Retirement savings adequacy

Measurement in Iceland

DECEMBER 2014

Retirement Savings Adequacy in Iceland
Reykjavik, 2014

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Preface

In light of the importance of mandatory private pension savings in Iceland as the main provider of retirement income, it is very important for all pension fund stakeholders to project retirement savings for future retirees. It is vital as well to project future interactions between the different pension pillars. In the ongoing pension debate, pension fund members often ask questions, such as:

- Will I receive adequate retirement income?

- Do I need to do something to ensure an adequate retirement income?

- Will pension benefits be cut or contributions increased in the future to balance assets and liabilities?

- How will increasing longevity affect my future retirement income?

- Is it fair that lifelong pension fund savings reduce pensions from the social security system?

The debate will go on; therefore, there is a need for a comprehensive study of retirement savings adequacy.

It is the role of the Financial Supervisory Authority to safeguard the integrity and sound operation of the financial market by supervising banks, insurance companies, and pension funds. It is important to project whether targeted replacement ratios will be met, as is stipulated in the Pension Act no. 129/1997, and to assess the sustainability of the pension system. Thus it is important to participate in and support analysis of the pension funds. The pension funds are not only Iceland's largest pension income provider, they are also an important player in the domestic financial market, with assets currently approaching 150% of GDP. Comparing retirement readiness with other countries can provide valuable input into the pension debate in Iceland. With expertise from the OECD and grant support from the European Union, it was possible to conduct comprehensive research on retirement saving adequacy in Iceland and in international context as well.

Within the Icelandic pension sector, there is growing interest among stakeholders in creating a permanent pension database covering parameters from all pension pillars. Such a database will surely be an important tool when estimating outcomes of different proposals for pension reforms. This study and the valuable work behind it could be the first step towards creating the pension database.

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Abstract

This report presents the results of a retirement savings adequacy study covering households and individuals in Iceland. The report includes Pillar I (public pension social security), Pillar II (occupational private pension savings), and Pillar III (personal pension savings). Additionally, the effect of housing wealth is estimated as pension savings. It is important to map the interactions among the different forms of pension income sources and how they substitute for one another. The Pillar II occupational private pension is the backbone of the Icelandic pension system. The income-tested Pillar I social security complements other pension pillars. Projected replacement rates and absolute pension payments are the main indicators of retirement savings adequacy.

The projected net replacement rate from Pillars I-III totalled 103% over all subgroups. The Pillar II private pension accounts for 2/3 of total pension income, while Pillars I and III account for 23% and 10%, respectively. Housing wealth is projected to add 18 percentage points to the total replacement ratio of the three pension pillars.

There is no country-specific target replacement ratio for the three pillars. The Pillar II private pension identifies an important benchmark of a 56% replacement ratio of career-average earnings. While the overall results show a 64% replacement ratio for the private pension, nearly one-third of pensioners will receive less than a 56% replacement ratio. One reason for this is a gap in contribution years. The DB pension funds for public servants are much more generous in pension payments than the DC funds for the private sector. The study projects the replacement ratio for the private sector at 54%, with more than half of private sector pensioners (55%) showing a replacement ratio below the 56% target. This is mainly due to gaps in contribution years and the feature of the accrual tables. Workers must contribute for up to 44 years to reach the 56% replacement ratio benchmark.

It is difficult to identify groups at risk, as Pillar I social security compensates for low pension income; however, first-generation immigrants will probably lack contribution years in the Pillar II system, which will curtail their rights in comparison with others. The study illustrates a marked difference in pension income by gender, with males receiving 24% higher income, on average, than females. The difference is more or less constant across all age groups.

1. Introduction

This report describes the results of a research project called "Retirement Savings Adequacy in Iceland", which was carried out from May to November 2014, after preparations that began in September 2012. The goal of the project was to assess pension savings in Iceland and to examine the role that private pensions can and do play in the retirement readiness of the Icelandic working age population. This is the first study of its kind for Iceland.

In most ways, the project was identical to a project originated by the OECD, which has been carried out simultaneously in several countries in Europe and the Americas. Extending the OECD Retirement Savings Adequacy (RSA) project to Iceland will allow the comparison of indicators of retirement savings adequacy across countries, as a common methodological framework is used for all the countries assessed.

The benefits of the Icelandic RSA project are mainly twofold:

1. It is a very useful contribution to the ongoing evaluation of the sustainability of the Icelandic pension system.

    Two government-appointed workgroups are reviewing the two main pillars of the Icelandic pension system. The first group is preparing a bill of legislation that aims to simplify and modify the social security system (Pillar I). The second group is preparing proposals to coordinate the structure of the public and private sector mandatory occupational private pension funds. Both workgroups are hoping to present their findings and proposals early in 2015. The results of the RSA project will be very useful in the analysis of the two workgroups proposals.

2. It is a very useful benchmark for comparison with other national systems because the Icelandic system is perhaps closest to the ideal pension system (three pillars) promoted by the OECD and the World Bank.

    The assets of the Icelandic mandatory occupational private pension funds (Pillar II) were close to 135% of GDP in 2013.[i] In all, Iceland's funded pension assets ranked 2nd among OECD countries, after the Netherlands.[ii] By 2013, pension payments from Pillar II funds had reached 62%[iii] of total old-age pension payments in Iceland. For several years, Iceland has ranked 1st among OECD countries, with other countries ranging from 52% down to zero.[iv] Thus the social security system (Pillar I) is a much lighter burden on the Icelandic government budget than it is in other OECD countries, which affirms the importance of the second-pillar private pension in providing pension benefits. Therefore, the Icelandic pension system is primarily a funded system, with the role of the Pillar I, social security, set to decline in relative importance in future decades, as accrual rights in the occupational pension funds mature fully.

The Icelandic research project was the result of cooperation among several organizations:

- OECD originated the idea and proposed it to the Financial Supervisory Authority (Icelandic abbreviation FME) in June 2012.

- The FME asked the Icelandic Pension Funds Association (Icelandic abbreviation LL) to conduct the research in Iceland under the supervision of the FME. This was agreed to in September 2012.

- The FME, in partnership with the OECD and the LL, applied for a grant from the European Commission (EC) by 1 October 2012. The grant was authorised in April 2013, and the grant agreement was signed by the FME and the EU in June and July 2013, respectively.

The pension data for the project were gathered from May to October 2014. The underlying calculations used in this report were carried out by TBG ehf., an actuarial consulting firm specializing in pension fund work.

Specific models were developed by TBG ehf. for each of the active pension funds in Iceland, enabling the calculation of pension rights for all individuals in the sample. Information on accrued pension rights at year-end 2012 and contributions paid in that year was used as the basis for the calculation of future pension accruals and pension payments by the actuarial models, under the economic assumptions stipulated in the RSA project.

The following persons were responsible for analysing the results and producing this report:

- Bjarni Guðmundsson, Certified Actuary at TBG ehf., assisted by Björn Bennewitz, Ph. D. Math.
- Björn Z. Ásgrímsson, Senior Risk Analyst at the FME, assisted by Karen Íris Bragadóttir, financial supervisor.
- Stefán Halldórsson, Project Manager at the LL.

The Supervisory committee members were:

- Hannes G. Sigurðsson, Economist and Deputy Director General at SA-Business Iceland.
- Stefán Ólafsson, Professor of Sociology, University of Iceland.

The initial plan was to complete the project by 1 June 2014. However, delays in obtaining permission for the processing of personal data stored in several pension fund databases and other factors made it necessary to seek an extension of the delivery date until December 2014.

This report contains six chapters and three annexes.

Chapter 2 describes the Icelandic pension system with its three pillars: 1. social security; 2. mandatory autonomous occupational private pension funds; 3. voluntary personal pension savings accounts. The chapter also describes pension taxation, retirement age, and demographic trends. It concludes with a discussion of the sustainability of the system.

Chapter 3 describes the assumptions for Iceland that are different from those described in the general methodology of the OECD project.

Chapter 4 describes the actual coverage of the three pillars, as shown in the results of the project.

Chapter 5 describes the results of the Icelandic research project. The main analysis centres on the intermediate scenario and compares the findings to various indicators that can be useful for policy discussions related to adequacy. The sensitivity analysis is based on two additional scenarios, which are pessimistic and optimistic in comparison with the intermediate scenario.

Chapter 6 describes the conclusions on the main strengths and weaknesses of the Icelandic pension system, as demonstrated in the findings. Included are policy recommendations received from various stakeholders, institutions, and labour market federations.

Annex 1 presents the general methodology of the OECD project.

Annex 2 explains the pension accrual calculations of a typical defined contribution (DC) Pillar II occupational pension fund.

Annex 3 contains a detailed description of the datasets, calculations, verifications, and quality checks of the study.

2. Description of the Icelandic pension system

2.1 General

The main characteristic of the Icelandic pension system is the relatively large role of mandatory autonomous occupational private pension funds. In 1969 these funds became general for wage earners by means of collective labour market agreements. They became mandatory by law in 1974. This was a result of a wide-ranging tripartite collective agreement among labour unions, the Confederation of Icelandic Employers, and the State.

At present, a contribution equalling a minimum of 12% of each private sector wage-earner's salary must be paid to an occupational fund – in most cases, a fund predetermined by collective agreement. The employee pays 4% and the employer pays 8%. In the public sector there is a higher contribution, 11.5% or 12%, from the employer.

2.2 A pension system of three pillars

The Icelandic pension system is based on three pillars. The first pillar is a tax-financed public pension (social security benefits). The second pillar consists of mandatory autonomous occupational private pension funds, which are set to become the dominant feature of the system. The third pillar is voluntary personal pension savings schemes with tax incentives (as for the second pillar) and a contribution from the employer as set in collective labour agreements.

The second and third pillars were significantly modified by comprehensive pension reform that took place in 1997 and 1998 and resulted in the current Pension Act, no. 129/1997. Tax incentives for voluntary personal pension savings were established as a part of that reform. At that time, the pension system for public sector employees was also reformed by establishing new, funded pension schemes alongside the old, underfunded schemes. The new schemes will gradually replace the old ones.

2.3 Pillar I - The social security system

The Icelandic social security system was founded in 1936, with the main goal of ensuring the livelihood of workers unable to work because of old age or disability. The system is unfunded and provides old-age pensions, disability pensions, and maternity and survivors' pensions. The following text describes only the old-age pension benefits. The social security system became universal in line with the Beveridge model in 1946.[v]

In order to enjoy full benefits, individuals must have lived in the country for at least 40 years between the ages of 16 and 67 (i.e., a minimum of 40 out of 52 years). The right to partial benefits is gained after residency for at least 3 calendar years and is calculated *pro rata* from 3 to 40 years.

The system provides a base old-age pension to all and, if needed, three types of supplementary pensions, fully income-tested, with considerable differences in reduction rates and income thresholds across pension categories. The ISK amounts described below are valid for the year 2014.

The base pension is ISK 35,279, or roughly 7% of the median income (2013 data). It is income-tested with a reduction after specified income thresholds for wages and financial income; however,

income from pension funds is exempt. The base pension is paid from age 67, but the recipient may choose to delay applying for it until up to age 72 and receive a larger amount (adding 6% per year, to a maximum of 30%).

The main pension payments come from supplementary pensions:

- An income supplement of ISK 111,330 is income-tested, with a 38.35% reduction applied above a specific income threshold, ISK 21,600.

- A household supplement of ISK 32,809 for people living alone is income-tested, with a reduction above a specific income threshold.

- In addition, the system provides for a "minimum subsistence guarantee", securing individuals living alone and receiving a household allowance a minimum total payment of ISK 218,515 per month and individuals sharing a household a minimum payment of ISK 188,313 per month. This is 100% income-tested against all other incomes, given its nature as a minimum guarantee.

- Additional pension supplements can be granted if, for example, a pensioner pays a high price for medicine, needs care from other people, has cohabitation costs, etc. A criterion is that income or wealth must be less than a given amount.

- A child pension is paid for children under age 18 if one of the parents receives an old-age pension. A double child pension may be paid if both parents are entitled to an old-age pension.

For an individual living alone and with no other income, the full pension from the social security system is ISK 218,515 in 2014, approximately 45% of the median income (2013 data).

Figure 2.1: Income-tested old-age pension and supplements from social security in relation to pension payments from Pillar II (for a person living alone with no other income)
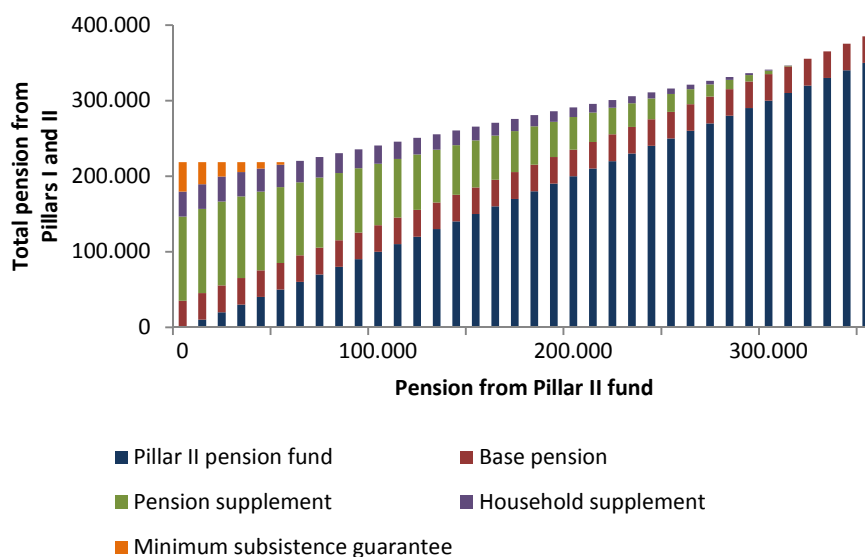

Figure 2.1 shows how social security amounts decline with increasing Pillar II pensions, above the Pillar I minimum subsistence guarantee level.

The system is financed directly out of taxes, without contributions. Adjustments of pension amounts are made through the state budget. By law, the amounts shall be determined so as to take account of wage trends, though in such a way that they will never rise less than prices as reflected in the consumer price index.

2.4 Pillar II – Mandatory autonomous occupational private pension funds

According to the Pension Act of 1997, pension funds must be approved by the Ministry of Finance. In order to receive approval, a pension fund must offer a retirement pension until death (lifelong annuity), a disability pension, and a survivors' pension, and it must have a minimum number of contributing fund members, among other requirements. Only those entities that have been approved by the Ministry of Finance are legally entitled to call themselves pension funds and to receive mandatory contributions. The funds are highly regulated, as is stipulated in the Pension Act, both in terms of member rights and pension fund operations, investments, and governance. There are currently 27 pension funds operating in the Pillar II system. No new pension funds have been established since the pension reform of 1997. Intermediaries offering annuities do not exist.

The law requires that all wage earners and self-employed persons aged 16 to 69 contribute to an approved pension fund. Currently, the law stipulates that the mandatory contribution must be at least 12% of wages and salaries received, although the contribution is divided between the employer and the employee. The general rule is that every wage-earning person working in the private sector is obliged to contribute 4% of his or her total salary to a predetermined pension fund according to a collective agreement. This is matched by an 8% contribution from the employer. Certain pension funds require higher contributions from employers (airline pilots 16%, bank employees 14.4%, and civil servants 11.5% or 12%). Part of the contribution can be used to acquire additional pension rights, including defined contribution schemes with personal accounts in the Pillar III system.

Occupational pension funds have existed since 1921 but became available to the general public in 1969, with mandatory membership from 1974 for wage earners and from 1980 for the self-employed.

The pillar II pension funds fall into two categories:

1. Funds with employer guarantees (only in the public sector) are defined benefit (DB) schemes.

2. The occupational funds should be classified as defined contribution (DC) schemes (or, in newer terminology, as defined ambition (DA) funds), as the accruals must meet a replacement goal stipulated by law, but the eventual benefits depend mainly on the investment returns and, to a lesser extent, on the costs of disability and survivors' pensions, as benefits are regulated by the financial position of the fund.

The pension benefit level can vary significantly between pension funds. First, there is a difference between public sector DB funds with employer guarantees and private sector DC funds. The benefit level is usually higher in the DB funds. Second, there are differences between the old (B-scheme) and new (A-scheme) public sector schemes. Third, the benefit level of ordinary private sector funds will ultimately depend on their investment returns, which in turn will vary from one fund to another.

Accumulated pension rights in the occupational pension funds are indexed to the consumer price index, except for the older DB public fund schemes, where the pension rights mostly move with a special wage index for public servants.

As of year-end 2013, there were 19 pure defined contribution (DC) occupational pension funds open and operating without an employer guarantee; seven defined benefit (DB) funds with employer guarantees from the central government or municipalities, and one fund that was no longer receiving contributions (a fund for previous employees of a state-owned bank stopped receiving contributions when the bank was privatised in 1987). Some funds run several pension schemes with different benefit rules. The 27 pension funds ran a total of 80 different pension schemes, more than half of them voluntary personal pension schemes (Pillar III).

The number of pension funds in Iceland has decreased over the last 30 years. This has been driven mainly by a desire to seek benefits of scale, such as reduced operating expense and risk diversification. Supervisory requirements and labour union mergers have played a part as well.

At year-end 2013, the total net assets of the 27 Pillar II pension funds amounted to ISK 2,400 billion (approximately EUR 15.5 billion), close to 135% of GDP. The largest fund had assets of ISK 472 billion (approx. EUR 3.1 billion).

The size distribution is very uneven. The three largest funds own almost half of total assets, and the 10 largest funds own more than 81% of the assets. The 10 smallest funds own less than 5% of total assets.

