The Impact of Fees on Irish Pensions

(Micro & Macro Economic)

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Executive Summary

In 2018 the Department of Employment Affairs and Social Protection published a consultation document on pension 'Auto Enrolment' in Ireland. The document proposed a phased introduction of Auto Enrolment, commencing in 2022, which would result in an employee having a value of 14% of his/her salary invested annually in a private pension scheme. The proposed make up of this 14% is 6% by the employee, 6% by the employer and 2% by the government. Each employee's pension fund will continue to grow over the years and the final pot will be available to them when they retire, usually in their sixties.

There are currently about 2.36 million employees in Ireland (ignoring the effects of Covid 19). 875,500 of these people are already paying into private pension schemes. It is anticipated that another 410,000 people will join the Auto Enrolment scheme when it comes into effect after 2022. This report primarily looks at these two groups, the 875,500 group and the 410,000 group, and examines how to optimise pension savings for these people. The wider public generally believes that pensions are very complicated and difficult to understand. However, when the topic is broken down into manageable steps it is not an unduly difficult topic.

Description	Employees
Public Servants	300,000
Private workers currently paying into a private pension scheme	875,500
Private workers, mainly medium paid workers captured by the new 'Auto Enrolment' scheme (commencing after 2022)	410,000
Private workers, mainly low paid workers who will have no private pension	775,500
Total	**2,361,000**

Figure S1

Time is a hugely important factor when it comes to pensions, therefore those who start early (ideally as soon as they start working) are likely to have much larger pensions when they retire.

Tax relief, which is granted by the government to incentivise pension saving is also important, but its significance is way over-stated by the pensions industry. In reality fees on a pension are charged on the size of the existing pension pot. When you start saving your pension pot is almost empty, so you pay low fees. As the pot fills, the annual fees mount up, and very soon they outstrip the annual tax relief on pension contributions. This is why fees of 3% (on the entire pot) add up to a lot more money than tax relief at 40% over the lifetime of a pension. This may appear strange but there is nothing unusual about it, the 3% is on the sum of money in the pot, and the 40% is on the annual amount going into the pot. These are different numbers.

In other countries (e.g. USA) the pension investor has the choice of paying annual fees as low as 0.15%, whereas in Ireland real choice is not available, and fees are typically 3% (when everything is added in). This difference of 2.85% typically reduces the final pension pot size for somebody currently earning €45,000 per annum, by circa €500,000 by the time they reach retirement age. For somebody on a current salary of €90,000 the pension pot reduction is over €1 million by the time they reach retirement age, etc. These numbers are confirmed by the OECD, who guides that every ¼% increase in Fees results in a 5% reduction in the value of the fund. Fees of ½% reduce it by up to 10% etc. So fees of 3% reduce the final pot by up to 60% (i.e. by retirement age). The matter of fees after retirement age is another matter, which is also discussed.

At present Irish employees contribute 9% of their gross earning towards their private pensions (i.e. employer and employee contributions). Government policy is to push this to 14%. Looking forward to the year 2057, and aggregating these numbers of the 875,500 group and 410,000 group, Irish pension investors will collectively lose in the order of €670 Billion if the current high fee model is allowed to prevail (€670 Bn is the average for the range €546 Bn to €794 Bn shown in Figure S2). This would be a costly mistake.

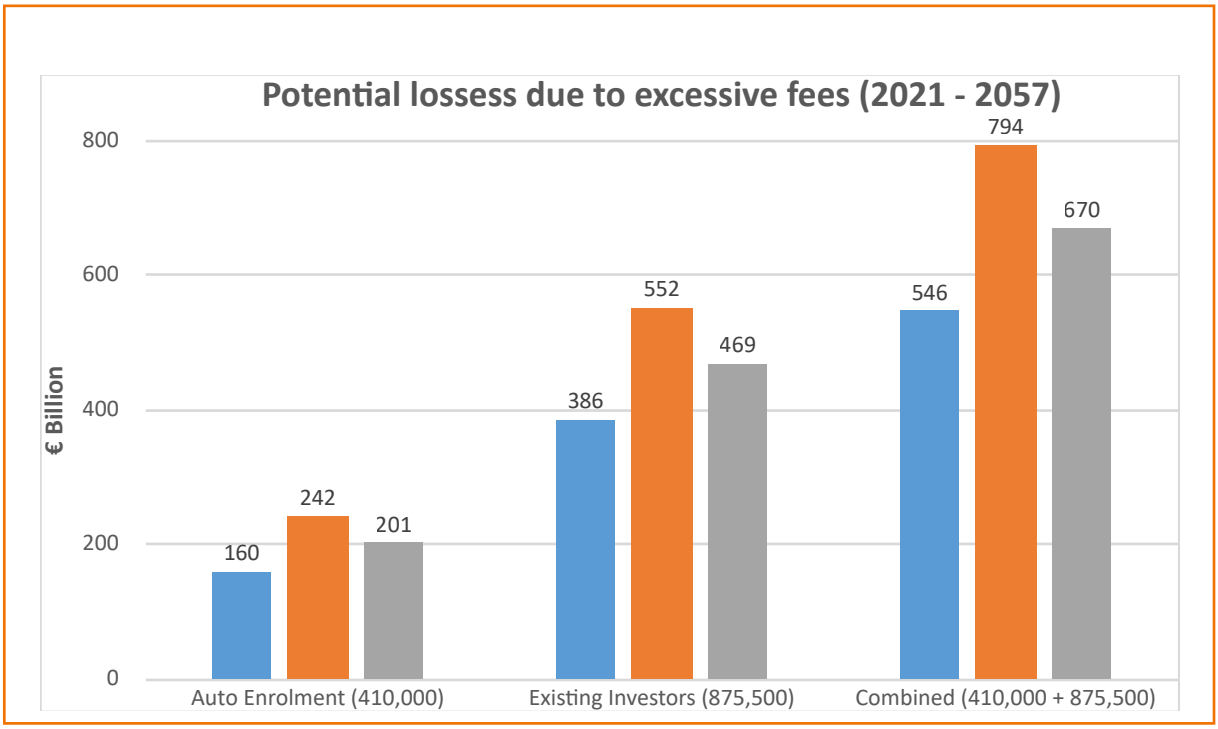


Figure S2

This report is evidence based, where there is a strong emphasis on presenting reliable and accurate data. Firstly, the author has built a Pension Calculator which is discussed in detail and is fully transparent. Secondly the numbers are confirmed by separately published guidelines from the OECD which supports the accuracy of the Calculator. Thirdly the author has derived a geometric equation from first principles, and this gives exactly the same answers as the calculator. Therefore, this 'triple lock' approach strongly (mathematically) corroborates the accuracy of the data, supporting the contention that pension investors in Ireland could collectively accumulate an extra €670+/- Billion by 2057 if investors move to a low fee model (facilitated by government intervention to change the pensions landscape). There are no cost implications for the state, other than the nominal costs associated with putting the system in place.

Under the current system, the individual pension investor is encouraged to play a role in making important decisions which affect their pension. In practice, once the individual has signed up they are substantially at the mercy of an industry that is primarily interested in its own welfare rather than the outcome of the investors.

An example is given of a 32 year old, who pays total fees of 3% to the Pensions Industry. By the time she retires at age 68, €418k will have been contributed to her pension pot (by her, by her employer and by the Irish government through tax relief). Her pot will peak at €512k when she reaches 68 and will then begin decreasing in value as she draws a retirement income. The fund will generate €483k of growth income (i.e. both pre and post retirement-age growth). Unfortunately the industry will take €392k of this growth, leaving just €91k of the growth for the investor. Amazingly, about €119k of the total fees will be levied after she retires at age 68.

Alternatively, this lady could invest in a low cost pension investment, where the fees would only be 0.20% per annum. Total contributions would remain the same at €418k, but by the time she reaches 68 her pot will peak at €1.25m.

Because of the low fees her fund will grow by €856k up to age 68, and she would get to keep €826k of this, with the pension managers being paid €30k.

The vast majority of our citizens lack the expertise to make the important decisions associated with pension investing, but the Irish government is well placed to examine how pensions are handled in other jurisdictions and how hundreds of billions of euros could be saved for future generations of Irish people. Given that the State, through tax relief, funds up to 40% of the value of pension contributions, it has a responsibility to ensure that the returns on these investments are optimised. At present (ignoring Covid 19) there are circa 4.5 people in employment for every one person of retirement age. By 2050 this ratio will be close to 2:1. Clearly this will put major strain on public finances as the need for increased funding for healthcare and pensions grows. This report outlines the choices which could be made by the Irish authorities to optimise pension wealth in future decades.

When you think about it, home ownership is another type of pension. Owning a home is a much more cost effective solution for the individual than renting throughout their lifetime. At present our 32 year old is paying €2,100 per month to rent an apartment in Dublin. She could purchase a property for €350k which would result in a monthly mortgage repayment of €1,261, which would be fully paid off after 30 years when she reaches 62. However, if she continues to rent throughout her life, based on a 4% annual growth in rents, the rent will be €6,800 per month when she reaches 62 and €10,000 per month when she reaches 72 and €22,000 per month if she lives to 92. These numbers clearly show that purchasing a property is the wise choice for any of our citizens who can afford to pay long term rent. In effect a mortgage spread over 30 years is clearly much better value than renting for a lifetime.

	Age 32	Age 62	Age 72	Age 82	Age 92
Mortgage/mth	€1,261	€0	€0	€0	€0
Rent/mth @2% rent inflation	€2,100	€3,800	€4,600	€5,600	€6,900
Rent/mth @4% rent inflation	€2,100	€6,800	€10,000	€15,000	€22,000

Figure S3

1.0 Setting the scene

In 2018 the Department of Employment Affairs and Social Protection published a consultation document on pension 'Auto Enrolment' in Ireland. Subsequently the Irish government planned for Auto Enrolment to commence in 2022, but this is likely to be delayed because of Covid 19. While employees will have the choice of opting out of this scheme, the experience in other countries is that a large majority of workers choose to continue making pension contributions once they are signed up to the scheme.

As shown in Figure 1, the total workforce employed in Ireland at the beginning of 2019[1] was approximately 2.36 million people. Of this, 300,000 (13%) were employed in the public service. When they retire, they will receive a public service pension which should provide them with a decent standard of living. At present, for those with full service, the annual pension is 50% of their final salary. So for example somebody on a final salary of €50,000 will receive an annual pension of €25,000.

Description	Employees	Commitments by Irish State
Public Servants	300,000	These will qualify for a public service pension (some may have a private pension scheme to top up their public service pension)
Private workers currently paying into a private pension scheme (mainly medium to high paid workers)	§875,500	In addition to their private pension they will also qualify for a contributory state pension when they retire (up to a maximum of €12,912).
Private workers, mainly medium paid workers captured by the new 'Auto Enrolment' scheme (commencing after 2022)	*410,000	In addition to their private pension they will qualify for a contributory state pension when they retire (up to a maximum of €12,912).
Private workers, mainly low paid workers who will have no private pension (some may opt-in to Auto Enrolment)	775,500	They will qualify for a contributory state pension when they retire (up to a maximum of €12,912).
Total	**2,361,000**	

Figure 1

§Revenue.ie publication: Statistics and Insights from the First Year of Real-Time Payroll Reporting (PAYE Modernisation). In addition, The Pensions Authority Annual Report 2019 puts this at 882,240 (the more conservative number is chosen).

**Department of Employment Affairs and Social Protection (2018) -Strawman Proposal.*

The vast majority of the circa 2 million non-public service employees (87% of the workforce) will qualify for a contributory pension from the Irish State when they retire, provided that they have accumulated the required number of PRSI contributions (stamps) during their working lives. Based on current payment rates, this pension will provide an annual income of €12,912 for those with maximum contributions (and this is expected to increase in line with inflation as the years go by). Therefore, if say a private pension pays €20,000 per annum, the retiree will have a total pension income of €32,912 (i.e. €20,000 + €12,912 = €32,912).

Of the 410,000 medium paid workers, these will also be entitled to a contributory state pension of €12,912, but their private pension is likely to be smaller (in the range of €2k to €12k depending on how many years of contributions they make). So if we take an additional private income of €6,000 per annum, these people will receive a total pension income of €18,912 when they retire (i.e. €6,000 + €12,912 = €18,912. This will be enough to give them a reasonable standard of living, but they will not be living the high life.

The remaining 775,500 employees will be totally dependent of the State pension of €12,912 when they retire, which is barely above the poverty threshold (but some may opt-in to Auto Enrolment).

So in practice the vast majority of private workers who advance to retirement age, will be relying upon the Irish State to fund part or all of their retirement years, which will be up to €12,912 per annum. In addition the State will have to pay each of the 300,000 Public Servants their full pension entitlements, which currently is up to half their final salary. Unfortunately the Irish State does not have a large pension pot from which it pays its citizens these pension entitlements. Instead they are paid from the 'current budget' i.e. it uses the money it collects in taxes each month to pay pensions as it goes along. In 2011 there were more than 5 people at work for every one person in retirement. This number has been in decline and presently there are 4.5 working for every person in retirement (4.5:1). It is projected that by 2050 there will only be about two workers for every person in retirement (2:1), and this may decline closer to 1:1 after 2060. This will put a huge strain on the people who are working, especially given that many of these are presently struggling to get on the property ladder and by 2050 many may still be renting accommodation. In addition we can expect the cost of healthcare to rise substantially in the coming years as our ageing population lives longer and as more high tech medical interventions become available.

Previous governments have been aware of these issues for decades. In 2001 Charlie McCreevy set up the National Pensions Reserve Fund (NPRF) with the goal of providing a financial reserve to help our ageing society meet the cost of the country's social welfare and public pension commitments from 2025 onwards. There were to be no withdrawals from this fund until 2025. However the economic crash which began in 2008 resulted in the Irish government raiding the NPRF (about €22 Billion) to help bail out the banks and fund other projects of national interest. Unfortunately from a pensions perspective this money was entirely lost.

Ireland's economy is once again in recovery (assuming that Covid 19 is a temporary blip), however the scars of the last recession still remain. The nation's post-Covid 19 debt is likely to be circa €240 Billion, whereas prior to the crash in 2008 it was €47 Billion. We are still faced with the impending pensions crisis but now the fuse is much shorter (i.e. we have less time to do something about the problem). The Irish government has signalled its intention to tackle this issue on three fronts:

1. Auto Enrolment in pensions from 2022 onwards (this has already been introduced in other countries)
2. Increase the State pension age to 68 by 2028 (with the likelihood of further increases in subsequent years).
3. A move to paying civil service pensions based on a the 'Career Averaging Model' instead of the previous' Final Salary Model' commenced for new entrants in 2013. This means that retirement benefits are based on a percentage of earnings throughout a public service career (however it will be after 2050 before the effects of the Career Averaging Model begin to deliver savings for the state)

There is a fourth and critically important issue that needs to be discussed, 'Pension Fees' (i.e. Pension Charges). The Fee structure on pensions in Ireland is very high by international standards. Fees are charged by numerous players in the supply chain, Brokers, Financial Advisers, Fund Managers, Custodians, Trustee, etc. and can easily add up to 3% (of the value of the fund) per annum. While this may seem a reasonable fee to the casual observer, in reality it is very large and can easily result in a modest investor losing hundreds of thousands of euros from their final pension pot. Irish pension investors should be paying a fraction of this amount. When you take into account that presently about 875,500 Irish people have personal/occupational pensions (and this will climb substantially with Auto Enrolment) the money wasted in costly fees quickly climbs to billions of Euro. This document follows the numbers and identifies how Irish society could retain in excess of €670 Billion over the next 37 years if the 'Fees' issue is tackled (bringing us up to 2057).

Clearly Ireland will be a significantly more affluent country if this money is retained by its citizens. Some of these savings will find their way into government coffers (through income tax, VAT, inheritance tax, etc.) and hence pay for the substantial costs associated with our ageing society. The alternative, allowing the money to flow into the pockets of fund managers whose primary shareholders live outside of Ireland, would be irresponsible and inexcusable. The economic crash of 2008 is now water under the bridge for which we have paid a heavy price. Surely we cannot allow an even bigger mistake to be perpetrated upon ourselves.

2.0 Introduction


Why are UK pensions so complicated?

Frequent rule changes and a huge range of schemes have made pensions a minefield

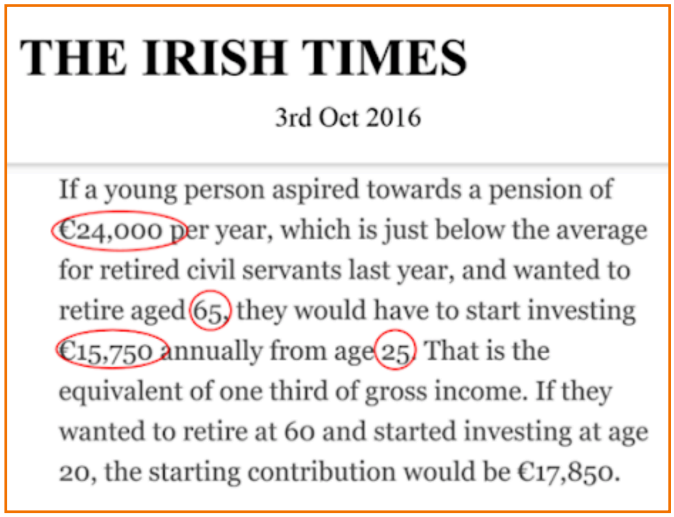
Figure 2

Almost everybody believes that pensions are really complicated. But are they? In May of 2016 the Bank of England's chief economist Andy Haldane warned that the UK pension system is too complicated, admitting that even he finds it confusing. "I consider myself moderately financially literate," he said. "Yet I confess to not being able to make the remotest sense of pensions." On the 19th May 2016 The Guardian[2] picked up on Mr. Haldane's comment and wrote an article under the heading "Why are pensions so complicated", accompanied by the picture of a Hedge Maze shown in Figure 2.

The following day on 20th May 2016, an article in the Financial Times[3] takes the polar opposite view, disagreeing with Mr. Haldane and going to some lengths to explain why pensions are not complicated at all.

In Ireland the message is generally pessimistic when it comes to pensions, conjuring up images of an exploding time bomb where people will have to work until they are well into their 70's e.g. Irish Independent[4] arguing that "Retirement age must rise by eight or 10 years".

An article in October 2016 in The Irish Times[5] puts forward some alarming numbers, that were generated by an actuary who wishes to remain anonymous. Part of this article is shown in Figure 3 and the salient numbers are circled in red. It claims that a 25 year old would need to contribute €15,750 in the first year and increase this annually in line with inflation over the next 40 years, simply to be able to draw a pension of €24,000 (valued in terms of today's value of money). If these numbers are a reflection of what is in store for our young Irish people we should be very worried that future pensions will be unaffordable. One wonders how many 25 year old's in today's workforce could afford to pay €15,750 into a pension each year?


THE IRISH TIMES

3rd Oct 2016

If a young person aspired towards a pension of €24,000 per year, which is just below the average for retired civil servants last year, and wanted to retire aged 65, they would have to start investing €15,750 annually from age 25. That is the equivalent of one third of gross income. If they wanted to retire at 60 and started investing at age 20, the starting contribution would be €17,850.

Figure 3

Unfortunately, the belief that pensions are really complicated is alive and well in Ireland., and most of our society have bought into this. The financial companies who operate in this space (brokers, financial advisors, fund managers, etc.) are quite happy with this situation because it projects the image that they are providing a highly sophisticated and complex service which is worth paying for. In reality many of these organisation are adding no value to the task of creating the wealth which we will need when we get older. We will return to this example in section 9.0.

This paper explores how pensions operate in Ireland. This involves:

1. Looking at the 'Key Drivers' that affect the financial outcome of a pension.
2. There will be a strong focus on expressing these drivers numerically. We will perform calculations which will show how a lot of money is wasted (but could be saved). Luckily the level of maths required is not difficult. If you have studied maths to Leaving Cert level you are well qualified. In any event author has built a pension calculator which does all of the mathematical calculations. It is imperative to look at what drives the numbers because at the end of the day talk is cheap. The pensions game is fundamentally about numbers (data), so you need to look at these numbers and understand how they work and then use this knowledge to obtain an insight into the black hole which is the pensions industry. Talking about the subject without the numbers is not very practical, like a doctor assessing a patient's overall health without looking at the laboratory results.
3. Looking at the Structure of the Pensions Industry. We will discuss the role which the Individual, the Government and various other parties play in pensions and how as a society we can seek to optimise the financial returns in future decades.

3.0 Demographics

Ireland, like most of Western Europe, has an ageing population. The data in Figure 4 shows that in the next three decades the number of people living in Ireland who are '65 and over' will grow at a much faster rate than the rest of society.

CSO POPULATION PROJECTIONS - BY AGE GROUP (in thousands) Published 2017									% Change
Age Group	2016	2021	2026	2031	2036	2041	2046	2051	2016 - 2051
0-19	1,307	1,341	1,345	1,314	1,322	1,369	1,435	1,489	114%
20-64	2,803	2,961	3,118	3,294	3,427	3,510	3,548	3,607	129%
65 & Over	630	745	871	1,007	1,147	1,297	1,464	1,597	254%
Total:	**4,740**	**5,048**	**5,335**	**5,615**	**5,896**	**6,177**	**6,446**	**6,693**	**141%**

Figure 4

In addition we are all aware that medical science is constantly developing new ways of prolonging life, and a child born in 2020 can expect to live to 93[6], whereas currently the average life expectancy is 82.

4.0 Pension Drivers

The schematic in Figure 5 gives an overview of the key drivers of any pension scheme. As you can see the drivers are labelled 1 to 10. We will look at each of these in turn and express these drivers as numerical values. As we progress we will be in a position to input these values into a Pensions Calculator, and then read and interpret the outputs. Of course the pensions industry would prefer if you were not able to do this, because if you understand what is happening it empowers you to make better financial decisions. Instead they like to give the impression that this is a highly complicated subject, but in reality you will have tackled much more complicated problems when studying for your secondary school exams.

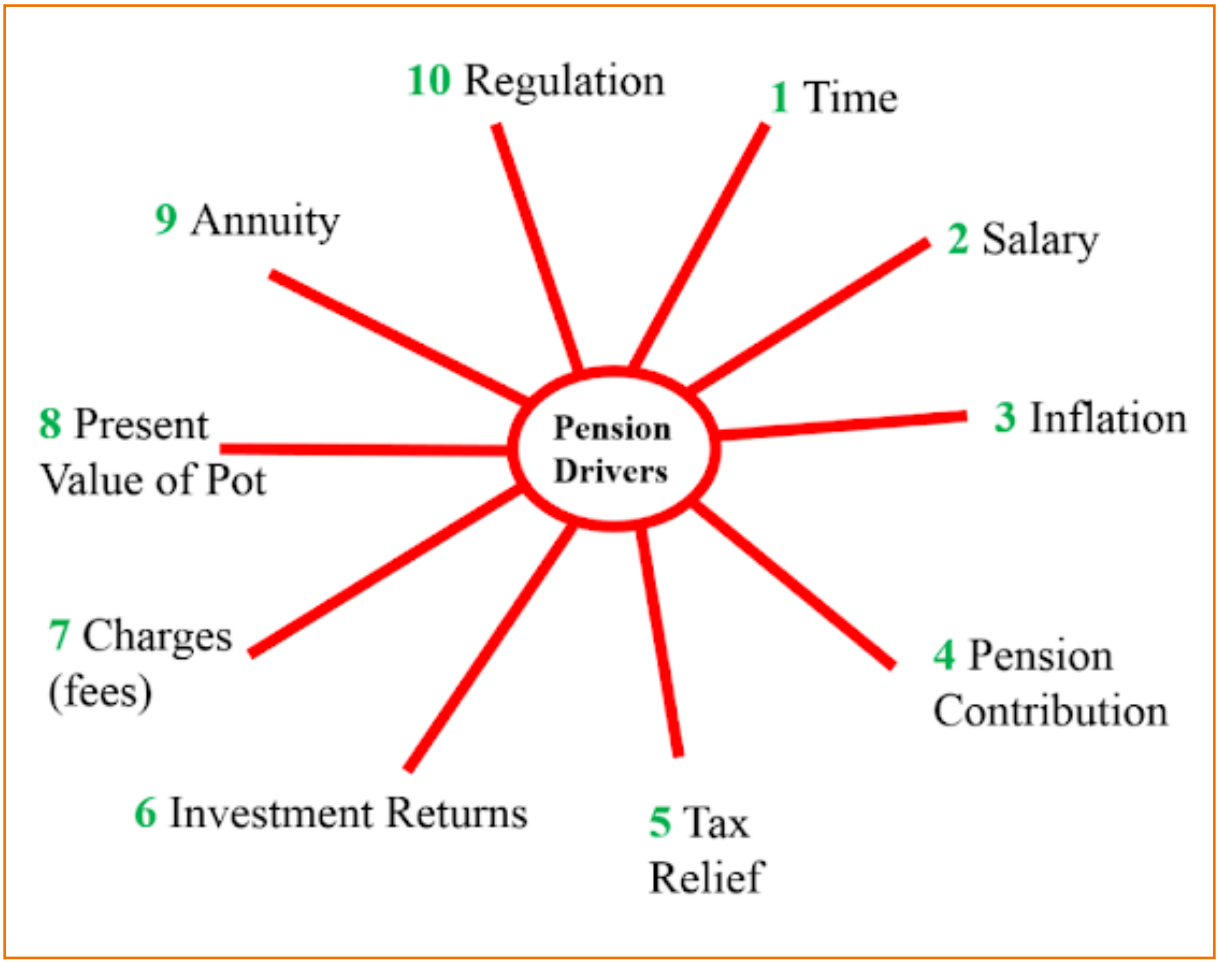


Figure 5

Figure 6 shows the input dashboard for the Pensions Calculator. At a later stage you will see the output part of the calculator, but right now lets concentrate on what we are inputting into the calculator. So let's get started. We begin by looking at Figure 5, where we see that 'Time' is the first key driver.

