3 billion krónur, annual payments due to pension increases average 9.1 billion in

the same period with total annual payments averaging 26.4 billion krónur in this period.³³ This amount can be viewed as being 28% of the 2010 personal income tax of 93.8 billion as reported by the Treasury Accounts.

The dire fiscal prospects portrayed above reveal an urgent need for policy action with the aim of preventing the fund's depletion and its obligations as of that time being carried in full by the Treasury. The options available in this regard include commencing annual injections of funds into the scheme, increased contributions and (possibly gradual) cuts in benefits, including curbing increases of, or dismantling entirely, the daytime wage index that has acted as a driving force behind the B division's escalating obligations.

5. Conclusion

In this article we have analysed the public pension funds in Iceland. We started out by focusing on the aspects that differentiate the public sector defined benefits funds from the defined contributions funds of the general labour market. We went on to analyse actuarial assessments and solvency requirements of pension funds. The main focus of the paper is the public pension funds in Iceland carrying an employer guarantee. This led us to an analysis of the LSR, the Pension fund for public employees along with its sister fund the LH. Together these two funds constitute the bulk of the public funds in Iceland with close to 90% of the assets and over 83% of the combined actuarial deficit of the funds that fall under the FME definition of funds with employer guarantee.

Given that unlike the pension funds of the general labour market the LSR and the LH were not conceived as funded schemes but rather a mix of a fund and a PAYG scheme it is not surprising that both schemes are characterised by significant long-term actuarial deficits. Both schemes were effectively closed in 1997 by ceasing to accept new members that were directed into the new A division of the LSR that largely is modelled on the private funds. We have found, however, that in a significant way the A division deviates from the private funds in that it lacks modalities for effectively countering the effects of a shortcoming in or a shock to investment performance as happened as a consequence of the 2008 economic collapse. In particular, the Act on the LSR does not allow for A division pension rights to be cut as is the normal recourse for the private funds and as we have shown a number of recent examples of.

As regards the B division and the LH we have found that these schemes are not only seriously underfunded but offer more generous pension rights for a given premium than the private funds and, moreover, carry an underlying mechanism that acts as a driving force in propelling upwards the obligations of these schemes. The daytime wage index in that regard creates an unsustainable effect on the actuarial position of the schemes. We have examined the balancing effect of the Treasury ad hoc payments that obviously went in the right direction but nevertheless despite being significant in volume have not managed but to lessen the foreseeable burden on the Treasury when these schemes become empty in 10 to 15 years.

We believe our analysis has significant policy implications, the most important of which is the need to formulate effective policies on how to avert or at least ameliorate the heavy foreseeable burden on taxpayers through the effects of the Treasury guarantee becoming operative when the schemes become empty of funds. Delays in implementing measures are certain to exacerbate the problems faced by the Treasury in this regard. Early measures, none of which could be termed easy by any standard, would, however, serve to lessen the severity of the choices that ultimately have to be made, including Treasury injections into the schemes and a downward revision of pension rights. It would appear that on the horizon a social discord could be detected in that members of private pension funds, that whenever the need arises cut back pension rights, might resist being subject to increased taxation in order to secure for public employees full pension benefits without any loss in pension rights.

For the Icelandic pension system as a whole our analysis suggests that decisions have to be made on aspects fundamental to its financial sustainability. First, consideration needs to be given towards gradually reducing the actuarial 3.5% discount rate down to a level that would be sustainable in light of reasonable expectations of the funds' investment performance in the period ahead. Such an action includes adjusting pension rights downward to reflect the funds' ability to meet their commitment to their members. An alternative approach would be to align the discount rate to the yield curves in the markets where the funds hold their investments. Changing the discount rate towards better reflecting investment performance would serve to prevent unwarranted expectations on the level of pension benefits that a discount rate misaligned from market reality is bound to induce; should fund performance exceed the assumed returns it would be painless to increase pension benefits. Second, given the high likelihood of increased life expectancy, extending the retirement age should be considered as the most natural response to increased life expectancy rather than meeting this challenge by increased premiums or cuts in pension rights.

Furthermore, there are unresolved issues between the three pillars of the Icelandic old age support system. To what extent shall pension benefits induce cuts in social security payments to the elderly? Shall disability insurance rest with the pension funds or be a matter dealt with on a broader social basis? These questions, however, lie outside the scope of the present paper.