Most funds are occupation-based; that is, they are linked to labour unions whose members are required to pay contributions to specified funds. The board of directors typically comprises an equal number of representatives from the labour unions and the corresponding federation of employers (or the guarantor, as for civil servants).

Some funds are not linked to labour unions, and they primarily have members who can choose which fund they belong to (mainly managers and the self-employed). Their boards mainly comprise members, without representatives from labour unions or employer federations.

While the pension fund legislation does not specify an age ceiling on contributions, all funds but one follow the minimum requirements for contributions from age 16 until the 70th birthday. Thus a person who begins to draw a pension at the customary age of 67 but continues to work will have to pay contributions until he or she reaches age 70. No accruals of pension rights can take place after that age. The exception is a fund that accepts contributions for an additional two years, until age 72.

The Directorate of Internal Revenue ensures that contributions are in line with income as shown on tax returns and initiates collection measures if contributions are missing.

In 2013, the estimated active membership in occupational mandatory private pension funds was 192,766, with an 87% coverage ratio of the working age population (16-67 years).

### 2.4.1 Differences between DC and DB funds

There are significant differences between private pension funds with employer guarantees (DB funds in the public sector) and ordinary private pension funds (DC) as regards both risk-bearing and the level of contributions and benefits. Guaranteed funds established before the Pension Act of 1997 are exempt from the full funding requirement. Furthermore, full funding will become the general rule for all public sector employees in the future and is currently applied to all new employees. The pension funds for public servants are currently the only DB funds in operation.

Table 2.1: The main differences between DC and DB funds (Pillar II)

	Defined contribution (DC)	Defined benefits (DB) – new A-schemes	Defined benefits (DB) – old B-schemes (closed to new entrants since 1998)
Retirement age	67 years	65 years	65 years of age or 95-year rule (age of member + years worked = 95, though not until 60 years of age)
Accrual rate per year	At least 1.4% on average	1.9% of full salary at time of payment	2% of final salary
Employee contribution	4% of total salary	4% of total salary	4% of total salary
Employer contribution	8%, except for two funds with 14.4% and 16%	11.5-12%	11.5% for the largest fund, 8% for most others, and 6% for one fund
Risk-bearing	Members	Employers	Employers

The Regulation on pension funds (no. 391/1998) stipulates that, at a minimum, each scheme must offer accrual rates equalling an average of 1.4% of wages per year over a 40-year period. This is commonly described as a goal for a lifelong pension with a replacement rate of 56% of average career wage, but because most funds now operate with an age-dependent accrual rate, the actual replacement varies. Many funds have accrual tables providing higher replacement rates, but some funds have chosen to allow a part of the contribution be used to acquire additional pension rights as chosen by the individual member, including DC schemes with personal accounts. For the new public sector funds, the annual accrual is actually 1.9% per year, independent of age, which gives a replacement rate of 76% of average wages at constant prices over a 40-year period.

Figure 2.2: Accrual pattern of a typical Icelandic DC fund
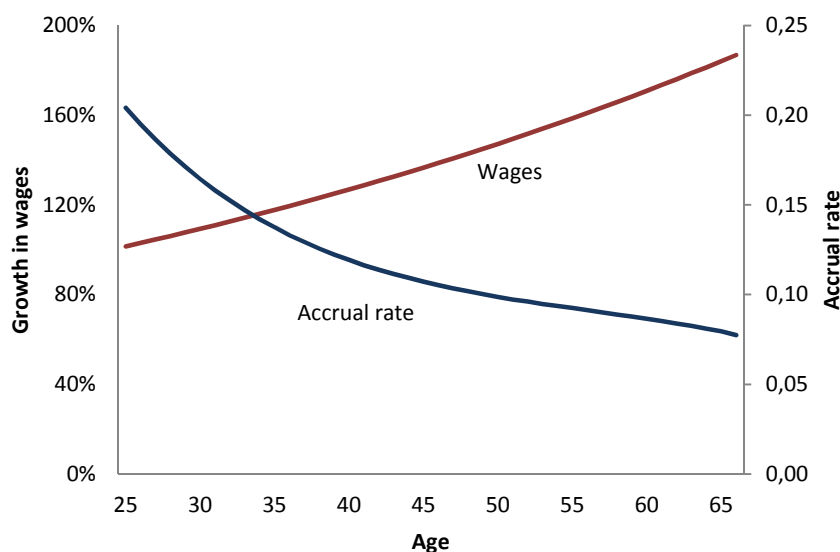
In the example in Figure 2.2 the accrual rates multiplied by wages produce a replacement ratio that reaches 56% at constant prices at the end of a 42-year work history, or 42% of final wage. The calculations are based on real annual wage growth of 1.5% and a 12% contribution rate.

The results of calculations for pension accruals in DC pension schemes have confirmed a known feature in the design of their accrual tables, resulting in slightly worse outcomes in the comparison of career-average wage to the national goal of a minimum 56% replacement ratio from Pillar II DC pension savings. The accrual tables assume a constant wage, with no increases, yet wage increases are the norm. This has the effect of reducing the replacement ratio slightly. In the theoretical example shown in Figure 2.2, the ratio is 55% after 40 years (instead of the 56% stipulated by law), and an additional two years of accruals (42 years instead of 40) are needed to reach the 56% mark. Depending on the wage increase profile, the number of contribution years needed to reach the 56% mark could be as high as 44.

The Pension Fund for State Employees is the largest public sector pension fund in Iceland. The total contribution to the fund's A-scheme, which is the new scheme with the full funding objective, is currently 15.5% of total salaries. By law, the board must decide each year what level of contributions is needed to ensure that the fund meets the solvency requirements stipulated in the law. After the financial crisis in 2008, the government has annually postponed increasing the contribution as required.

At present, there are three methods used to fulfil employer guarantees for public sector funds:

1) Increases in pension payments from the basic benefit promise are paid monthly by the state.
2) The guarantors' share of pension payments is calculated annually by the fund's actuary and is paid monthly by the municipalities.
3) Lump sum payments, either in cash or via debt instrument, are used to reduce the guarantee deficit.

2.5 Pillar III - Voluntary personal pension savings

As part of the general pension reform in 1997, legislation on tax incentives for voluntary personal pension savings was passed. The reform made it possible for employees to deduct from their taxable income a contribution to authorised personal pension schemes.

The personal pension savings programme came into effect in 1999. Maximum tax-deductible contributions of 4% of total salaries by the employee were allowed between 2000 and 2008, and again from mid-year 2014. In addition, according to collective agreements, employers contribute 2% to those voluntary pension savings if the employee matches the amount with at least the same percentage. The total contribution can therefore be 6%. Employers are, though, allowed to pay higher contributions than the 2%.

The pension savings are available as a lump sum or by programmed withdrawal from age 60 (earlier in case of disability) and are fully inheritable.

Employees are free to choose their provider of additional pension rights; i.e., both for the special contribution to voluntary personal pension savings and for the rights in excess of the 56% minimum stipulated in the Pension Act for mandatory pension savings.

Pension funds must be authorised by the Ministry of Finance to provide such pension schemes. At year-end 2013, there were 24 authorised voluntary personal pension funds, 16 of them run by occupational private pension funds, six by banks and savings banks and two by foreign insurance companies. The estimated total membership of personal voluntary funds was 113,441, and total assets were ISK 412.5 billion (EUR 2.6 billion). About 40% of the working-age population contribute voluntarily to personal pension plans.

Voluntary personal pension savings schemes are always classified as defined contribution (DC). The pensions generally follow investment returns only, but there are also available foreign programmes with guaranteed returns.

2.6 Pension taxation

Pension funds are tax-exempt, and investment income is therefore not taxed. Pension payments are taxed as ordinary wage income.

Because pension contributions are deductible from the tax base both for employees and employers, the taxation principle can be described as an EET system (Exempt contributions, Exempt investment income and capital gains of the pension institution, Taxed benefits).

2.7 Retirement age

The normal retirement age is 67 for private sector employees and 65 for public sector employees (even less for members of the old B-schemes). In the Pillar I system, the minimum age for the old-age pension is 67. Icelanders work longer than most Europeans: the average Icelandic male retires at 68.2 years of age and the average female at 67.2. The system incorporates incentives for citizens to extend their employment beyond the official pensionable age and, at the same time, punishes early retirement with lower future pension payments. The benefits of remaining in the workforce are particularly strong for low- and middle-income earners. Consequently, the participation rates

of elderly are among the highest in the OECD, at 84.3% for the age group 55-64, compared with the OECD average of 59.7%.[vi]

The rule of thumb in the private sector is that members can begin to withdraw old-age pensions at age 67, while in the public sector schemes the age is 65. Early or late pension withdrawal is allowed in all private sector pension funds and the new funded public sector funds, with reduced or additional benefits.[1] In the older B-schemes of public funds, the retirement age can be anywhere from 60 to 65 years, dependent on length of service of each member; early withdrawal is not allowed, but late withdrawal is allowed with additional benefits. The flexible withdrawal rules vary between funds. In some funds, the early withdrawal period begins as early as age 60, but in no funds does it begin later than at 65. The late withdrawal period ends as late as age 75 for some funds, but never earlier than age 70. In general, the benefit rule in the new public sector scheme and in the private sector is neutral towards the choice of early or late retirement.

2.8 Sustainability of the pension system

The age distribution among the Icelandic population is relatively favourable compared with continental Europe. The ratio of retirees to the working-age population is currently low and is estimated to remain so for the next few decades. The asset-building nature of the current pension system therefore reduces the risk that a higher dependency ratio will result in a fund shortage or require higher taxes to finance retirement schemes in the future.

Iceland's population is relatively young, with 12.9% of the population 65 years or older (2013 data[vii] – compared with the OECD average of 15.6% or the European average of 16.8%), a high fertility rate,[viii] and life expectancy of 82.3 years.

Iceland's Pillar I pension system is surprisingly inexpensive compared with those in other OECD economies.[ix] Low public expenditure on pensions stems from the income-tested character of the system and has its origins in the development of the social security system in the country. However, a low expenditure ratio could also be a result of the country's relatively young population, low unemployment rate, and high labour participation rate among older men and women.

Recently, higher pension payments from the Pillar II pension funds have substantially decreased the proportional share of tax-financed benefits from the Pillar I system. In 2013, Icelandic pension funds accounted for 62%[2] of old-age pensions from the mandatory components (Pillar I and Pillar II) of the pension system.

The old-age pension and supplements from the social security system will continue to grow in absolute amounts, however. They are expected to peak until 2035 and then decline thereafter. Even though higher payments from the Pillar II funds reduce the income-tested Pillar I benefits received by most individuals, the rapid growth in the number of pension recipients will lead to higher total expenditures for two decades to come.

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[1] One pension fund allows only late withdrawal.

[2] Comparison of old-age pensions is based on the same components as included in the study calculations: old-age pensions only from Pillar II pension funds and old-age base pension, income supplement, household supplement and minimum subsistence guarantee supplement from Pillar I social security.

Additionally, there is a large shortfall in state finances concerning Pillar II DB pension liabilities. The pension fund for state employees is underfunded (accrued liabilities) by approximately ISK 432 billion[x] (25% of Iceland's year-2013 GDP), and if no action is taken to deal with this, the B-scheme will be depleted by 2023, according to a recent estimate.

3. Iceland – specific assumptions

This chapter describes the assumptions for Iceland that are different from those described in the general methodology of the OECD project (Annex 1).

3.1 Dataset description

The calculations for Iceland are based on five administrative datasets obtained from five data centres operated for pension funds, banks, and depositories for personal pension savings. These data centres (Jóakim, Fuglar, LIVE, Landsbanki, and Allianz) have records of contributions paid and accrued benefits in occupational private pension plans and records of contributions paid and assets accumulated in personal pension plans/schemes for nearly the entire Icelandic population. The five datasets can be merged, as they share the same personal identifier. This allows data from different pension plans to be added together for each person, generating a total of all accrued pension rights as of year-end 2012.

Data on housing wealth and remaining mortgage balances come from the tax authorities (Directorate of Internal Revenue).

3.2. Sample selection

The original dataset includes all individuals of age 35-64 years as of year-end 2012 who have at some time paid contributions to a mandatory occupational pension fund (Pillar II). This sample included 176,700 individuals. However, 30% of them did not live in Iceland at year-end 2012, leaving approximately 121,000 individuals for further selection. The people not resident at that time are mainly foreigners who have worked in Iceland in the past; however, Icelanders who have moved abroad temporarily or permanently are included as well.

From these data, it is possible to identify all households where both spouses are 35-64 years of age and at least one of them is in the labour force. The sample includes non-working spouses, as long as they are living with a spouse who paid a contribution corresponding to the minimum wage or higher in 2012.

The research sample focused on households (two persons) and single individuals who were full participants in the pension savings system in 2012 (at least one member of the household paid a contribution equal to or above that corresponding to the labour market minimum wage for one year – ISK 193,000 monthly in 2012).

Households where one or both members are receiving disability pensions are excluded. This is because of the highly complicated income-based adjustments or caps on such pension under current rules.

After the above criteria had been applied, the final size of the research sample was just under 90,000 individuals, 74% of the total population in the age group 35-64, according to Statistics Iceland.

The results assigned to gender include all individuals in a single-person household, as well as those with a spouse younger than 35 years or older than 64 years (excluded from the sample). To some

extent, the characteristics of the gender groups may deviate from the general characteristics of the full gender groups in the sample.

3.3 Age of retirement

For the public pension, the normal age of retirement is 67. That pension may be deferred up to age 72 but cannot be claimed before age 67. For the mandatory private pension, the normal retirement age is 67 for private sector employees and 65 for those in the public sector. By law, pension funds are allowed to offer earlier or later retirement, with benefits adjusted accordingly. Early withdrawal may not take place before the 60th birthday.

The study assumes that individuals retire at age 65 in the pessimistic scenario, women retire at 67 years and men at 68 years in the intermediate scenario, and all retire at age 70 in the optimistic scenario.

3.4 Employment status and earnings going forward

Salaries are not directly available in the datasets but can be calculated from the contributions paid in the mandatory private pension system. Unemployment periods can also be estimated, as people receive unemployment benefits from a single source and pay reduced contributions. However, it is not possible to distinguish between an unemployed person and one who has left the labour force if unemployment lasts more than three years (quite uncommon in Iceland, at least before the financial crisis in 2008).

For future unemployment, the model assumes random unemployment periods, independent of age or sex, experienced by 40% of the population. The average unemployment rate is set at 3%, which was about the average unemployment rate in Iceland before the financial crisis struck in 2008. The unemployment is set using a stochastic simulation model. For persons among the 40% that will experience unemployment, unemployment periods are simulated, with an average length of one year and the probability of starting a new unemployment period in each year set at 7.5%.

Individuals making the majority of their contributions to a public sector fund (DB) in 2012 are classified as public workers. The same methodology is used to classify people as private sector employees (DC). Going forward, it is assumed that individuals will continue to pay into the same pension fund as they did in 2012.

Career-average earnings are calculated from age 25 onwards. This is because most people have not worked full-time while in school and have only paid contributions for summer and part-time jobs. To include such years in the calculations of average earnings would have produced a lower average and thus indicated a higher replacement ratio than is realistic. The choice of age 25 corresponds to the regulatory requirement that accrual tables of pension funds must meet the goal of a 56% replacement ratio over a 40-year period beginning, at the earliest, at age 25.

3.5 Sources of retirement income

Four different sources of retirement income have been included in this study: pension payments from the three pillars – social security, mandatory occupational pension funds, and voluntary personal pension savings – and potential capital income from housing wealth (homeowners at year-

end 2012). Excluded are other sources, such as wages, other capital income or asset sales, and insurance products with a savings component, which hardly exist in the Icelandic market.

3.6 Social security pension benefits

Data are not required to calculate future pension benefits from this system, as it is based on known rules given information on a person's occupational pensions and other income.

The rules and amounts of the old-age base pension, income-tested pension supplement, household supplement (for those living alone), and minimum subsistence guarantee, as applicable in 2014, are used in the calculation but adjusted to 2012 price levels. From then on, the benefits and income-testing limits are increased by the productivity growth in each scenario.

By law, all people who have been residents of Iceland for at least three calendar years are entitled to an old-age pension from Pillar I (social security). Full rights are gained by residency of at least 40 years from age 16 to 67, adjusted *pro rata* for residency of 3 to 39 years. It is assumed in the calculations that the number of years of contributions equals the number of years of residency, and Pillar I rights are adjusted accordingly. The results show 100% coverage, but the benefits vary according to the number of contribution years.

3.7 DB funded pension benefits

The current rules are applied in the calculations and no specific assumptions have been made, except that the state will be able to pay pensions despite the significant underfunding of public sector pension funds.

3.8 DC funded pension benefits

The current rules are applied in the calculations, with the following exceptions:

In the calculations, an adjustment has been made for the actuarial balance of each fund, a reduction or increase in each member's accrued rights, to reflect the fund's position at the end of 2012. The accrued benefits in the DC funds recorded in the original datasets did not reflect the financial position of the fund. Funds may be under- or overfunded, and the accrued benefits shown for each member were just those stipulated by the fund deeds, possibly with increases or decreases that have followed previous adjustments of benefits.[3]

The interest rate assumptions in the intermediate scenario are identical to those used by the Icelandic DC funds in actuarial valuations and the setting of accrual rates. Therefore, having adjusted the accrued benefits at end of 2012 so that the actuarial position is in balance, it can be assumed, in the absence of changes in other factors (longevity, disability rate), that the benefits accrued in future years will be in line with the benefit rules as stated in the current fund deeds.