Year (Present)	1a	2021	**10** Exercise care when filling in these boxes. Remember garbage in equals garbage out.
Age	1b	32	
Current Annual Salary (€)	2a	€50,000	
Expected annual growth in Salary (%)	2b	2.5%	
Estimated annual inflation rate (%)	3	2.5%	
Pension contribution as % of annual salary	4a	14.0%	
How much of your pension is paid by employer (%)	4b	50.0%	
Tax Relief	5	40.0%	
Expected annual growth in pension fund (%)	6	6.0%	
Annual fees charged to existing fund (%)	7a	3.0%	
Fees charged to the annual contributions (%)	7b	3.0%	
Value of pensions at present (€)	8	€0	
Annuity Rate	9	4.5%	

Figure 6

4.1 Time (Driver 1)

You will already know that time is really important when it comes to investing. As you can see in Figure 6 there are two 'Time' inputs which need to be taken into account to perform the calculations i.e. 1(a) the current year, which in this case is 2021 and 1(b) the present age of the person making the contributions, which is 32. Let's give this person an identify. Her name is Rachel Hickey and she works for a large software company.

Now let's return to Figure 5 and we can see that Salary is the next Key Driver.

4.2 Salary (Driver 2)

There are two 'Salary' inputs in Figure 6. 2(a) Rachel's current salary is €50,000 and 2(b) The rate at which Rachel expects her salary to grown over the coming years. Of course this is not an exact science and the individual can adjust the anticipated growth rate on the input dashboard. Maybe the growth rate will be low at 1% or higher at 6% per annum as Rachel develops her career and progresses to senior management. In this instance we are projecting a year on year growth in salary of 2.5%.

4.3 Inflation (Driver 3)

Figure 5 shows that Inflation is the next Key Driver. In this instance we are using the average long term inflation rate of 2½%, but once again it is possible to adjust this up or down to see the effect it has on the output (you can play around with the inflation rate to see how it affects the final value of your pension).

4.4 Pension Contribution (Driver 4)

There are two 'Pension Contribution' inputs. 4(a) Pension Contributions as a % of annual salary and 4(b) How much of pension is paid by the employer. In the case of '4(a)' people invest in their pension in different ways. For example a self employed contractor may invest one payment of €6,000 a year into his pension scheme, or an employee may invest €500 per month, etc. To be able to input this data into the Pension Calculator it is necessary to convert the pension

contribution (in €) for the present year into a percentage of the annual salary. So in Rachel's case, in the first year, her annual pension contribution will amount to €7,000 (she obtained this information from the salaries department by simply asking for it). Given that her salary is €50,000 per annum this works out at 14% each year. Now looking at 4(b) Rachel's employer matches every euro she contributes. So in effect Rachel contributes half of the €7,000 and her employer contributes the other half (i.e. €3,500 each). If Rachel's employer makes no contribution towards her pension, then item 4(b) would be set at zero percent, or if Rachel's employer makes a contribution of €1,400 per annum, item 4(b) would be set to 20%, etc.

In 2018 the Department of Employment Affairs and Social Protection published a consultation document on pension 'Auto Enrolment' in Ireland. This document proposes a phased introduction of Auto Enrolment between 2022 and 2028, which would culminate in an employee having 14% of his/her salary invested annually in a private pension scheme by 2028. It is suggested that 6% of this will come from the employee, a further 6% will come from the employer, while a final 2% will come from the State. Of course the full details of this scheme have yet to be worked out, but a total annual investment of 14% of salary is quite a realistic figure to use. Once the new Auto Enrolment system is in place this section of the calculator will be updated by the author.

4.5 Tax Relief (Driver 5)

At present in Ireland there are two rates of income tax, 20% and 40%. For a single person the 20% rate of tax applies to the first €35,300 of income; and the 40% rate applies to anything above this. For a married couple (on one income) an annual income of €44,300 can be earned before the 40% rate of tax applies; whereas for a married couple with two incomes, a combined annual income of €70,600 can be earned before the higher 40% tax rate applies.

The government is anxious that people should invest in their own pensions, and as an incentive they allow them tax relief on any contributions they make (up to a generous limit, shown in Figure 7).

So for example a married couple with an income of €40,000, who invests say €5,000 into a pension scheme; they would receive tax relief at 20% because they are only paying tax at the lower rate (in other words the state is paying 20% of €5,000=€1,000 into their pension scheme). This €1,000 is effectively free money, which the couple would not have in their pension pot if they did not invest in a pension. On the other hand a couple earning €80,000 who invest €5,000 into their pension scheme would receive tax relief at 40% because they are paying tax at the higher rate (the state is paying 40% of €5,000 = €2,000 into this pension scheme). This €2,000 is free money which the couple would not have in their pensions pot if they did not invest in a pension. (note: it is important to point out that while tax relief is an important part of pension investing, its significance is regularly exaggerated by pensions sales people, and in practice this is dwarfed by the Charges & Fees which are extracted by the pensions industry. We will see this clearly when we look at the outputs from the pension calculator later on). As already discussed, these numbers are likely to change with the advent of Auto Enrolment in 2022, but the changes for existing investors in private pension schemes are unlikely to be dramatic.

Age:	Limited to:
Under 30 years	15% of net relevant earnings
30-39 years	20% of net relevant earnings
40-49 years	25% of net relevant earnings
50-54 years	30% of net relevant earnings
55-59 years	35% of net relevant earnings
60 years plus	40% of net relevant earnings

Figure 7

In Rachel's case, she is earning €50,000 per annum, which is well above the annual cut off amount of €35,300. So the pension contribution that Rachel makes will receive tax relief at 40%. Therefore she inserts 40% at item 5 'Tax Relief' amount, as shown in Figure 6.

If you need help in establishing what rate of 'Tax Relief' you are entitled to on your pension contributions, you should contact the salaries department in your organisation, who should easily be able to provide you with this information.

4.6 Investment Returns (Driver 6)

In summary:
Stock markets grow some years and contract in others, but on average the year-on-year growth is in the region of 6% to 8% per annum. The annual 'Matrix Book' published by Dimensional is a reliable source of long term stock market performance data. Some of the experts would like you to believe that they can predict the future movement in the stock markets, and all they ask in return is for a total combined fee of 2% to 3% per annum. Of course they cannot predict which stocks will perform best, and paying them fees at these level is likely to devastate your long term wealth. When we run the calculator later on we will use 6% annual growth.

Countless experts have written books/article/papers/software on how to invest in the stock markets, with many authors claiming to have discovered unique insights into maximising investment returns. On the back of these theories ride the Investment Brokers/ Financial Advisors/ Fund Managers, etc. who claim to have the ability to 'Actively' manage and grow our money into the future, all for a modest fee, or so they say.

To the average woman or man this approach makes sense. One could say that this is the 'scientific' approach where the experts study the problem in detail and once they understand how it works they publish their findings so that the rest of society can understand how the system operates and therefore everybody can benefit.

Figure 8

Figure 8 shows a photograph of Warren Buffet He is one of the wealthiest people in the world (circa $85 Billion) and a legend in his own lifetime. Born in 1930 he has made his money from investing in stocks, and along the way he has made thousands of other people into multi-millionaires through his investment company Berkshire Hathaway. He is a philanthropist and he lives a modest lifestyle in his hometown of Omaha in Nebraska (hence his nickname 'The Sage of Omaha'). I will not attempt to summarise Mr. Buffets investment philosophy in this paper except to say that he claims no credit for it. He says he learned about investing from Benjaman Graham, whose book 'The Intelligent Investor' was first published in 1949 and is still in print today. Mr. Buffet recognises that most people do not have the time or the inclination to get involved in day to day investing. His advice to these people is to stay away from the Brokers/Hedge Fund Manager type of advisor (known as 'Active' management) and instead to invest their money into low fee 'Passive' funds. These Passive funds have a long history of generating annual growth rates of circa 6% to 8% which consistently outperforms the Actively managed funds (after all fees are paid).

Figure 9

In 2007 a Hedge Fund company challenged Buffet on this advice, resulting in a wager being placed between Buffet and the firm, where the loser would pay $1 million to charity at the end of a decade. In 2017 Buffet had won by a country mile[7] (by investing in a Vanguard fund). This Passive investment fund achieved annual returns of 7.1% whereas the Active fund only returned an annual average of 2.2%.

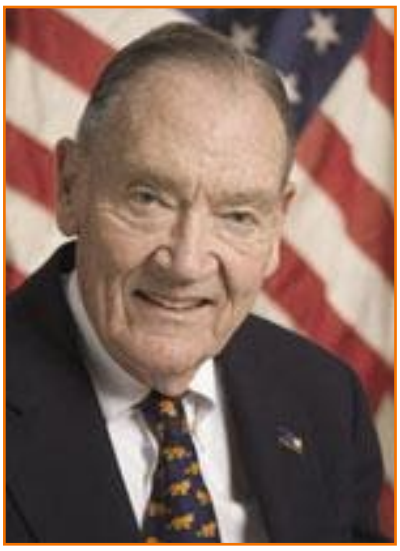


Figure 10

In the mid 1970's John Bogle (Figure 10) established an investment company in the USA called Vanguard. Prior to this most investors subscribed to the conventional wisdom that the best way to grow wealth in the stock market was to choose a really good fund manager who understood how the markets work and had the ability to pick the winners ('Active' investing). Since his days as an undergraduate John Bogle had his doubts about Active investing, primarily because of the fees that were levied by the industry on the investor. His research indicated that if an investor put his/her money into a broad basket of stocks (e.g. S&P 500), this basket would generate a much better return in the long term, than had the money been given to the so called 'experts'. The Active versus Passive debate has been raging now for over four decades and it is clear that Passive investing is winning hands down, and Vanguard has gone on to be one of the largest investment companies in the world. In the USA investors have the option of buying Passive investments from a range of organisations (not just Vanguard) where they pay very low annual fees (e.g. 0.15% of the total amount in the investment pot). In Ireland (and other small jurisdictions) while in theory it is possible to invest Passively, unfortunately the low fees are not on offer (e.g. 3% is not unusual when you tot up all of the charges). The difference between 0.15% and 3% fees may seem minor when you consider that an investor is receiving 40% tax relief from the government. But in fact it has huge consequences.

Let us look at Rachel again. She receives 40% tax relief on the annual amount that she pays into her pension. So in 2021 lets say her contribution is half of €7,000 = €3,500 (her employer is paying the other €3,500). But it only costs Rachel €2,100 because she qualifies for €1,400 tax relief (i.e. 40% of €3,500 is €1,400). Now looking at the fees, the 3% in fees is charged to the total value of the fund which she has accumulated, which in 2021 is valued at say €7,000 (because Rachel is just starting her pension in 2021). Therefore, at the end of 2021 Rachel will pay annual fees of €210. That is fine, there is nothing to get too excited about. After all Rachel has about €7,000 in her pension pot and it only cost her €2,100, plus an extra €210 in fees. Roll on the years.

By the end of 2032 (only 12 years later) Rachel's pension pot will have grown to circa €115,000. By then her annual contribution will have grown to €9,400 (i.e. the annual amount increases over time in line with increasing wages). Her employer will still be paying half of this (€4,700) and Rachel will be receiving 40% relief on her contribution of €4,700 (i.e. €1,880) so it will cost her €2,820. Now for the fees; 3% of €115,000 = €3,450. So just 12 years into her pension (roughly one third of the journey if she plans to retire at age 68) Rachel is paying a lot more in fees annually (€3,450) than the tax relief is giving her (€1,880). In fact the annual fees are close to double the tax relief she is receiving. Most likely Rachel is not even aware that it is happening, but it will have a major effect on the size of her pension pot by the time she comes to retirement age, more than €550,000 (I will clarify these calculations at a later stage in section 5.0 of this document). This is a major issue and it is widespread in the pensions industry in Ireland. When Rachel was being sold the pension product she was told about the tax relief of €1,400 and the low fees of €210 per annum. She was not warned about the big annual fee payouts in later years. When you take into account all of the other people like Rachel in Ireland, the loss to the economy will be hundreds of Billions of euros, which clearly our society will need in future years.

So why is the stock market so important in saving for a pension? If you have €4,000 to save every year and you keep this money in a box under the bed, after 40 years you will have €160,000 in the box; but unfortunately inflation will gnaw away at its real value over time. If inflation is say 2.5% per annum, then in real terms your €160,000 will only be worth €59,600 in terms of today's value of money.

If you invest the annual amount of €4,000 into a savings account, which gives an annual return of 2%, then after 40 years you will have €255,500 in your account. With inflation at 2.5% it will be worth €95,000 in terms of today's value of money.

If you invest the annual amount of €4,000 into a pension scheme which returns 5% per annum (after all charges and fees), then after 40 years you will have €537,000 in your account. With inflation at 2.5% it will be worth €200,000 in terms of today's value of money.

So clearly putting your money into low return investments is not a good way to achieve long term financial security. In practice most people who invest in private pension schemes rely on the stock market as the vehicle to achieve growth. They invest in company Shares (known as Stocks in the USA), which generally grow in value over time. They may also invest in Bonds, which pay an annual interest rate (called a coupon). These bonds provide a fixed income, which is generally a lot lower than the rate which can be obtained from Shares, because there is less risk involved in Bonds (especially government Bonds).

Why for example has Coca Cola become a global brand and made a lot of money for its shareholders? Is it:

a. Because Coca Cola manufactures a range of high quality products which customers love and are willing to pay for? or
b. Because stockbrokers who buy and sell shares have driven the share price of Coca Cola upwards through constant buying and selling?

Clearly the correct answer is (a). The constant trading of the stocks has a minimal part to play in driving growth in the business, especially in the long term. The stock market simply reflects the value of the business at a point in time. So for example if the quality of Coca Cola's products deteriorates for some reason and customers no longer want to buy these products, then the value of the company's shares will decline, and ultimately it may even go out of business (no matter how much buying or selling of these shares that the stock market engages in). Unfortunately many investors seek advice on investing from people like stockbrokers and believe that (b) is an important part of the answer. These investors pay excessive fees to become involved in buying and selling, which devastates their future wealth.

When it comes to pensions everybody in the supply chain is jostling to maximise their share of the money on offer. They all want to see their businesses grow and return increased profits to their shareholders. Typically your financial advisor will sell a range of financial products (e.g. Life Insurance, Income Protection, Mortgage Protection, Serious illness cover, etc.) and they will seek to sell a mix which optimises their wealth.

In the case of Rachel, her financial advisor is likely to give priority to his own financial future. He has a business to run, bills to pay. He probably thinks that Rachel is really well set-up, with her employer paying half her pension and the tax authorities giving her a 40% discount on her contributions. He argues (in his own mind) that surely a few percent extra in fees will not make a significant difference to Rachel's long term pension outcome, but it could help him make a living. If you are thinking along these lines you are falling into the trap of pseudo-investing, and it will cost you and your family dearly in the long term.

A stock market is a place where shares are bought and sold. In some respects the stock market has many of the characteristic of a wholesale fish market, where the buyer is looking for a bargain and the seller is looking to optimise the price achieved. If there is a shortage of a particular stock the price will go up, and if there is an oversupply or perhaps there is speculation about the quality of what is on offer, then the seller will be looking to offload the stock and the price will go down.

Just a few decades ago trading of shares took place on a trading floor where the traders bought and sold the shares on behalf of their clients. You may have seen this on TV (or YouTube) where, typically young inexperienced men (historically very few women) frantically compete with one another to buy or sell shares. Their goal is simply to buy or sell (ideally doing both) because that is how they make money for their organisations and hence themselves. It matters little to them that the investor has gained or lost money in the transaction, because their business model allows them to make money when they are buying and selling. These are the 'Active' investors and it is little wonder that they appear frantic, because they want to cram as many deals into the working day so that they can optimise their bonuses.

The Passive investors understand that allowing relatively inexperienced, testosterone filled young men to gamble with their money on a daily basis is not a good idea, especially when they obtain a fee each time they undertake a transaction, whether they create or destroy their clients wealth. The Passive investors have studied human behaviour and historic data on a wide range of international stock markets (going back over 100 years) and recognise that these

markets have good years and bad years. Sometimes you get several years of growth followed by decline, however in the long term stock markets grow in value, typically at an average rate of 6% to 8% per annum.

The Active investors claim that they can predict which shares will underperform and which will outperform the market average. It would be great if they could perform this trick, because it would guide the investor away from the underperforming stocks and towards the high performing ones. In this situation it would of course be worth paying a fee for this information. However, independent scientific studies show that these predictions are very unreliable. Sometimes of course they will get it right but lots of independent studies indicated that they mostly get it wrong.

The historic data on stock market performance is relatively easy to obtain. It is compiled by organisations such as MSCI. Lots of countries have stock exchanges e.g. FT in London, The Nasdaq and S&P and Dow Jones in New York, etc. Each of these stock markets has an 'Index' which monitors performance over time (i.e. data). This data is readily available to the public. Each year a company called 'Dimensional' (another Passive investor) publishes a very useful record of various global stock market performances, which is called the 'Matrix Book'. This is a fine publication and is filled with raw data. It shows the historic past performance of several leading stock indices going back many decades. It is easily accessed online.

If you purchase a Passive investment fund that grows at 6% annually and pay fees of say 0.5%, then you will have 5.5% left over for annual growth. If however, you purchase an Active investment fund and pay fees of 3%, then clearly you will only have 3% left over for annul growth. Various academic studies indicate that Passive investing trumps Active investing about 90% of the time[8]. Therefore in the USA there is a large migration by investors from Active to Passive investing, with the latter now accounting for over 40% of Assets Under Management (AUM) and growing rapidly. In 2016, sixty of the largest Active fund managers in the world (competitors of one another) met in New York to discuss the worrying trend of clients withdrawing their funds from Active management and transferring to Passive[9]. Unfortunately in Ireland the Pensions industry is still promoting the fiction that Active investing is best and that they are worth the high fees. While Passive products are available in Ireland the low fee version are not readily available to investors (i.e. you could be offered a Passive product where the total fees amount to 2.5%, which is about 15 times more than a similar investor in the USA would pay).

Later on when I run the calculator I will use the a 6% annual growth rate as the long-term stock market performance (before fees).

4.7 Fees (Driver 7)

In summary:

As shown in Figure 6, Fees is the next Key Driver. The fees associated with investing in a pension are applied to the money that is already in the pension pot i.e. 7(a); as well as to the money that is being put into the pension pot each year i.e. 7(b).

There is a lot of confusion about fees, and very often there is not full disclosure from the Industry. Typically the average fees in Ireland amount to 3%, when you add everything up. When we run the calculator later on we will look at how existing fees of 3%, and lower fees of 1% and 0.2% affect the outcome.

In many countries the issue of fees has been acknowledged at the very top of the political pyramid, as outlined in Figure 11[10] and Figure 12[11] . Discussions like these have not happened in Ireland, but they should.

Figure 11

Figure 12

Figure 13 shows how a Dutch pension fund is pulling no punches as it lays down the ground rules regarding pension fees Before we look at the distribution chain for the pensions industry, let us first of all briefly look at the more familiar structure of the distribution chain for the foods we consume every day, as outlined in Figure 14. Rachel is at the end of a long chain. She buys her produce from local retailers, who in turn source them from a range of wholesalers. Sometimes a wholesaler may deal directly with the farm, but most frequently they deal with the processors, who in turn source their produce from the farmers. Clearly there can be large price differences between retailers.

Figure 13

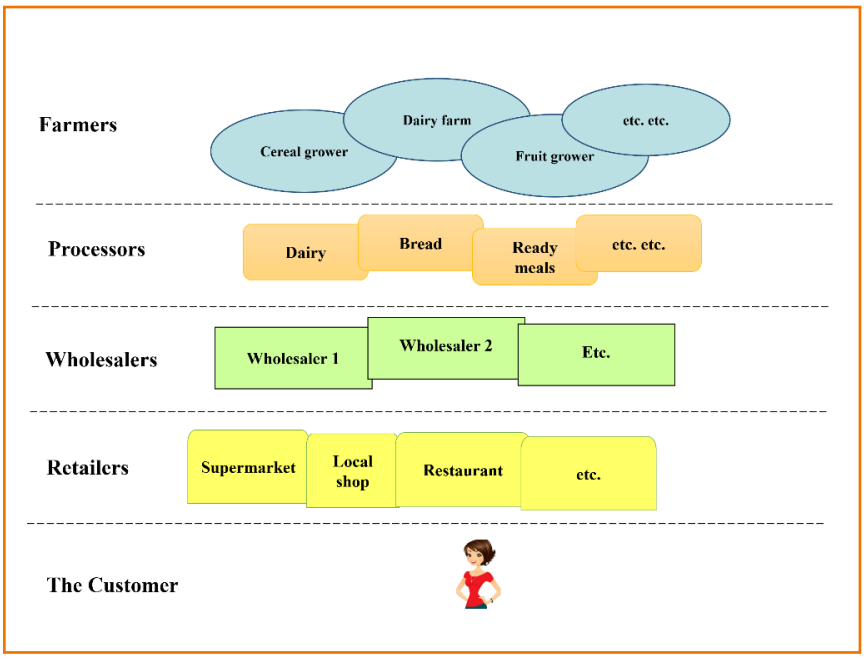


Figure 14

For example, if Rachel purchases a bar of chocolate at a petrol station she will pay €1.45, however at her local supermarket she can buy a pack of four for €1 which works out at 25c each, for exactly the same product. So shopping around can result in large savings.

At the height of the Celtic Tiger (2004-2007) many Irish people travelling abroad noticed the large price differential between products sold in Irish supermarkets by comparison to similar, and often identical, products in other European countries. The Irish media regularly highlighted this issue, asking why Ireland was a 'Treasure Island' for the large retailers. They made very little progress in obtaining satisfactory explanations. We were regularly assured by the large retailers that prices in Ireland were higher because of the cost of doing business in this country. The supermarkets claimed that they were only taking a modest margin (20% is considered a good margin in retail). However, following the economic crash in 2008, the competition in the retail sector began to increase substantially with many customers shifting to the German discounters, Lidl and Aldi. Suddenly the other large retailers were able to offer discounts of 50% and more, and all of these companies are still in business more than a decade later. Clearly the previous margins of 20% were inaccurate. The large retailers were able to turn a deaf ear to the Irish media, but they sat up and took notice of competition.

Figure 15 shows a diagram of the typical pensions distribution chain that exists in Ireland. As an investor, all Rachel wants to do is purchase a selection of stocks that are traded on the stock markets, and for these to be held long term in her pension account. In practice the task of setting up such an arrangement is fairly simple, not dissimilar to setting up a bank account. In the USA 'Passive' investors are able to acquire all of these services (shown in Figure 15) for a combined total fee of 0.15%. So if the stockmarket grows at 6% per annum, the investor will get to keep 5.85% of this (i.e. the investor keeps

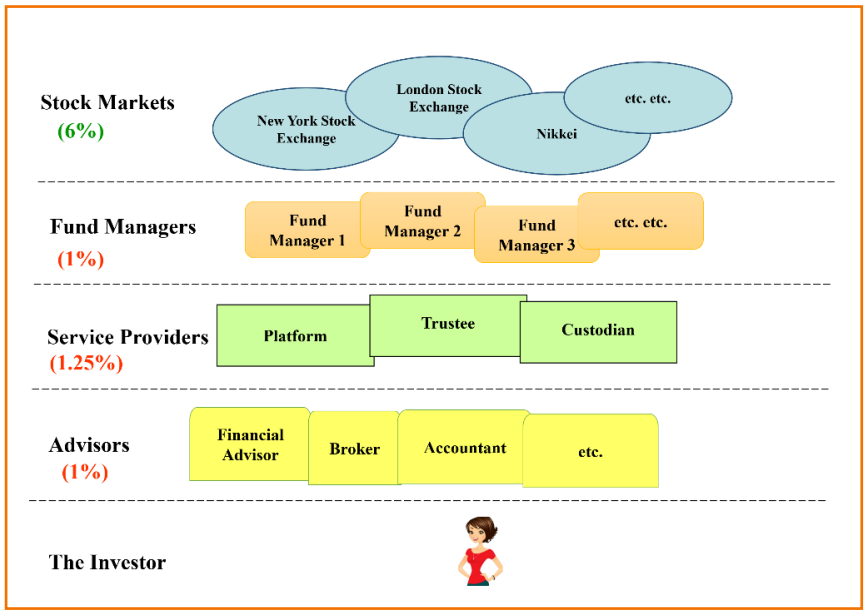


Figure 15

97.5% of the annual growth). However, in Ireland it is not unusual for an investor to have to pay 3.25% annually for the services of the middlemen (i.e. the numbers shown in red in Figure 15). Based on stock market growth of 6% and 3.25% fees, the investor will get to keep 2.75% of this (i.e. the investor only keeps 45.8% of the growth). During the remaining 37 years of her working life this will result in over €550,000 lost to Rachel. Devastating, but Rachel and most people invested in pensions are not even aware that this is happening to them.