Notes

- ¹ I would like to thank actuaries Bjarni Guðmundsson Bjarni Þórðarson, Vigfús Ásgeirsson and Þórir Óskarsson for helpful advice, and Þorkell Sigurgeirsson, CFO of LSR, for providing and explaining actuarial data and information on LSR and LH. I also thank Sigurður Guðjón Gíslason for effective research assistance and Davíð Steinn Davíðsson, professor Þorvaldur Gylfason, Þórarinn V. Þórarinsson and two anonymous referees for useful comments. Any errors are my own.
- ² On the structure of the system of the general labour market pension funds and their finances see Ólafur Ísleifsson (2007) and (2009).
- ³ Bjarni Guðmundsson (2006). This rule is also part of Icelandic law, cf. paragraph. 39 of Act no. 129/1997 on mandatory pension insurance and the operations of pension funds.
- ⁴ Bjarni Guðmundsson (2006), p. 104.
- ⁵ The authorization for the regulation of the discount rate is in paragraph 24 of Act no. 129/1997 on the operation of pension funds and mandatory pension insurance. The 3.5% discount rate had previously been generally used in actuarial appraisals and had also been agreed upon by the parties to the labour market; cf. Ólafur Ísleifsson (2007), p. 164. Guðmundur Guðmundsson (1998), p. 25, rejects the 3.5% rate as being too low, given the prevailing interest rates, seemingly not taking into the account the possibility of increasing pension rights to prevent undesirable intergenerational income transfers.
- ⁶ Blake (2006b), p. 258.
- ⁷ Ólafur Ísleifsson (2009), p 131.
- ⁸ Statistics Sweden (2009).
- ⁹ Bjarni Guðmundsson and Helgi Bjarnason (2011).
- ¹⁰ Bjarni Þórðarson (2010).
- ¹¹ I thank Bjarni Guðmundsson for pointing this out.
- ¹² NOSOSKO Socialstatistisk Komité (2008).
- ¹³ Gylfi Arnbjörnsson (2004).
- ¹⁴ We apply the FME classification of pension funds as presented in the 2010 Annual Pension Report with the exception that we add the LSR A division to the table. See Benedikt Jóhannesson (2011) for a list of actuarial deficits applied to a broader definition of public pension funds.
- ¹⁵ We draw here on the notes to the Bill that became Act no. 141/1996.
- ¹⁶ LSR and LH 2009 Annual Report, p. 4.
- ¹⁷ Cf. the Althingi website <http://www.althingi.is/altext/121/s/0432.html>, retrieved April 25, 2011.
- ¹⁸ Cf. the FME website <http://fme.is/lisalib/getfile.aspx?itemid=8194>, retrieved June 9, 2011.
- ¹⁹ This increase in the total contributions ratio can be understood as the relative increase in the value of future contributions (184.6 billion krónur as reported by the LSR 2010 Annual Report, p. 38) needed to cover the total A division deficit of 47.4 billion krónur.
- ²⁰ LSR 2009 Annual Report, p. 2.
- ²¹ Hallgrímur Snorrason (1993), p. 10, discusses to what extent the Act no. 129/1997 on mandatory pension insurance and the operations of pension funds should apply to funds enjoying employer guarantee and, whether pension funds should be allowed to back their obligations by other means than their assets.
- ²² LSR and LH 2010 Annual Report, p. 28.
- ²³ Act no. 1/1997 on the LSR, paragraph 27.
- ²⁴ OECD. Pension Markets in Focus. December 2008, p. 4.
- ²⁵ OECD. Pension Markets in Focus. July 2011, p. 4.
- ²⁶ Compiled by the author from Central Bank of Iceland data retrieved on December 8, 2011 from <http://sedlabanki.is/?pageid=444&itemid=eac7cb65-cee8-4eab-9caa-aba9d7cda26d&nextday=8&nextmonth=12>.
- ²⁷ This point seems to be overlooked by some researches, e.g., Capacent (2009) that seems to focus on comparison of investment returns in domestic currency while ignoring effects on the real value of pension benefits.
- ²⁸ LSR and LH 2010 Annual Report, p. 41.
- ²⁹ This index can be found at the Statistics Iceland website, www.hagstofa.is, but only in the Icelandic version (in Icelandic, *vísitala lífeyrisskuldbindinga fyrir opinbera starfsmenn*).
- ³⁰ Tryggingafræðileg úttekt á B-deild LSR miðað við árslok 2009 (An actuarial assessment of the B division of the LSR at end year 2009). Talnakönnun hf., April 2009, p. 7.
- ³¹ Data until August 2011.
- ³² LSR (October 3, 2011).
- ³³ LSR (October 3, 2011).

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