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[3] In case of overfunding, above a certain level of actuarial balance, the fund must restore balance by increasing accrued benefits and pensions in payment. In case of underfunding, benefit cuts may be needed (the risk is shared across members and pensioners). Pension funds must adjust a 10% deficit/surplus within one year, but may run with a deficit/surplus of 5-10% for five consecutive years.

If real interest rates are substantially below 3.5%, as in the pessimistic scenario, the funds will have to reduce the benefits accrued. In the same way, if interest rates turn out to be above 3.5%, the funds will be able to (and obliged to) increase benefits. This has been allowed for in the calculations by adjusting, at the end of each year, the accrued benefits by the shortfall / surplus in the contribution reserve. Finally, at retirement age, the old-age pension is determined by equality of the value of pension payments valued at the relevant interest rate and the contribution reserve built over the years.

The formula used by each individual pension fund is used, rather than converting assets accumulated at retirement into an annuity as described in the framework. The target is calculated based on the assumption of a real interest rate of 3.5%, which is the rate prescribed in the official regulation for annual actuarial valuation of Icelandic pension funds. A typical formula can be stated in this way:

$$Contribution * (factor^{age}/10,000) = pension\ value\ at\ standard\ retirement\ age$$

A typical factor table is shown in Annex 2.

3.9 Evolution of private pension coverage

No assumption is made about changes in private pension coverage. By law, contribution to Pillar II occupational pension plans is mandatory from age 16 until age 70.

No assumptions are made about changes in coverage of voluntary personal plans. Individuals paying such contributions in 2012 are assumed to continue paying contributions at the current rate until retirement. Those not paying contributions in 2012 are assumed not to begin or resume paying such contributions. An analysis of the distribution of contributions paid by the various cohorts shows a very even distribution, and no age groups appear to be penalised by this assumption.

A temporary authorisation for people younger than 60 years to withdraw limited amounts from personal pension savings took effect after the financial crisis of 2008 and has since been extended, usually for one year at a time. Such withdrawals are reflected in the net position at year-end 2012, but further withdrawals were not assumed. At mid-year 2014, a new temporary authorisation took effect, whereby contributions made during the following four years may be used, exempt from income tax, to pay down existing mortgages or as a part of down payment on residential property by first-time buyers. This will therefore transfer some pension savings into real estate, but it is also expected to increase coverage somewhat, as it encourages people to enter into a personal pension savings programme. No assumptions were made in the study calculations about the effects of this temporary authorisation.

Some pension funds permit their members to place a portion of their 12% mandatory Pillar II contribution into the personal pension savings programme. The dataset does not provide a breakdown of the contributions into those components. As a result, the weight of Pillar III will increase in all results, and the weight of Pillar II will be reduced. This is not considered to change the results to any marked degree.

3.10 Non-contributory pension benefits

The Pillar I social security system pays benefits out of general tax revenues, and there is no requirement of tax payments to be eligible to receive Pillar I benefits.

3.11 Poverty line

There is no official poverty line in Iceland. The calculations use the Eurostat standard, which draws the poverty line at 60% of median disposable income, as reported by Statistics Iceland.

3.12 Comparison with recent retirees

Data were obtained from the Directorate of Internal Revenue on total declared income of all individuals 61 years of age and older for revenue year 2012. The data on income from Pillar I (social security system) and Pillar II pension funds for individuals aged 67 were used to calculate the mean total income for recent retirees, but were not suitable for calculation of the median. The average income of the age group 68-72 was lower and was therefore not used.

The data on income from Pillar III voluntary personal pension savings were not used in comparisons, as the rules allow people 60 years of age and older to withdraw such pensions entirely at their discretion; therefore, the data cannot be compared with the projections of the research model, which assumes an even distribution of payments over the remaining life of each owner of third-pillar pension assets.

3.13 Analysis of results by groups

The datasets contain information allowing the individuals to be sorted by income, age, gender, and sector (public or private). It is not possible to identify self-employed persons; therefore, no comparison can be made between the self-employed and employees. The calculations are made on a household basis and will therefore report equal pensions for the two individuals in a two-person household, making gender analysis across the whole sample useless. Therefore, gender analysis is only applied to single-person households (see Section 3.2). In all tables or figures in this report where gender is listed, it refers to single men and single women.

4. Coverage

In Chapters 4-6, the term coverage refers to the share of employed people who are enrolled in or participate in pension plans. In the Icelandic system, the first two pillars have essentially full coverage by law and the third pillar has wide coverage that has primarily been driven by collective labour agreements.

4.1 Pillar I social security pension and supplementary payments

As the model assumes that all people in the sample will remain in the work force until retirement, the results will show 100% coverage, but the payments will vary according to income-testing criteria and the number of contribution years.

4.2 Pillar II mandatory autonomous occupational private pension fund payments

The sample included only households where at least one person was paying contributions from minimum wage in 2012. Accordingly, the results of this study show 100% coverage of Pillar II pensions.

Table 4.1: Summary of coverage in Pillar II pension schemes

	Only DB or DC	Both DB and DC	Total	Receiving pensions (in a household)
DB	180 (0.2%)	42,199 (46.9%)	42,379 (47.1%)	57,314 (63.7%)
DC	47,579 (52.9%)	42,199 (46.9%)	89,778 (99.8%	89,894 (99.9%)

A total of 2,508 spouses did not pay a contribution in 2012 (2.8% of the sample).

The high coverage of DC schemes is explained primarily by contributions made at a young age (from age 16), when some participation in the work force is almost universal in at least summer or part-time jobs. Job mobility is also quite high in Iceland, and in many cases this leads to a change of pension fund receiving contributions, while old accruals stay with the previous fund(s). It is obvious that almost everybody will pay into a DC fund at some time during his or her working life.

As the DB funds provide up to 43% higher accrual rates than the DC funds, the wide difference in the ratio of DB pension receivers in each subgroup will have a significant effect on the results.

- Half (50%) of the low-income individuals will receive some DB pension (on a household basis), compared with 66% for the medium-income individuals and 71% for high-income individuals.

- The likelihood of DB pension increases with age, with the youngest cohort (35-39) having a 56% ratio and the oldest two cohorts around 70%. Three factors could be part of the explanation: fewer public employees hired after the 2008 crisis (more likely to affect the younger cohorts), the effect of general occupational mobility accumulates with age, and many people may actually seek jobs in the public sector in the latter part of their working life because of perceived job security and with (well-known) better accrual rates of pension rights.

- Only 28% of single males have accrued DB rights, compared with 62% of single women. This most likely reflects the female-dominated professions of teachers and nurses, who, by collective agreements, pay contributions into DB funds.

4.3 Pillar III voluntary personal pension savings

It is estimated that over 60% of the sample made contributions to personal pension savings in 2012 and that around 90% of the sample owned some personal pension assets at the year-end.[4] The lower number is a more realistic indicator of coverage, as the higher number is explained primarily by the fact that, as a result of collective labour agreements, employers paid a 1% contribution into personal pension savings for all employees over a two-year period (temporary automatic enrolment, without requiring a contribution from the employee).

4.4 Weaknesses in coverage of the three pillars

There is no inherent weakness in the coverage of the two mandatory pillars.

- All individuals will receive income-tested payments from Pillar I (social security system), depending on length of residency in the country.

- All wage-earners will accrue pension rights in the Pillar II funds.

Accordingly, all individuals, whether earning wages or not, will receive, at a minimum, an amount equal to the guaranteed minimum payments from Pillar I. Most individuals will receive pensions from Pillar II and therefore a higher total amount than just the guaranteed Pillar I payments. Thus the pension system has 100% coverage.

However, if there are gaps in the residency history of the individuals, they may not be entitled to full benefits from Pillar I. They might be entitled to a partial/full pension from other countries where they have fulfilled the minimum residency requirements for pension vesting. If their income from those sources is below certain limits, they will be entitled to means-tested financial assistance from their municipality of residency. Accordingly, no individuals are supposed to suffer absolute poverty.

Due to data limitations, the results do not provide an estimate of the number of individuals who might be entitled to pensions from abroad or might need financial assistance from a municipality, but there is undoubtedly a group of such individuals in the sample.

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[4] Full data on personal pension savings (Pillar III) were not available.

5. Retirement income

In this chapter, the analysis of results is ordered according to the weight of the three pillars in the total pension income, beginning with Pillar II. Particular attention is paid to two dominant effects on the results: insufficient number of contribution years and the large difference in pension accrual rates between DB and DC Pillar II pension schemes.

5.0.1 Notes on methodology and interpretation of results

There exist two national goals for pension income:

- For Pillar II, a minimum ratio: the 56% replacement ratio of wages (according to the Pension Act of 1997).

- For Pillar I, a fixed amount: the minimum subsistence income (according to the Social Assistance Act of 2007).

The analysis in Chapters 5 and 6 frequently includes a comparison with the 56% goal, as it is the only ratio available that has been formally incorporated into regulatory instruments.

The design of accrual tables for DC pension funds, as described in Section 2.4, has an effect on the comparison with the 56% goal. A sensitivity analysis shows that it can increase the ratio of people falling short of the 56% mark by 3-7 percentage points, varying with age and income levels.

In the analysis, the emphasis is mainly on the median values, as they generally give a better picture of income distribution than the mean values do. The distribution is usually skewed; high-income individuals receive much more than those in the low-income group. Unless otherwise described, all ratios in tables and figures are median values. All ISK amounts are displayed on a gross income basis (before taxes).

The calculations have been performed in accordance with the required methodology for the OECD project, so as to enable comparison with results from other countries. The pension projections have been carried out on a household basis, in most cases illustrating joint pension income for two people. It has therefore been necessary to conduct a separate analysis of pensions by gender and by sector in order to illustrate differences that would otherwise have been less clear in the results.

- Calculations by household distort the gender results, as both individuals in a two-person household are shown as receiving the same pension amount. The results by gender in the tables in Chapters 5 and 6 apply only to individuals living alone. Therefore it was deemed necessary to add Figure 5.3, which shows pension income by gender for the entire sample.

- Calculations by sector do not give a clear picture of the difference between the sector-based pension schemes, DB in the public sector and DC in the private sector. Nearly all people in the sample will receive pension income from DC funds and two-thirds of the sample will receive pension income from DB funds. Therefore it was deemed necessary to add Figures 5.4-5.7, which show the replacement ratios for those receiving at least 90% of their pension from either DB or DC funds.

In the tables, the terms Public sector and Private sector refer to the people who in year 2012 paid the larger or full share of their pension contributions to a DB fund or a DC fund, respectively. The

terms are not fully interchangeable with the terms DB and DC, respectively, but they give a good indication of the difference in replacement ratios between those two systems.

The results by age are biased a little by the calculation methodology, which assumes that all people in the sample who contributed to pension funds in 2012 will continue to do so until retirement. The older cohorts have in most cases already experienced some contribution gaps, but the methodology assumes that the younger cohorts will have no such gaps in the future. When the model assumes temporary unemployment, contributions will be paid out of unemployment benefits.

5.1. Pillar II - the backbone

The Pillar II mandatory autonomous occupational pension funds are the backbone of the Icelandic pension system for two reasons:

- Proportional weight: Pillar II has by far the largest share, 67%, of projected future pension payments with full retirement of the sample, compared with 23% for Pillar I and 10% for Pillar III (see Figure 5.8).

- Coverage: Because contribution is mandatory for all people in the workplace, coverage is very high.

As is described in Chapter 3, the private sector occupational DC funds have a goal of 56% of average wage, while the public sector occupational DB funds have a goal of 76%. The analysis of results for Pillar II pensions will therefore focus on the replacement ratio of career-average wage (inflation-indexed).

With more than a quarter of the sample paying into a DB fund in 2012 and almost two-thirds of the sample having accrued some DB rights in their career, it is to be expected that the overall results will be higher than 56% of average wage over the individual's working life. Furthermore, because the intermediate scenario of the study has a retirement age of 68 years for men and 67 years for women, the numbers will show up to 53 calendar years of accrual (beginning at age 16) for men and 52 years for women. This will result in an improvement in the replacement ratio. For DC funds, it will be small, as the age-dependent accrual rates are lowest at the end of the career (see Figure 2.2), but males will receive a postponement bonus for the one year they delay retirement, from age 67 to age 68. For DB funds, on the other hand, it will be larger, as they still offer a flat rate accrual, and additionally there is a larger postponement bonus, 3 years for males and 2 years for females.

It should be borne in mind that most people begin their working life not at the beginning of a calendar year but in summer, after they finish school. They will therefore need 41 calendar years to achieve the full 40-year accrual that counts toward the goal of a 56% or 76% replacement ratio.

5.1.1 Pillar II overall results

The key question is: are the Pillar II funds achieving what they set out to do (or at least as mandated by law)? The key number here is the median replacement ratio for inflation-indexed career average wage. It should be at minimum 56% in order to meet the requirements of the law for DC funds (private sector) and 76% for DB funds (public sector), but a more realistic number is probably around 61-62%, which reflects a weighted average of the replacement ratio for the contributors to DB and DC funds in this study.

The results have to be interpreted in light of two factors in the contribution history: length (number of years contributed) and level (percentage of full earnings).

Table 5.1: Pillar II replacement ratio of career-average wage
and proportion of people receiving less than 56%

	All	35-39	40-44	45-49	50-54	55-59	60-64
RR (career-average wage)	64%	64%	64%	64%	64%	63%	61%
% of people receiving less than 56%	32%	27%	29%	31%	33%	36%	42%

The overall median replacement ratio for all individuals in the sample comes out at 64%, close to the weighted average of DB and DC contributors. But a significant proportion, 32% of the sample, does not clear the 56% mark. This is explained primarily by a work history shorter than 40 years, as is shown in Figure 5.1 which gives an example of the distribution of length of work life.

Figure 5.1: Average number of contribution years at year-end 2012
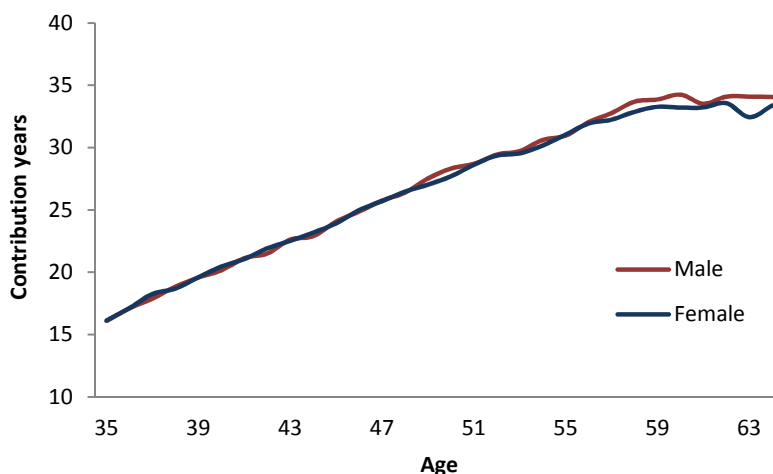
On average, the people in the sample have paid contributions for fewer years than their age would suggest. At age 35, they have contributed for an average of 16 years, or 85% of the years since age 16. The ratio stays above 80% until in the late fifties, when it begins to decrease rapidly, and by age 64 the number of contribution years is slightly below 34, which is around 70% of the years since age 16.

This decrease is probably due to two factors: the oldest cohorts missed a few contribution years at the beginning of their career, as most pension funds did not commence operations until 1969 and in the years thereafter. The other factor is recent withdrawal from the labour force, either voluntary or due to long-term unemployment. (Disability is not a factor, as all households with a person receiving disability pension at year-end 2012 are excluded from the sample.)

This means that, on average, these people will not reach 40 years of contribution before their retirement, even if they retire at age 70. Obviously, this will result in lower replacement ratios and, in the case of DC pension schemes, it will be difficult to reach the goal of 56% for career-average wage.

This is further demonstrated in Figure 5.2.

Figure 5.2: Distribution of contribution years of 60-year-old males
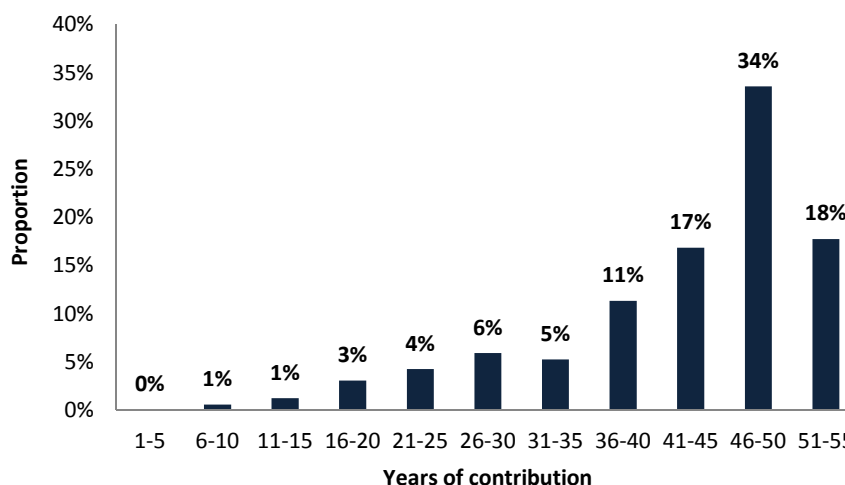
Almost 30% of 60-year-old males will have a work history shorter than 40 calendar years, although they could have had up to 53 calendar years of contribution. This can only be explained by gaps in work history or late entry into the workforce in Iceland (the latter is common for first-generation immigrants). These 30% of 60-year-old males with a shorter work history than 40 years will have a replacement ratio averaging 42% of career-average wage. On the other hand, more than 70% of the 60-year-old males will have a longer working life than 40 years and a replacement ratio of 71%. The whole cohort of 60-year-old males will have an average replacement ratio of 61%.