Many of the players involved in the pensions industry try to justify the role that they play in the chain. The Advisor, who may be an accountant or a pensions advisor or a broker, is normally the first point of contact and may be located in your local town. Typically this individual, like the shopkeeper, will have a flair for sales (i.e. they make their money out of selling products such as mortgages, life insurance, pensions, etc.). This advisor would typically inform the investor that the service they provide is very cheap, amounting to about 1%, which they claim is very low in the context of tax relief at 40%. As we now know this is a misrepresentation and the apparently small annual fees soon begin to outstrip the 40% tax relief as the pension pot begins to grow. Tax relief is a once off on the money you put into your pension pot each year and over time it works out at much less than the fees, which are levied on the entire pot year after year after year.

The 'Service Providers' is really the backroom administration of your pension. It is shown as three distinct components in Figure 15, but in practice one organisation could easily provide this service. For example, when Rachel wants to buy shares for her pension, she needs a computer platform that contains her personal details so that the shares can be purchased in her name, so there needs to be a Platform (a database) with her details on it. The role of the Trustee is to ensure that Rachel is complying with the correct legislation (rules and regulations etc.) which govern pensions. The role of the Custodian (as the name implies) is to bank the money for the long term, so that it is available when retirement age comes around. While all of this may sound complicated it is primarily a computer system in a back office that performs all of these 'Service Provider' tasks. Once the system has been set up it costs very little to run, and the combined fee of 1% which is typically charged in Ireland is totally unjustified.

The role of the Fund Managers is to carry out the research on the shares which are listed on the stock markets and to purchase/sell a selection on behalf of the Investor. These Fund Management companies often employ highly paid analysts who specialise in studying stock market trends and using their knowledge to choose the likely winners (i.e. this is Active Investing). As already outlined in 4.6 above, the problem with this approach is that it does not work well. This may be a surprise to some readers because we are all led to believe that the best way to tackle any problem is to study it in detail and then use this knowledge to predict future performance. Why then does this approach not work when it comes to long term investing? The answer is not complicated. As an example, let us say that the value of all of the shares listed today on a theoretical stockmarket is €X Billion.

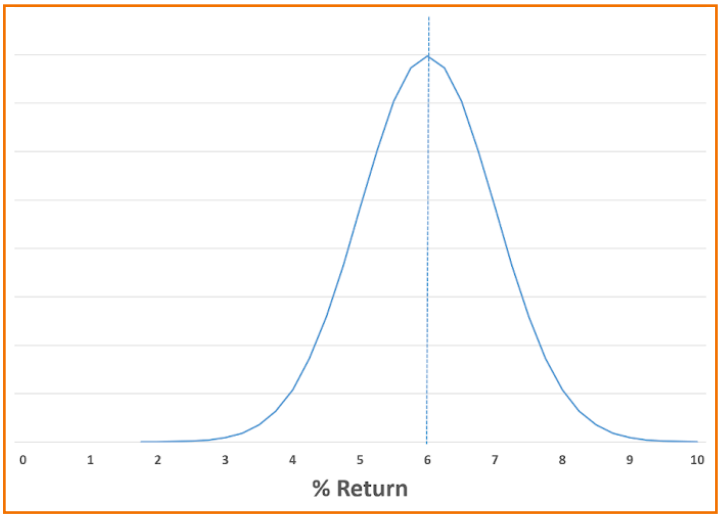


Figure 16

Over the next year the value of these shares grows by say 6%. So in a year from now the stockmarket will have a total valuation of €1.06X Billion. It is mathematically impossible for every investor to achieve returns of 10%, because if they did the market would have grown to €1.1X Billion. Of course some small number of Fund managers will achieve a 10% growth on behalf of their clients (i.e. 4% above the average of 6%), but when this happens there are equivalent investors who will only receive 2% growth (i.e. 4% below the average of 6%). The stock market is a 'zero sum' game, which means that for every winner there is an equivalent loser, because the average growth for the year has to work out at 6%. Figure 16 shows a graphical representation (i.e. Normal Distribution) of this, where the average (mean) annual return rate is 6%.

Now taking fees into account, because the graph shown in Figure 16 assumes that all of the stock market gains will be retained by the investor, which of course is not what happens in the real world because there is no such thing as a free lunch.

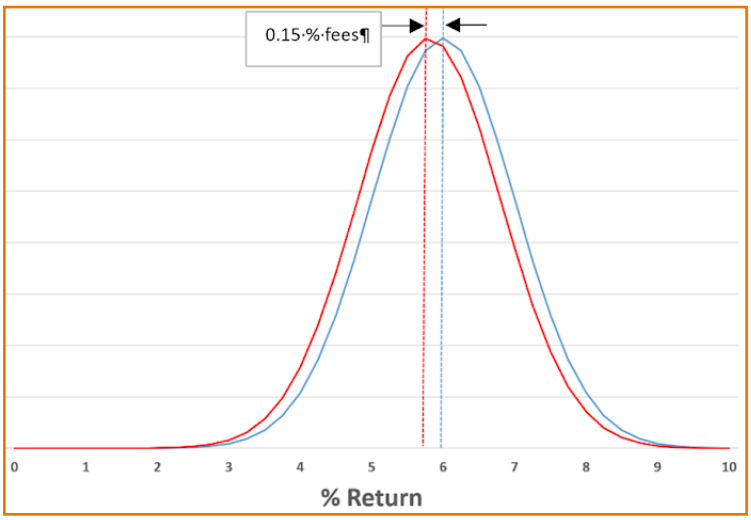


Figure 17

If the total fees are 0.15% (which is the case in some other countries for Passive investors) the investor would get to keep 5.85% of the 6% growth (i.e. 6% - 0.15% = 5.85%). Therefore, the after fees outcome for the investor in now represented by the red graph in Figure 17. Overall this is still a pretty good outcome because the red graph (after 0.15% fees) closely follows the blue graph (before fees) and therefore the average investor will come close to achieving the stockmarket average of 6% (i.e. achieving 5.85%).

If the total fees are 3% (which is unfortunately often the case in Ireland), the investor would get to keep 3% of the 6% growth (i.e. 6% - 3% = 3%). Therefore, the after fees outcome for the investor in now represented by the red graph in Figure 18. Overall this is a poor outcome. On closer examination of the red graph, it can be seen that only a tiny percentage of investors are now likely (statistically) to obtain a return which exceeds 6% (i.e. the thin sliver highlighted in green).

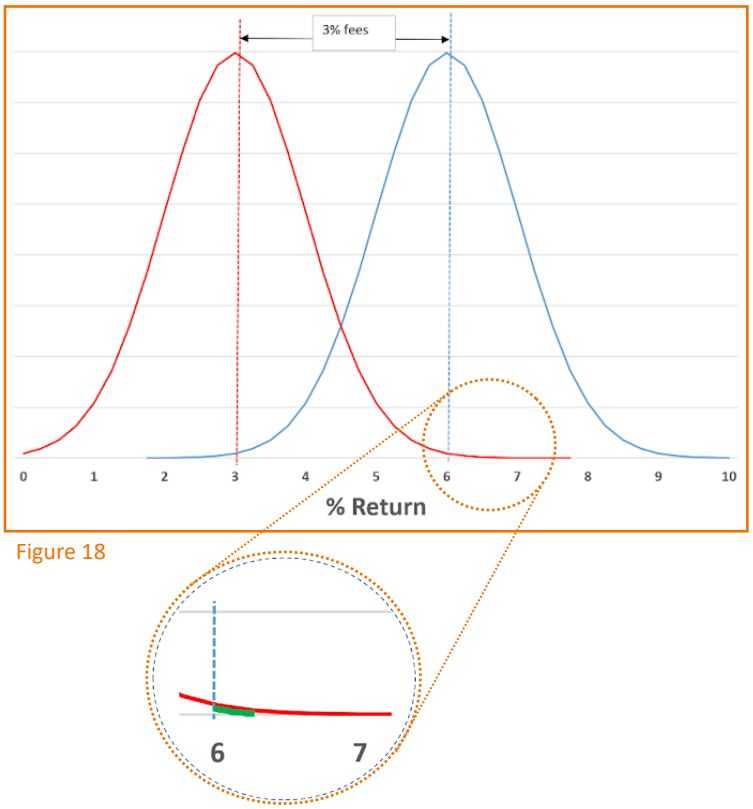


Figure 18

In recent decades (beginning in the 1970's with Vanguard) many investors are turning away from the high fee 'Actively' managed structure. Instead they are choosing service providers (e.g. Vanguard, Dimensional, etc.) who have automated the entire back office process outlined in Figure 15, and hence these service providers only need to charge a small fee of about 0.15% of the fund value, therefore 5.85% of the average annual growth of 6% is passed on to the investor (every investor). Several independent studies have been carried out which show that about 85%+ of Actively managed funds fail to meet the average growth in the stock market. In other words, why would an investor choose to use the services of a Fund Manager to Actively look after their pension pot, when in practice 85% of these funds fail to achieve the 6% average long term growth mark; when the investor could instead achieve close to the 6% average growth by simply purchasing the funds Passively? It makes no sense to pay for the Active when the independent studies show that you have a much better chance of success with Passive investing where the fees are dramatically lower.

There are numerous stock markets around the world, with thousands of companies listed on them. The likelihood of a Fund Manager picking the winners from this very long list is statistically very slim. You don't have to be a genius to figure this out (think of a horse race with 10 runners) however many of the Advisors and Fund Managers would like you to believe that they can pick a small number of successful shares from many thousands that are listed. They want you to believe this so that they can continue charging you fees.

Companies such as Vanguard, Dimensional etc. involved in Passive investing have researched this matter in great detail and they have copious amounts of scientific research which comes down heavily in support of the Passive investing (low fee) investment model. This is why Warren Buffet put his money into Vanguard instead of gambling with the Hedge Fund managers who ultimately lost.

Figure 19 shows a graph, published in the Wall Street Journal (July 2019), which clearly shows that the move from 'Active' to 'Passive' investing has been taking place in the USA

This trend is deeply worrying for the major players involved in Active investing. As previously stated, in November 2016 about 60 executives from rival Active Fund Management companies met in New York for a brainstorming session to try to stem this mass movement of funds. It was dubbed 'The Seismic Shift Senior Leadership Forum'[9] Unfortunately in Ireland this subject receives very little in-depth comment.

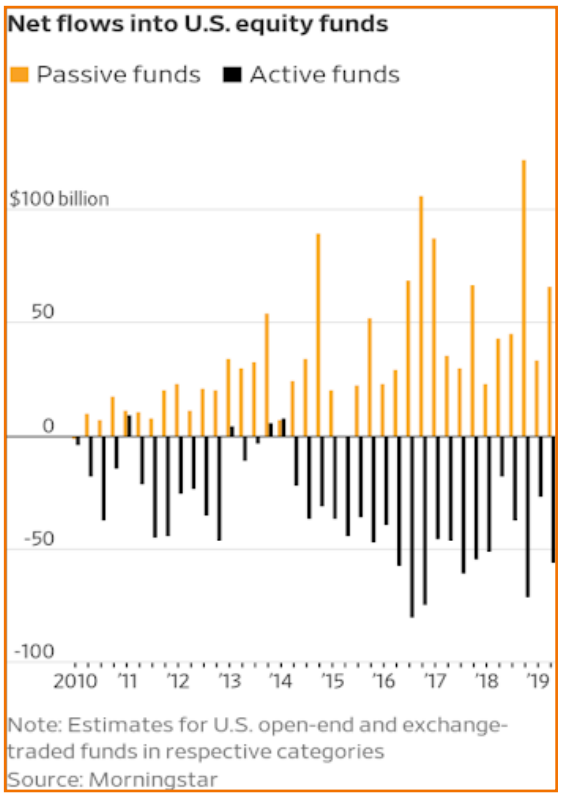


Figure 19

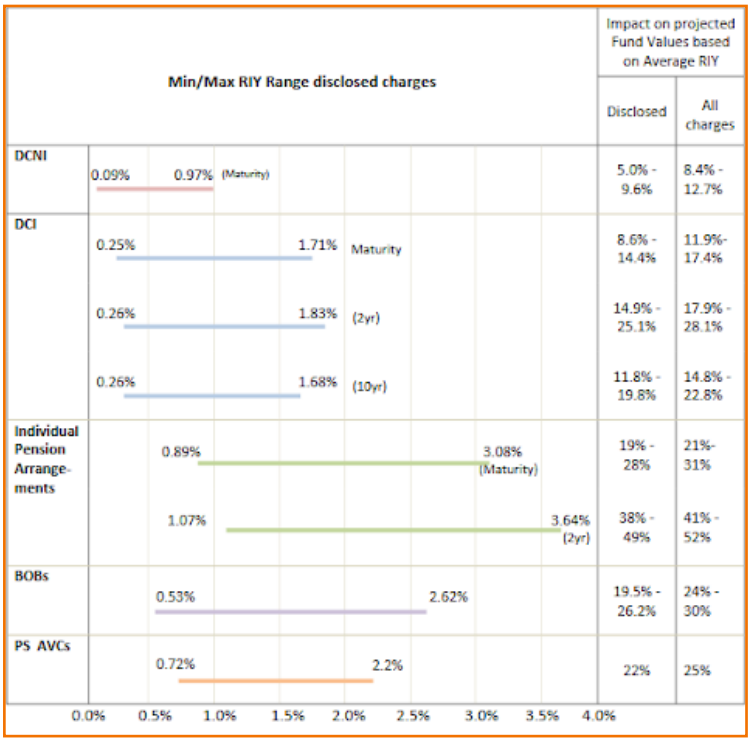
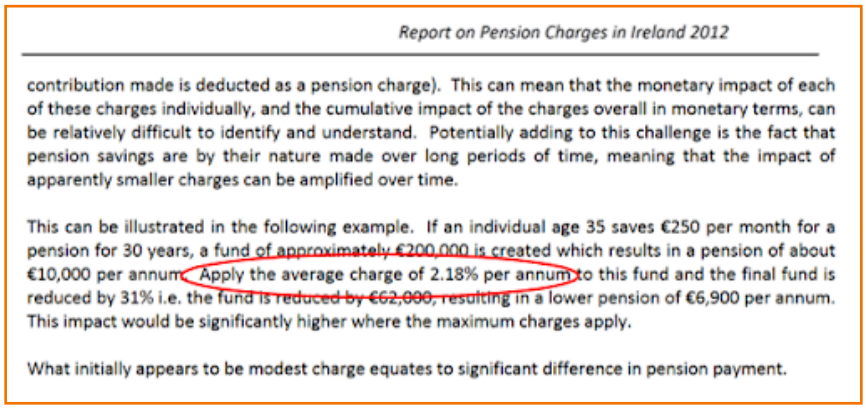


Figure 20

In 2012 the Department of Social Protection published a Report on Pension Charges in Ireland[12]. An extract from this report (page 6) is shown in Figure 20, showing charges across a range of different pension types.

Figure 21 is also an extract from the 2012 report (page 1), where it states that the average charge (in Ireland) is 2.18% per annum (circled in red).



Report on Pension Charges in Ireland 2012

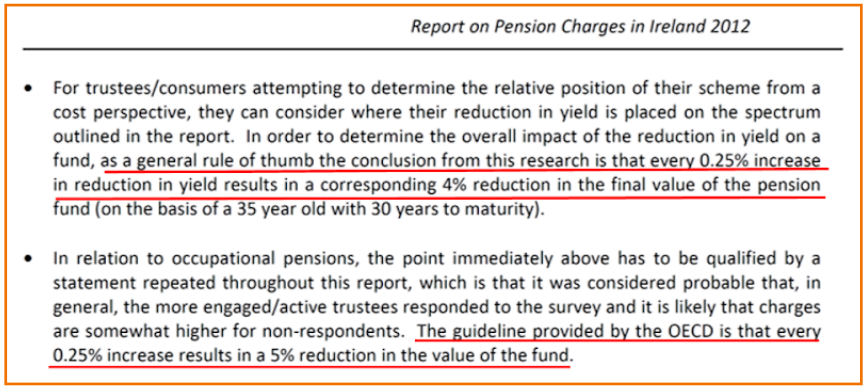
contribution made is deducted as a pension charge). This can mean that the monetary impact of each of these charges individually, and the cumulative impact of the charges overall in monetary terms, can be relatively difficult to identify and understand. Potentially adding to this challenge is the fact that pension savings are by their nature made over long periods of time, meaning that the impact of apparently smaller charges can be amplified over time.

This can be illustrated in the following example. If an individual age 35 saves €250 per month for a pension for 30 years, a fund of approximately €200,000 is created which results in a pension of about €10,000 per annum. Apply the average charge of 2.18% per annum to this fund and the final fund is reduced by 31% i.e. the fund is reduced by €62,000, resulting in a lower pension of €6,900 per annum. This impact would be significantly higher where the maximum charges apply.

What initially appears to be modest charge equates to significant difference in pension payment.

Figure 21

At a later stage in the report it highlights that 'The guideline provided by the OECD is that every ¼% increase results in a 4% to 5% reduction in the value of the fund' (this extract from page 16 of the report is underlined in red in Figure 22).



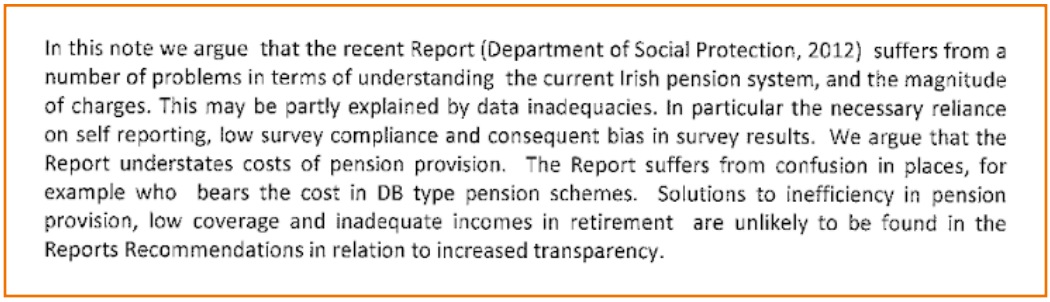
Report on Pension Charges in Ireland 2012

- For trustees/consumers attempting to determine the relative position of their scheme from a cost perspective, they can consider where their reduction in yield is placed on the spectrum outlined in the report. In order to determine the overall impact of the reduction in yield on a fund, as a general rule of thumb the conclusion from this research is that every 0.25% increase in reduction in yield results in a corresponding 4% reduction in the final value of the pension fund (on the basis of a 35 year old with 30 years to maturity).

- In relation to occupational pensions, the point immediately above has to be qualified by a statement repeated throughout this report, which is that it was considered probable that, in general, the more engaged/active trustees responded to the survey and it is likely that charges are somewhat higher for non-respondents. The guideline provided by the OECD is that every 0.25% increase results in a 5% reduction in the value of the fund.

Figure 22

So here we have concrete proof from the OECD that fees which may appear small are in fact very costly in the long run. Fees of ¼% reduce the pension pot by up to 5%. Fees of ½% reduce it by up to 10% etc. So fees of 2.18% reduce the final pot by up to 43.6%(according to the OECD rule of thumb). If say an investor expected to have a pension pot of €400,000 before fees, this would now be reduced to €225,600 because of fees (a difference of €174,400).



In this note we argue that the recent Report (Department of Social Protection, 2012) suffers from a number of problems in terms of understanding the current Irish pension system, and the magnitude of charges. This may be partly explained by data inadequacies. In particular the necessary reliance on self reporting, low survey compliance and consequent bias in survey results. We argue that the Report understates costs of pension provision. The Report suffers from confusion in places, for example who bears the cost in DB type pension schemes. Solutions to inefficiency in pension provision, low coverage and inadequate incomes in retirement are unlikely to be found in the Reports Recommendations in relation to increased transparency.

Figure 23

In February 2013 Professor Jim Stewart of Trinity College Dublin and Porfessor Bridget McNally of NUI Maynooth wrote a separate document ('A Note on Pension Fund Charges in Ireland'[13]) offering a polite but stinging criticism on the Department of Social Protection report on Pension Charges in Ireland discussed above, indicating that certain charges have been omitted altogether. An extract from this report is shown in Figure 23 and uses words like 'suffers', 'data inadequacies', 'bias', 'underestimates', etc.

Professors Stewart/McNally reference a 2011 study in the UK by Sier & Norman which estimates costs of 3.2%; and another 2012 study by Pitt-Watson found that 21 out of 23 participants were unable to give a full breakdown of charges.

If fees of over 3% are being charged in the UK, it is highly likely that they are also being charged in Ireland. Ultimately fees of 3% would reduce the value of the final pension pot by 60% over 40 years (based on the OECD 5% reduction for every ¼% in fees rule).

On page 221 of the 2012 Department of Social Protection report, the authors are effectively conceding 'charges could be somewhat higher', with the following statement:

> *"….must be qualified by the observation that it was considered probable that the more engaged/active trustees responded to this survey and it is likely that charges could be somewhat higher for non-respondents."*

In plain English this appears to be saying that the respondents were self-selecting (i.e. 'the engaged/active ones responded'). Professor Stewart/McNally point out that the response rate was as low as 33% for some groups, and some respondents misunderstood the questions they were being asked regarding charges.

Aside from the report by Professors Stewart/ McNally, it is surprising that the Department of Social Protection report did not explore the impact of fees on pension wealth, either at the level of the individual investor, or at a macro economic level.

This link https://www.ft.com/content/16c200de-776c-4d09-bec2-d0464a8672b5 is a podcast by the Financial Times (2020) which is inviting the British public to join its campaign for 'Clear Pension Charges' (discussed in the first circa 10 minutes of the podcast). If the Financial Times is having issues understanding pension charges, it is highly probable that we in Ireland are also having the same problem, only perhaps we are unaware of what is happening to us.

Since 2013 the Pensions Authority has published a number consultation documents where it called for submissions from stakeholders and interested parties with a view to reform and simplify the wider pensions landscape[14]. It states that 'the Authority's objective is a pension system which is fit for purpose, reliable and well managed, and which participants understand and trust……..and achieve better value for money'. Some good recommendations have come out of these consultations (for example the goal of reducing the large number of trustees), but unfortunately the matter of fees has been effectively ignored. It is difficult to understand how 'value for money' can be achieved if nobody is addressing where up to 60% of the pension fund goes?

Based on these reports/advice from the Department of Social Protection and The Pension Authority, it would appear that government policy is to ignore the matter of fees, and let the market regulate itself. There appears to be a tacit acceptance that high fees are part of this industry in Ireland, and that there is very little that can be done about them, other than to hope that the pensions equivalent of an Aldi or Lidl will appear on our shores.

Over recent decades the method by which fees are measured has changed a number of times in an attempt to cajole(force) the pensions industry to fully disclose their charges.

- **AMC** (Annual Management Charges) was the first attempt. However, it omitted several of the fees associated with running a fund, which effectively allowed the industry to make their money from a range of add on activities.
- **TER** (Total Expense Ratio). This replaced AMC and in theory this should have captured all charges, but in practice it omitted costs like Initial fees, interest on borrowing and 'Investment Chain' fees.
- **OCF** (Ongoing Charges Figure). Unfortunately it does not capture costs such as Performance Fees, Entry & Exit Charges, Fees for advice, and 'Investment Chain' fees.

This has been a real game of cat and mouse and to date the industry has won this game.

MIFID II is the most recent anagram in the journey to achieve full disclosure of charges. MIFID II came into effect on 3rd January 2018. This is a European regulation which is striving to protect investors and improve client outcomes. So far these rules appear to be partially working, but it only applies to Europe and it could be years before it becomes clear whether or not the industry has found loopholes. e.g. in the UK "City power couple Gina and Alan Miller have called for

the chief executive of the Financial Conduct Authority, Andrew Bailey, to "regulate or resign" over a failure to enforce rules on costs and charges on UK fund managers" (January 2019)[15].

A Personal Retirement Savings Account (PRSA) is a long-term personal pension plan, which were first introduced in Ireland under the Pensions (Amendment) Act 2002. A PRSA is a contract between the individual and a PRSA provider in the form of an investment account. The individual can change employment and continue to use the same PRSA, and from one PRSA to another at any time, free of charge. The maximum charges under a Standard PRSA cannot exceed (a) 5% of contributions paid and (b) 1% per annum of the PRSA assets.