The replacement ratio by age is also affected by contribution level, due to a period of lower contributions:

- In the early years of the Pillar II system, contributions did not come from total earnings, as overtime payments and some other wage components were excluded. Gradually, the contribution was increased until, in 1989, contributions from all monetary wages became mandatory. Thus the oldest cohorts have a shorter history of full contributions, whereas the youngest cohort has paid full contributions at all times.

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR (career-average wage)	59%	66%	62%	62%	64%	84%	59%
% of people receiving less than 56%	45%	27%	34%	36%	34%	9%	41%

The replacement ratio by income is also in accordance with expectations, as seen in Table 5.2. The low-income group probably includes a larger proportion of people with gaps in their work history, as is indicated by the large share of people below the 56% mark. Many in the high-income group may have had gaps because of years spent studying and working abroad, as most graduate studies are pursued overseas.

The results show little difference in the replacement ratio by gender, but the underlying data show a different picture. On average, the pension payments in the entire sample are on average 24% higher for males than for females, as is shown in Figure 5.3, with the difference ranging from 16% to 38% by age. On the other hand, the results in Table 5.2 apply only to people living alone and the females in that group are predominantly employed in the public sector, where pension accruals are much higher than in the private sector. Therefore, despite receiving lower pension amounts, the females have a higher replacement ratio than the males.

Figure 5.3: Projected pensions by gender and age
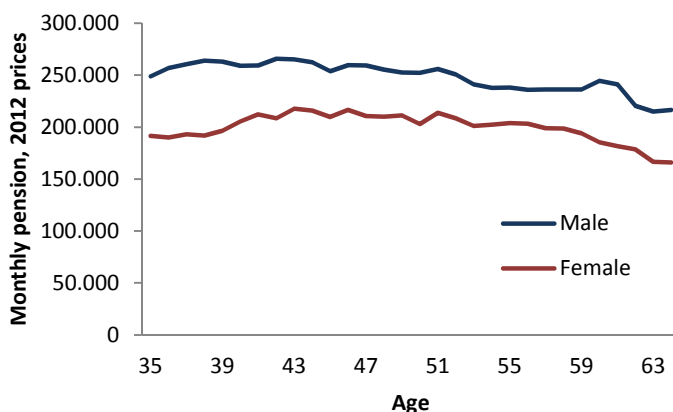
The replacement ratio by sector in Table 5.2 reflects the large difference in accrual rates in DB and DC funds. This is analysed in more detail in the following sections.

5.1.2 Pillar II DB funds

Almost two-thirds of the sample will receive some pension payments (on a household basis) from DB funds. Of those, the majority paid their primary contributions into a DC fund in 2012 and, in general, hold limited rights in DB funds. This reduces the median pension rights for the DB system, whereas those currently paying contributions to DB funds have far greater pension rights than most of the other groups in the dataset. The generous accruals are clearly shown in Figure 5.4, which focuses on people who receive their pension mainly from DB funds.

Figure 5.4: Replacement ratio of career-average wage for people in
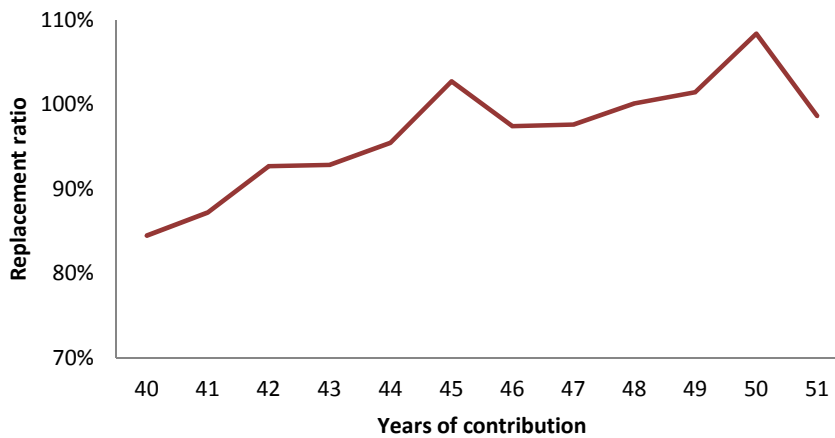age group 60-64 with 90% of Pillar II pension from DB funds

Figure 5.5: Replacement ratio of career-average wage for people in
age group 35-39 with 90% of Pillar II pension from DB funds
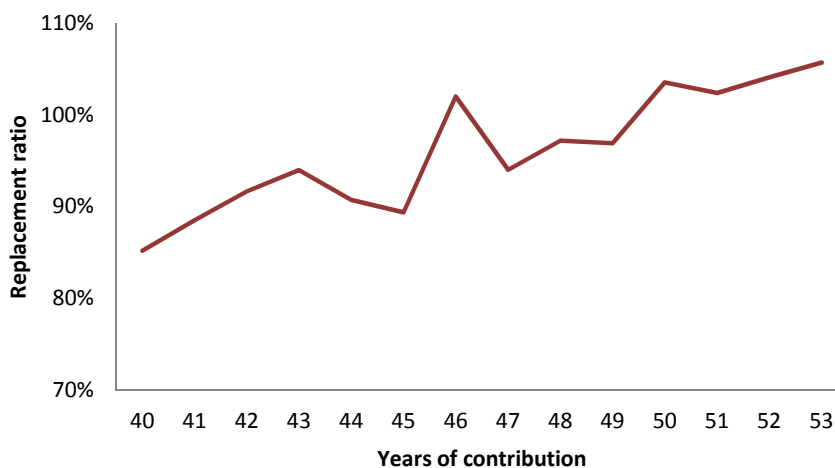
After 40 years of contributions, pension rights in DB funds are already well above the 76% goal. The people who continue working will approach or exceed the 100% mark. The high replacement ratio may come as a surprise, but the explanation lies in the generous accruals of the old B-schemes. With a 2% accrual rate for the first 32 years and then 1% per year, after 40 years the accrual will amount to 72% of final wage. If salaries are assumed to rise by a real rate of 1.5% per year, the final salary after 40 years will be 32% above the career-average salary, and with a 72% accrual of final wage the replacement ratio will be 95% of the career-average salary. This number for the B-schemes should be compared with the much lower 56% replacement ratio goal of DC funds.

5.1.3 Pillar II DC funds

Virtually all households will receive some pension payments from DC funds. The median pension amount for all those receiving DC benefits is therefore essentially the same as for the whole sample in the study.

The DC accruals are much lower than those in DB funds, as is shown clearly in Figure 5.6, which focuses on people who mainly receive their pensions from DC funds.

*Figure 5.6: Replacement ratio of career-average wage for people
in age group 60-64 with 90% of Pillar II pension from DC funds*
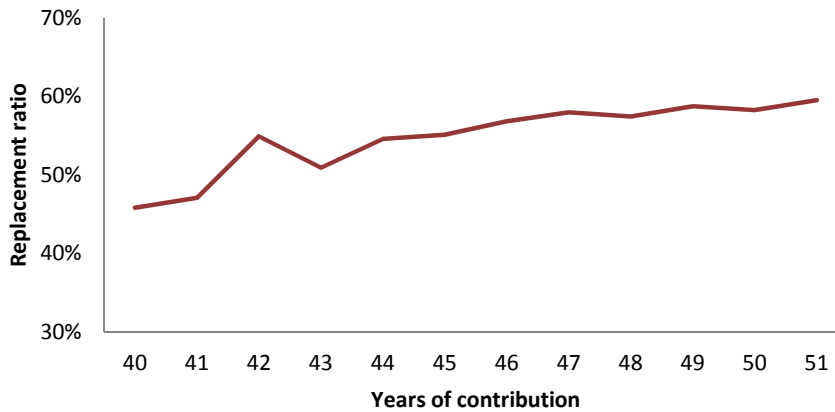
Figure 5.6 shows that, in most cases, people in the age group 60 to 64 who have paid contributions for 40 years mainly into a DC fund have not been able to accrue pension rights reaching the 56% goal. The people who continue working will reach that goal on average five years later.

The people in this cohort have had lower accruals in their early working years, as contributions were not paid from the full salary, and quite many missed a few contribution years in the beginning, as Pillar II DC pension funds were not yet widely in operation. Furthermore, their pension funds have generally had to cut accrued benefits somewhat following the 2008 financial crisis, and this is reflected in the calculations.

*Figure 5.7: Replacement ratio of career-average wage for people
in age group 35-39 with 90% of Pillar II pension from DC funds*
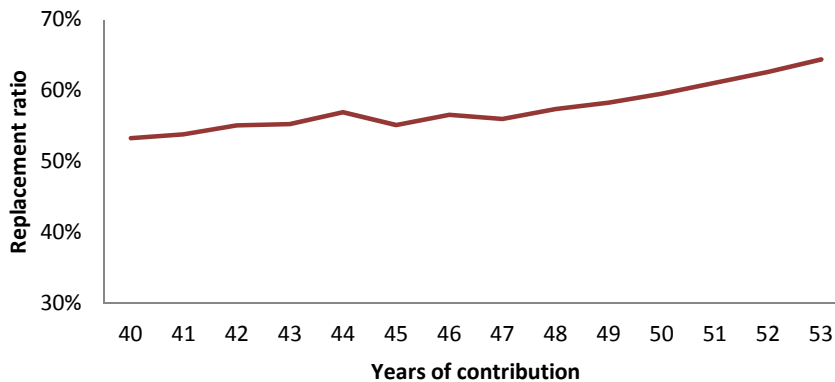
It should be borne in mind that most people in all cohorts in the study have not worked full-time while in school and have only paid contributions for summer and part-time jobs. The calculation of career-average wage has been modified to reflect this. Such years will still be included in the count of contribution years. It is therefore most likely that people will fall short of the 56% replacement ratio for the first 40-41 years of contribution history.

An additional factor reducing the likelihood of reaching the 56% replacement ratio is the fact that DC fund accrual tables are calculated on the basis of constant wages, without future wage increases,

whether age-based or productivity-based. This typically lowers the replacement ratio by 1-2% for people with a typical history of wage increases, as is shown in Annex 2.

However, despite the various explanations of factors contributing to a lower replacement ratio, the fact that there is a large group of people not reaching the 56% goal is a weakness that will be analysed further in the next section.

5.1.4 Pillar II weaknesses

While the Pillar II system was surely designed to have no weaknesses, the results of the study have identified several weaknesses, especially in the DC funds. The actuarial design of the accrual tables has already been discussed (see Section 2.4).

Despite good intentions, not all pension goals may be met. The DC funds do not guarantee pensions, even though they have a defined ambition (DA) of 56% replacement ratio for average life-time earnings. If their returns are insufficient, then they will have to cut benefits. The DB funds guarantee pension amounts, regardless of investment returns, as they are backed by the state and municipalities, but the large funding deficit at the present time will be a considerable challenge.

However, if individuals have long periods of unemployment, they run the risk of having gaps in their contribution history, resulting in lower Pillar II pension payments. At the lower end of the income scale, this is compensated for by the Pillar I social security pensions.

Additionally, the cohorts paying into DC funds between 1969 and 1989 did have lower accruals than are needed to achieve the 56% goal. This weakness was corrected a long time ago, but it will take another 15-20 years from now until the effects of the lower accrual rates cease to drag the replacement ratio down towards or below the 56% goal.

Tables 5.3 and 5.4 shed light on the nature of the weakness in DC accruals.

Table 5.3: Replacement ratio of career-average wage and proportion of people below 56%
People with 90% of Pillar II pension from DC funds

	All	35-39	40-44	45-49	50-54	55-59	60-64
RR (career-average wage)	54%	59%	56%	55%	52%	50%	48%
% of people receiving less than 56%	55%	41%	49%	53%	59%	68%	75%

The replacement ratio declines with age, and the proportion below the 56% goal grows very rapidly with age. The explanations are of two types:

- Weaker accruals in the first two decades of widely available Pillar II DC funds (1969-1989): the effect of a lower level of contributions before 1990, which grows by age, beginning at age 39 in the sample, and the missing years of contribution before pension funds became generally available for all, affecting the oldest cohort in the sample.

- Fewer than 40 years of contributions: almost a quarter of this sample will have fewer than 40 years of contributions. The proportion grows with age, as shown in Table 5.4.

Table 5.4: Frequency of contribution history shorter than 40 years, by age group

	35-39	40-44	45-49	50-54	55-59	60-64
% of people who will have fewer than 40 years of contributions	13%	19%	23%	29%	35%	45%

Various explanations for the missing contribution years are readily available: Late arrival into workforce (first-generation immigrants and others); school years without contributions, especially when studying abroad; work abroad; absence from the workforce for family reasons (child-raising, homemaking – bearing in mind also that paid maternity leave with pension fund contributions is a relatively recent practice).

The missing contribution years obviously affect the results, especially for those paying contributions primarily into DC funds. The frequency of this element is not a sign of weakness of the Pillar II system as such, but is a problem that must be addressed, if not with some modifications of the Pillar II system, then by letting the Pillar I system deal with it.

5.2 Pillar I - the social security safety net

The role of the Pillar I social security system is primarily to bring individuals with low or no pension payments from Pillar II funds or income from other sources up to a minimum income level. There are various income-testing measures built into the system, resulting in a very flat distribution at the low end of the income distribution.

People with no wage income receive a low base pension from age 67. Additionally, most of them receive some pension supplements. Only those with a relatively large income from Pillar II pension funds or capital income do not receive any supplements. The results of the study show, however, that more than half of the high-income individuals will receive some supplements despite the income-testing. In other words, more than 90% of the total sample will receive some income-tested supplements. This is in accordance with the data available from the tax authorities, where the highest quintile (top 20%) of individuals sorted by total income from pension sources (Pillars I, II, and III), receives some supplements from Pillar I. The tax data do not show the exact percentile mark for the cut-off.

People earning wages above a certain amount will receive a reduced or no base pension, and their pension supplements will also be income-tested.

5.2.1 Pillar I complementing Pillar II pensions

Table 5.5 shows, when compared with the tables in Section 5.1.1, that the Pillar I system has a strong equalising effect on the replacement ratio, in addition to raising it significantly.

Table 5.5: Pillar I and II replacement ratio of career-average wage and proportion of people receiving less than 56% from Pillars I and II combined

	All	35-39	40-44	45-49	50-54	55-59	60-64
RR (career-average wage) from Pillar I	31%	29%	30%	32%	32%	31%	32%
RR (career-average wage) from Pillar II	64%	64%	64%	64%	64%	63%	61%
Sum RR from Pillars I and II	94%	93%	94%	96%	95%	94%	93%
% of people with pension < 56% from Pillars I+II	6%	4%	5%	6%	7%	7%	7%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR (career-average wage) from Pillar I	61%	29%	11%	27%	41%	22%	31%
RR (career-average wage) from Pillar II	59%	66%	62%	62%	64%	84%	59%
Sum RR from Pillars I and II	119%	94%	73%	89%	105%	106%	90%
% of people with pension < 56% from Pillars I+II	1%	3%	18%	7%	3%	2%	7%

The higher pension received by public sector employees from Pillar II pension funds results in lower Pillar I pension and supplements. However, more than half of public sector employees (as classified by their contributions to a DB fund in 2012) will receive some income-tested supplements.

The lower pension received by private sector employees from Pillar II pension funds results in higher Pillar I pension and supplements. Most of the private sector employees (as classified by their contributions to a DC fund in 2012) will receive some income-tested supplements.

5.2.2 Pillar I weaknesses

By definition, there are no weaknesses in Pillar I social security support, as long as residency requirements are met. Coverage is 100% for those with a minimum of 40 years' residency in Iceland. The minimum pension subsistence guarantee amounts are 11% above the Icelandic poverty line (60% of the median disposable income) for single individuals and 28% above the poverty line for couples.

Table 5.6: Comparison of social security minimum and poverty line in Iceland

ISK – 2012 amounts	Social security minimum	Poverty line (60%)	Difference
Single person	201,682	181,086	11%
Couple / two-person household	347,614	271,629	28%

The benefit levels from Pillar I are not fixed, however, but depend on annual allocations in the state budget and are therefore liable to political intervention. The Social Security Act stipulates that the amounts shall be determined so as to take account of wage trends, though in such a way that they will never rise less than prices as reflected in the consumer price index. There are examples from recent history where benefits have lagged behind general wage increases at times, but they have caught up later.

A sensitivity analysis has been conducted in this study, in order to measure the effects of having no productivity increase in the Pillar I benefits; i.e., skip the 1.5% increase built into the intermediate scenario, on which the main analysis in this chapter is based. The results show that, without the 1.5% annual increase, the median pension replacement ratio would decrease by 11 percentage points for all individuals and from 4 to 22 percentage points for the various subgroups, with lower-income groups suffering a larger decrease. In some cases, this would also result in some groups falling below the benchmarks of poverty or the income of recent retirees. In this instance, Iceland would slide downwards in a country comparison of replacement ratios.

5.3 Pillar III - the optional pension savings

The personal pension savings programme took effect in 1999. The oldest cohort in the study will therefore have had the option of participating in the programme for 16-20 years prior to reaching retirement age at 67. The youngest cohort, on the other hand, has been able to participate in the programme since age 22 and may therefore receive close to the maximum pension from this source, as calculated in the study. All cohorts in the study are affected by two periods (1999 and 2008-2014), when lower contributions were allowed than at present.

5.3.1 Pillar III impact on the overall system

Personal pension savings will constitute 10% on average of the total pension payments (Pillar I-III). Most people in the sample will receive such payments. In 2012, contributions to personal pension savings were made by nearly 60% of the sample, and nearly 90% of the sample owned some personal pension assets.

The replacement ratio of personal pension savings differs in the various sub-groups, as is shown in Table 5.7:

Table 5.7: Increase in replacement ratio of career-average wage from Pillar III

	All	35-39	40-44	45-49	50-54	55-59	60-64
RR (career-average wage)	8pp	10pp	10pp	8pp	8pp	7pp	6pp

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR (career-average wage)	5pp	8pp	13pp	8pp	6pp	8pp	9pp

The ratio by age primarily reflects the length of participation in the programme. The oldest cohort has had the shortest time to build up such savings.

The ratio by income primarily reflects the capacity and willingness of the individuals to participate in the programme, thereby reducing their present disposable income in order to receive higher income during retirement. Additionally, the ratio for the high-income group reflects a frequent practice among employers of paying larger contributions to senior managers' personal savings accounts.

The ratio by gender corresponds to the ratio by income, as males in the gender sample have higher income than females.

The ratio by sector primarily reflects the different weight of other pension income. The actual ISK amount is quite similar for both groups, but because public sector individuals receive higher income from their Pillar II savings than do private sector individuals, their personal pension savings constitute a smaller share of total pension income.

5.3.2 Pillar III weaknesses

There is no inherent weakness in the design of personal pension savings programme. It is open to all wage earners, but it is optional and therefore each individual must make his or her own decision on participating. However, it could be considered a weakness that participation or coverage of Pillar III depends on earnings, which means that lower-income groups will most likely have less protection from this source than middle- and higher-income groups. The effect of Pillar III is thus regressive or skewed to some extent, a common characteristic of voluntary insurance schemes.

5.4 The three pillars combined

The importance of the funded pension pillars (II and III) is clearly demonstrated in Figure 5.8 and Table 5.8. The funded portion is 76.6%, whereas the unfunded portion (Pillar I) is only 23.4%. This assumes that DB funds in Pillar II will be fully funded despite the current large funding deficit, primarily in the old B-scheme of the Pension Fund for State Employees. Even if the funding deficit is taken into account (currently estimated at 10 percentage points in Figure 5.8), the pensions coming directly from tax revenues would only represent approximately 36% of the total.

Figure 5.8: Weight of the pension system components, as % of total pension payments
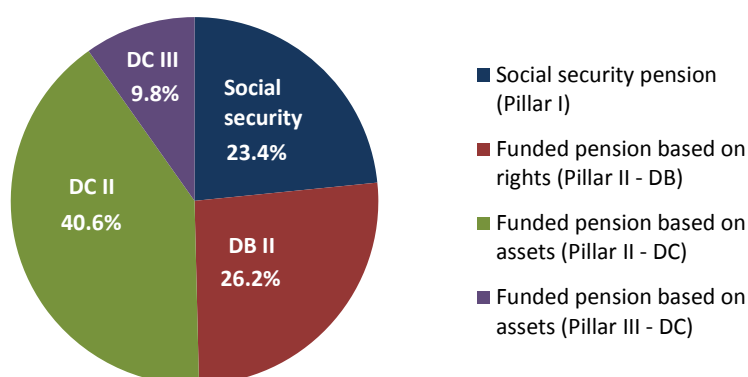
Figure 5.8 is based on the mean of total pension income for the total sample. Table 5.8 is, on the other hand, based on calculations of the median of pension income.

Table 5.8: Contribution of the three pillars to the total replacement ratio of career-average income

	All	35-39	40-44	45-49	50-54	55-59	60-64
RR from Pillar II	64%	64%	64%	64%	64%	63%	61%
RR from Pillar I+II	94%	93%	94%	96%	95%	94%	93%
RR from Pillar I+II+III	103%	103%	104%	104%	104%	101%	99%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR from Pillar II	59%	66%	62%	62%	64%	84%	59%
RR from Pillar I+II	119%	94%	73%	89%	105%	106%	90%
RR from Pillar I+II+III	124%	103%	86%	97%	111%	115%	99%

One way of illustrating the strengths and weaknesses of the pension system overall is to grade it by three indicators. The results are shown for pension income received from the two mandatory pillars (I and II), as it is surely the goal of stakeholders in the pension system to provide sufficient pension income from these pillars. The third pillar is omitted because participation is optional, but it obviously improves the results for those who have chosen to participate in a personal pension savings programme.

1. What is the share of funded pensions?

The Icelandic system is strong by this measure, as is shown in Table 5.9. Both overall and for every group, the result is well above the 50% mark.

Table 5.9: Average share of funded pensions (Pillar II and III) in total pension income at retirement

	All	35-39	40-44	45-49	50-54	55-59	60-64
% of funded pensions in total pension income	77%	77%	78%	77%	76%	75%	73%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
% of private pensions in total pension income	54%	76%	88%	76%	74%	84%	73%

2. How many people will have a pension income below the average for recent retirees?

The Icelandic system is moving in the right direction, as is evidenced by the age distribution. The younger cohorts have a result below 10% as seen in Table 5.10, but the older cohorts are slightly above the mark, primarily because they did not accrue pension rights from their full salaries in the early part of their career.

Table 5.10: Ratio of people with lower pension income from Pillars I and II than recent retirees

	All	35-39	40-44	45-49	50-54	55-59	60-64
% of people worse off than average current retirees	7%	3%	5%	7%	9%	10%	12%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
% of people worse off than average current retirees	24%	3%	0%	4%	8%	1%	9%

The low-income group is at risk of a weak pension income, although the amounts are well above the poverty line. However, the result as shown in Table 5.10 is fully explained by a partial working life. A person who has worked full-time for 40 years, even at low wages, will receive pension payments exceeding those of the average recent retiree.

It should be noted that, in this case, the results are comparing numbers of a somewhat different statistical nature. The median for the low-income group is compared to the mean for recent retirees because the data for recent retirees did not allow realistic calculations of median income. Because the median is below the mean (as is normally the case in income distributions), this will inevitably lead to a higher proportion being displayed than would otherwise be the case. When the mean is computed for the study sample, all groups will have higher income than the average recent retiree. Although this also is the case with the low-income group, it is inevitable that some low income individuals will not reach the mark.

3. How many people will have a pension below 56% of career-average wage?

As is shown in Table 5.5, the median replacement ratio for pensions from Pillars I and II combined is 94% for the entire sample, with only two groups below the 90% mark. In this respect the Icelandic system is strong, when Pillar I pension complements the Pillar II pension. As is previously explained, there exists no national goal for the replacement ratio for the two pillars combined, but were it to be introduced, a reasonable guess would put it in the 70-80% range.

However, median results can hide weaknesses in the distribution. It is therefore useful to examine the low end of the distribution, which is shown in Table 5.11. The numbers indicate primarily the proportion of people who have few contribution years and will therefore receive only partial pension income from Pillar I, based on the residency rule.

Table 5.11: People with replacement ratio from Pillars I and II below 56% of career-average wage

	All	35-39	40-44	45-49	50-54	55-59	60-64
% of people with pension < 56% from Pillars I+II	6%	4%	5%	6%	7%	7%	7%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
% of people with pension < 56% from Pillars I+II	1%	3%	18%	7%	3%	2%	7%

In general, the results give a similar picture for all subgroups, except for the high-income group, where it is common to have much higher income in the latter half of the career than in the early years.

5.5 Housing wealth

Residential housing wealth as calculated using OECD methodology adds 18 percentage points (pp) to the total replacement ratio from the three pillars of pension savings. The increase is different for some sub-groups as seen in Tables 5.12 and 5.13.

Table 5.12: Increase in replacement ratio when housing wealth added

	All	35-39	40-44	45-49	50-54	55-59	60-64
Increase in RR including housing wealth	18 pp	13 pp	15 pp	18 pp	20 pp	23 pp	26 pp

The difference in housing wealth by age could be a result of several factors: there may be a higher occurrence of renting among the younger cohorts; the young probably own less expensive property than the old (and the model assumes that they hold the same property until retirement); and property prices have risen over time, which benefits the older, whereas the model keeps current property prices constant in real terms and therefore may not give younger property owners an increase comparable to that already obtained by the older.

*Table 5.13: Increase in replacement ratio when housing wealth added*

	Low income	Medium income	High income
Increase in RR including housing wealth	16 pp	18 pp	18 pp

The results are in line with expectations for the income groups. Housing wealth makes less of a difference for the high-income group, although it is to be expected that lower-income individuals have less housing wealth, both in terms of frequency of ownership and value of property.

The model treats income from housing wealth as capital income, resulting in a reduction of Pillar I pension supplements. Overall, this lowers the Pillar I payments by 7%, but the impact is highest for low-income individuals (who receive the highest pension supplements) and it also rises with age, which is in accordance with the supplements rising with age.

Housing wealth increases the median replacement ratio for the entire sample by 14 percentage points of final wage and 18 percentage points of career-average wage. The proportion of people with a replacement ratio of final wage above 54% rises by 4 percentage points. However, housing wealth is not distributed evenly. Less than half of the sample, 47%, had positive housing wealth at year end 2012, where the tax-base value of the property exceeded unpaid mortgages and loans (eligible for interest subsidies through the income tax system). The uneven distribution is undoubtedly reflected in the results, as is shown in Tables 5.12 and 5.13.

Figure 5.9: Share of the three pillars and housing wealth in total pension savings amounts
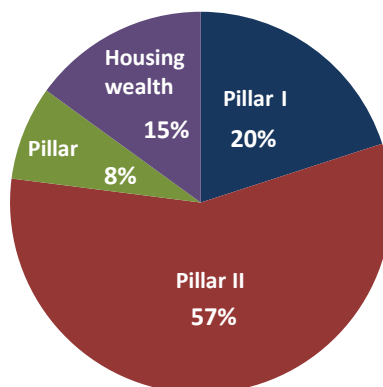
Housing wealth is a significant component of the total pension savings, as shown in Figure 5.9, almost double the size of Pillar III personal savings. People have for a long time considered ownership of their housing as being an important part of their savings.

5.6 Groups at risk

The results of the study show that an individual who is in the workforce in a full-time job from young adulthood until retirement age will receive pension income from Pillar II pension funds, supplemented by Pillar I social security payments, which is well above the Icelandic poverty line and also above the average income of recent retirees (see Annex 2). In this way, the pension system achieves results that surpass the main indicators used for comparison. It could therefore be said that there are no groups at risk of insufficient pension savings, as long as the individuals remain in the workforce in a full-time job with a contribution history of 42-44 years.

However, there will be individuals who do not have such a regular career. They might have fewer years in the workforce, or they might have been working part-time due to family commitments. It is not possible to determine from the data which groups these people might belong to, but common sense would consider first-generation immigrants and parents staying at home with several young children as more likely to be at risk than others. In both cases, there is an additional penalty for losing young age working years from the calculations, as the age-related accrual is highest at the beginning and decreases with age. This also works against those who stay longest at university, finishing post-graduate studies, as their accrual years will be relatively few.

It should be noted that The Pension Act of 1997 allows couples to split the earnings accrual for the cohabitation period. This can provide homemakers with a correction for the period they stay at home without wages and pension rights accrual.

The oldest cohorts in the study have been identified in Section 5.4 as being at risk of low pension income from Pillars I and II in comparison with recent retirees. However, when the elective saving instruments, Pillar III and housing wealth, are included, the gap is nearly closed. Their pension savings therefore have a different composition, but the outcome is similar. As time passes, the effects of lower contributions in the early years of the Pillar II funds on pension amounts will disappear.

A fourth group with a special history are the self-employed, who were not required by law to start paying contributions until 1980 and had the option of paying into Pillar III personal savings only until 1998, when the Pension Act came into effect and they were required to pay their contributions to Pillar II funds from then on. Many of them therefore have fairly large Pillar III assets but a shorter history of Pillar II contributions. In many cases, they will be part of the high-income group but will be shown with a low replacement ratio of final wage.

There is no need to change the pension system for these groups. People who fulfil the residency requirement (40 years) will receive pension payments above the poverty line from Pillar I. If people who do not fulfil the requirement do not receive pension income from abroad, they will be entitled to financial assistance from the municipality, but in lower amounts, approximately 78% of the minimum guarantee from Pillar I.

5.7 Sensitivity analysis

The optimistic scenario shows an overall improvement in replacement ratio of 11 percentage points of final wage. There is little need to discuss further the outcomes of the optimistic scenario, as they only improve on what is already a strong outcome from the intermediate scenario. In other words, a good system only becomes better in the optimistic scenario.

The pessimistic scenario obviously paints a different picture because of both lower returns and an earlier retirement age, allowing fewer years to accumulate assets. The results show an overall reduction in replacement ratio of 9 percentage points of final wage.

Table 5.14: Comparison of results from three different scenarios:
Pessimistic (Pess.), Intermediate (Int.) and Optimistic (Opt.) – Pillars I, II and III

		All	35-39	40-44	45-49	50-54	55-59	60-64
RR (final wage)	Pess.	75%	73%	75%	77%	77%	75%	71%
	Int.	84%	83%	85%	86%	86%	84%	80%
	Opt.	95%	93%	96%	98%	97%	94%	90%
RR (career-average wage)	Pess.	81%	77%	79%	81%	83%	84%	85%
	Int.	103%	103%	104%	104%	104%	101%	97%
	Opt.	136%	142%	141%	139%	135%	129%	122%
% of people with pension < earnings of recent retirees	Pess.	21%	16%	18%	20%	22%	25%	31%
	Int.	11%	7%	9%	11%	12%	14%	17%
	Opt.	5%	3%	4%	5%	7%	7%	8%

		Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR (final wage)	Pess.	107%	74%	54%	70%	81%	81%	72%
	Int.	116%	83%	65%	80%	87%	91%	82%
	Opt.	129%	94%	77%	90%	96%	101%	93%
RR (career-average wage)	Pess.	102%	81%	63%	75%	93%	91%	77%
	Int.	124%	103%	86%	97%	111%	115%	99%
	Opt.	163%	135%	117%	130%	142%	147%	132%
% of people with pension < earnings of recent retirees	Pess.	57%	15%	2%	21%	21%	6%	26%
	Int.	38%	6%	0%	9%	14%	2%	14%
	Opt.	20%	2%	0%	3%	6%	1%	7%

Obviously, in a pension system with a high ratio of funded pensions, there is a considerable risk that asset returns will be insufficient to meet the goals of the system. In this case, the Pillar I social security system should provide the safety net to guarantee an acceptable minimum pension income.

Two of the assumptions in the pessimistic scenario are questionable in the case of Iceland:

- The model assumes early retirement for all at age 65. In the case of Iceland, people have tended to retire later than is permitted by law and fund regulations. In an economic downturn, it is to be expected that Icelanders will choose to continue working longer to increase their pension accruals (subject to job availability).

- In a recent economic downturn, politicians decided to increase the income-testing effects of the Pillar I social security system and re-distribute the freed-up resources from the higher-income groups to the neediest. The model, on the other hand, reduces the increases in the Pillar I system but does not change the distribution of pensions.

6. Conclusions

6.1 Strengths of the Icelandic pension system

For a long time, there has been a broad consensus in Iceland on the importance and strength of the Pillar II mandatory pension funds. The two main elements are universal coverage and the long history. Since the early eighties, the funds have built up a strong asset base, now approaching 150% of GDP, and the cohort closest to retirement age has generally participated in the funds since beginning of adulthood, although at lower contribution rates initially. An additional element of strength is the strong support of the Pillar I social security system at the lower end of the pension income scale, ensuring that all individuals (who fulfil residency criteria) will receive pension payments well above the poverty line.

Pillar III and home ownership have a relatively high level of coverage by international standards and therefore add to the replacement ratio of final wage, reducing for many people the risk of having to make significant lifestyle changes at retirement. But participation in those savings forms is neither mandatory nor universal; inevitably, some people will be at a risk of a weak replacement ratio.

An important factor in the strength of the results lies in the very high level and long duration of labour force participation and employment. In the OECD statistics,[xi] Iceland ranks highest overall for both men and women. In the prime-age category (25-54), Iceland actually never comes out at the top, although usually it is in the highest ranks, but in the youngest (15-24) and older population (55-64) groups, Iceland achieves by far the highest work participation scores. In Iceland, employment participation among the 65-69 age groups is by far the highest among OECD countries.

This shows that Icelanders generally retire later than other advanced Western nations. This reduces the burden on the social security system, as Icelanders have fewer years in retirement than is common elsewhere, even though Icelanders are right at the top of the longevity list.

The statistics of very high labour force participation do not conflict with the findings of a considerable ratio of a low number of contribution years, as is discussed in Chapter 5. People in school or those who stay at home for family reasons, working abroad, etc., are not considered a part of the labour force and therefore are not included in the above statistics.

The results of the calculations in the study provide the following answers to key questions in the assessment of the strengths and weaknesses of the Icelandic pension system:

1. Would working-age individuals have a present value of pension income at retirement above current poverty thresholds?

Yes, 100%. The guaranteed minimum payment from Pillar I social security for a single individual is 11% above the Icelandic poverty indicator, set at 60% of median disposable income.

2. Would working-age individuals have sufficient pension income at retirement to be at least as well-off as the cohort already retired?