But does this really mean that the fees are capped at (a) 5% of contributions paid and (b) 1% per annum of the PRSA assets? The short answer is (a) Yes and (b) No; but mainly No. From a mathematical point of view (b) has a much greater impact on the size of the final pot than (a), and unfortunately it is quite easy for the Pensions Industry to jack up the fees for (b) while still complying with the legislation. This can be achieved through 'Investment Chains' which is now discussed directly below:

Investment Chains example:

John has €95,250 in his pension pot at the end of 2020 which is under the management of 'The X Investment Co'. He invests €5,000 into his pension at the beginning of January 2021; and an amount of €250 is deducted from this €5,000 investment (in line with the 5% Contribution fee). So at the beginning of January 2021 John effectively has €95,250 + €5,000 - €250 = €100,000 in the pot which is now available to grow throughout 2021. The fee for funds under management is 1% p.a. So if the fund grows by 6% to €106,000 and if 1% fees are deducted (i.e. €1,060), John will have €104,940 left in his fund at the end of 2021.

But there is nothing stopping 'The X Investment Co' from investing all of John's €100,000 into another investment company, say 'The Y Investment Co'. This latter company can now take a fee (any fee) say €2,000 from the investment and return €104,000 to 'The X Investment Co' at the end of the year. 'The X Investment Co' will then take its 1% fees from this amount i.e. €1,040. So John is left with only €106,000 - €2,000 – €1,040 = €102,960. There is nothing stopping the industry from having several links to this Investment Chain. As far as John is aware he is only paying fees to 'The X Investment Co', but clearly there are others drawing fees from his fund as well. 'The X Investment Co' can confirm that it only made a gain of €4,000 on John's original €100,000 (which is technically true) and is therefore legally entitled to take its 1% on the entire €104,000, with no laws being broken.

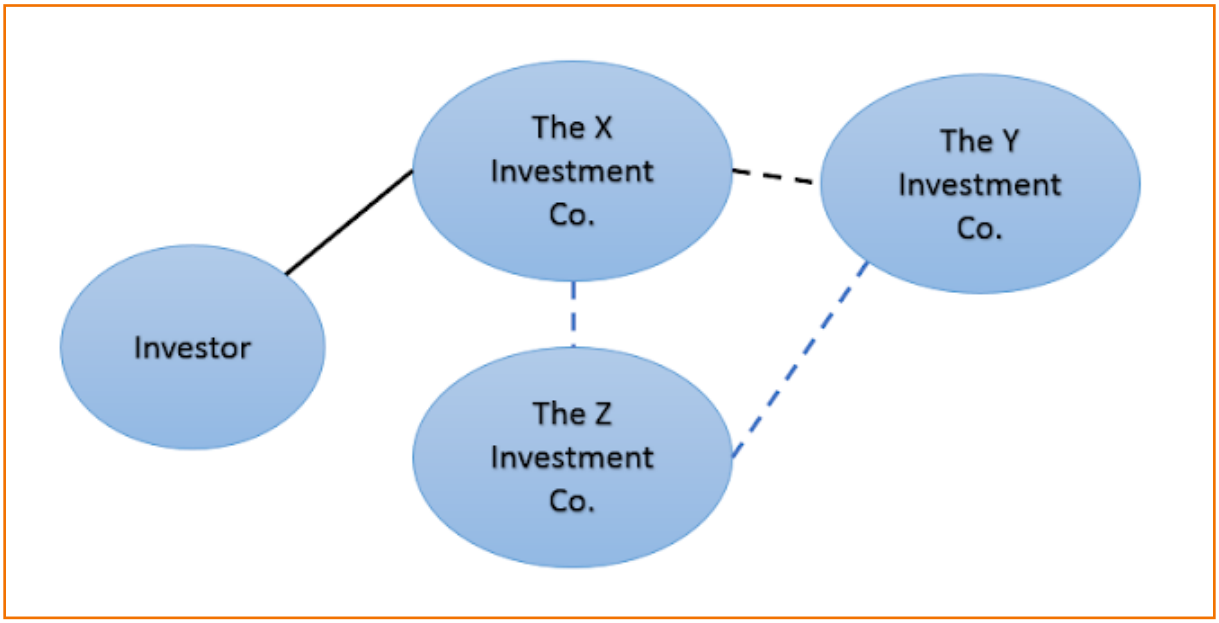


Figure 24

As another variation, consider a pension fund that purchases units of a fund with a portfolio dominated by pharmaceutical firms. This fund may in turn hold investments in other funds. This chain can add considerably to investment costs which are not explicit.

John Kay discussed this issue (Review of Equity Markets and long term Decision Making, 2012[16]) where he highlights that costs may be exacerbated by the growth of the Investment Chain (also referred to as Intermediation), which has led to increased costs for investors.

This could be stopped by a State led pensions body dealing directly with the Passive Funds which track the Indices (e.g. Vanguard or Dimensional, etc.). However, this will not work if the funds are sold through the hierarchy of intermediaries (shown in Figure 15).

All investors should be worried that the industry's ability to charge additional fees through Investment Chains will also become ingrained in the proposed new Auto Enrolment scheme. Historically the industry has found innovative ways around regulations which were introduced to compel full disclosure.

In any event, an ordinary unsuspecting pension investor in Castlebar or Castleisland or Cashel or wherever may not realise that fees of say 2½% or 3%, which appear modest, have the potential to slash the final value of the pension pot by 50% (even if these fees are declared). Why would they? given that it does not appear to have registered as an issue in the minds of the Pensions Authority. Surely the role of the Pensions Authority is to make this perfectly clear to individual investors, and to point out viable alternatives to the Irish government, so that they can plan to retain this wealth in Irish society. Our society will need it badly by 2050 when there will be a lot more older people, requiring pensions and medical care.

In summary, when we run the calculator later on we will look at how existing fees of 3%, and lower fees of 1% and 0.2% affect the outcome.

4.8 Value of Pension at present (Driver 8)

In Figure 6, the 'Value of Pension at present' box shows the size of fund accumulated by the investor. As Rachel is only starting out this amount will be €zero. However, if for example Rachel had say €25,000 in her pension pot, this would go into box 8. Investors can find out how much their pension is worth by consulting their personal benefits statement, which should be supplied annually by their pension provider.

4.9 Annuity Rate (Driver 9)

The word 'annuity' comes from the Latin word 'annus' (year).

When Rachel reaches retirement age she will have a fundamental choice to make. She has the option of:

1. using her pension pot to purchase a steady annual income for the rest of her life. This is often referred to a 'purchasing an annuity', or
2. keeping her pension pot of money invested and drawing some of this money every year to live on. This is referred to as an Annual Retirement Fund (ARF).

Rachel does not need to make this decision until she reaches retirement age, which is a long way in the future. Nonetheless, the Annuity Rate which Rachel anticipates that she will achieve (when she retires) has to be factored into the overall calculation at the very start, to help establish how much she needs to pay into her pension every month/ year.

This is a very important issue, but it can be confusing for many people, because it involves performing two calculations simultaneously. i.e. the first calculation is to work out the future value of the pension pot and the second calculation is to work out the annuity value of this. However, we can simplify this by separating these calculations out, first of all calculating the size of Rachel's pension pot, and once we know this we can then apply the Annuity Rate to the total pension pot. This works well to facilitate transparency and hence understanding.

So in other works we are parking the Annuity Rate issue right now, and we will run the calculator without taking the Annuity Rate into account. Then, once we know the size of the future pension pot at retirement age, we will explore what implications the Annuity Rate has on this (i.e. this is discussed in Section 8.0).

4.10 Regulation (Driver 10)

Regulation is discussed in Section 16.0.

5.0 Running the calculator

5.1 1st calculator run

Figure 25 shows the pension calculator 'Input Dashboard' for Rachel Hickey. This calculation is being performed in 2021 when she is aged 32 years old and earning €50,000 per annum. Rachel is expecting her salary to grown in line with inflation which is estimated to be 2½% per annum. Rachel will see 14% of the value of her salary paid into her pension in the first year. Half of this will come from her employer. In addition she benefits from Tax Relief at 40% of her share of the contributions. She is assuming that her fund will grow at 6% gross per annum (i.e. before fees) and that fees of 3% per annum will apply. Given that Rachel is starting out with her first pension, she has not accumulated a pension pot at present. Finally, the Annuity Rate on the calculator is set to 0%, because as already discussed in Section 4.9 we are parking the Annuity Rate issue right now, and are running the calculator to establish the size of her pension pot at retirement, without taking the Annuity Rate into account. Then, once we know the size of the future pension pot, we will explore what implications the Annuity Rate has on this separately, in Section 8.0.

Year (Present)	2021	Exercise care when filling in these boxes. Remember garbage in equals garbage out.
Age	32	
Current Annual Salary (€)	€50,000	
Expected annual growth in Salary (%)	2.5%	
Estimated annual inflation rate (%)	2.5%	
Pension contribution as % of annual salary	14.0%	
How much of your pension is paid by employer (%)	50.0%	
Tax Relief	40.0%	
Expected annual growth in pension fund (%)	6.0%	
Annual fees charged to existing fund (%)	3.0%	
Fees charged to the annual contributions (%)	3.0%	
Value of pensions at present (€)	€0	
Annuity Rate	0.0%	

Figure 25

Appendix 1 shows a print out of the 1st Run of her pension calculator. Rachel plans to retire at age 68 in 2057, because at that age her PRSI pension (paid by the Irish State) will kick in. Rachel's Fund will be worth €685,558.

Out of this Rachel and her employer will have contributed €418,138 and she will have accumulated €267,420 of growth (i.e. €418,138 + €267,420 = €685,558)

The cumulative fees paid to the various advisors in the pensions industry will be €301,559.

Important note:

Some people looking at Appendix 1 may notice that given that the fund will grow at 6% and the fees will be 3%, surely the Advisors share and Rachel's share of the growth should be exactly the same. Unfortunately things are not always what they seem. To help understand this have a look at Rachel's very first annual contribution in 2021 (i.e. Appendix 1) where a total of €7,000 in contributions are made to her pension. This growth by 6% in the first year equals €420, bringing the total value of her fund to €7,420. However the pensions industry charges fees of 3% on the total value of the fund of €7,420, and not on the €7,000.

i.e. €7,420 x 3% = €223.

So logically if the advisors get €223 out of the €420 growth, this only leaves €197 of the growth for Rachel in that year (€420 - €223 = €197). This might seem like an insignificant amount, but in Appendix 1 you can see how this accumulates year on year, with the advisors getting about €34k more than Rachel by the time she retires in 2057 (i.e. €301,559 - €267,420 = €34,139). This means that the investor is actually getting less than half of the 6% growth (in fact it is 47% of the 6%, which equals 2.82%, and therefore the pensions industry is getting the remaining 3.18% of the 6% growth; which is a 53% share).

5.2 2nd calculator run

Figure 26 shows the pension calculator 'Input Dashboard' and the only difference from Figure 25 is that the fees have been reduced from 3% per annum to 1% (which is still high by comparison with pension savers in the USA who pay as low as 0.15% for Index Trackers).

Year (Present)	2021	Exercise care when filling in these boxes. Remember garbage in equals garbage out.
Age	32	
Current Annual Salary (€)	€50,000	
Expected annual growth in Salary (%)	2.5%	
Estimated annual inflation rate (%)	2.5%	
Pension contribution as % of annual salary	14.0%	
How much of your pension is paid by employer (%)	50.0%	
Tax Relief	40.0%	
Expected annual growth in pension fund (%)	6.0%	
Annual fees charged to existing fund (%)	1.0%	
Fees charged to the annual contributions (%)	1.0%	
Value of pensions at present (€)	€0	
Annuity Rate	0.0%	

Figure 26

Appendix 2 shows a print out of the 2nd Run of Rachel's pension calculator.

When Rachel retires in 2057, her Fund will now be worth €1,041,897, by comparison to €685,558 when the fees were 3%, the difference being €356,339 extra in her final fund.

Out of this Rachel and her employer will have contributed exactly the same amount as previously, €418,138, but now she will take €623,760 of the growth, by comparison to only €267,420 of growth when the fees were 3%.

The cumulative fees paid to the various advisors in the pensions industry will still be €133,843, which are still substantial.

5.3 3rd calculator run

Figure 27 shows the pension calculator 'Input Dashboard' and the only difference from Figure 25 is that the fees have been reduced from 3% per annum to 0.2% (which should/could be arranged in Ireland, through Index Trackers).

Year (Present)	2021	Exercise care when filling in these boxes. Remember garbage in equals garbage out.
Age	32	
Current Annual Salary (€)	€50,000	
Expected annual growth in Salary (%)	2.5%	
Estimated annual inflation rate (%)	2.5%	
Pension contribution as % of annual salary	14.0%	
How much of your pension is paid by employer (%)	50.0%	
Tax Relief	40.0%	
Expected annual growth in pension fund (%)	6.0%	
Annual fees charged to existing fund (%)	0.20%	
Fees charged to the annual contributions (%)	0.20%	
Value of pensions at present (€)	€0	
Annuity Rate	0.0%	

Figure 27

Appendix 3 shows a print out of the 3rd Run of her pension calculator.

When Rachel retires in 2057, her Fund will now be worth €1,244,586, by comparison to €685,558 when the fees were 3%, the difference being €559,028 extra in her final fund.

Out of this Rachel and her employer will have contributed exactly the same amount as previously, €418,138, but now she will take €826,449 of the growth, by comparison to only €267,420 of growth when the fees were 3%.

The cumulative fees paid to the various advisors in the pensions industry will be €30,271.

6.0 Verifying the numbers

We now need to independently verify that the pension calculator used in section 5.0 is producing results which are reliable (i.e. to show that the number crunching in the calculator is correct).

6.1 Using a mathematical equation

The best way to approach this is to derive a mathematical 'Pension Equation' from first principles, and as we proceed we can use the equation to produce results that can be compared with the numbers produced by the calculator displayed in Appendix 1.

Assume:

'S' is the total fund size after fees that an investor will accumulate over the years of contributing to a pension.

'a' is the investment in the first year, which is €7,000.

'r' is the annual growth less the fees charged. We know that the growth is 6% per annum and that in reality the total fees are 3.18%, which leaves 2.82% growth for Rachel (this was discussed in section 5.1)

'x' is the amount by which the investor's contribution will increase every year. In this case we are assuming 2½% per annum (in line with inflation).

Year 1 S=€7,000 x 1.0282 = €7,197 (this is the amount for 2021 in Appendix 1)

S= a r

= ar ➔ this is taken forward to year 2

Year 2 S=[(€7,197) + (€7,000 x 1.025)]1.0282 = €14,778 (this is the amount for 2022 in Appendix 1)

S=[(ar) + (a x)]r

= $ar^2 + arx$ ➔ this is taken forward to year 3

Year 3 S=[(€14,778) + (€7,000 x 1.025^2)]1.0282 = €22,756 (this is the amount for 2023 in Appendix 1)

S=[($ar^2 + arx$) + (a x^2)]r

= [($ar^2 + arx$) + ax^2]r

= $ar^3 + ar^2x + arx^2$ ➔ this is taken forward to year 4

Year 4 S= [(22,756) + (7,000 x 1.025^3)]1.0282 = €31,149 (this is the amount for 2024 in Appendix 1)

S= [($ar^3 + ar^2x + arx^2$)+(a x^3)]r

= $ar^4 + ar^3x + ar^2x^2 + arx^3$ ➔ this is taken forward to year 5, etc.

If you look carefully at each of the equations from year one to year four, you can see a pattern emerging. In fact the fund is growing 'geometrically', and we can represent this by a general equation for 'n' years. This is because very few people invest in a pension for just four years, in practice this may be for up to 40 years or more (and we call this 'n').

$S = ar^nx^0 + ar^{n-1}x^1 + ar^{n-2}x^2 \ldots\ldots\ldots\ldots\ldots arx^{n-1}$ Equation 1 (note that $x^0=1$)

Now for a bit of equation manipulation. Multiply both sides of Equation 1 by x/r. This gives us Equation 2.

$S.x/r = ar^{n-1}x^1 + ar^{n-2}x^2 \ldots\ldots\ldots\ldots\ldots arx^{n-1} + ax^n$ Equation 2

Now subtract Equation 2 from Equation 1, which gives us Equation 3

$S = ar^nx^0 + ar^{n-1}x^1 + ar^{n-2}x^2 \ldots\ldots\ldots\ldots\ldots + arx^{n-1}$

$S.x/r = ar^{n-1}x^1 + ar^{n-2}x^2 \ldots\ldots\ldots\ldots\ldots + arx^{n-1} + ax^n$

$S-Sx/r = ar^nx^0$ (all of these in the middle cancel) $- ax^n$ Equation 3

$S-Sx/r = ar^nx^0 - ax^n$

$S(1-x/r) = ar^n - ax^n$

$$S = \frac{ar^n - ax^n}{(1-x/r)}$$

$$S = \frac{a(r^n - x^n)}{(1-x/r)}$$

This is the 'Pension Equation'

(i.e. based on one annual contribution, but it can easily be modified to allow for 12 monthly contributions, etc.)

So let us use this equation to test if we get the amount of €31,149 after four years of investing.

$$S = \frac{€7{,}000\ (1.0282^4 - 1.025^4)}{(1-1.025/1.0282)}$$

= €31,149 so the 'Pension Equation' is correct (as this is the amount for 2024 in Appendix 1)

Let us try it one more time for 2057, at which point Rachel will have been investing for 37 years.

$$S = \frac{€7{,}000\ (1.0282^{37} - 1.025^{37})}{(1-1.025/1.0282)}$$

= €685,558 (this is the amount for 2057 in Appendix 1)

Conclusion: we have proven conclusively that the Pension Calculator produces exactly the same result as the mathematical 'Pension Equation' here, which was derived separately.

So which is better, the calculator or the equation? Clearly the calculator is a much more informative tool. While the equation, is useful to give a quick answer to how much the final fund will be worth, it does not give the detailed picture which the calculator displays. With the calculator one can see all of the key inputs and outputs, showing the cumulative annual fees charged, the annual growth in the fund, etc. With the calculator it is the investor that is empowered, not the advisor who would prefer to hide behind an equation.

6.2 Compare with the OECD rule of thumb

As already stated in section 4.7, the Department of Social Protection published a Report on Pension Charges in Ireland[12] in 2012, which indicates that the average charge on a pension in Ireland is 2.18%. That report also states that 'The guideline provided by the OECD is that every ¼% increase results in a 4% to 5% reduction in the value of the fund' at maturity. So fees of 2.18% reduce the final pot by between 34.9% (if you use the 4%) and 43.6% (if you use the 5%).

Also discussed in section 4.7 was a paper produced in February 2013 by Professor Jim Stewart of Trinity College Dublin and Porfessor Bridget McNally of NUI Maynooth ('A Note on Pension Fund Charges in Ireland'[13]). This document was critical of the Department of Social Protection's report on Pension Charges in Ireland, indicating that certain charges had been omitted. Other evidence also discussed in section 4.7 suggest that the 2.18% annual average charge is too low, and it was concluded that 3% is a more accurate estimate.

The data displayed in Figure 28 was generated by the pension calculator [i.e. Rachel's situation as outlined in Figure 25 was maintained, and the only inputs that were systematically changed were:

1. Driver 6 = % Investment Returns.
2. Driver 7a & 7b = % Fees.

The table in Figure 28 shows a summary of the outputs, and effectively shows the 'growth zone' for pensions; i.e. the growth zone range is based on the long term historic stock market growth performance covering the range of 5% to 7%. In addition the fees displayed are in the range 0% to 4% (the 0% fees is purely a reference point to indicate how much the fund would grow without fees).

So for example, if Racheal achieves a return of 5% per annum from her investments and pays zero fees, she will have €654k in her pot after 30 years. If however she pays fees of 3% she will only have €400k in her retirement account. Therefore 3% in fees results in a 39% reduction in the value of her fund over a 30 year period [i.e. €400k/€654k)100% = 61%, meaning that 39% was lost as a result of fees].

If the fund grows over 40 years, and say Rachel achieves an investment growth of 7% before fees, and she pays fees of 3%, she will have €982k in her fund, which represent a 52% reduction in the value of her fund due to the fees [i.e. €982k/€2,046k) 100% = 48%, meaning that 52% was lost as a result of fees].

		€ value after fees (with 30 years to maturity)				
		0% fees	1% fees	2% fees	3% fees	4% fees
% growth before fees	5%	€654K (0% lost)	€552K (15% lost)	€468K (28% lost)	€400K (39% lost)	€343K (48% lost)
	6%	€773K (0% lost)	€648K (16% lost)	€456K (29% lost)	€462K (40% lost)	€394K (49% lost)
	7%	€918K (0% lost)	€764K (17% lost)	€639K (39% lost)	€538K (41% lost)	€455K (50% lost)

		€ value after fees (with 40 years to maturity)				
		0% fees	1% fees	2% fees	3% fees	4% fees
% growth before fees	5%	€1,280k (0% lost)	€1,016k (21% lost)	€815K (36% lost)	€662K (48% lost)	€544K (58% lost)
	6%	€1,611k (0% lost)	€1,263K (22% lost)	€1.001K (38% lost)	€802K (50% lost)	€650K (60% lost)
	7%	€2,046k (0% lost)	€1,585K (23% lost)	€1,241K (39% lost)	€982K (52% lost)	€786K (61% lost)

Figure 28

The data from the pension calculator summarised in Figure 28 (which agrees exactly with the pension equation outlined in section 6.1), also agrees with the rule of thumb from the OECD, showing that investors can lose between 30% and 60% of their pension fund by retirement age, due to fees. This 'triple lock' of calculations gives confidence that this data can be relied upon.

From Figure 28, it is interesting to see that the longer the pension is left to grow, the more of a stranglehold the fees have on the pension fund. For example, for a growth rate of 6%, and fees of 3%; after 30 years the fees will have eaten up 40% of the pot, but by 40 years it will have consumed 50%. It is also interesting to note that the impact of fees is not linear. For example, assuming 6% growth over a 30 year maturing period, the first 1% of fees results in a 16% loss, the second 1% results in a 13% loss, the third 1% fees results in a 11% loss and the fourth 1% results in a 9% loss. The report discusses the matter of post retirement-age fees in section 15.0.

7.0 The State as a Pension Investor

The Irish state awards generous tax relief on pension contributions, as shown in Figure 29. So a 51 year old who is earning €60,000 per annum could get tax relief on annual pension contribution of up to €18,000 per annum (i.e. 30% x €60,000 = €18,000). This tax relief is granted at the marginal rate of tax; so if this is at 40% it will mean that the real cost to the investor is only 60% of the €18,000 = €10,800. So in this instance the Irish state has chipped in with a very credible €7,200.

Rachel pays €7,000 into her pension in 2021, half of which comes from her employer). Her share represents 7% of her salary, therefore she is well within the 20% limit for her age.

Appendix 1 shows that up to 2057 Rachel and her employer pay €418,138 into her pension, so half of this comes from Rachel = €209,069 and 40% of her contribution comes from the Irish state who has granted her tax relief = €83,627. So clearly the Irish state is a very large contributor to Rachel's pension; and to the pensions of many Irish citizens throughout the length and breadth of the country. In this context it makes it all the more surprising that neither the Department of Social Protection or the Pensions Authority see it as their remit to address as a priority the issue of fees. This issue will be addressed at a 'Macro' level later in this report when we look at the big picture from an Irish economic point of view (section 11.0).

Age	Percentage limit
Under 30	15%
30-39	20%
40-49	25%
50-54	30%
55-59	35%
60 or over	40%

Figure 29

8.0 More on the Annuity Rate

The discussion on the Annuity Rate already commenced in section 4.9, but the author decided to park this issue and return to it later, which is now.

Section 4.9 has been reproduced in the box below, to help refresh what has already been said on this topic and lay the foundation for further understanding.

> The word 'annuity' comes from the Latin word 'annuus' (yearly), from 'annus' (year).
>
> When Rachel reaches retirement she will have a fundamental choice to make. She has the option of:
>
> (i) using her pot to purchase a steady annual income for the rest of her life. This is often referred to a 'purchasing an annuity', or
>
> (ii) keeping her pot of money invested and drawing some of this money every year to live on. This is referred to as an Annual Retirement Fund (ARF).
>
> Rachel does not need to make this decision until she reaches retirement age, which is a long way in the future. Nonetheless, the Annuity Rate which Rachel anticipates that she will achieve (when she retires) has to be factored into the overall calculation at the very start, to help establish how much she needs to pay into her pension every month/year.
>
> This is a very important issue, but it can be confusing for many people, because it involves performing two calculations simultaneously. i.e. the first calculation is to work out the future value of the pension pot and the second calculation is to work out the annuity value of this. However, we can simplify this by separating these calculations out, first of all calculating the size of Rachel's pension pot, and once we know this we can then apply the Annuity Rate to the total pot. This works well to facilitate transparency and hence understanding.
>
> So in other works we are parking the Annuity Rate issue right now, and we will run the calculator without taking the Annuity Rate into account. Then, once we know the size of the future pension pot at retirement age, we will explore what implications the Annuity Rate has on this.

So we parked the Annuity Rate issue, and we ran the calculator to establish the size of the future pension pot. Now that we know the size of the future pension pot, we can explore what implications the Annuity Rate has on Rachel's annual pension income. i.e. we have already established the size of Rachel's pension pot in section 5.1 (also see Appendix 1). She will have €685,558 in her fund in 2057. But what annual income will she get from this?

This is where the choices outlined in (i) and (ii) come into play. So lets explore option (i) first. In 2057 Rachel has the option to approach one of the many companies who will offer her an annual income (i.e. annuity) for the rest of her life, in return for her handing over her pot of money (in fact she could take some of her pot tax free, but to avoid complicating the issue let us say she sells them the entire pot).

Based on our best estimate today (in 2021) Rachel will only get a return of approximately 3% per annum on her pot (this is quoted by insurance companies who are willing to buy up pension pots in return for giving an annual payment i.e. 'annuity'). This amount of 3% is way under the long term stock market return of circa 6%.

The annuity percentage return is low because the company buying her pension pot has first of all to make a profit, but it also has to factor in the risk that Rachel may live to 100 years. Of course the annuity company knows that the average life expectancy for a female retiring today in Ireland is 82. A small percentage of them will live to 100 so they will lose money on these clients, but some will die soon after retirement and they will soon be able to stop paying pensions to them, so it all balances out.

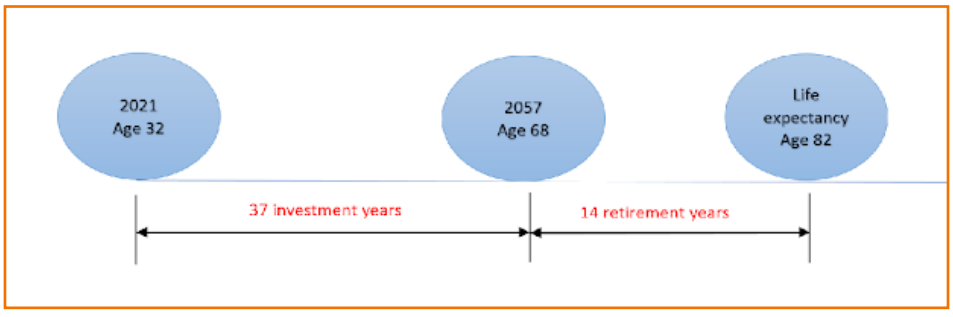


Figure 30

But unfortunately (from a pensions point of view) people are living longer, and the percentage annuity that Rachel will be offered when she arrives in 2057 may even drop below the 3% return, which is a very poor return given that the stockmarket has a long history of achieving an average of 6% (which includes peaks and valleys, but still averages out at this amount in the long term).

Let us proceed with the of 3% annuity rate.

So Rachel will receive an annual income of €20,567 in 2057 from selling her fund of €685,558 (i.e. €685,558 x 3% = €20,567).

Clearly the purchasing power of €20,567 will be much less than it is today, because the cost of living will have gone up due to inflation between 2021 and 2057. It is difficult for people like Rachel to decide whether or not €20,567 is a good or bad amount to have, because she has no real idea what the general cost of living will be in 2057 (it is too far into the future for her to get her head around this).

To overcome this problem the pensions industry converts her future pot of money into a 'Present Value' i.e. they give her the €20,567 number in terms of what it would be worth today. This is not difficult, all that is required is to adjust for inflation over the next 37 years. This calculation is shown below:

$$\text{Present Value} = \frac{\text{Future Value}}{(1 + \text{inflation})^{\text{years}}} \qquad \text{(assume inflation as 2½\%)}$$

$$\text{Present Value} = \frac{€20,567}{(1 + 0.025)^{37}}$$

Present Value = €8,249 (2021 value)

So here we have it, all boiled down to one number. In other words, if Rachel decides to purchase an Annuity with her pension pot, based on our best estimate of an annuity rate of 3% this will give her an annual income of €20,567 in 2057, but we need to express this in terms of 2021 money value, which is €8,249 (assuming 2.5% annual inflation).

Appendix 4 is a refinement of Rachel's 3% fees calculator; where an amount of 3% 'Annuity Rate' has been inserted into the Input Panel (previously this was set to zero). Therefore, another column has been added to the calculator to show the Present Value (i.e. 2021 Value) of the 2057 pot, which is an amount of €8,249 (which agrees with the maths above). So the pension calculator saves having to perform the maths, by first of all calculating the annuity that can be drawn from the future pot, and then bringing this annuity amount back to the present value.

While some readers may think that this process is unnecessarily complicated (and maybe nonsensical), in fact it is very sensible and this is the principle by which pension calculators work.

To complete the picture, it is assumed that Rachel will also receive the state pension in 2057. The Pensions Authority (on its pension calculator webpage) expect that future governments will be in a position to increase the state pension over time and by 2057 it will be much more than the 2021 value of €12,912 (for a person with maximum contributions). Thankfully it is not necessary to calculate the future value of the state pension. We have gone to a lot of trouble to calculate the 2021 value of the 2057 pension annuity, so we simply add this to the 2021 value of the state pension of €12,912 i.e. everything has been brought to the present (2021) value.

Therefore, Rachels salary in 2057 will be made up of a combination of her own private pension of €8,249 and the state pension of €12,912, giving her a total of €21,161(expressed in terms of 2021 value of money).

After a lifetime of work Rachel will not exactly be living the high life on this level of income, and the Irish state will be the main source of her retirement income. If the state cannot maintain its full payments due to an ageing population, then she may find it difficult to make ends meet. Rachel now has to decide if she is investing enough of her salary in her pension, or maybe she should be looking at option (ii)?

With option (ii) Rachel could purchase an Approved Retirement Fund (ARF) when she reaches retirement age in 2057. In practice ARF's are becoming very popular as more and more people moving into retirement prefer them to buying annuities. An ARF allows them to retain full ownership of the fund and control the income they wish to draw from the

fund annually for the rest their lives (within certain limits). In addition, when they die the money remaining in the fund becomes part of their estate, which can then be distributed in accordance with their last will and testament.

So for example in 2057 Rachel could continue to keep her fund invested in the stockmarket and hence obtain average stockmarket returns of 6% per annum.

As already discussed pension investors in USA (and many other countries) are having their pensions managed for total fees of about 0.15%. This could be achieved in Ireland, if necessary by government intervention who would subcontract the work out to one of the large Index Tracker funds such as Vanguard or Dimensional (why not? given that up to 40% of the contributions come from the Irish State anyway, by way of tax reliefs, so the Irish state has a lot of skin in the game).

With this arrangement Rachel could take say 4.5% out of her €685,558 pot of money each year (i.e. €685,558 x 4.5% = €30,850), and still leave scope for the fund to continue growing by 1.3% per annum after fees of say 0.2%:

6% growth

-0.2% annual management fees

-4.5% used to live on

1.3% the rate at which the fund continues to grow

This continuous growth would help protect Rachel against pension poverty in later years if she lives into her mid-nineties).

Of course the future amount of €30,850 has to be converted to the present value:

$$\text{Present Value} = \frac{€30,850}{(1 + 0.025)^{37}}$$

Present Value = €12,373

Which is €4,124 per annum better than the original €8,249. But remember that with an ARF Rachel will still get to keep her full pension pot of €685,558, and when she dies this money is more likely to stay in Ireland, where the Irish government will collect taxes on it when it is ultimately distributed i.e. through Inheritance Tax, VAT, etc. It is a win-win for Irish society, rather than a substantial part of the pot being syphoned off to a large overseas fund. You can see from the pensions calculator in Appendix 5 that the amount of 4.5% annuity rate has been included in the Input Panel, and that for 2057 the amount of €12,373 is shown as the present value (i.e. 2021 value).

If however, from 2021 onwards Rachel had paid fees of only 1% and achieved an annual growth of 6% per annum, you have seen in section 5.2 that this would have grown to €1,041,897 by 2057. Rachel could take 4.5% out of her €1,041,897 pot of money each year (i.e. €1,041,897 x 4.5% = €46,885).

Now converting the €46,885 to the present value:

$$\text{Present Value} = \frac{€46,885}{(1 + 0.025)^{37}}$$

Present Value = €18,804

You can see confirmation of this number in the pension calculator in Appendix 6 (where the amount of 4.5% annuity rate has been included in the input panel, and the fees set to 1%), i.e. for 2057 the amount of €18,804 is shown as the present value (i.e. 2021 value).

With this arrangement, Rachels salary in 2057 will be made up of a combination of her own private pension of €18,804 and the state pension of €12,912, giving her a total of €31,716 (in terms of the 2021 value of money). This is a very significant improvement.

Lets do the calculation one more time, assuming that from 2021 onwards Rachel had paid fees of 0.2% and achieved an annual growth of 6% per annum. You have seen in section 5.3 that this would have grown to €1,244,586 by 2057. Rachel could take 4.5% out of her €1,244,586 pot of money each year (i.e. €1,244,586 x 4.5% = €56,006).

Now converting the €56,006 to the present value:

$$\text{Present Value} = \frac{€56{,}006}{(1 + 0.025)^{37}}$$

Present Value = €22,462

You can see confirmation of this number in the pension calculator in Appendix 7 (where the amount of 4.5% annuity rate has been included in the input panel, and the fees set to 0.2%), i.e. for 2057 the amount of €22,462 is shown as the present value (i.e. 2021 value),

With this arrangement, Rachel's salary in 2057 will be made up of a combination of her own private pension of €22,462 and the state pension of €12,912, giving her a total of €35,374 (in terms of the 2021 value of money).

Clearly the Annuity Rate is an extremely important part of the calculating process, because this percentage is used to predict future annual income generated by the fund. The annuity rate for a person who plans to retire in their mid sixties, who would like their income to grown in line with the consumer price index after retirement is about 3%. This is a low investment return by comparison to the stock market, and hence it has a knock-on effect of providing a low Present Value yearly income. The Pensions Authority states that it is using an annuity rate of just 2% in its calculator. This is one of the reasons why the example outlined in Figure 3 (in the Introduction to this report) shows an alarmingly high pension contribution for a 25 year old. We will now discuss this example in section 9.0 below, and run the numbers through the calculator.

9.0 Example of a 25 year old saving for a pension

In the Introduction to this report (section 2.0) some pension numbers generated by an actuary were discussed. Part of this article is shown in Figure 3. It claims that a 25 year old would need to contribute €15,750 in the first year and increase this annually in line with inflation over the next 40 years, simply to be able to draw a pension of €24,000 (valued in terms of today's value of money. One wonders how many 25 year old's in today's workforce could afford to pay €15,750 into a pension each year?

The pension calculator hosted by the Pensions Authority[17] (January 2021) shows that a 25 year old would have to invest €7,200 of their annual salary (before tax relief) into a pension to be able to retire on a pension of €24,000 at age 65. This calculator assumes that the investor will qualify for the state contributory pension of €12,912, by age 68 (having accumulated the necessary PRSI 'stamps' over their working lifetime). Therefore the 25 year old will really only be saving to fund a pension income of €11,088 per annum (i.e. €24,000-€12,912). In addition there is tax relief on the €7,200 annual investment (potentially 40% depending on income), which could further reduce the net annual contribution to €4,320. Of course an annual investment of €4,320 is a substantial contribution for any 25 year old to make. The amount of €15,750 in the Irish Times article seems to assume that (i) the investor will not qualify for any state pension and (ii) will not receive any pension contribution from his/her employer and (iii) will not obtain any tax relief on contributions. It is unusual for an investor to miss out on all of these three benefits. Of course if this was the case the total investment (according to the Pension Authority calculator) would be closer to €15,750. One hopes that articles such as this do not dissuade young employees from investing in their pension.

10.0 Comparison of Online Pension Calculators

The previous example demonstrates how the numbers can oscillate significantly, depending on who is offering their opinion and which key drivers are included/excluded from the calculations.

In this section we look at the calculator inputs and outputs from three online pension calculators for Rachel's situation (which were run in January 2021):

- Pensions Authority
- Irish Life
- Zurich

Starting with the Pensions Authority calculator, the annual contribution for the first year was adjusted to achieve 14% of €50,000 (=€7,000, same as Rachel). This required a bit of trial and error when inputting the data, because the calculator was asking for the 'target pension amount'. Once the amount of €23,300 was inputted this gave the annual contribution of €7,000 required for the first year. This calculator assumes that the state will pay a pension of €12,912, so in reality the additional annual pension required will be €10,388 (i.e. €23,300 - €12,912). The assumptions used in this calculator are outlined in Appendix 8 (along with screenshots of the calculator runs for each of the three online calculators used).

The Pensions Authority calculator assumes that after fees and charges the fund will grow by an average of 3.7% per annum. The inflation amount is not stated, but we will assume it is close to 2.5%. We can now put the Pensions Authority data into the equation:

$$S = \frac{a(r^n - x^n)}{(1-x/r)}$$

$$S = \frac{€7{,}000\ (1.037^{37} - 1.025^{37})}{(1-1.025/1.037)}$$

$$= €811{,}847$$

As shown in Appendix 9, the pension calculator independently confirms that Rachel's pot should be worth €811,847 at the end of 2057 (using the Pensions Authority assumptions). Of course the Pensions Authority calculator does not show us the size of the pot, but the maths indicate that it should be €811,847.

It is difficult to understand how the Pensions Authority calculator can deliver an annual pension of €10,488 out of a pot of €811,847, based on an annuity of 2% (as stated in their assumptions). To achieve this level of return the inflation rate would need to be close to 1%, which is far from the long term inflation rate. It would therefore appear that the Pensions Authority calculator is using an annuity rate of 3%, even though it is stating 2% in the assumptions?

If we now run the numbers on the Irish Life calculator, the annual contribution for the first year was adjusted to achieve 14% of €50,000 (=€7,000, same as Rachel). This gives an annual pension of €22,213, which is only slightly different to the Pensions Authority number of €23,300. Assuming that the state will pay a pension of €12,912, the actual pension from Irish Life will be €9,301 (i.e. €22,213 - €12,912).

We also run the numbers on the Zurich calculator. An annual contribution for the first year of €7,000 (same as Rachel) gives an annual pension of €22,560, which is also only slightly different to the pensions Authority number of €23,400. Assuming that the state will pay a pension of €12,912, the actual pension from Zurich will be €9,648 (i.e. €22,560 - €12,912).

It is surprising to see such close alignment between the output numbers from the first three calculators shown in Figure 31, even allowing for actuarial standard of practice rules. Each calculator seems to arrive at more or less the same annual pension even though the assumptions published in the small print differ a bit. These pension amounts are less than half of what Rachel should be getting if she were living in the USA and paying low Index Tracker fees (€22,464, as outlined in the raw calculations in section 8.0 and Appendix 7).

Calculator	Pension contribution in first years (2021)	Pensions to be drawn down in 2057	Notes
Pensions Authority	€7,000	€10,488	See Appendix 8 for assumptions and screenshots
Irish Life	€7,000	€9,301	See Appendix 8 for assumptions and screenshots
Zurich	€7,000	€9,648	See Appendix 8 for assumptions and screenshots
Low fee index Tracker (with realistic Annuity Rate)	€7,000	€22,462	See Appendix 7, and section 8.0 of this report

Figure 31 (all values stated in Present Value of money i.e. 2021)

Online calculators are very quick to 'bundle' the state pension with the private pension. This must be confusing for many investors, who may believe that a starting contribution of say €7,000 per annum will buy them a pension of circa €23K per annum, when in fact it will only buy them circa €10K per annum; because €13K (i.e. €12,912) of this will come from the state and has absolutely nothing to do with their private pension. This practice of bundling should be discontinued (or at least made fully transparent).

It is perhaps understandable how Irish Life and Zurich arrive at their outputs, after all they are internationally owned organisations which are out to make a profit. However, the Pensions Authority key drivers are highly conservative in terms of the annuity rate and growth rate it is using and highly generous on the matter of industry fees & charges it is willing to accept. Given our ageing demographics there is a strong likelihood that by 2050 the state will not be able to maintain pension at current levels, but the Pensions Authority calculator is assuming that it will (i.e. at its Present Value of €13k). In the long term this approach is heading for the perfect storm, resulting in win-win for the industry and lose-lose for Irish society.

Important notes:

1. It is not easy to compare one calculator exactly with another, unless all of the key drivers and assumptions are clearly stated, along with the exact construction of the calculations. For example the author is assuming that 37 investment years exist between 2021 and 2057, because both 2021 and 2057 are taken as full investment years. Some calculators may only count this as 36 years. In any event this is not a big issue, because the 2056 outputs can be read from the calculator in the event that the investor may like to retire a year earlier, etc.
2. The Pensions Authority calculator assumes that the spouse of the investor will get a pension amounting to 50% of the investor's.
3. Reading the 'assumptions' which accompanied these calculators, the Gross annual Investment Returns vary from calculator to calculator. Zurich assumes that the annual investment returns will be 4.2%, whereas The Pensions Authority assumes they will be 4% initially (after expenses), before dropping to 3.7% in the last 10 years before retirement commences. Irish Life assumes that annual investment returns will be 5% before retirement commences. The long term historic data of international indices (some of which back over one hundred years) shows that the gross annual investment returns are closer to 7% to 8% (with 6% being a conservative working percentage). This can be verified by for example referring to the 'Matrix Book' which is updated and published annually be Dimensional (available online). In this context using a growth rate as low as 3.7% may be close to half what is actually happening. It is difficult to know for certain if it growth rate applied by the Pensions Authority is before or after fees are charged.

11.0 The Macro picture

The 2019 data in Figure 32 (in green) was published by Revenue[18] in 2020. The data in blue was calculated from the green Revenue data.

Range of gross Income €	Number of Income Earners	Gross Pay €	Employee Pension Contributions €	% breakdown of the 875,500 Income Earners		% of employee Gross Pay contributed to pension
				%	Cumulative %	
0 to 5,000	10,700	27,540,000	990,000	1.22%	1.22%	3.59%
5,001 to 10,000	14,900	113,610,000	3,450,000	1.70%	2.92%	3.04%
10,001 to 15,000	20,200	254,520,000	8,040,000	2.31%	5.23%	3.16%
15,001 to 20,000	27,500	485,010,000	16,790,000	3.14%	8.37%	3.46%
20,001 to 25,000	38,800	880,280,000	31,500,000	4.43%	12.80%	3.58%
25,001 to 30,000	57,600	1,586,780,000	57,580,000	6.58%	19.38%	3.63%
30,001 to 35,000	71,400	2,325,800,000	91,010,000	8.16%	27.54%	3.91%
35,001 to 40,000	87,800	3,303,070,000	134,570,000	10.03%	37.57%	4.07%
40,001 59 45,000	80,500	3,416,340,000	147,730,000	9.19%	46.76%	4.32%
45,001 to 50,000	66,800	3,168,710,000	145,270,000	7.63%	54.39%	4.58%
50,001 to 60,000	112,200	6,147,710,000	308,290,000	12.82%	67.21%	5.01%
60,001 to 70,000	88,000	5,698,360,000	320,110,000	10.05%	77.26%	5.62%
70,001 to 80,000	59,000	4,398,400,000	254,120,000	6.74%	84.00%	5.78%
80,001 to 90,000	40,100	3,394,150,000	198,570,000	4.58%	88.58%	5.85%
90,001 to 100,000	25,200	2,381,840,000	138,860,000	2.88%	91.46%	5.83%
100,001 to 125,000	32,400	3,587,140,000	213,310,000	3.70%	95.16%	5.95%
125,000 to 150,000	15,700	2,138,080,000	130,930,000	1.79%	96.95%	6.12%
150,001 to 200,000	13,500	2,313,050,000	140,180,000	1.54%	98.49%	6.06%
200,001 to 250,000	5,800	1,297,850,000	76,840,000	0.66%	99.15%	5.92%
250,001 to 300,000	3,200	858,330,000	47,780,000	0.37%	99.52%	5.57%
>300,000	4,200	2,308,350,000	87,600,000	0.48%	100%	3.79%
Total:	**875,500**	**50,084,920,000**	**2,553,520,000**	100%		4.71% Average
		Employer Pension Contribution €	**1,960,000,000**			
		Total Pension Contribution €	**4,513,520,000**			

Figure 32

It is interesting to note that in 2019 circa 54% of employees earned below €50,001 per annum and about 8.5% of the working population earned greater than €100,000 per annum. On average employees contributed between circa 3% and 6% of their gross pay towards their pension (with the overall average being 4.71%). The combined contribution by employees and employers toward private pension schemes was €4.513Bn. This works out as 9% of the total gross pay of €50.085Bn. Therefore, the employers contribution was 4.29% (i.e. 9% - 4.71% = 4.29%).

From Figure 32 it can be seen that employees on lower incomes contribute a smaller percentage of their gross pay towards pensions than those higher up the income scale. Clearly this needs to be taken into account before performing the macro calculations, as it would not make sense to apply the combined contribution of 9% to everybody. For example, employees on an income scale of €0 to €5,000 are contributing 3.59% of their income towards their pension, which is less than the average of 4.71% for the entire population of investors. Therefore, the 'Real' percentage needs to be calculated, to take into account that for say those on the €0 to €5,000 income range, both the individual and the employer are contributing less than the average of 9%. The calculation for this group is:

(9%/4.71%) x 3.59% = 6.87% i.e. 'Real' % Gross Pay Contributed

Figure 33 shows the data for all of these 'Real' calculations for the entire range of incomes.

A second example, for those on the income scale of €80,000 to €90,000 who are contributing 5.85% of their income towards their pension, which is more than the average of 4.71% for the entire population of investors. Therefore, the 'Real' percentage needs to be calculated, to take into account that both the individual and the employer are contributing more than the average of 9%. The calculation for this group is:

(9%/4.71%) x 5.85% = 11.18% i.e. 'Real' % Gross Pay Contributed

Range of gross Income €	Number of Income Earners	% of employee Gross Pay contributed to pension	Real' % Gross Pay contributed to pension by employee & employer
0 to 5,000	10,700	3.59%	6.87%
5,001 to 10,000	14,900	3.04%	5.81%
10,001 t0 15,000	20,200	3.16%	6.04%
15,001 to 20,000	27,500	3.46%	6.62%
20,001 to 25,000	38,800	3.58%	6.84%
25,001 to 30,000	57,600	3.63%	6.94%
30,001 to 35,000	71,400	3.91%	7.48%
35,001 to 40,000	87,800	4.07%	7.79%
40,001 to 45,000	80,500	4.32%	8.27%
45,001 to 50,000	66,800	4.58%	8.76%
50,001 to 60,000	112,200	5.01%	9.59%
60,001 to 70,000	88,000	5.62%	10.74%
70,001 to 80,000	59,000	5.78%	11.05%
80,001 to 90,000	40,100	5.85%	11.18%
90,001 to 100,000	25,200	5.83%	11.15%
100,001 to 125,000	32,400	5.95%	11.37%
125,001 to 150,000	15,700	6.12%	11.71%
150,001 to 200,000	13,500	6.06%	11.59%
200,001 to 250,000	5,800	5.92%	11.32%
250,001 to 300,000	3,200	5.57%	10.64%
>300,000	4,200	3.79%	7.26%
Total:	875,500	4.71% Average	9.00% Average

Figure 33

The data in Figure 33 is now incorporated into Figure 34 and the size of the final pot is calculated twice for each salary segment (using the pension calculator), the first time when the fees are 3% and again when the fees are 0.2%.

Real' % Gross Pay contributed to pension by employee & employer	Range of gross Income €	Number of Income Earners	€ Fund value if fees are 3%	€ Fund value if fees are 0.20%	€ Total loss per individual	€ Gross loss
6.87%	0 to 5,000	10,700	16,821	30,537	13,716	146,761,200
5.81%	5,001 to 10,000	14,900	42,676	77,476	34,800	518,520,000
6.04%	10,001 t0 15,000	20,200	73,942	134,238	60,296	1,217,979,200
6.62%	15,001 to 20,000	27,500	113,460	205,979	92,519	2,544,272,500
6.84%	20,001 to 25,000	38,800	150,725	273,631	122,906	4,768,752,800
6.94%	25,001 to 30,000	57,600	186,913	339,328	152,415	8,779,104,000
7.48%	30,001 to 35,000	71,400	238,085	432,227	194,142	13,861,738,800
7.79%	35,001 to 40,000	87,800	286,098	519,393	233,295	20,483,301,000
8.27%	40,001 to 45,000	80,500	344,224	624,916	280,692	22,595,706,000
8.76%	45,001 to 50,000	66,800	407,515	739,818	332,303	22,197,840,400
9.59%	50,001 to 60,000	112,200	516,568	937,796	421,228	47,261,781,600
10.74%	60,001 to 70,000	88,000	683,697	1,241,208	557,511	49,060,968,000
11.05%	70,001 to 80,000	59,000	811,652	1,473,501	661,849	39,049,091,000
11.18%	80,001 to 90,000	40,100	930,694	1,689,615	758,921	30,432,732,100
11.15%	90,001 to 100,000	25,200	1,037,396	1,883,326	845,930	21,317,436,000
11.37%	100,001 to 125,000	32,400	1,252,735	2,274,259	1,021,524	33,097,377,600
11.71%	125,001 to 150,000	15,700	1,576,909	2,862,771	1,285,862	20,188,033,400
11.59%	150,001 to 200,000	13,500	1,986,404	3,606,189	1,619,785	21,867,097,500
11.32%	200,001 to 250,000	5,800	2,494,452	4,528,516	2,034,064	11,797,571,200
10.64%	250,001 to 300,000	3,200	2,865,633	5,202,371	2,336,738	7,477,561,600
7.26%	>300,000 (say €325k)	4,200	2,310,820	4,195,145	1,884,325	7,914,165,000
Average 9%	**Total**	**875,500**				**386,577,790,900**

Figure 34

So for example for investors who are in the salary range €0 to €5,000 (taking the mid-point salary of €2,500) we see that the retirement pension pot will be €16,821 if the fees are 3%, but could be €30,537 if the fees are curtailed to 0.2%. Therefore, the potential loss is €13,716 for each individual (i.e. €30,537 - €16,821 = €13,716). When we multiply this by the 10,700 investors we reach a total loss of €146.76 million for this segment, over the 37 year investment period.