Yes, most of them will (93%). All sub-groups analysed have a median pension income above that for this comparison group. However, the distribution statistics show that low-income individuals have the highest risk of having a pension income lower than that of recent retirees. This is most likely due to the large increase in the immigrant population since the early 2000s. Many immigrants have inadequate accumulation of accruals in occupational pension funds and/or insufficient residency in the country (40 years of residency are required for full social security rights in Pillar I).

3. Would working-age individuals have sufficient pension income at retirement to maintain a certain level of their standard of living?

Iceland does not have a formal national goal for replacement ratio as compared with final earnings. By law, the goal of Pillar II funds is at minimum 56% of career-average wage (inflation-indexed). With Pillar I payments consisting of a fixed basic component and income-tested supplements, no single number exists as a goal for the Pillar I system apart from the minimum guarantee, which is now well above the 60% poverty line and above the minimum wage in the labour market. The two pillars combined will generally provide pensions around 95% of career average wage, but a somewhat lower replacement ratio, 65-80%, of final wage as seen in Table 6.1.

In most cases, when Pillar III personal savings are added, the median replacement ratio rises above 100% of career-average wage and is typically between 80% and 90% of final wage.

Table 6.1: Replacement ratio measured in two ways

Pillar I+II+III	All	35-39	40-44	45-49	50-54	55-59	60-64
RR of final wage	84%	82%	84%	86%	86%	83%	80%
RR of inflation-indexed career-average wage	103%	103%	104%	104%	104%	101%	97%

Pillar I+II+III	Low income	Medium income	High income	Men	Women	Public sector	Private sector
RR of final wage	115%	83%	64%	79%	86%	90%	81%
RR of inflation-indexed career-average wage	124%	103%	86%	97%	111%	115%	99%

The only group with a median replacement ratio of final income below 80% is the high-income group, at 64%. All other subgroups are comfortably above the threshold, as is the sample as a whole.

6.2 Weaknesses of the Icelandic pension system

The weaknesses can be summarised as follows:

1) Pensions are perceived as low in comparison with general wage levels.

2) There is a large difference in pensions from DB and DC funds.

3) The stringent income-testing of Pillar I pensions and supplements weakens the support for the Pillar II system.

4) There is a surprisingly high ratio of people with Pillar II pension below 56% of career-average wage, especially from the DC funds.

6.2.1 Pensions perceived as low

Although replacement ratios are high, actual pension payments are widely perceived as less than satisfactory, compared with common wage levels in society. The median wages paid in 2012 were approximately ISK 432,000. The minimum guaranteed pension income for an individual living alone was approximately ISK 202,000, 46.7% of the aforementioned median wages. For a couple, the minimum pension amount was approximately ISK 174,000 per person, or approximately 40% of the median wages.

It should be noted that most people who are now 67 years or older have not contributed fully to Pillar II pension funds for all of their working years. Therefore, they receive lower pension payments from the funds than is to be expected for younger cohorts. The study projects future pension payments from Pillar II funds as 27% higher than recent retirees received from the funds in 2012, compared at the same price level. Additionally, the Pillar I pension payments come in strongly at the lower-income end, resulting in an overall difference of 33% in combined payments from the two pillars between current and future retirees

The current dissatisfaction with pension income may therefore be temporary, disappearing gradually in the next 10-15 years or so.

It is likely that, in the past, this dissatisfaction has played a part in the decision to postpone retirement beyond the normal retirement age offered by the pension schemes. Rising pensions might encourage some people to retire earlier than was common until now.

An indicator of the perceived inadequacy of pension savings is the reduction in income that most people will experience upon retirement. Table 6.2 shows an analysis of the reduction.

Table 6.2: Working-age people with replacement ratio below different ratios of final wage (all three pillars)

	All	35-39	40-44	45-49	50-54	55-59	60-64
% of people with pension <54% of final wage	6%	6%	6%	6%	7%	7%	9%
% of people with pension <70% of final wage	26%	27%	25%	23%	24%	27%	33%
% of people with pension <100% of final wage	73%	78%	73%	70%	70%	73%	78%

	Low income	Medium income	High income	Men	Women	Public sector	Private sector
% of people with pension <54% of final wage	0%	3%	24%	11%	5%	2%	8%
% of people with pension <70% of final wage	0%	22%	64%	34%	22%	15%	30%
% of people with pension <100% of final wage	26%	81%	96%	78%	71%	76%	66%

6.2.2 Large difference between DB and DC pensions

Another weakness in the system is the disparity between DB funds for public employees and DC funds for those in the private sector, as is clearly demonstrated in the results. Currently, the accrual tables in DB funds give, on average, 1.9% pension rights of earnings and, for a 40-year reference period, this adds up to 76%. For DC funds, the numbers are 1.4%-1.5% and 56-60%. This difference in pension rights accrual is a long-standing matter of dispute. From the public side, this large difference in pension rights accrual has been justified by the argument that public sector wages are lower than those in the private sector. Better pension rights compensate for this. On the other hand, private sector employees perceive this difference as gravely unjust, and the assumption of lower public sector wages is not universal. The disparity is a weakness, as it undermines the solidarity among stakeholders in the pension system that is needed to deal with other problems, such as increasing longevity. It also hinders labour mobility between the public and private sector. In particular, middle-aged and older public sector employees lose valuable future pension rights by moving to a job in the private sector.

It should be kept in mind, though, that the Pillar I income-testing mechanism reduces the disparity between DB and DC pension payments to a considerable extent. A comparison of two persons, one receiving ISK 330,000 in Pillar II pension before taxes and the other ISK 230,000, shows that the perceived difference in occupational retirement pension of ISK 100,000 narrows to less than ISK 40,000 after taxes, when Pillar I pension and supplements have been taken into account.

6.2.3 Stringent income-testing of Pillar I payments

An additional weakness, also likely to undermine public support for the system, is a particular effect of the income-testing in the Pillar I social security system for low payments from Pillar II pension funds. A person who receives up to ISK 56,350 in monthly pension from Pillar II will be hit with an equal reduction in Pillar I pension supplements, resulting in no net income increase. (The comparable threshold for people receiving a disability pension is ISK 20,000.) This effect is shown in Table 2.1 and is clearly supported by the results of the study calculations. It skews the distribution at the low end of pension income and increases the proportion of people who fall below various reference ratios in the study, such as 54% of final wage (the OECD average), 56% of career-average wage, and the earnings of recent retirees.

6.2.4 High ratio of Pillar II pensions below 56% mark

For the individual, receiving a Pillar II pension below 56% of career-average wage is probably not a significant problem, as the Pillar I pension and supplements will compensate for it in most cases, especially for the lower-income group. However, the surprisingly high ratio of Pillar II pensions below the 56% mark, especially from the DC funds, is a problem in itself, as it adds to the burden of

the Pillar I social security system, which is payable out of tax revenues. The Pension Act was intended to reduce this burden and, in this respect, is not achieving fully the intended results.

There are three generic solutions to this problem: let the social security system take care of it, increase the flexibility of solutions for individuals who fall short of the 56% mark, or make structural changes in the design of the funded systems.

6.2.5 Options for improvement

The study has not identified disparities in the results where a particular group might need a corrective measure. All disparities can be explained by one or more of the following three factors:

- Gaps in contribution history or late entry into the labour force.

- Lower contributions (as percentage of total wages) from 1969 to 1989.

- The proportional share of public sector employees in each group, receiving the higher accrual rates of DB pension schemes.

However, there are people in all groups who have not accrued enough pension rights to reach the goals of the Pillar II system. There is a need to review the options available to enable these people to improve on their expected outcome.

- **Do nothing and let the Pillar I Social Security system deal with this situation.** This is actually assumed in the study calculations. Despite a significant frequency of individuals in this situation, the study results show that Pillar I will continue to decrease as a share of total pension payments.

- **Increase the flexibility in retirement age and allow contributions after the current age limit of 70.** This would enable people to make their own choice about how to increase their pension savings; for example, by working additional years, which would both increase accruals from contributions and generate postponement bonuses (typically a 6-7% increase in pension per year of postponement).

- **Increase pension savings by higher contribution levels.** If this were universal, it would be a somewhat awkward solution, as it would force additional savings on those already entitled to good pensions, reducing disposable income during their working life. An optional increase in private pension savings - for example from age 50, allowing individuals to pay higher contributions (tax-deductible) into Pillar II or Pillar III pension schemes - would enable people to compensate for a weak contribution history during their younger years and for lower accrual rates in the later years.

Policy recommendations from stakeholders

A presentation of the preliminary results of the study was given to representatives of stakeholders in the pension system; i.e., governmental and municipal agencies, along with the largest employer and labour confederations. Afterwards, participants were asked to submit policy recommendations to address potential weaknesses in the pension system. The following are the main points, as submitted by stakeholders, relating to the matters covered by the study:

The Pillar II public sector (DB) pension schemes and private sector (DC) schemes should be coordinated with the goal of a 76% replacement ratio for a 40-year working life on the basis of increasing contributions from the current 12% to 15.5%. (This would mean bringing DC schemes in line with the public sector DB schemes.)

DB schemes should offer age-based accrual instead of flat-rate accrual, thereby neutralising inter-generation transfers.

The income-testing mechanism in Pillar I should allow higher Pillar II pension income before it begins to reduce pension supplements.

Flexibility in retirement options should be increased, including part-time retirement and the possibility of taking a break from retirement to re-enter the workforce.

The replies from stakeholders showed a consensus on the present design of the Icelandic pension system, as there were no proposals for major structural changes. The first three points address some of the weaknesses discussed in Section 6.2 and would go a long way towards ensuring broad-based support in society for the pension system. The last point reflects a willingness to lengthen working life, resulting in higher income than pensions only would provide, while at the same time possibly accruing further pension rights (depending on age).

Many of the stakeholders who sent in the above recommendations have representatives in two government-appointed commissions that have been studying possible improvements in the Icelandic pension system for several years. The recommendations have therefore already been submitted and discussed in the commissions. At this time, it is not clear when the commissions will publish their findings and recommendations.

In one commission, the main confederations in the labour market, both private and public sectors, have explored the measures needed to coordinate the two Pillar II pension models – DB with a 76% replacement ratio goal and DC with a 56% goal. They have agreed on the desirable outcome of 76% replacement ratio for all and age-dependent accrual, but the work has been stalled by difficulties in reaching agreements on other changes.

The other commission was set up to draft a bill of legislation for changes in the Pillar I social security system, including a simplification of benefit components, increased harmonisation of conditions for income-testing, and more effective interaction with the Pillar II benefit structures.

[i]   Yearbook 2013 of pension fund statistics; Financial Supervisory Authority (2014).

[ii]   Funded pension indicators, OECD Global Pension Statistics database.

[iii]   Pension fund statistics, autumn 2014, The Icelandic Pension Funds Association, http://ll.is/wp-content/uploads/2014/09/Hagtölur-LL-des-2014.pdf

[iv]   Pension-benefit expenditures: Public and private 1990-2009, Pensions at a glance, OECD 2013.

[v]   Íslenska leiðin (The Icelandic Welfare Model: An International Comparison). Reykjavík: The University Press and the Social Security Administration, 1999.

[vi]   Labour force participation rates by selected age groups, OECD employment outlook 2014, OECD.

[vii]   OECD Dataset: Demographic References, data extracted Nov. 20, 2014.

[viii] Eurostat Total fertility rate, 1960–2012 (live births per woman) YB14.png, Statistics Explained, Eurostat website

[ix]   Funded pension indicators, OECD Global Pension Statistics database.

[x]   Yearbook 2013 of pension fund statistics; Financial Supervisory Authority (2014).

[xi]   Labour force participation by selected age groups and employment/population ratios by selected age groups, in OECD Employment Outlook 2014.

Annex 1:

COMMON METHODOLOGY *(ANNEX SUPPLIED BY OECD)*

This annex describes the main characteristics of the general framework followed by each country covered in the project. While assumptions used to estimate pension rights have to be country-specific, there is a need for a common framework for all countries analysed to model the retirement readiness of people currently of working-age. The ultimate goal is to be able to compare the final output (the role of private pensions in retirement preparedness) across countries.

The analysis is based on the measure of what people have already accumulated in terms of pension rights and pension assets. It complements this stock of rights and assets with what people may accumulate from now until the day they retire using different scenarios regarding what may happen during this period. These scenarios are defined following the values taken by five parameters: inflation, productivity, age of retirement, rate of return on assets and discount rate.

A1.1. Parameters of the model

The values of the five parameters are combined into three coherent scenarios, representing pessimistic, optimistic and intermediate states of the world. The scenarios are common to all the countries covered. In order to build coherent macro-economic scenarios, real returns on assets, discount rates and productivity growth are linked according to the following framework:

- In equilibrium, the long-term interest rate on government bonds is assumed to be equal to the potential long-term growth of the economy;

- The potential long-term growth of the economy is assumed to be a function of productivity and labour force growth: $(1 + Productivity\ growth) \times (1 + Labour\ force\ growth)$;

- The discount rate is given by the long-term interest rate on government bonds;

- Returns on portfolio investment then depend on the returns on equities and the portfolio composition. The return on equities is assumed to equal the return on long-term government bonds plus an equity premium. A balanced portfolio of 60% in variable assets and 40% in fixed income is assumed.

Following this framework, certain values representing agreement among country representatives have been chosen for productivity growth, labour force growth and equity premium for each of the three scenarios.

	Pessimistic	Intermediate	Optimistic
Productivity growth	0.7%	1.5%	2.7%
Labour force growth[1]	-0.3%	0.5%	1.0%
Equity premium (percentage points)	1.0	2.5	4.0
Real discount rate	0.4%	2.0%	3.7%
Real equity return	1.4%	4.5%	7.7%
Real rate of return assuming a 60/40 portfolio	1.0%	3.5%	6.1%

Notes: (1) -0.3% growth in the labour force is the Eurostat assumptions for EU countries for the period 2010-2060; 0.5% is just below the growth assumptions assumed for the US in the next 20 years by the U.S. Bureau of Labour Statistics.

Taking into account all the parameters, the three scenarios are defined as follows:

Parameters	Pessimistic	Intermediate	Optimistic
Inflation	4%	2%	2%
Productivity	0.7%	1.5%	2.7%
Real rate of return	1%	3.5%	6.1%
Real discount rate	0.4%	2%	3.7%
Age of retirement	Early	Observed	Official or Observed + 2

A1.2. Sample selection

If household level information is available, the sample includes the head of the household and the spouse. The other household members are excluded as usually no detailed information is available for them in surveys.

The sample only includes households where both spouses are older than 35,[xii] at least one of the spouses is younger than 65, and the head[xiii] of the household does not declare him/herself as retired and not in the labour force.

If there is a maximum age of retirement in the country analysed, individuals who have already reached that age are excluded from the sample.

The sample only includes individuals with a working history, *i.e.* who have worked at least once since the beginning of their career. Individuals who have never worked at the time of the data collection are therefore excluded. If the working history is only partially known, only individuals who were working at the time of the data collection or who have worked during the 5 preceding years are included in the sample.

To avoid excluding a significant part of working-age population, the sample also includes non-working spouses when household level information is available, as long as they are living with a partner with a working history.

There are cases when wages for the full working history may not be necessary to calculate benefits from PAYG, DB and DC pension plans. In most surveys, there is already data or information available that may render data on past wages unnecessary, for example:

- if the number of pension points accumulated at the time of the data collection is available for social security systems with points (*e.g.* Germany);

- if assets accumulated in DC pension plans at the time of the data collection are available;

- if the number of years of membership in DB pension plans at the time of the data collection is available.

As long as one of these conditions is not met, there is a need to work on a sub-sample of individuals with wages for their full working history.[xiv]

A1.3. Age of retirement

The study considers that each individual in the household takes his/her own retirement decision. Three different assumptions are considered to determine the age of retirement.

- The individual retires as early as possible. This corresponds to the minimum age of retirement in each country. It usually comes with a reduced pension. It may depend on the number of years the individual has been contributing to the system.

- The individual retires at the actual average age of retirement observed in the country analysed.

- The individual retires at the official or statutory age of retirement of each country. That age may be the same for all individuals or may depend on the date of birth. It is usually the age when individuals are entitled to a full PAYG pension. It may depend on the number of years the individual has been contributing to the system.

In case the actual average age of retirement is larger than the official age of retirement, the study assumes that the individual retires at the actual average age of retirement plus two years rather than assuming s/he retires at the official age of retirement.

The individual may not be allowed yet to receive benefits from all his/her pension sources at the assumed age of retirement.[xv] In those cases, the study assumes that s/he stops contributing and accruing pension rights from that date. However, the amount of pension benefits s/he may get at retirement is calculated at a later date, when s/he is allowed to receive all his/her pension benefits.

If at the time of the data collection the individual is already older than the age of retirement assumed in the hypothesis chosen, the study assumes that s/he retires as of the following year.

If both spouses do not retire the same year, the benefits of the one retiring the first are adjusted to the year when the second spouse retires, in line with the rules in each pension system.

A1.4. Employment status and earnings going forward

Inflation and aggregate productivity are assumed to be fixed during the whole projection period. Inflation takes the values of 0% or 2% depending on the scenario. Aggregate productivity gains are assumed to be identical across individuals and take the values of 0.7%, 1.5% and 2.7% depending on the scenario.

The study also adjusts earnings according to an age-specific productivity factor. It uses cross-section data on earnings by socio-economic characteristics for as many years as possible. The study calculates the change in average earnings (in per cent) between different age groups in each year and then averages them out. The resulting changes are distributed linearly across the different single ages to get the age-specific productivity factors.

The extrapolation of future earnings is based on past earnings which are adjusted by inflation and productivity (both aggregate productivity and age-specific productivity). It also depends on the employment status in each year:

- Wages in year N are equal to wages in year N-1 adjusted by inflation and productivity for individuals employed in year N. If the wage in year N-1 is null or missing, the wage in year N is set equal to the last positive wage.

- Individuals unemployed or out of the labour force in a given year are assumed to have a wage equal to zero that year. If they go back to employment, the study assumes they earn the same wage as their last positive wage, adjusted by the age-specific productivity factor.[xvi] Wages earned thereafter are adjusted by inflation and productivity, until retirement.

The employment status going forward is based on the most reasonable scenario for each country and on data availability.

As a baseline, individuals are randomly assigned an employment status in each year of the simulation based on the long-term unemployment rate in the country analysed and on the probability to ever suffer a spell of unemployment during one's career. If the unemployment rate observed at the time of the data collection is higher (respectively lower) than the long-term unemployment rate, the study randomly selects individuals unemployed (respectively employed) at the time of the survey and assume they go back to employment (respectively lose their job) during the following five years so that the unemployment rate converges towards its long-term value. The study also assumes random spells of unemployment for individuals employed at the time of the data collection but who have never suffered spells of unemployment yet, so that the proportion of individuals experiencing unemployment equals 40%[xvii] in each age group. They are assumed to suffer only one spell of unemployment.

As an alternative to the baseline case, when data are available, the study uses transition probabilities between the different employment statuses and wage equations estimated from survey or administrative data.

A1.5. Projection of PAYG/public pension benefits

This part depends on each country's pension system and is described in the relevant country sections in Antolin and Payet (2014).[xviii]

PAYG pension benefits are adjusted upward (respectively downward) for late (respectively early) retirement according to the rules in the country analysed.

If both spouses do not retire the same year, the PAYG pension benefits of the one who retires first are adjusted to inflation (or to any other index depending on the rule in the country analysed) to get an equivalent value up to the year the second spouse retires.

A1.6. Projection of benefits from funded pension plans based on accumulated rights (DB)

The study assumes that the individual covered by a DB pension plan at the time of the data collection will continue to be included in the same plan until s/he retires.

The study therefore calculates the total number of years in the plan as the number of years in the plan at the time of the data collection plus the remaining number of years until retirement. If the number of years in the plan is missing or not available, the current tenure in the job offering the plan is used. If both the number of years in the plan and the tenure in the job offering the plan are not available, the study assumes the individual has been covered in each year he has been employed. Years during which the individual is unemployed are not counted as years in the plan.[xix]

The study calculates expected benefits from DB pension plans using the actual formula of the plan the individual is a member of, if available. Otherwise they are calculated as the product between the total number of years in the plan, the accrual rate and the reference wage. If the accrual rate is not available, the study assumes 1.5%.[xx] The reference wage taken into account in the benefit formula can be for instance the final wage, the average wage during the career, or the average wage during the last "x" years. If this information is not available, the study assumes a final wage DB formula.

If the individual has a DB plan with a former employer and already receives benefits from it, the study uses the amount of benefits declared by the individual. The benefits are adjusted by inflation to get an equivalent value the year the individual effectively retires if the individual declares that the benefits are effectively adjusted for the cost of living.

If the individual has a DB plan with a former employer and expects to receive benefits in the future from it, the study uses the amount of expected benefits declared by the individual. If the individuals do not know what their expected benefits will be, the study calculates them using exactly the same formula as for the current DB plan (if the number of years in the former DB plan is available or can be estimated).

A1.7. Projection of benefits from funded pension plans based on assets accumulated (DC / hybrid)

The study considers here all plans in which the benefits are based on the level of assets accumulated in the plan at the time of retirement. This is obviously the case of pure DC pension plans, but also of hybrid DB plans, in which benefits depend on a rate of return credited to contributions (*e.g.* cash balance plans in the United States).

The study assumes that an individual covered by a DC or hybrid pension plan at the time of the data collection will continue to be included in the same plan until s/he retires.

In order to estimate benefits from DC and hybrid pension plans, information on contribution rates and on the level of assets accumulated at the time of the survey is needed.

The study considers both employee and employer contribution rates. If employer (respectively employee) contributions are mandatory, missing and null values in the survey are replaced by the average employer (respectively employee) contribution rates observed for individuals with positive employer (respectively employee) contribution rates.

If the contribution rate is not available, the level of contributions is required, and is transformed into a contribution rate by dividing contribution levels at the time of the data collection by the gross amount earned in the main job at the time of the survey. If the amount earned in the main job is missing, the study uses total wages and salaries earned (possibly from several employments).

If the level of assets at the time of the survey is available, the further accumulation up to retirement assumes a constant contribution rate (equal to the one observed at the time of the data collection – employee plus

employer) and a constant real rate of return on assets (depending on the scenarios, real rate of return can take the values of 1%, 3.5% or 6.1%).

If the level of assets at the time of the data collection is not available, the study needs to build the whole accumulation, from the time the individual joined the plan until retirement, assuming the same contribution rate (equal to the one observed at the time of the survey) and real rate of return during the whole period. If the total number of years in the plan is missing, the study uses the current tenure in the job.

If the individual suffers unemployment, the study assumes s/he keeps the assets accumulated in the plan and transfers all the assets when going back to employment into a new plan with the same characteristics. This is equivalent to assuming that the individual stays in the plan but does not contribute during the years of unemployment. The assets therefore continue to accumulate even during unemployment periods with the return credited to past contributions.

The study transforms estimated assets accumulated at retirement into a stream of pension income by calculating the benefit payment of a non-inflation indexed fixed annuity priced using the annuity premium formula, based on current life expectancy tables by age and gender for each country and a constant discount rate (taking values of 0.4%, 2% or 3.7% depending on the scenario): $\frac{1}{nominal\ discount\ rate} \times \left(1 - \frac{1}{(1+nominal\ discount\ rate)^{lexERA}}\right)$, where lexERA is the life expectancy at the effective age of retirement.

Benefits already in receipt or expected in the future from former plans are also taken into account.

A1.8. Evolution of private pension coverage for voluntary systems

The coverage of voluntary private pension plans going forward is based on the most reasonable scenario for each country.

In countries where coverage increases with age, the model randomly selects individuals not covered by any private pension plan at the time of the data collection to become members of a plan during the simulation, following the age-specific coverage rates currently observed in the data.[xxi]

In countries where new private pension products have been introduced recently and are expected to cover a larger share of the population in the future, the model randomly selects individuals not covered by any private pension plan at the time of the data collection to become members of a plan during the simulation, with the coverage rate converging asymptotically towards a reasonable target based on the current trend.

Considering the shift from DB to DC schemes, all new pension plan members are supposed to join a DC plan.

The contribution rate that new pension plan members will have corresponds to the average contribution rate observed for individuals currently having a DC pension plan, broken down by age and income level.

Assets in the new DC plan are accumulated from the year the individual gains membership until retirement and are transformed into a stream of pension income using the same annuity formula as for current hybrid and DC pension plans.

A1.9. Projection of non-contributory pension benefits

Once all pension sources have been projected at retirement for each member of the household, the corresponding incomes are summed across households' partners. The total household pension income is then divided by 1.5 in the case of couples (using the OECD equivalence scale which assigns a weight of 1 for the first adult and of 0.5 for the second) and the result is assigned to the head and his/her spouse.

Non-contributory pension benefits (e.g. safety net or solidarity pension programmes) may also be added to the total household income, before dividing by the equivalence factor of 1.5. If the total pension income of the household falls under a certain threshold, which is usually inflation indexed, the study calculates the amount of non-contributory pension benefits that the household is entitled to.

A1.10. Housing wealth

The study also accounts for the role that housing can play to complement pension income at retirement when data are available. It considers the option of converting housing equity into a stream of income. The study assumes that the net housing wealth is used as collateral to get annuity payments at retirement until passing

away.[xxii] This differs from instruments currently available in the market to convert housing equity into a stream of income. For example, in the United States, reverse annuity mortgages allow loan proceeds to be taken as fixed monthly payments until the individual leaves the house. With such instruments, the individual can pay back the loan to the lender and keep the house. However, the amount of the loan is generally based on a small percentage of the value of the house (e.g. 20% to 50%). In the approach used here, the individual gets life annuity payments based on the full net value of the house and the provider keeps the house after the annuitant passes way.

Individuals not owning their home at the time of the data collection are assumed to remain in that situation until retirement. This is like assuming that most homeowners bought their first home by age 35-40.

For homeowners, net housing wealth at retirement is calculated as the value of the property at retirement minus the mortgage value left at retirement. The study assumes that property prices do not grow in re real terms. This means that the value of the property, as declared by individuals at the time of the data collectiotion, remains constant in real terms until the day they retire. Based on the mortgage value at the time of the da data collection, the mortgage value in each year until retirement is calculated as: $Mortgage(t)\,t = Mortgage(t-1) \times (1+r) - Payment$, where r is the interest rate (5% in nominal terms if the actual ra rate is not available in the data) and payment is the mortgage payment (1/3rd of salary if the actual payment is not available in the data). If the mortgage value at the time of the data collection is not provided in the data, the study assumes that net housing wealth at retirement is equal to 80% of the value of the property at retirement.

A1.11. Retirement savings adequacy indicators

For all the countries, the following indicators are calculated.

- Coverage: the study calculates the proportion of individuals receiving pension benefits from each of the different income sources.

- Income composition: the study calculates the average share of total pension benefits coming from each of the different income sources.

- The study calculates the proportion of individuals retiring with a pension income below the poverty line, using two different definitions of the poverty line:

  – the country-specific definition of the poverty line; and

  – the OECD definition of the poverty line: 50% of the total population equivalised median income.

Depending on whether the poverty line threshold uses an absolute or a relative measure, the potential pension income at retirement of working-age individuals is discounted by inflation only or by inflation and productivity respectively (see box 2.A.1).

- Comparison with current retirees: the study calculates the proportion of individuals with a pension income above the average pension earnings of people recently retired. Recently retired people are defined as those who have spent up to five years in retirement. Only income sources earmarked for retirement (i.e. PAYG public pensions and funded private pensions, whether occupational or personal) are considered when calculating the average pension earnings of recent retirees. The pension income of future retirees is discounted by inflation to express it in the same year as current retirees' pension income (see box 2.A.1).

- Replacement rate: different ratios are calculated[xxiii]

  – RR1: Ratio of pension income at retirement to final earnings

  – RR2: Ratio of pension income at retirement to inflation-indexed career-average earnings (excluding years with no earnings)

  – RR3: Ratio of pension income at retirement to wage-indexed career-average earnings (excluding years with no earnings)

The replacement rates calculated in this study are complementary to the ones published in the OECD *Pensions at a Glance* series and differ from them in various aspects. *Pensions at a Glance* calculates theoretical replacement rates for an individual entering the labour market today at age 20 and working for a full career in the private sector at the average wage until the official age of retirement (which varies between countries). The rules of the pension system that applies to that individual are the rules in the current legislation for all mandatory pension schemes (voluntary funded occupational pension plans are also included for some countries where they have a broad coverage). One could argue that the replacement rates in *Pensions at a Glance* are a sort of maximum replacement rates an individual can achieve in each country given current rules because of the full career assumption.

In contrast, this study combines actual information on individuals from different cohorts (aged 35 to 64) with projections about their labour history until retirement. It uses historical information on their career from representative survey or administrative data sets to assess what they have already accumulated in terms of pension rights and assets under the pension system's rules that applied during those years. This stock of rights and assets is then complemented given current pension legislation, using scenarios projecting each individual's labour history until retirement under different economic conditions (e.g. inflation, productivity, rates of return, etc.). The calculations cover all sources of pension income, whether they are mandatory or voluntary, occupational or personal, PAYG-financed or funded. Finally, looking at a sample of actual individuals allows breaking down replacement rates by different socio-economic characteristics. Because the study uses actual data for individuals 35 and older, it is very unlikely that everybody will work for a full career. The study would tend therefore to produce lower replacement rate estimates than in *Pensions at a Glance*.

The study then calculates the proportion of individuals with a replacement rate (RR1) above 66% and the proportion of individuals with a replacement rate above a country-specific reference (either RR1, RR2 or RR3 depending on the definition of the reference). The country-specific reference should represent the explicit or implicit benchmark of the pension system in terms of benefits, usually defined for an individual with average earnings working for a full career.

- • Housing wealth: the study calculates two indicators when taking into account the stream of income that people can extract from housing wealth in the sources available to finance retirement: the proportion of people with a replacement rate (RR1) above 66% and the share of annuity payments from housing in the total income at retirement.

As far as possible, the indicators are broken down by age (5-years age brackets), gender, income (3 groups: 20% lowest pre-retirement income; 20% highest pre-retirement income; 60% remaining middle pre-retirement income), sector (public vs. private) and employment status (employee vs. self-employed).

Box A1.1. Productivity discounting, purchasing power and income distribution

The goal of calculating net present values is to compare monetary values at the same point of time. The most common one is to express income or wages in terms of their purchasing power in one reference year (e.g. in 2010 euros). This leads to expressing income or wages in real terms. For this purpose the discount rate is the inflation rate.

However, real income in two different points of time may differ because of productivity growth. The wage of two individuals with the same labour history and the same occupation may be higher in 2020 than in 2010 in real terms because productivity has increased. Therefore, in real terms (after discounting for inflation) the same person would have a higher wage and higher purchasing power in 2020 than in 2010 at the same age.

There are in practice two different productivity factors that make individuals' wages to differ across time and across ages. Individuals' wages increase as they age because there is an age-productivity factor. However, wages also increase as a result of increases in the general productivity (aggregate productivity) in a country. The growth of wages as one becomes older (age-specific productivity) is different from the growth of wages resulting from aggregate productivity.

The aggregate productivity factor lifts all boats and means that two individuals with the same labour history (e.g. employment record and occupation) will have different real wages at the same age in different points of time. The individual aged 60 in 2010 will have lower real wages than the same individual aged 60 in 2020, simply because the latter lives in a wealthier society.

The age-specific productivity factor means that two individuals in the same year, same occupation and labour history, but one aged 40 and another one 50 will have different wages, with the latter having generally higher wages.

Following the arguments stated above, it is adequate to discount using only inflation when the issue to analyse is the purchasing power of two wages in different periods of time. In this context, one expresses wages in e.g. 2010 euros. However, if one is concerned about income distribution, things are different and discounting only by inflation and expressing things in just real terms may not be fully adequate.

If the policy goal is to assess how two individuals compare in terms of their relative situation in the income scale of their country, there is a need to discount by inflation and the overall aggregate productivity. However, age-specific productivity should not be used for discounting.

All of the above affects the way the indicators are calculated in this study. More specifically, the discounting method varies depending on whether the income of future retirees (that are retiring in different years) is compared with absolute or relative poverty thresholds, whether individuals are classified according to different income levels (low, medium and high income groups), or whether future retirees are compared to current retirees. The discounting method is irrelevant when calculating replacement rates of people retiring in different years.

Regarding the **classification of individuals according to different income level groups** (based on the final wage), the final wage needs to be discounted by aggregate productivity. Otherwise, it is very likely that two individuals with the same labour history and occupation but different ages (and therefore retiring in different years) will be classified in different groups when they should be assigned to the same income group. Relatively to the society they each live in, both individuals should be in the same position (and same income level group) because they both enjoyed the same growth in earnings during their career. This means that the <u>final wage needs to be discounted by aggregate productivity as well as inflation</u>. Failing to discount by aggregate productivity would lead to an over-representation of young individuals in the group of high income and an over-representation of old individuals in the group of low income.

Regarding **absolute poverty thresholds**, they are generally revised with inflation on annual basis in most countries. The idea seems to be to make sure that people can maintain a minimum purchasing power over time in the society they live in. Therefore, when comparing different individuals retiring at different points in time to see whether their retirement income puts them above that minimum purchasing power threshold, <u>retirement income only needs to be discounted by inflation</u>. Obviously, individuals retiring later will be more likely to be above the absolute poverty threshold because they have enjoyed aggregate productivity growth and they live in a wealthier society.

Things are different when looking at **relative poverty**. Relatively to the society, both individuals should be in the same position because they both enjoyed the same growth in earnings during their career. This means that the <u>retirement income</u> of two individuals retiring at different points in time needs to be <u>discounted by inflation and aggregate productivity</u>.

Finally, the **comparison with current retirees** is <u>similar to the comparison with an absolute poverty line</u>. Once in payment, pension benefits generally only increase with inflation. Because the individual retiring at the same age but later in time is living in a wealthier society, s/he can end up with a pension above the one of current retirees. Therefore, *ceteris paribus* future retirees would be better off than current retirees. Our analysis will assess if this is the case. If it is not, it may be due to other factors such as pension reforms reducing benefit entitlements, or lower returns to portfolio investment.

xii   The study shuns from the younger workers (i.e. those aged 16 to 24 and 25 to 34) as their past labour histories may be short or non-existent and thus strong assumptions about their future work histories would be required.

xiii   When the head of the household is not defined in the data set, the study assumes that the head is the prime wage earner.

xiv   If the full working and earnings history is not available however, it is not possible to calculate the replacement rate with respect to career-average earnings.

xv   For instance, in the Netherlands, people cannot receive their public pension benefits before the official age of retirement, but may retire earlier from their occupational pension plan.

xvi   The last positive wage is also adjusted by aggregate productivity if the aggregate productivity growth is negative in year N.

xvii   According to the labour market literature, on average, only around 40% of individuals in any given cohort suffer spells of unemployment. See Taylor, M. and A. Booth (1996), "The changing picture of male unemployment in Britain", ESRC Research Centre on Micro-social Change, University of Essex; Dex, S. and A. McCulloch (1998), "The Reliability of Retrospective Unemployment History Data", *Work, Employment & Society*, Vol. 12, No. 3; and Schmillen, A. and J. Möller (2010), "Determinants of lifetime unemployment", IAB Discussion Paper 3/2010.

xviii   Antolin, P. and S. Payet (2014), "The Role of Private Pension Provision in Retirement Readiness: Country Specific Assumptions and Analysis", OECD Working Papers on Finance, Insurance and Private Pensions, No. XX, OECD Publishing.

xix   The study assumes that an individual covered by a DB plan and suffering unemployment goes back to employment with the same employer or within the same industry, then keeping rights in his/her DB plan.

xx   This rate is based on the most common practice of DB plans in many countries.

xxi   For instance, let assume that, at the time of the survey, occupational private pension plans cover 47% of the employed population for individuals aged between 35 and 39 and 52% of the employed population for individuals aged between 40 and 44. When individuals aged 35 to 39 reach 40 to 44 in the simulation, their coverage rate is set equal to 52% by adding new members.

xxii   The annuity calculation follows the same methodology as presented in section 2.A1.7 for DC assets.

xxiii   In the case of couples, the denominator corresponds to the equivalised pre-retirement earnings.