These losses of €386 Billion assume that in future each investor will contribute 9% (average) of their gross income annually to their pension until 2057 (i.e. 37 years). However, we are constantly being reminded that as a society we are not contributing enough. Under the proposed Auto Enrolment scheme (due to commence in circa 2022?) the government is encouraging us to target 14% of our income (6% employee, 6% employer, 2% government = 14%). In practice some people will invest much more than 14% because they can afford to do so, especially if their employer is willing to make generous contributions. Therefore, we will run the calculations again for the 875,500 investors, showing an average future Gross Contribution amount of 14% rather than the present 9%. The data from these calculations is shown in Figure 35.

'Projected' % Gross Pay contributed to pension by employee & employer	Range of gross Income €	Number of Income Earners	€ Fund value if fees are 3%	€ Fund value if fees are 0.20%	€ Total loss per individual	€ Gross loss
14.00%	0 to 5,000	10,700	34,278	62,229	27,951	299,075,700
14.00%	5,001 to 10,000	14,900	102,834	186,688	83,854	1,249,424,600
14.00%	10,001 t0 15,000	20,200	171,390	311,147	139,757	2,823,091,400
14.00%	15,001 to 20,000	27,500	239,945	435,605	195,660	5,380,650,000
14.00%	20,001 to 25,000	38,800	308,501	560,064	251,563	9,760,644,400
14.00%	25,001 to 30,000	57,600	377,057	684,523	307,466	17,710,041,600
14.00%	30,001 to 35,000	71,400	445,613	808,981	363,368	25,944,475,200
14.00%	35,001 to 40,000	87,800	514,169	933,440	419,271	36,811,993,800
14.00%	40,001 to 45,000	80,500	582,724	1,057,898	475,174	38,251,507,000
14.00%	45,001 to 50,000	66,800	651,280	1,182,357	531,077	35,475,943,600
14.00%	50,001 to 60,000	112,200	754,114	1,369,045	614,931	68,995,258,200
14.00%	60,001 to 70,000	88,000	891,225	1,617,962	726,737	63,952,856,000
14.00%	70,001 to 80,000	59,000	1,028,337	1,866,880	838,543	49,474,037,000
14.00%	80,001 to 90,000	40,100	1,165,449	2,115,797	950,348	38,108,954,800
14.00%	90,001 to 100,000	25,200	1,302,560	2,364,714	1,062,154	26,766,280,800
14.00%	100,001 to 125,000	32,400	1,542,506	2,800,319	1,257,813	40,753,141,200
14.00%	125,001 to 150,000	15,700	1,885,285	3,422,613	1,537,328	24,136,049,600
14.00%	150,001 to 200,000	13,500	2,399,453	4,356,052	1,956,599	26,414,086,500
14.00%	200,001 to 250,000	5,800	3,085,011	5,600,639	2,515,628	14,590,642,400
14.00%	250,001 to 300,000	3,200	3,770,569	6,845,225	3,074,656	9,838,899,200
14.00%	>300,000 (say €325k)	4,200	4,456,127	8,089,812	3,633,685	15,261,477,000
Ave 14%	**TOTAL**	**875,500**				**551,998,530,000**

Figure 35

Therefore the potential savings, for the cohort of the 875,500 investors, will be in the range €386Bn to €551 Bn.

In this paper it is assumed that a typical pension will take 37 years to accumulate (but in practice this will vary significantly). As shown in Figure 36 (in green) a new pension which is started in 2021 will mature in 2057; a new pension started in 2022 will mature in 2058, etc.

Clearly all 875,500 existing pension holders will not mature in the same year (the existing pension investors are shown in blue). In fact a good estimate is that 1/37th of the 875,500 will mature each year (about 23,600 per annum). Please note that these are working estimates and a closer examination should be performed by a government appointed body to obtain more precise data. Logically some pensions will mature in 2021, while another batch will mature in 2022, and another batch in 2023, etc. Clearly, if the funds in these pensions are 'intercepted' and transferred from high fee to low fee structures, significant losses will be averted. As shown in blue in Figure 36 a fund which is due to mature in 2022, and is intercepted in 2021, will save on one year of high fees. A fund due to mature in 2023, and is intercepted in 2021, will save on two years of high fees, etc. These fees are significant, because in the latter years, the pension fund is climbing towards its maximum. So for example 3% annual fees will be circa €9k in the final year for a fund of €300,000. Another example, fees of 3% for an existing fund of €700,000, for an employee earning €80,000 per annum, will add up to a staggering €121k over the last five years approaching retirement age. Therefore, there is a huge opportunity to minimise losses by diverting funds from high fee to low fee structures.

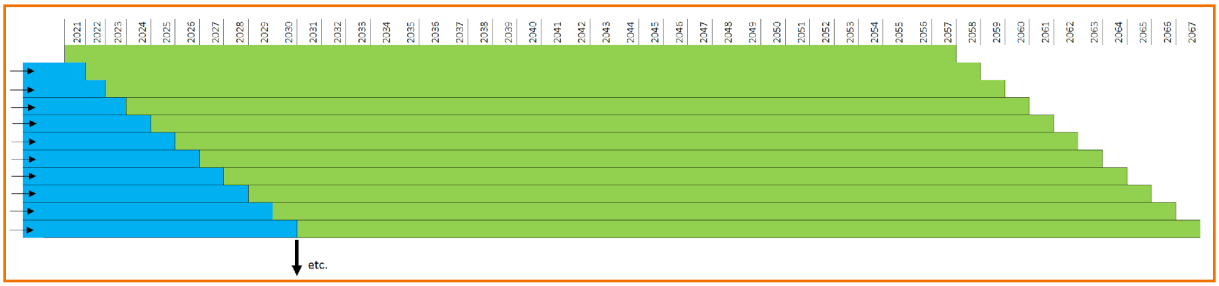


Figure 36

The author therefore concludes that that part of the savings to be made between 2021 and 2057 (in the range of €386 Billion to €551 Billion, as outlined in Figures 34 & 35) will be brought about from existing pension investors who transfer from high fee managed funds to low fee passive funds.

Of the remaining circa 1.1 million employees who do not currently invest in a private pension, it is not clear how many will opt out of Auto Enrolment. While experience in other countries indicate that about 90% remain in the pension scheme after Auto Enrolment, in practice some of the people targeted by Auto Enrolment will be earning close to the minimum wage, perhaps on a part-time basis. Therefore, many will fall below the minimum income threshold which will make them eligible for Auto Enrolment. For the purpose of this exercise it is assumed that 410,000 additional people will take out pensions as a result of the government's Auto Enrolment initiative (this number is highlighted in Figure 1. i.e. 410,000 was put forward in the Department of Employment Affairs and Social Protection (2018) -Strawman Proposal); but the total number could be more than this, possibly as high as 600,000.

A breakdown of the additional cohort of 410,000 investors (i.e. those who will be recruited through Auto Enrolment) is shown in Figure 37. The author is not aware of any published data which outlines how the 410,000 income earners will be distributed across the income range. Therefore, the author has made an 'educated' estimate of this; assuming that the vast bulk (351,000 = 85%) will fall into the income range between €20,000 and €80,000. You can see that the average 9% growth rate is used in Figure 37, which shows that over a 37 year investment period the total loss in wealth as a result of high fees for this additional 410,000 pension investors will be circa €160 Billion.

'Real' % Gross Pay contributed to pension by employee & employer	Range of gross Income €	Number of Income Earners	€ Fund value if fees are	€ Fund value if fees are	€ Total loss per individual	€ Gross loss
			3%	0.20%		
6.87%	0 to 5,000	1000	16,821	30,537	13,716	13,716,000
5.81%	5,001 to 10,000	2000	42,676	77,476	34,800	69,600,000
6.04%	10,001 t0 15,000	5000	73,942	134,238	60,296	301,480,000
6.62%	15,001 to 20,000	8000	113,460	205,979	92,519	740,152,000
6.84%	20,001 to 25,000	16000	150,725	273,631	122,906	1,966,496,000
6.94%	25,001 to 30,000	20,000	186,913	339,328	152,415	3,048,300,000
7.48%	30,001 to 35,000	25,000	238,085	432,227	194,142	4,853,550,000
7.79%	35,001 to 40,000	50,000	286,098	519,393	233,295	11,664,750,000
8.27%	40,001 to 45,000	80,000	344,224	624,916	280,692	22,455,360,000
8.76%	45,001 to 50,000	65,000	407,515	739,818	332,303	21,599,695,000
9.59%	50,001 to 60,000	65,000	516,568	937,796	421,228	27,379,820,000
10.74%	60,001 to 70,000	20,000	683,697	1,241,208	557,511	11,150,220,000
11.05%	70,001 to 80,000	10,000	811,652	1,473,501	661,849	6,618,490,000
11.18%	80,001 to 90,000	10,000	930,694	1,689,615	758,921	7,589,210,000
11.15%	90,001 to 100,000	10,000	1,037,396	1,883,326	845,930	8,459,300,000
11.37%	100,001 to 125,000	9,000	1,252,735	2,274,259	1,021,524	9,193,716,000
11.71%	125,001 to 150,000	5,000	1,576,909	2,862,771	1,285,862	6,429,310,000
11.59%	150,001 to 200,000	3,000	1,986,404	3,606,189	1,619,785	4,859,355,000
11.32%	200,001 to 250,000	2,000	2,494,452	4,528,516	2,034,064	4,068,128,000
10.64%	250,001 to 300,000	2,000	2,865,633	5,202,371	2,336,738	4,673,476,000
7.26%	>300,000	2,000	2,310,820	4,195,145	1,884,325	3,768,650,000
Ave 9%	**TOTAL**	**410,000**				**160,902,774,000**

Figure 37

For completeness, we should also run the calculations assuming that the projected % Gross Pay contributed by employees and employers may increase to 14% (in line with government targets; 6% employee, 6% employer, 2% government = 14%). Therefore, Figure 38 shows the calculations for the 410,000 investors, showing an average future Gross Contribution amount of 14%.

'Projected' % Gross Pay contributed to pension by employee & employer	Range of gross Income €	Number of Income Earners	€ Fund value if fees are	€ Fund value if fees are	€ Total loss per individual	€ Gross loss
			3%	0.20%		
14.00%	0 to 5,000	1000	34,278	62,229	27,951	27,951,000
14.00%	5,001 to 10,000	2000	102,834	186,688	83,854	167,708,000
14.00%	10,001 t0 15,000	5000	171,390	311,147	139,757	698,785,000
14.00%	15,001 to 20,000	8000	239,945	435,605	195,660	1,565,280,000
14.00%	20,001 to 25,000	16000	308,501	560,064	251,563	4,025,008,000
14.00%	25,001 to 30,000	20,000	377,057	684,523	307,466	6,149,320,000
14.00%	30,001 to 35,000	25,000	445,613	808,981	363,368	9,084,200,000
14.00%	35,001 to 40,000	50,000	514,169	933,440	419,271	20,963,550,000
14.00%	40,001 to 45,000	80,000	582,724	1,057,898	475,174	38,013,920,000
14.00%	45,001 to 50,000	65,000	651,280	1,182,357	531,077	34,520,005,000
14.00%	50,001 to 60,000	65,000	754,114	1,369,045	614,931	39,970,515,000
14.00%	60,001 to 70,000	20,000	891,225	1,617,962	726,737	14,534,740,000
14.00%	70,001 to 80,000	10,000	1,028,337	1,866,880	838,543	8,385,430,000
14.00%	80,001 to 90,000	10,000	1,165,449	2,115,797	950,348	9,503,480,000
14.00%	90,001 to 100,000	10,000	1,302,560	2,364,714	1,062,154	10,621,540,000
14.00%	100,001 to 125,000	9,000	1,542,506	2,800,319	1,257,813	11,320,317,000
14.00%	125,001 to 150,000	5,000	1,885,285	3,422,613	1,537,328	7,686,640,000
14.00%	150,001 to 200,000	3,000	2,399,453	4,356,052	1,956,599	5,869,797,000
14.00%	200,001 to 250,000	2,000	3,085,011	5,600,639	2,515,628	5,031,256,000
14.00%	250,001 to 300,000	2,000	3,770,569	6,845,225	3,074,656	6,149,312,000
14.00%	>300,000	2,000	4,456,127	8,089,812	3,633,685	7,267,370,000
Ave 14%	**TOTAL**	**410,000**				**241,556,124,000**

Figure 38

The potential savings, for the cohort of the 410,000 investors, will be in the range €160Bn to €242 Bn (as shown in Figures 37 & 38). The author is ignoring the tapered growth in pension contributions which is proposed for the Auto Enrolment scheme (i.e. it may take 8 to 10 years for the full 14% contributions to be in place).

All of the potential losses outlined in Figures, 34, 35 & 37,38 are brought together in Figure 39.

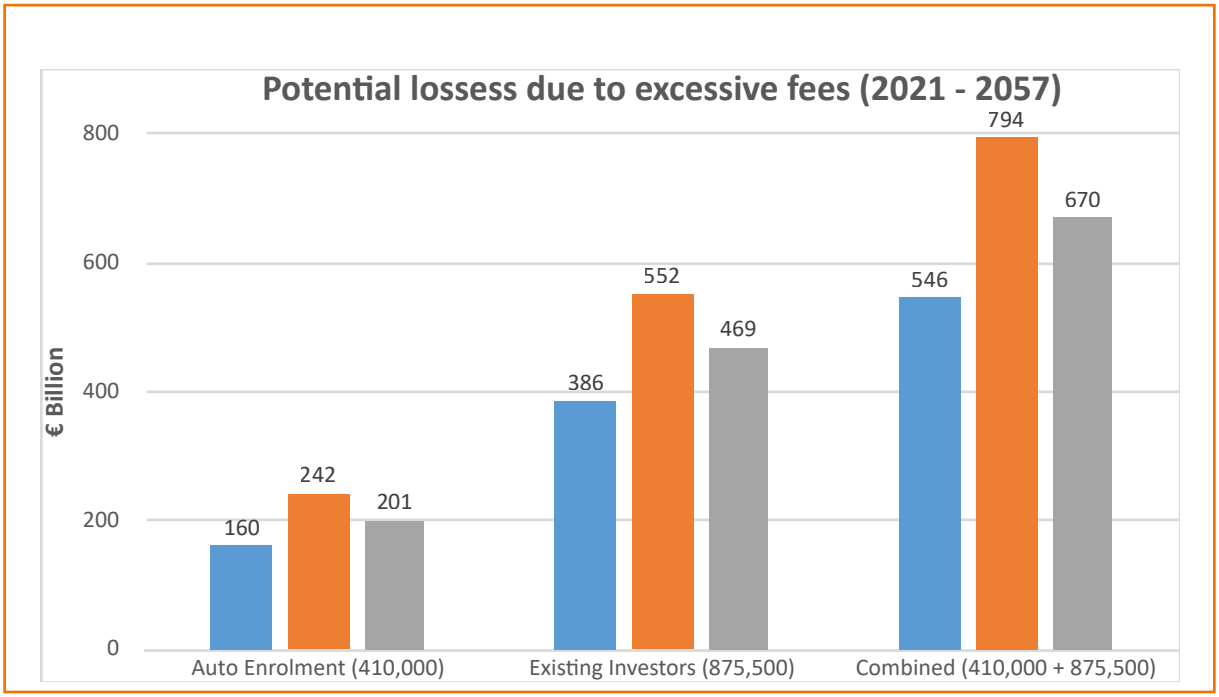


Figure 39

We can see that the losses for the 410,000 Auto Enrolment investors is likely to be in the range of €160 Bn to €242 Bn (average €201 Bn). The losses for the existing 875,500 pension investors is likely to be in the range €386 Bn to €552 Bn (average €469 Bn).

Combining the 410,000 cohort with the 875,500 cohort, we see that the total losses are likely to be in the range €546 Bn to €794 Bn (average €670 Bn). By any standards €670 Bn is a staggering amount of money to deprive Irish society of, and worth fighting for.

We can convert this to the 2021 value of money:

$$\text{Present Value} = \frac{\text{€670 Billion}}{(1 + 0.025)^{37}}$$

Present Value = €268 Billion (Compare this to the national debt which is likely to be circa €240 Billion at the end of 2021)

Clearly, the benefits of slashing pension fees will not finish in 2057, in fact they will only be beginning. There will be little by way of visible rewards before 2057 because all of the money will be accumulating (locked-up) in the pension funds, waiting for the investors to retire (unless, as already discussed, existing pension investors are facilitated to break-out of their existing high fee pension arrangements before retirement age and transfer to low fee index trackers). But after 2057 the funds will begin releasing their wealth, which will ultimately flow into all aspects of Irish society, and the Irish exchequer will get its cut through income tax, VAT, inheritance tax, etc. Therefore the years between now and 2057 can be viewed as 'priming the pump'.

If we slash the pension fees/costs now, we will have an extra €670+/- Billion in the tank by 2057. This paper has been put forward on the basis that an average investor will contribute between 9% and 14% of their salary towards their pension over a 37 year period (but the amount and duration will vary for each individual). Therefore by 2057, $1/37^{th}$ of the €670 Billion will be delivered in extra wealth to people retiring at the end of that year. So $1/37^{th}$ of the €670 Billion is circa €18 Billion extra in 2057 (this is worth €7.2 Billion in terms of 2021 money: $€18x10^9/1.025^{37}$ = €7.2 Bn). Of course there will be another €7.2 Billion in 2058, and another €7.2 Billion in 2059, and another extra €7.2 Billion in 2060, etc.

Our choice is to install this new pump now (i.e. low fee Index Tracker model) and after 37 strokes of the handle (i.e. years invested) we will have reached a stage where each additional stroke will deliver an extra €7.2 Billion (2021 value), which will continue to flow in each subsequent year.

12.0 Impact on the Pensions Industry

Many of the players involved in the pensions industry (as outlined in Figure 15) believe that the existing structure is what is best for Irish society, and that thousands of jobs in the financial services sector could be lost if the low fee investment model is adapted on a widespread basis.

This is a very weak argument for a number of reasons:

1. The industry is not entitled to an income at the expense of investors.
2. Many of the businesses who give pensions advice also provide other services, such as (a) Life Insurance (b) Income Protection (c) Financial Planning (d) Serious Illness cover (e) General investments (f) Mortgage Protection (g) Mortgages. Therefore there is significant scope for them to diversify into other areas of the business, and it is therefore unlikely that there will be significant job losses.
3. The financial services sector has an ongoing demand for experienced staff in other areas of the industry. So if some financial advisors/brokers find that their income diminishes because of the movement into Index Trackers, these individuals should seek employment into other areas of the industry. This is the way modern economies operate, people constantly retrain and move into new roles as demand for their existing services changes.

However, for the sake of this exercise let us assume that a low fees pension model will result in 5,000 job losses in Ireland. This is highly unlikely but it worth asking the 'what if' question and examining the cost/benefit implications if this did happen. Typically the Industrial Development Authority (IDA) pay an incentive of about €10,000 per job to attract new industries to Ireland (i.e. Foreign Direct Investment). Therefore, the total cost of replacing these 5,000 jobs would be a €50 million once off payment i.e. 5,000 jobs x €10,000 per job = €50 million. Therefore, the Benefit of implementing these changes would be €670 Billion (i.e. €268 Billion expressed in 2021 value of money) as outlined in section 11.0 and the cost would be €50 million. This represent a Benefit to Cost ratio of circa 5,360 to 1. These numbers are compelling. The sooner we move our pension investment into low fee Index Trackers the better.

13.0 Adequacy and Sustainability of Pensions

Some people argue that the State should be the primary provider of pensions in Ireland, and they point to Scandinavia as a model that we should follow. In practice the Irish state is the main pensions provider for the vast majority of people, whether they are employed in the public service or in the private sector. This is outlined in section 1.0 of this report, and summarised in Figure 1. Cleary an income of circa €13,000 per annum is not enough to live on comfortably in the autumn of our lives.

The Melbourne Mercer Global Pension Index (MMGPI) looks at the pension schemes in various countries around the world, monitoring these schemes in terms of 'Adequacy' and 'Sustainability', revealing who is the most and who is the least prepared to meet the pension challenge. The most recent Report (2018)[19] looked at 34 countries, and Figure 40 shows the 'Adequacy versus Sustainability' ratings for these 34 global pension systems.

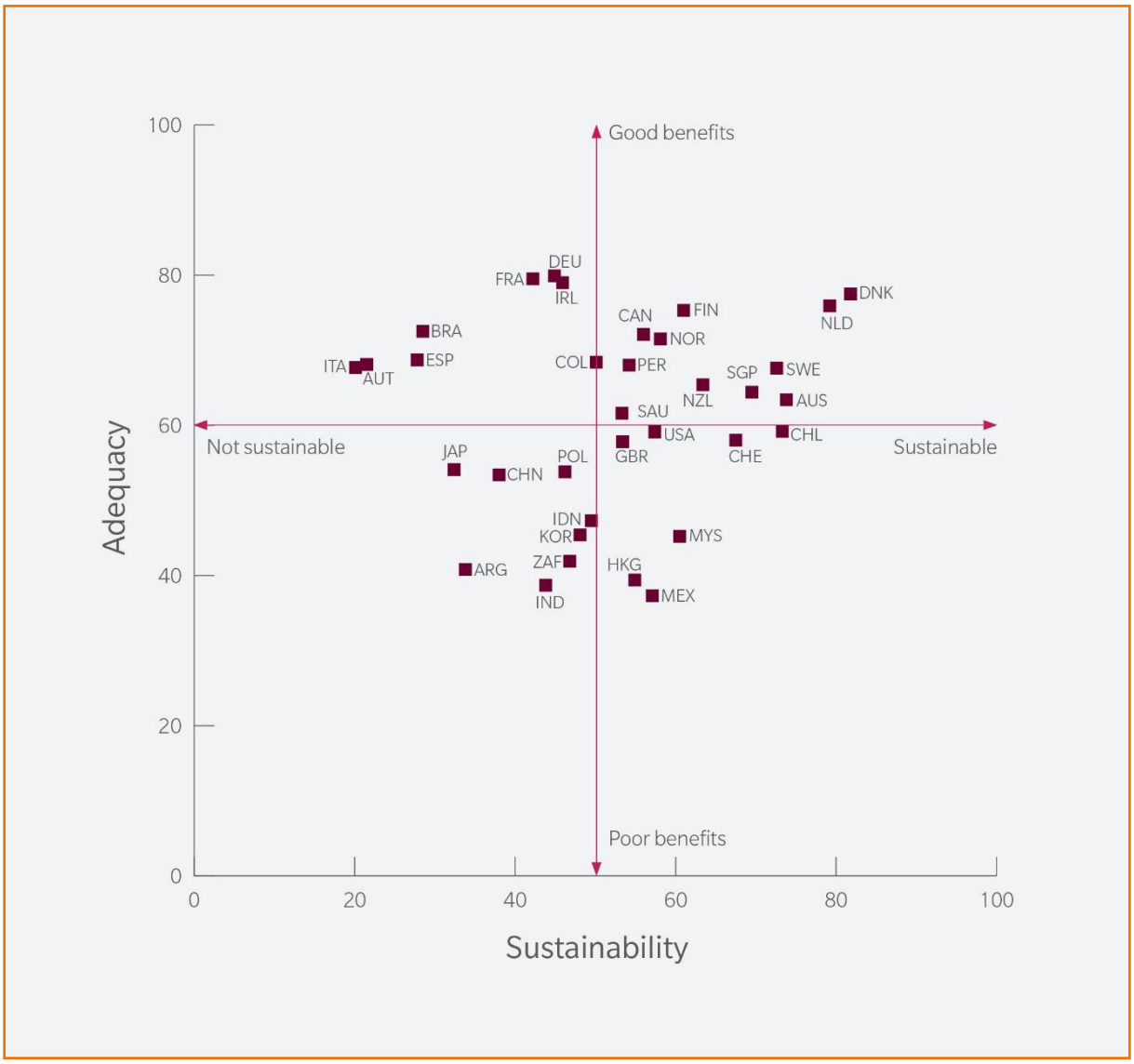


Figure 40

Denmark and The Netherlands are the front runners (i.e. both of these countries are located in the top right quadrant, demonstrating both Adequacy and Sustainability). Both of these have been classified as 'A-Grade world class retirement income systems with good benefits - clearly demonstrating their preparedness for tomorrow's ageing world'.