Annex 2:

ACCRUAL OF PENSION RIGHTS IN A TYPICAL PILLAR II DC FUND

A typical formula can be stated in this way:

Contribution * (factor^{age}/10.000) = pension value at standard retirement age

A typical accrual table:

Age	Factor	Age	Factor	Age	Factor	Age	Factor	Age	Factor
16	3.108	26	1.950	36	1.332	46	1.053	56	913
17	3.004	27	1.865	37	1.293	47	1.035	57	901
18	2.882	28	1.787	38	1.257	48	1.018	58	889
19	2.739	29	1.714	39	1.223	49	1.002	59	877
20	2.602	30	1.646	40	1.193	50	987	60	866
21	2.474	31	1.582	41	1.164	51	973	61	853
22	2.354	32	1.525	42	1.138	52	961	62	839
23	2.243	33	1.471	43	1.115	53	948	63	825
24	2.138	34	1.421	44	1.093	54	937	64	810
25	2.041	35	1.375	45	1.072	55	925	65	795
								66	774

The accrual rates multiplied by the wages produce a replacement ratio that reaches 56% in fixed prices at the end of a 42 year work history (age 25-66) or 42% of final pay. The calculations are based on yearly growth of 1.5% in wages in real terms and a 12% contribution rate.

Typical Icelandic DC pension fund
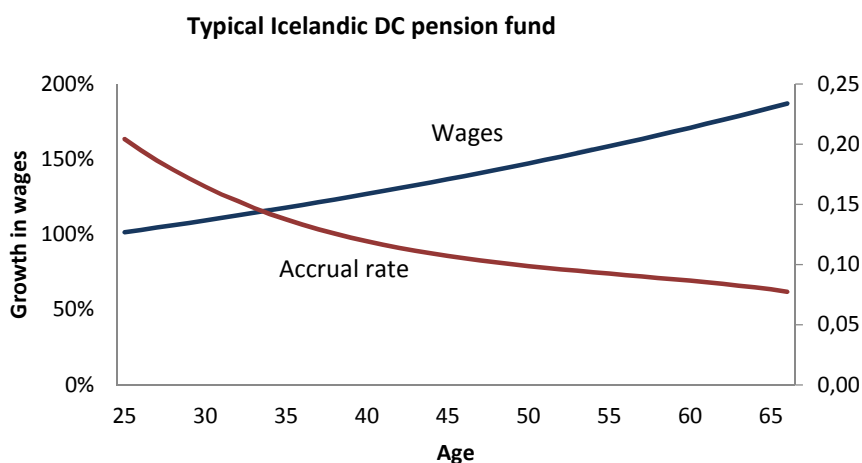
An individual who began working at age 25 with monthly wages amounting to ISK 193,000 (the minimum wage in 2012) and a 40-year contribution history would be entitled to a Pillar II pension of ISK 140,822, or 54.2% of career-average wages, and Pillar I payments of ISK 120,244. The total pension of ISK 261,046 gives a replacement ratio of 101% of career-average wage and 77% of the final wage. The pension is 15% higher than the average (inflation-adjusted) combined Pillar I-II pension received by recent retirees in 2012.

Annex 3:

Data and data verification

The original dataset included persons who had accrued pension rights in the Icelandic Pillar II system at the end of 2012, were born between 1948 and 1977, and were alive at year-end 2012. Excluded were rights acquired in two small pension funds that chose not to participate (dataset A).

For those persons, additional data were collected on personal pensions (dataset B) and housing wealth (dataset C).

The dataset A was collected from four IT providers. The data sent from each provider consisted of three files:

File 1: A unique personal identifier for the person in question, gender, year of birth, the identifier of the head of household, whether the person received a disability pension, an old-age pension, or unemployment benefits in 2012.

File 2: A unique personal identifier, fund identifier, fund department identifier (many Icelandic funds are divided into departments where the rights may vary, especially with regard to widows'/widowers' benefits), accrued rights at year-end 2012 in ISK and, in the case of DB funds, the percentage of pensionable pay.

File 3: A unique personal identifier, fund identifier, fund department identifier, year, contributions paid to the fund and, for DB funds, the percentage accrued for all years the person has made contributions to the fund.

Files were delivered in CSV format, with the unique personal identifiers encrypted, as were fund identifiers, gender, and year of birth. Files were delivered on DVDs to TBG ehf. by persons entrusted by LL (the Icelandic Pension Funds Association). The data were encrypted again after reading and the DVD media destroyed.

Each file was delivered with a checksum from the IT provider, which was verified upon receipt by TBG and LL personnel.

The files from the various providers were then combined on the unique personal identifier, giving a complete view of each person's total accrued pension rights in the Icelandic pension system.

The data received were compared to the accounts published by the Icelandic Financial Supervisory Authority (FME) by comparing the ratio of contributions received for the sample for 2012 with the total contributions received for the fund in 2012.

TBG are appointed actuaries for some of the funds in question and had access to data for the fund members on an individual basis, albeit with a different encrypted personal identifier. Even so, an exact comparison of total contributions received and rights accrued could be made for the cohorts in dataset A.

Various checks were made on the data to ensure their integrity. Some problems did surface, ranging from problems with encryption methods to various problems in assembling the data, necessitating a few repeat runs of the collection of data from some of the IT providers.

Also available for checking were data from the tax authorities, giving total contributions paid in 2012, by age, gender and pillar.

A comparison with the final corrected data set and the data from tax authorities in 2012 is given in the following chart:

Number of people in data set A/living in Iceland 2012
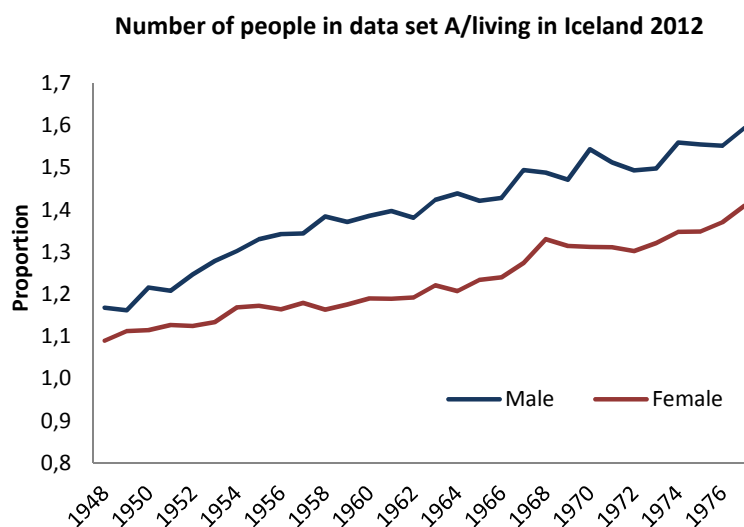
One salient point is that the number of people in the cohorts in question who hold rights in the Icelandic Pillar II system far exceeds the number living in Iceland at year-end 2012.

Most people working in Iceland, even for only a few months, are required to pay contributions to Pillar II funds. Residents of the European Economic Area do not receive contribution reimbursements upon leaving the country. The rising number of people holding rights in the pension system in the younger cohorts probably reflects the increase in the number of people coming to work in Iceland during the economic upturn preceding the crash in 2008, and a number of foreign employees working on projects in connection with new hydroelectric plants. For example, it can be said that the number of national ID numbers issued by the Icelandic authorities to people born in 1975 exceeds 7,500, whereas the number born in Iceland in 1975 was 4,384 and the number living on 1 January 2013 was 4,280.

The following chart shows the proportion of persons in dataset A versus the data collected by tax authorities in income year 2012.

Proportion paying premium in 2012
Data set A / Data from tax authorities 2012
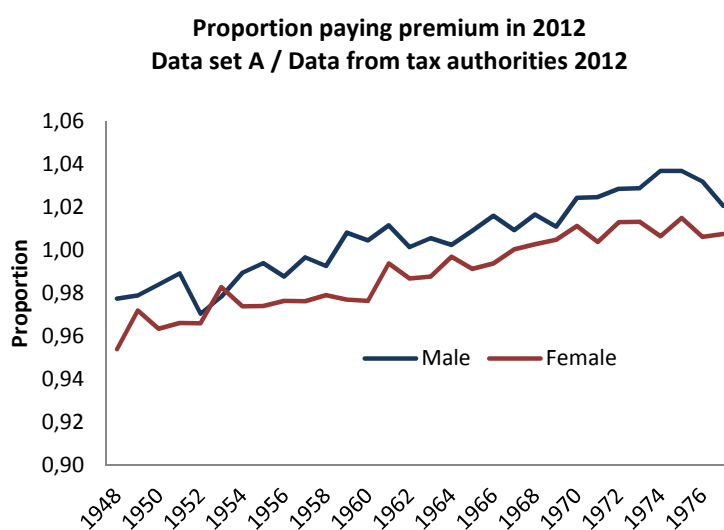
Generally, the numbers are in agreement, considering that the criteria for having taxable income in Iceland and paying contributions to the Pillar II system are not exactly the same and that the tax data were collected at a different point in time.

Dataset A comprised 176,700 persons in 101,100 households.

After dataset A had been corrected, datasets B and C were collected for the same group. Dataset B was verified in a manner similar to that used for dataset A, again resulting in some repeat runs of the data collection. For the private pensions, data were collected from one additional IT provider.

No data were available for independent verification of dataset C, housing wealth and mortgages.

### Selection of sub-sample from data

Due to differing rules for linkage of old-age pension with disability pensions, all persons from households where a disability pension was received in 2012 were excluded from the sample. Also excluded were persons receiving some old-age pension in 2012, as the lowest pensionable age for the three scenarios to be considered, 65 years, is higher than the age of the people in the sample (the oldest were 64 years old in 2012).

Last, only persons in households where at least one member paid contribution on wages equal to or higher than ISK 193,000 per month in 2012 were included. This threshold wage corresponds to the lowest income for a person working full-time in 2012, according to the labour agreements in force during that year.

The resulting sample consists of 89,995 persons in 58,406 households.

Details of calculations and assumptions

For each person in the resulting sample, future accruals of pension rights are calculated under the assumption of one of the three scenarios previously detailed and set out by the OECD. It is assumed that each person will continue to pay to the same Pillar 2 pension funds as in 2012 and will pay the same percentage of pay into a personal pension (Pillar III) as in 2012.

Proportion in sample with
personal pension contributions in 2012
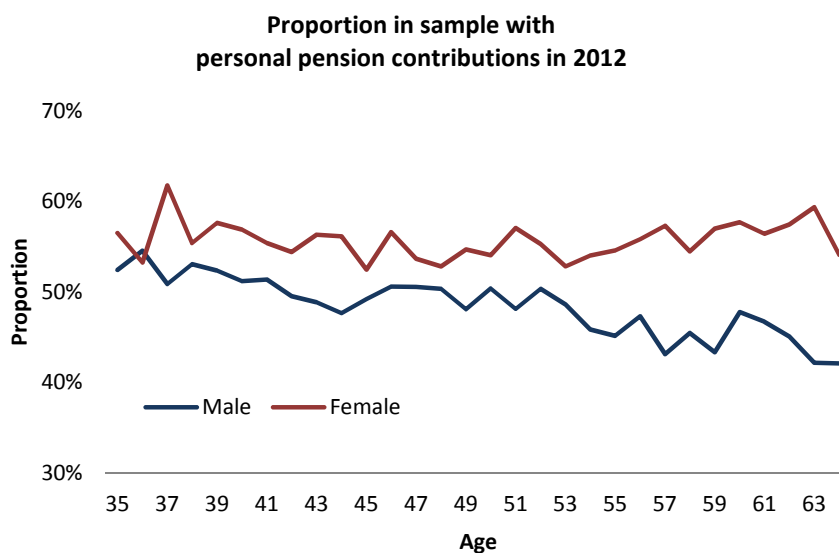
The coverage of personal pensions seems to be slightly higher for the younger part of the sample, so it was not considered necessary to include an age-dependent increase in personal pension coverage.

Wages in past years are extrapolated from contribution payments using the accrual rates in effect for each fund or department. For the older DB system, where contributions are made only from regular pay, it is assumed that total pay is given by applying a correction factor of 1.43 (this factor was used in calibrating the benefit scale in the new DB systems, where contributions are made from total pay) Also, for most of the DC

funds, a correction factor was applied for the years before 1990 because, in most funds, contributions were limited to pay without overtime. This correction ranged from 1.2 to 1.6, depending on the profession, based on data from Kjararannsóknarnefnd (labour wages research unit), available on the Statistics Iceland website. Past wages extending back to 1980 were converted to 2012 prices using a version of the consumer price index (CPI) for indexation of benefits in most DC funds; prior to 1980, the regular CPI was used. The CPI is calculated by Statistics Iceland. For conversion of past wages, the general wage index from Statistics Iceland is used back to 1990. For earlier years, data from Statistics Iceland on paid hourly wages of Icelandic workers are used.

For calculation of future pension accruals, wages are increased in line with the assumptions given in the relevant scenario.

Additionally, an age-related pay function is imposed. The age functions are separate for men and women, based on data in the sample from the calendar years 2008-2012. Longer periods were considered for the base but ultimately rejected due to structural changes that have occurred since the early years (different composition and educational level of the workforce) and effects of economic upheavals.

Age-dependent wage function
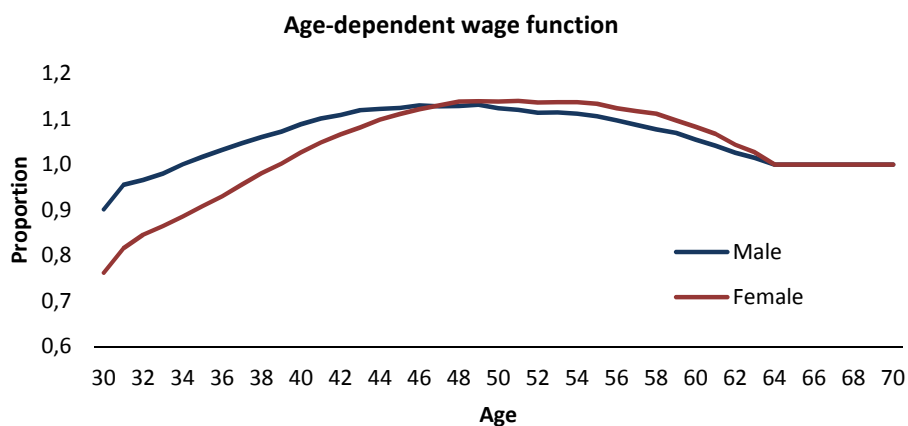
In the data for each person, the fund and fund department of Pillar II funds paid into in 2012 were specified, and the relevant fund rules were then applied to calculate contributions and pension accruals and, if applicable, increases in pension amounts due to postponed retirement, or decreases due to early retirement. Basically, there are a few different types of accrual rules in use in Icelandic Pillar II funds. In the DC system, there are four types: pure age-related benefit accruals, a fixed percentage of pay when accruals are made, and a mixture of the two, as well as a mixture of payments from own savings up to a fixed age and then a lifelong annuity. In the DB system, there are two types of system: the old, now closed system, which gives benefits as a percentage of final pay, and then indexed using the wage index or based on the salary of the successor to the pension holder. Typically, each year in service gives 2% of salary in pension rights each year, with contributions paid from a limited portion of total wages. In the newer system (from 1997/98), contributions are paid from total wages and rights are 1.9% of the average career salary for each year in service, indexed using the CPI. In all, there are nearly 40 variations on the rule system.

Benefits from the Pillar I system were calculated based on rules in force from 2014, converted to the benefit levels of 2012.

Calculations of Pillar III benefits were straightforward, using the assumptions and conventions given in scenarios provided by the OECD.

Data on housing wealth did not include mortgage payments in 2012 or length of mortgage; therefore, payments were calculated as is specified in the OECD template, as a fixed portion of salaries and with the stated interest rate.

Calculations were performed by a program written in Python, specifically for the RSA project, giving for each scenario specified the Excel sheet results specified in the template given by OECD and a file with results for each individual stating the benefits from each pillar, in prices at pension age and fixed prices and wages in 2012, along with gender, household status, and year of birth.

Verification of results

Results for the oldest age group (60-64) were compared with benefits paid out to new pensioners in 2012. Furthermore, for each of the funds in question, a separate calculation was made in a spreadsheet and compared to the results from Python program.