This topic was discussed in the Irish Times[20] in October 2018, as highlighted in Figure 41 below:

> Achieving a "B" rating, Ireland was placed behind top-ranked Netherlands, Finland and Australia, but ahead of Germany (13th), the UK (14th) and France (16th). The Irish system scored highly for both the adequacy of the expected benefits and the standards of governance applied.
>
> However, Danny Mansergh, head of member communications at Mercer in Ireland, said Ireland's "moderately respectable" ranking, does not "tell the full story".
>
> The underlying truth is that Ireland provides a comparatively generous State pension, but also one that is set to come under serious fiscal strain as the population ages rapidly between now and 2050," he said.
>
> Indeed, Ireland was only placed 24th, with a D rating, when it came to sustainability, and the report highlighted Ireland's rapidly ageing population. The ratio of workers to pensioners is set to fall from 5:1 today to 2:1 by 2050, and this is compounded by the country's low level of pension coverage. Figures from the Central Statistics Office show that less than 50 per cent of the population have a private occupational pension.
>
> *Over-reliance*
> "It is clear that over-reliance on Ireland's comparatively generous State pension must be addressed," the report said.

Figure 41 *Source: Irish Times, October 2018*

In addition to 'Adequacy' and 'Sustainability', the MMGPI report highlights a third key element of the debate which is now emerging, i.e. 'Coverage', which refers to the proportion of the adult population participating in the pension system. As already discussed Ireland is already preparing to tackle this issue, by introducing 'Auto-Enrolment' in 2022.

Using Figure 40 as a reference framework, at present Ireland is supplying its citizens with an 'Adequate' pension (circa €13k max for citizens who do not qualify for a public sector pension). By comparison to the other countries it is up there as one of the best in the world (even though most people would agree that one will not be living the high-life on €13k per annum).

But it is clear from the MMGPI report that this €13k is not 'Sustainable' therefore it is likely to decrease in real terms between now and 2050 (and beyond). Our society has an opportunity to do things better so that our position transitions from the top left to the top right quadrant. If we get is wrong it is likely that we will drift towards the bottom left quadrant. This is the nightmare situation, where our older people will be surviving on inadequate pensions and those who are still at work will be struggling to sustain them.

Of course, part of the solution is to achieve more 'Coverage', and Auto-Enrolment will address this. However, it makes no sense to squander the opportunity to maximise gains by allowing excessive fees to be charged on our pensions, ironically transferring our wealth to citizens of other counties who have a higher pension ranking than Ireland. As the saying goes 'charity begins at home' and it is therefore incumbent on our government to urgently put structures in place to minimise our losses. This represent a huge opportunity cost for of Ireland.

14.0 Who should be the Custodian of the pension funds?

As a general observation the average woman or man in the street would not feel comfortable with the government looking after their individual pension investment pots, because they fear that the State may dip into their savings at any time, as it did when it introduced a temporary Pension levy in 2011, which peaked at 0.75% per annum in 2014-2015.

The justification for introducing this levy was that the country was in the midst of a serious international economic downturn which began in 2008. No doubt, this was short term thinking, but in fairness the government did discontinue the levy in 2016. The levy did have a small (but significant effect) on the size of pension funds, however this was minuscule by comparison to the massive effect that the annually 2% to 3% pension industry fees has when they are charged over the lifetime of a pension.

In any event the government does not need to have control of our actual pension bank account to extract a levy. It only has to introduce the necessary legislation and the money will be collected and passed on to the State by the pension fund managers. The point here is that it does not matter whether or not the state has a role to play as custodian of the pension finances to allow it to collect a levy.

It is ironic that many investors claim that they do not trust the state, even though many were very thankful that it was there to guarantee individual savings up to €100k when the banks collapsed in 2008. Older people are very happy to rely on the state for their €13k annual pension when they retire, and for many this will be their only source of income. During the ongoing Covid 19 crisis, the State has repeatedly intervened with significant financial supports for employees and businesses who were affected by the pandemic.

In reality the State is our ally, and logically the more money we have as individuals when we get older, the more money the government will have to spend on vital services. Many of us complain about the State services we receive, and indeed there is room for significant improvement in all aspects of public service. However, in terms of looking after our individual pension pots of money, the State is well capable of looking after these, and given that it could drive pension fees down as low as 0.2% annually, it would be a much better partner to have at our side as our society ages. Remember that in addition to having our €13k annual pension waiting for us when we retire, the State presently contributes 20%-40% of the annual private pension contributions each year (through 20%-40% tax relief). Therefore, the State is on our side and striving to maximise the returns.

For those in our society who are steadfast in their opposition to the State controlling their individual pension accounts, it would be very easy to introduce legislation to cede legal control of each pension pot to the individual owner, similar to the way that each individual owns their own bank account. In fact this is probably the best way forward, where each person legally owns their own pension pot, and the money is spread amongst a range of custodians just in case one of them goes bust.

15.0 Key Investor Decisions

Many pension funds offer their clients a choice between various investment approaches, by classifying them as “low risk”, “Medium Risk” or “High Risk”. Alternatively the risks associated with these funds may be on a scale of 1 to 5, where 1 is low risk and 5 is high risk.

In theory this approach offers the investor an element of choice. In practice this is a very flawed approach because:

1. The investor has no real insight into which investments will be successful. By making this choice they may feel that they are playing an important role in their long term financial outcome. In reality they are gambling.
2. The advisor also has no real insight into which investments will be successful in the future, and will be aware that low fee Index Trackers are the best option for the client (but provide a lower income for the advisor).

In his 2004 book “The Paradox of Choice” the American psychologist Barry Schwarts[21] highlights that offering too much choice to the consumer is not a good thing. For example in a large supermarket, where there are is a choice of say 80 shampoos, it can be very difficult for the customer to select which one is best. In effect the consumer is paralysed by choice, and often ends up buying something they have doubts about. On the other hand if the choice is limited to five shampoos, it is much easier for the shopper to make their selection. The pensions industry is very clever in the way that they offer customers a pretty straightforward choice (with risk levels of low, medium, high or 1,2,3,4,5).

While the investor may get a satisfied feeling from making their selection, in reality the choice they are being offered is a flawed one. It is not their role to gamble on which part of the stock market will perform best, because the data shows that over 85% of investing professionals get this wrong. Instead the choice offered should be whether they want to (i) invest in low fee Index Trackers with total fees of 0.2% or (ii) high fee managed funds.

The reader will be aware from previous sections of this report that in addition to time, three of the key drivers of long term investing are “Fees”, “Annual % growth” and the “Annuity Rate”. Logically, the higher the annual % growth rate and the longer the investment period, then the larger the size of the final pot. In addition if a high annuity rate is used, this means you get a larger annual income from your final pot, whereas if you use a low annuity rate (say 3%) you get a diminished annual pension when you retire.

Many of the investment funds, including the Pensions Authority, assume that a low annuity rate will be used (between 2% and 3%). In addition they advise investors to shift away from riskier investments in the years leading up to retirement. The logic (apparently) is that the investor does not want to see their retirement pot maturing in the middle of a stockmarket slump. Of course this mindset assumes that the investor will be purchasing an Annuity when they retire, which we have already seen is not a good long term option when compared to an ARF (Section 8.0).

Figure 42 shows two outcomes for Rachel, and earlier in the report you will have seen how this data was created. The data to create Outcome 1 is shown in Appendix 7, and indicates that if Rachel invests from age 32 in a low fee Index Tracker, she will have circa €1.25m in her pension pot when she retires at age 68. This will generate an annual pension income of €22,462 (that will grow in line with the consumer price index), which means that Rachel's pot will remain intact as she progresses through her retirement (i.e. this is why the line remains flat after retirement). As already discussed, Rachel will also receive the state pension of €12,912, however in this section we are focusing on how much she will get from her own pot, as the State pension is funded from an entirely different source.

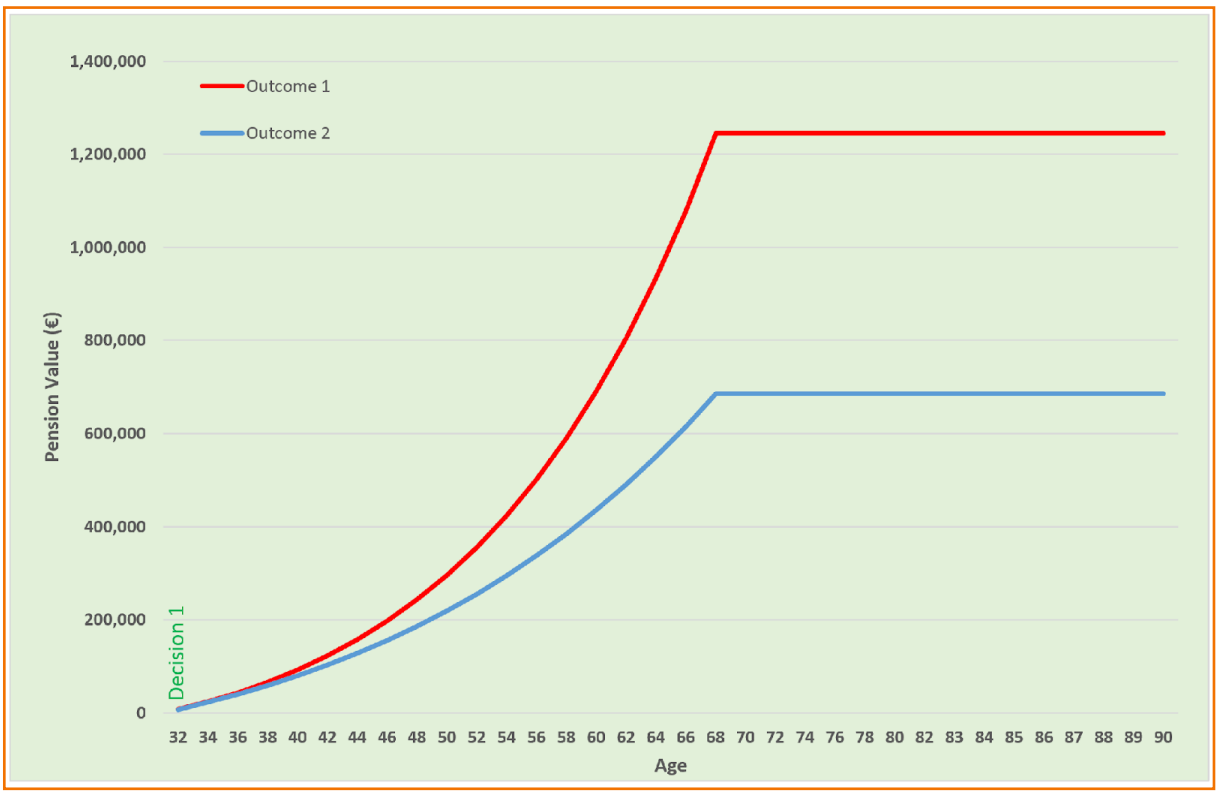


Figure 42

The data used to create Outcome 2, is shown in Appendix 5, and indicates that if Rachel invests from age 32 in a Managed Fund, she will have circa €686K in her pension pot when she retires at age 68. This will only generate an annual pension income of circa €12k (2021 value).

Rachel's first Decision, at age 32 as she begins her pension journey, will be whether she would like Outcome 1 or Outcome 2. This should be a very easy decision to make, because the sensible investor will opt for Outcome 1, given that it generates a final pension pot which is almost twice as large as Outcome 2.

Unfortunately for Rachel (and the other citizens of the Republic of Ireland) it is not possible to access the low fee (0.2% total) investments necessary to enable Outcome 1 to evolve. There is no good reason why these low fee Index Trackers are not available in Ireland, but unfortunately that is the case. Index Trackers are available in Ireland, but the fees are high. Investors in other countries are able to access these products at low fees (as low as 0.15% total). The Irish government needs to step in to facilitate this choice for Rachel, otherwise she (along with all the other Irish investors) will be locked out from Outcome 1 and condemned to follow the Outcome 2 trajectory.

In practice Rachel will have to make two other important investment decisions as she progresses towards retirement. These are highlighted as Decision 2 and Decision 3 in Figure 43.

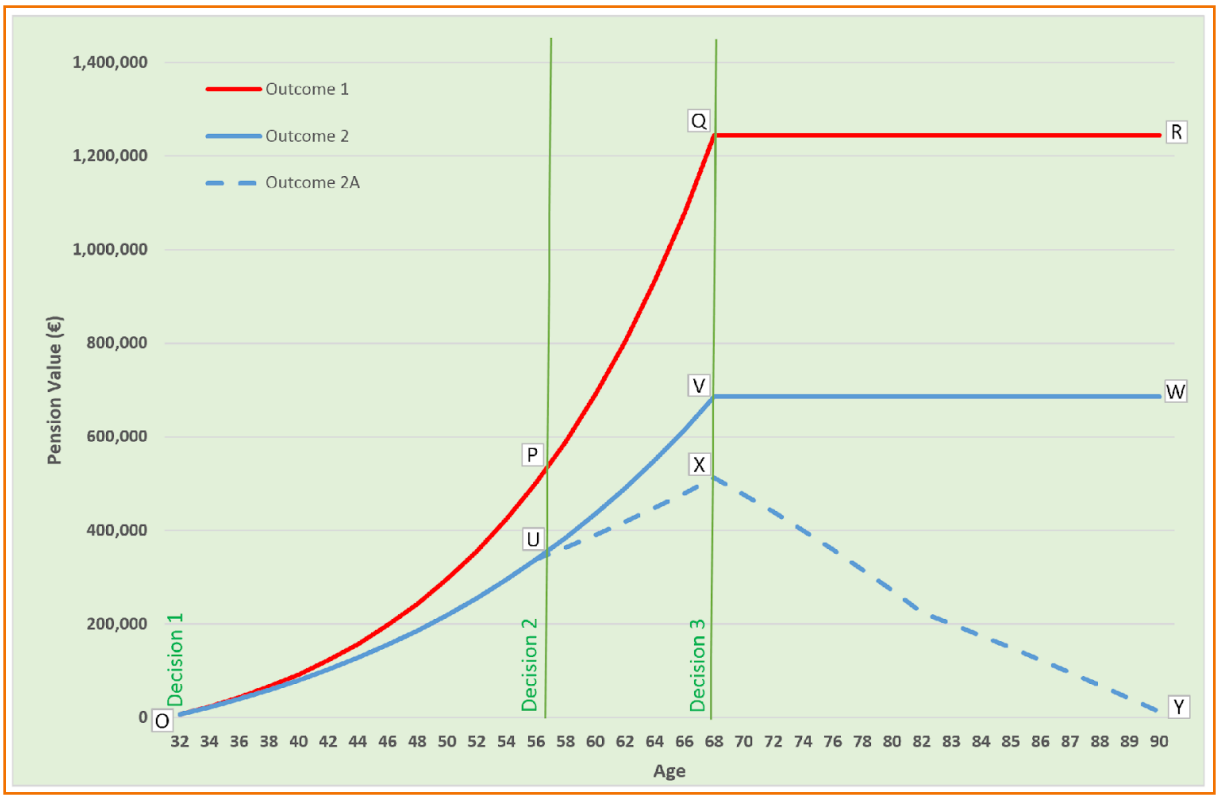


Figure 43

She will be faced with Decision 2 about a decade before her chosen retirement age, where her financial advisors will recommend that she shifts her funds into lower risk investments, the reasoning being that it is prudent to reduce risk exposure as the retirement date draws near (The Pensions Authority assumes that this will happen 10 years prior to retirement).

So when Rachel reaches point U she will be encouraged by her advisors to reduce her exposure away from so called 'riskier investments'. In effect she is being asked to move away from the U-V line, which reflects the 6% average growth in the stockmarket (with fees of 3% per annum) onto the U-X line, which reflects the smaller growth rate (say 3%) made up of stocks and bonds etc. (but still with fees of 3% per annum). The net effect is that Rachel's pot is not generating any net investment returns between U and X, because the returns are being eaten up by fees (i.e. 3% growth minus 3% fees = 0% growth). The only reason that the U-X line is still going upwards is because Rachel (along with her employer and of course the government through tax relief) are pumping money into the pension pot. Once Rachel reaches retirement age at point X, the contributions will cease (and the fund will only be worth €512K at point X, whereas it would have been worth €686K at point V).

At point X Rachel will have to make another decision, i.e. whether she wants to purchase an Annuity or draw her pension through an ARF. We have already shown that the ARF is much better, so there is not much of a decision to be made here. Therefore, after point X her fund will still continue to grow at say 3% annually (a continuation of the low risk investment strategy) but this will be eaten up by annual fees of 3%. Therefore the size of her pension pot will face a steady decline throughout her retirement years, as she draws money from it. The X-Y line shows that if Rachel draws a pension of circa €10,000 per annum from her private pension then all of her pension fund will be depleted by the time she reaches 90. If however she draws the €12,373 per annum (which, was discussed in section 8.0) she will run out of money by the time she is 82 (all drawings in terms of 2021 value of money). In effect Rachel has been channelled by the industry (most likely without her knowing it) into Outcome 2A, which for her was a really bad deal. By the time she reaches 90, she and her employer and the Irish State will have contributed €418,138 to her fund. This fund will have grown by a further €483,260 (i.e. pre and post retirement-age growth), but Rachel will only have benefited from €90,649 of this growth (throughout her entire lifetime), with the remaining €392,611 going as fees to the Pensions

Industry. About €119k of these fees will be incurred after Rachel retired at age 68. These are truly shocking numbers. This data is shown in Appendix 10 and is used to populate the graph in Figure 44. (i.e. it shows that Rachel takes a pension of €12,373 after she retires at age 68, and the graph stops at age 82 because all of her pension pot has been used up).

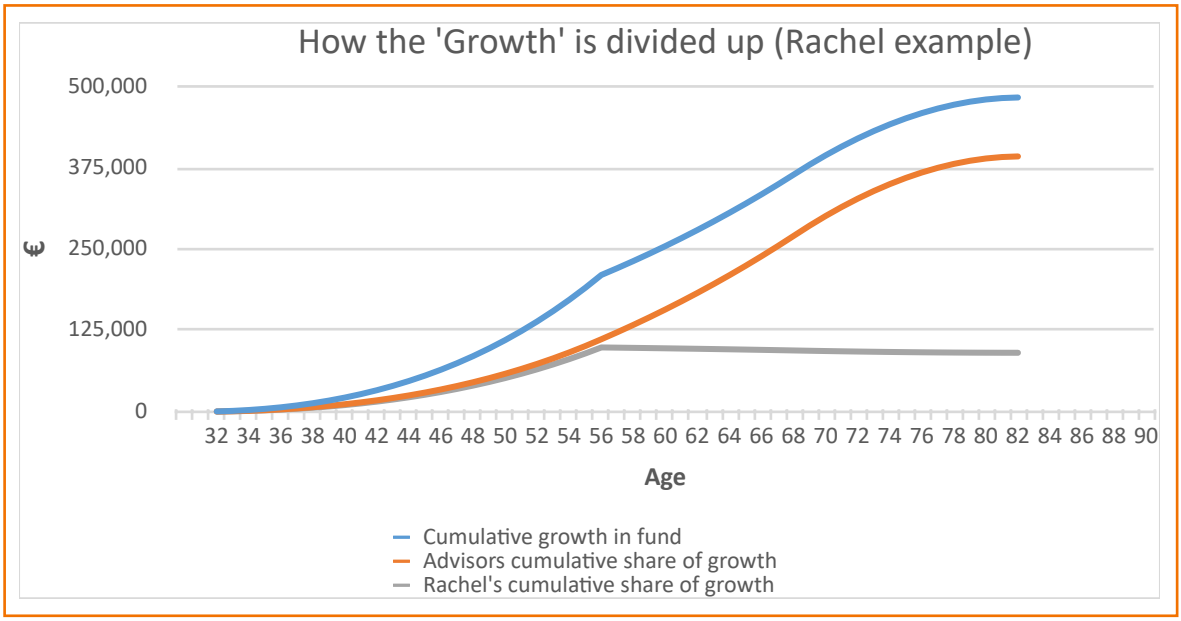


Figure 44

If on the other hand, Outcome 1 was made available to Rachel; the data shows that she and her employer and the Irish State would still have contributed €418,138 to her fund, and this will have grown to €1.25m by the time she reaches 68 (i.e. 'Q' on Figure 43). She can now draw the €22,462 per annum (in terms of 2021 value of money) from her pot, but the value of the pot will remain steady, as shown by line 'Q-R' in Figure 43. Effectively, her fund is now working as it was designed, 'as a money machine' to fund her golden years.

As shown in Figure 45, her fund will have generated €2.5m by the time that she reaches 90, and she will get to keep €2.4m of this (of course paying income tax on her annual income in the normal way). This data is shown in Appendix 11 and is used to populate the graph in Figure 45. On first impressions the reader may question the validity of these numbers, however, the data does not lie. This is what Albert Einstein called the 'Magic of Compound Interest'; but of course it is not magic, it is fairly basic maths. If the investor retains most of the 6% annual growth, 'Time' will do the rest.

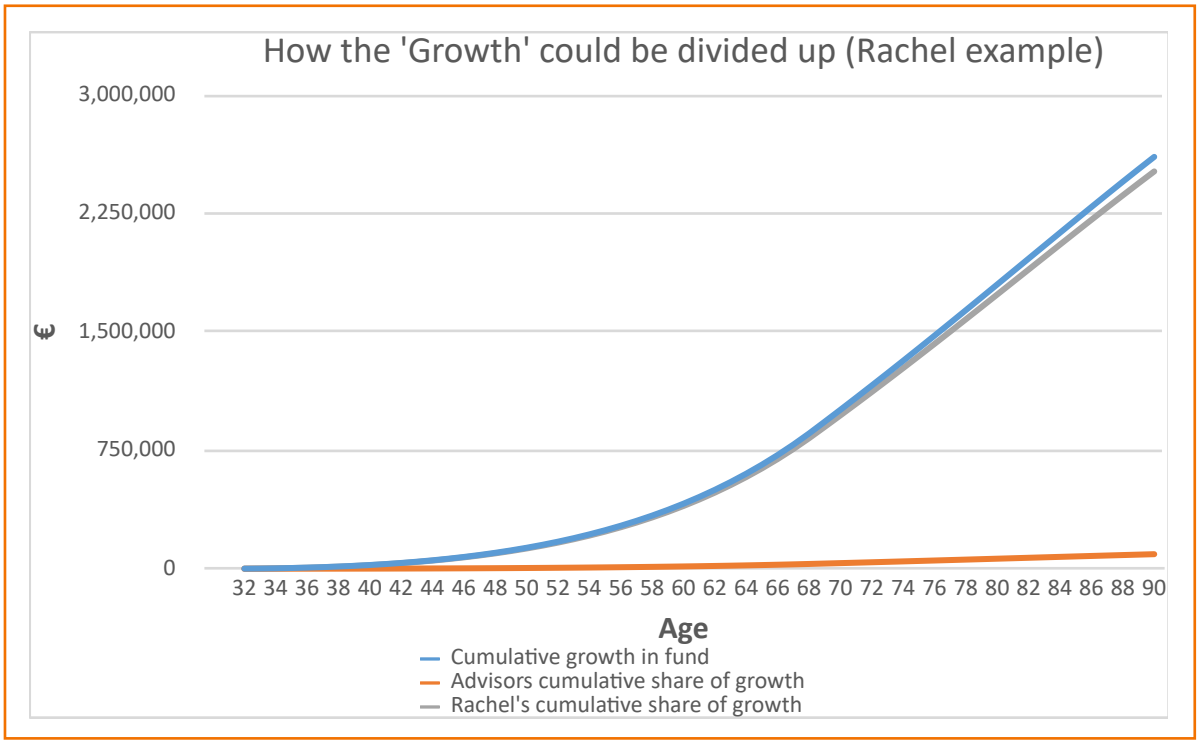


Figure 45

The pensions industry has conditioned society into accepting that it is prudent to swap into low risk investments as retirement age draws nearer, but is this a sensible approach, especially given that they continue to charge high fees for managing these low fee investments?

Say a pension investor begins saving at age 32 and shifts into low risk investing at age 57 and retires at age 68, and eventually dies at age 90; logically this means that the investor only has access to the average stockmarket return of 6% (before fees) for the first 25 years (age 32 to 57), and accepts a lower than average return of 3% (before fees) for the last 33 years (age 57 to 90). This hardly makes sense, especially given that the pension fund is much larger as the years progress. This shift happens because people have a fear of reaching retirement age in the middle of a recession, and they are worried that they may be forced to liquidate their assets at that point in time. But of course by using ARF's they are not compelled to liquidate when they reach retirement age, and can afford to wait for the recession to lift. More than a century of stockmarket data shows us that markets rise and fall, but in the long run they grow steadily at about 6% per annum.

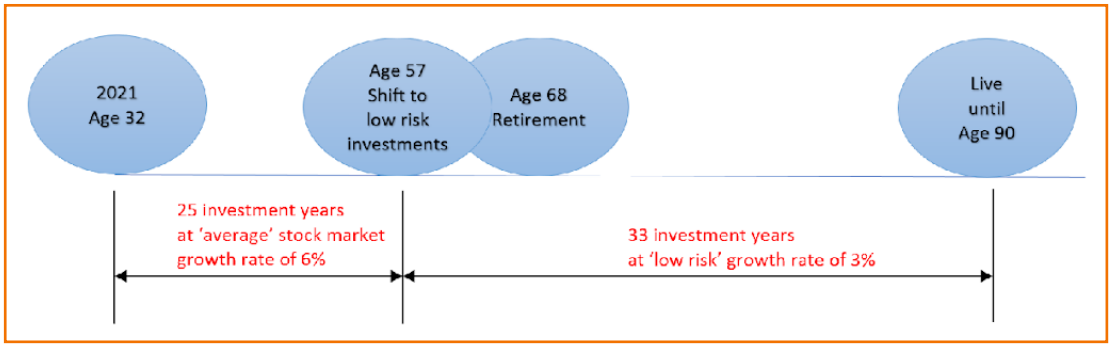


Figure 46

The sensible alternative is for Rachel to stay invested in the stockmarket (e.g. through an ARF with Vanguard or Dimensional, where low fees prevail) as a long term investment vehicle, and not to purchase an annuity when she retires. Of course there is always the possibility that when Rachel comes to retirement age, the stockmarkets will be in a slump and therefore the value of her pension pot will be lower than expected. To overcome this problem the Irish State could operate a system similar to the *'Risk Equalisation'* used in the Health Insurance market. So given that the stockmarket grows at an average of 6% per annum, and given that some people will arrive at their retirement age at the height of a boom, while for others it will be in the middle of a recession; a government scheme could be put in place where everybody benefits from the average growth rate (say 6%) hence removing the need to have to divert funds into low risk investments in the decade leading up to retirement

This approach would benefit all of Irish society and allow them to obtain average stockmarket returns (say 6%) throughout their lives. The alternative, for a 32 year old like Rachel is to only get the 6% rate for 25 years (until age 57) and then make do with about half of this (3%) for the rest of her life. If she lives to age 90, this means that the lower 3% rate will have lasted for 33 years and her income will continue to shrink as she gets older. Realistically this is not a sensible way to approach long term investing. It makes much more sense to pool our resources through a *'Risk Equalisation'* model and work as a team (a society).

As a further refinement; the investor is presently allowed access a tax free payment on reaching retirement, which is normally 25% of the pension pot value. The pension rules could be modified to allow the retiree to live on this for a number of years (e.g. 6 years), while the remaining 75% of the pot is preserved, thus giving time for the markets to recover.

Another variation of the graph shown in Figure 45 is shown below in Figure 47. To create this graph, low fees have been maintained at 0.2%, however the expected annual growth rate of the fund has been adjusted down from 6% to 5% per annum, from age 57 onwards (in an attempt to reduce risk exposure). Clearly this 1% reduction slows the steepness of the growth curve (i.e. Rachel's growth curve in Figure 47 is less steep than in Figure 45); but nonetheless €1.75m in growth is achieved by age 90. In this situation Rachel can continue to draw the €22,462 per annum from her pot from age 68 (in terms of 2021 value of money). Of course the value of the pot will continue to decline as retirement progresses, but by age 90, there will still be €440k left. Key to achieving this outcome is that total fees must be kept low, i.e. 0.2%.

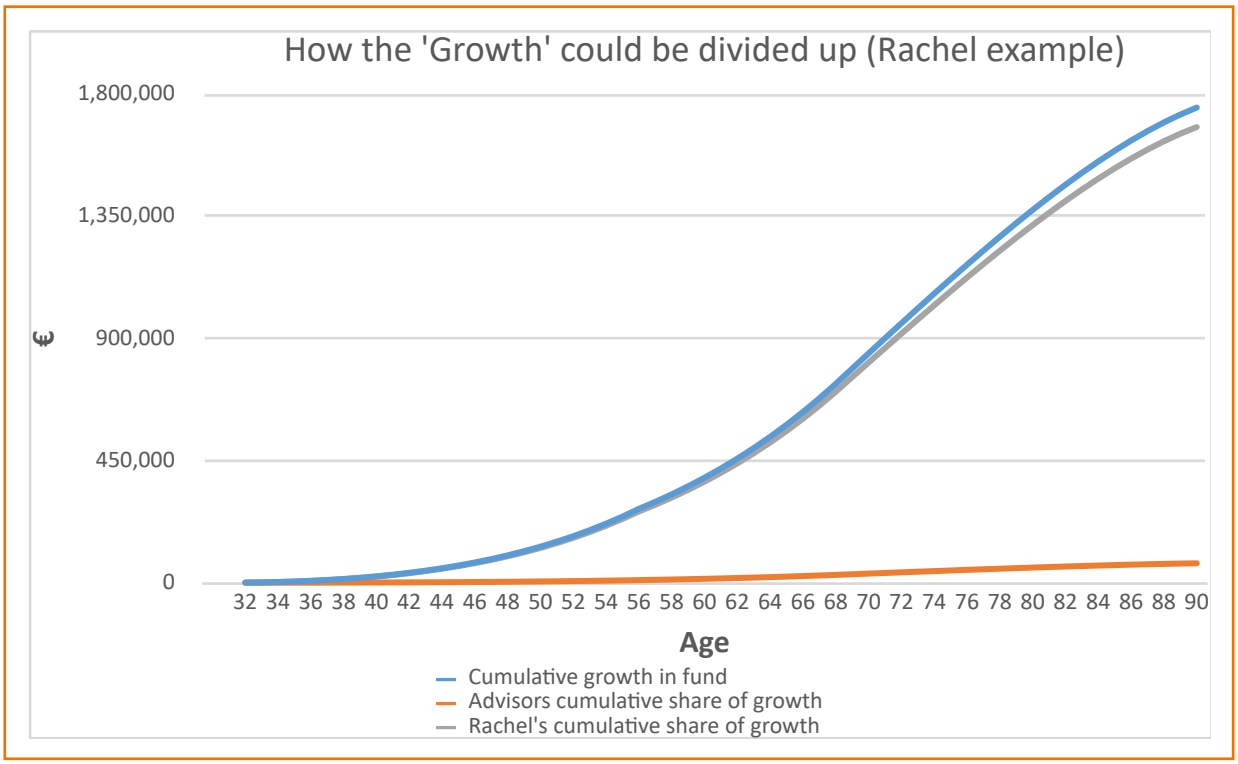


Figure 47

At a macro level, given that fees of 3% result in an approximate 50% reduction in the value of the final pot; the existing 875,500 pension investors will accumulate circa €469Bn by 2057, but they will have left another €469Bn slip through their fingers, through unnecessary fees. Likewise, for the 410,000 additional pension savers who will be recruited through Auto Enrolment, they will accumulate circa €201Bn by 2057, but they will have left another €201Bn slip through their fingers, through unnecessary fees.

	Anticipated size of pension pots by 2057	Lost through unnecessary fees by 2057
Existing 875,500 pension savers	€469 Bn	€469 Bn
Additional 410,000 pension savers (Auto Enrolment)	€201 Bn	€201 Bn
Sub Total	**€670 Bn**	**€670 Bn**
Total:	**Total €1.34 Trillion***	

Figure 48

*Equivalent to a 2021 value of €537 Billion

From Figure 48 it is clear that recruiting an additional 410,000 pension investors is not the holy grail to tackle our future pension requirements. The big windfall will come through reducing fees; and by behaving in an intelligent and logical way we could have €1.34 Trillion in our collective pension pots by 2057 (instead of half of this). This prize is there for the taking, but it will require action to make it happen.

From Figures 45 & 47, the reader may have noticed, that if an investor at retirement age with a healthy pension pot (i.e. one that has benefited from 5-6% annual growth coupled with low fees of 0.2%), their pot has the potential to 'kick-on' and generate substantial growth after retirement commences (i.e. 68). This extra wealth has not been quantified at a Macro level in this report; but a glimpse of what can be achieved at a personal level (for Rachel) can be seen in Figures 45 & 47. There are hundreds of billions of additional euro to be reaped from this source. This matter should be investigated further as part of the reform to the existing system.

16.0 Regulation

According to the Citizens Information website:

> "The Pensions Authority (formerly known as the Pensions Board) is the statutory body tasked with overseeing the proper administration of pension schemes and the protection of pension rights for people living in Ireland".

It is difficult to accept that the Pensions Authority as a real 'Authority' on pensions, or to have acted as a 'Protector' of pensions. Over the years it has not acted on very clear signals regarding the consequences of high fees on pension wealth (OECD, etc.). Its online pension calculator produces projections which fall a long way short of international investment returns, and it appears to be unaware of the international trends where pension investors are diverting funds into low fee Index Trackers. In Ireland it is effectively impossible to gain access to Index Tracker pensions without paying high fees.

The Pensions Authority appears very determined to regulate the Trustees, but one wonders if this will deliver more long term wealth for Irish investors! It is ironic that the Pensions Authority is made up of state employees who qualify for guaranteed state pensions, and yet day to day funding comes from fees that are levied on private pensions. The role that this organisation plays should be examined in detail by the government with a view to fundamental reform.

17.0 Pension versus a Home

Rachel is living with her partner Jim and their combined earnings are €90,000 per annum. They have been renting an apartment together in Dublin for the last three years, currently paying €2,100 per month. They see this as dead money, but from time to time they come across media reports stating that lifelong renting is normal in other European countries and that the next generation needs to accept that renting will be the new norm for Irish people, especially for those wishing to live in or close to our cities. They are sceptical about this advice. They have savings of €15,000 and Jim's parents have agreed to give them €20,000 to get them on to the property ladder. Based on current Central Bank lending rules, they calculate that they can borrow a further €315,000, thus allowing them to bid up to €350,000 for a property.

An online mortgage calculator shows that they will have to repay €1,261 per month to service the borrowings of €315,000 (based on a mortgage period of 30 years, with a fixed interest rate for the first 4 years). At the end of the 30 years (circa 2052) they will have completely cleared the mortgage and be living rent free (i.e. they will be in their early sixties at that stage).

Rachel has also worked out the maths if she continues to rent for the next 30 years. She assumes that rents will grow at between 2% and 4% per annum. So their current rent of €2,100 per month will have grown to between €3,800 and €6,800 per month in 30 years time (i.e. 1.02^{30} = 1.81 x €2,100 =€3,800; 1.04^{30} = 3.24 x €2,100 =€6,800)

Rachel is asking herself the question "how could it possibly be better to pay rent which is presently €2,100 versus a mortgage of €1,261, and in 30 years time the rent will have increased to between €3,800 and €6,800 per month, but the mortgage will be €0 because they would have paid off the loan and be living rent free".

She runs the rent numbers again for 40 years time and 50 years time and 60 years time (when she will be 72, 82 and 92). This data is shown in Figure 49.

	Age 32	Age 62	Age 72	Age 82	Age 92
Mortgage/mth	€1,261	€0	€0	€0	€0
Rent/mth @2% rent inflation	€2,100	€3,800	€4,600	€5,600	€6,900
Rent/mth @4% rent inflation	€2,100	€6,800	€10,000	€15,000	€22,000

Figure 49

Figure 50 shows a copy of a 'Threshold' appeal (Dec 2020) for funds to help older people facing homelessness. The picture is of a lady called 'Rose', who as stated has 'worked all her life'. It seems logical to assume that she also paid rent during her lifetime, but unfortunately she is now facing eviction.

Figure 50

Rachel is determined not to end up like Rose. She is convinced that she and her partner need to purchase a home of their own, and not doing so will expose them to a much lower standard of living in later life.

In ideal circumstances Irish citizens should contribute towards their own private pension as well as purchasing their own home. However, if the individual's personal finances dictate that only one of these is possible, then it is obvious that owning a

home should take priority. This opinion is based purely on the maths.

Let's say that Rachel decides not to purchase a home and therefore continue to rent. When she is 82, her rent could be €15,000 per month, i.e. €180,000 per annum. Of course this is 50 years into the future and we therefore need to convert this to today's value of money:

$$€180,000/ 1.025^{50} = €52,000 \text{ per annum}$$

Rachel and her partner will be struggling to pay this level of rent. Remember that Rachel will be getting €12,912 from her contributory State pension; and even if her private pension returns the best possible results of €22,462 (as outlined in 'Outcome 1 in section 15.0); her total gross pension will only be €35,374. If we assume that she is still with her partner Jim by then, and say he also has a pension of say €30,000. So together they would have combined incomes of circa €65k, and be paying €52k of this (80%) in rent. Clearly this is totally unsustainable, and later in life they could easily find themselves in a situation like Rose, especially when one of them dies. To overcome this they should seek to purchase their own home rather than paying rent for the rest of their lives.

Many Irish workers would like to contribute to a pension scheme as well as buying a home (i.e. if they can afford the pension and can clearly see value for money). This is why it is incumbent on the State authorities to provide realistic advice on the 'annuity rate' used to create future pension projections. The annuity rate matter has been discussed in some detail in this report. If an unrealistically low annuity rate is used when preparing projections for say a young worker starting out, it is likely to turn him/her off saving for a pension, because there is a danger that they will see the projected costs as being too high (see Figure 3). This could be avoided by employing a realistic annuity rate, which is linked to post-retirement Passive investing and taking out an ARF when reaching retirement age.

18.0 Conclusions

1. Typically the fees charged on pensions in Ireland are extremely high, amounting to 3% annually of the value of the investment pot. The OECD guidelines indicate that every ¼% increase in fees results in up to 5% reduction in the value of the final fund; therefore annual fees of 3% results in a reduction in value of the final pot of up to 60% by retirement age. These calculations are verified in the report.
2. In other countries (e.g. USA) the pension investor pays annual fees as low as 0.15%, whereas in Ireland it is typically 3%. This difference of 2.85% typically reduces the final pension pot size for somebody currently earning €45,000, per annum, by circa €500,000. For somebody on a current salary of €90,000 the pension pot loss is over €1 million, etc.
3. The pensions industry in Ireland tries to justify these charges on the basis of the 'Active' work they do to manage the funds on behalf of investors. However, numerous independent studies have shown that in the medium to long term 'Passive' investing generates much higher returns for the investor. The fees for 'Passive' investing are (should be) much lower.
4. The Irish state is a major investor in pensions (through tax relief) and will ultimately be left to pick up the pieces in future decades if citizens have not made adequate provision for their retirement. Looking forward to the year 2057, and aggregating all of these losses, Irish pension investors stand to lose in the order of €670 Billion if the current high fee model is allowed to prevail. It would be a disgrace if we allow this to happen, because by then there will be a lot more older people in our society, and we will need all of the extra money we can muster. Only circa €201 Billion of these losses will come from the much heralded 'Auto-Enrolment' scheme which the government plans to start rolling out from 2022 onwards. The vast bulk (€469 Billion in losses) will come from contributions being made by existing pension savers.
5. The Irish State should look at introducing a *'Risk Equalisation'* system for pension savers. So given that the stockmarket grows at an average of 6% per annum, and given that some people will arrive at their retirement age at the height of a boom, while for others it will be in the middle of a recession; a government '*Risk Equalisation*, scheme could be put in place where everybody benefits from the average growth rate (say 6%) hence removing the need to have to divert funds into low risk investments in the decade leading up to retirement.
6. While there is legislation stipulating that the charges for PRSA's are capped at (a) 5% of contributions paid and (b) 1% per annum of the PRSA assets; in practice the Pensions Industry can get around this with ease, by investing through intermediaries (also known as 'Investment Chains'). Overcoming this issue is a major problem which needs to be addressed (but it can be done through legislation and giving a State body a say in the investment process).
7. State authorities should provide realistic guidance on the 'annuity rate' used to create future pension projections. The annuity rate matter has been discussed in some detail in this report.
8. Home ownership is another type of pension. If our citizens are compelled to rent throughout their circa 40+ years working lives, then they will struggle to pay rents when they retire and their income falls. It makes much more sense for our workforce to purchase their own properties while they are working, ensuring that when they retire their accommodation needs have been taken care of. In later life the property could be used to fund nursing home care for those who are not capable of living at home.

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Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	3.00%
Fees charged to the annual contributions (%)	3.00%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	223	223	197	7,197
2022	33	51,250	7,175	14,175	2,153	4,253	862	1,282	457	680	603	14,778
2023	34	52,531	7,354	21,529	2,206	6,459	1,328	2,610	704	1,383	1,227	22,756
2024	35	53,845	7,538	29,068	2,261	8,720	1,818	4,428	963	2,347	2,081	31,149
2025	36	55,191	7,727	36,794	2,318	11,038	2,333	6,760	1,236	3,583	3,177	39,972
2026	37	56,570	7,920	44,714	2,376	13,414	2,873	9,634	1,523	5,106	4,528	49,242
2027	38	57,985	8,118	52,832	2,435	15,850	3,442	13,076	1,824	6,930	6,146	58,978
2028	39	59,434	8,321	61,153	2,496	18,346	4,038	17,113	2,140	9,070	8,043	69,196
2029	40	60,920	8,529	69,682	2,559	20,904	4,663	21,777	2,472	11,542	10,235	79,917
2030	41	62,443	8,742	78,424	2,623	23,527	5,320	27,096	2,819	14,361	12,735	91,159
2031	42	64,004	8,961	87,384	2,688	26,215	6,007	33,104	3,184	17,545	15,559	102,943
2032	43	65,604	9,185	96,569	2,755	28,971	6,728	39,831	3,566	21,111	18,721	115,290
2033	44	67,244	9,414	105,983	2,824	31,795	7,482	47,314	3,966	25,076	22,237	128,220
2034	45	68,926	9,650	115,633	2,895	34,690	8,272	55,586	4,384	29,460	26,125	141,758
2035	46	70,649	9,891	125,523	2,967	37,657	9,099	64,685	4,822	34,283	30,402	155,925
2036	47	72,415	10,138	135,662	3,041	40,698	9,964	74,648	5,281	39,564	35,085	170,746
2037	48	74,225	10,392	146,053	3,117	43,816	10,868	85,517	5,760	45,324	40,193	186,246
2038	49	76,081	10,651	156,704	3,195	47,011	11,814	97,331	6,261	51,585	45,745	202,450
2039	50	77,983	10,918	167,622	3,275	50,287	12,802	110,133	6,785	58,370	51,762	219,384
2040	51	79,933	11,191	178,813	3,357	53,644	13,834	123,967	7,332	65,703	58,265	237,077
2041	52	81,931	11,470	190,283	3,441	57,085	14,913	138,880	7,904	73,606	65,274	255,557
2042	53	83,979	11,757	202,040	3,527	60,612	16,039	154,919	8,501	82,107	72,812	274,852
2043	54	86,079	12,051	214,091	3,615	64,227	17,214	172,133	9,124	91,230	80,902	294,993
2044	55	88,231	12,352	226,443	3,706	67,933	18,441	190,574	9,774	101,004	89,570	316,013
2045	56	90,436	12,661	239,104	3,798	71,731	19,720	210,294	10,452	111,456	98,838	337,943
2046	57	92,697	12,978	252,082	3,893	75,625	21,055	231,349	11,159	122,615	108,734	360,816
2047	58	95,015	13,302	265,384	3,991	79,615	22,447	253,796	11,897	134,512	119,284	384,668
2048	59	97,390	13,635	279,019	4,090	83,706	23,898	277,695	12,666	147,178	130,516	409,535
2049	60	99,825	13,975	292,994	4,193	87,898	25,411	303,105	13,468	160,646	142,459	435,454
2050	61	102,320	14,325	307,319	4,297	92,196	26,987	330,092	14,303	174,949	155,143	462,462
2051	62	104,878	14,683	322,002	4,405	96,601	28,629	358,721	15,173	190,122	168,599	490,601
2052	63	107,500	15,050	337,052	4,515	101,116	30,339	389,060	16,080	206,202	182,858	519,910
2053	64	110,188	15,426	352,478	4,628	105,743	32,120	421,180	17,024	223,225	197,955	550,433
2054	65	112,943	15,812	368,290	4,744	110,487	33,975	455,155	18,007	241,232	213,923	582,213
2055	66	115,766	16,207	384,497	4,862	115,349	35,905	491,060	19,030	260,262	230,798	615,296
2056	67	118,660	16,612	401,110	4,984	120,333	37,914	528,974	20,095	280,356	248,618	649,728
2057	68	121,627	17,028	418,138	5,108	125,441	40,005	568,980	21,203	301,559	267,420	685,558
2058	69	124,667	17,453	435,591	5,236	130,677	42,181	611,160	22,356	323,915	287,245	722,836
2059	70	127,784	17,890	453,481	5,367	136,044	44,444	655,604	23,555	347,470	308,134	761,615

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	1.00%
Fees charged to the annual contributions (%)	1.00%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	74	74	346	7,346
2022	33	51,250	7,175	14,175	2,153	4,253	871	1,291	154	228	1,063	15,238
2023	34	52,531	7,354	21,529	2,206	6,459	1,356	2,647	239	468	2,179	23,709
2024	35	53,845	7,538	29,068	2,261	8,720	1,875	4,522	331	799	3,723	32,790
2025	36	55,191	7,727	36,794	2,318	11,038	2,431	6,953	429	1,228	5,724	42,519
2026	37	56,570	7,920	44,714	2,376	13,414	3,026	9,979	535	1,763	8,216	52,930
2027	38	57,985	8,118	52,832	2,435	15,850	3,663	13,642	647	2,410	11,232	64,064
2028	39	59,434	8,321	61,153	2,496	18,346	4,343	17,985	767	3,177	14,808	75,960
2029	40	60,920	8,529	69,682	2,559	20,904	5,069	23,054	896	4,073	18,981	88,663
2030	41	62,443	8,742	78,424	2,623	23,527	5,844	28,899	1,032	5,105	23,793	102,217
2031	42	64,004	8,961	87,384	2,688	26,215	6,671	35,569	1,178	6,284	29,285	116,670
2032	43	65,604	9,185	96,569	2,755	28,971	7,551	43,120	1,334	7,618	35,502	132,071
2033	44	67,244	9,414	105,983	2,824	31,795	8,489	51,610	1,500	9,118	42,492	148,475
2034	45	68,926	9,650	115,633	2,895	34,690	9,487	61,097	1,676	10,794	50,303	165,936
2035	46	70,649	9,891	125,523	2,967	37,657	10,550	71,647	1,864	12,658	58,989	184,513
2036	47	72,415	10,138	135,662	3,041	40,698	11,679	83,326	2,063	14,721	68,605	204,266
2037	48	74,225	10,392	146,053	3,117	43,816	12,879	96,205	2,275	16,996	79,209	225,262
2038	49	76,081	10,651	156,704	3,195	47,011	14,155	110,360	2,501	19,497	90,863	247,567
2039	50	77,983	10,918	167,622	3,275	50,287	15,509	125,869	2,740	22,237	103,632	271,254
2040	51	79,933	11,191	178,813	3,357	53,644	16,947	142,816	2,994	25,231	117,585	296,398
2041	52	81,931	11,470	190,283	3,441	57,085	18,472	161,288	3,263	28,494	132,794	323,077
2042	53	83,979	11,757	202,040	3,527	60,612	20,090	181,378	3,549	32,043	149,334	351,374
2043	54	86,079	12,051	214,091	3,615	64,227	21,806	203,183	3,852	35,896	167,288	381,379
2044	55	88,231	12,352	226,443	3,706	67,933	23,624	226,807	4,174	40,069	186,738	413,181
2045	56	90,436	12,661	239,104	3,798	71,731	25,551	252,358	4,514	44,583	207,775	446,879
2046	57	92,697	12,978	252,082	3,893	75,625	27,591	279,949	4,874	49,458	230,491	482,573
2047	58	95,015	13,302	265,384	3,991	79,615	29,753	309,702	5,256	54,714	254,988	520,372
2048	59	97,390	13,635	279,019	4,090	83,706	32,040	341,742	5,660	60,374	281,368	560,386
2049	60	99,825	13,975	292,994	4,193	87,898	34,462	376,204	6,088	66,463	309,741	602,735
2050	61	102,320	14,325	307,319	4,297	92,196	37,024	413,227	6,541	73,004	340,224	647,543
2051	62	104,878	14,683	322,002	4,405	96,601	39,734	452,961	7,020	80,023	372,938	694,940
2052	63	107,500	15,050	337,052	4,515	101,116	42,599	495,560	7,526	87,549	408,011	745,063
2053	64	110,188	15,426	352,478	4,628	105,743	45,629	541,190	8,061	95,610	445,580	798,058
2054	65	112,943	15,812	368,290	4,744	110,487	48,832	590,022	8,627	104,237	485,785	854,075
2055	66	115,766	16,207	384,497	4,862	115,349	52,217	642,239	9,225	113,462	528,777	913,274
2056	67	118,660	16,612	401,110	4,984	120,333	55,793	698,032	9,857	123,319	574,713	975,823
2057	68	121,627	17,028	418,138	5,108	125,441	59,571	757,603	10,524	133,843	623,760	1,041,897
2058	69	124,667	17,453	435,591	5,236	130,677	63,561	821,164	11,229	145,072	676,092	1,111,683
2059	70	127,784	17,890	453,481	5,367	136,044	67,774	888,938	11,973	157,046	731,893	1,185,374

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	0.20%
Fees charged to the annual contributions (%)	0.20%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	15	15	405	7,405
2022	33	51,250	7,175	14,175	2,153	4,253	875	1,295	31	46	1,249	15,424
2023	34	52,531	7,354	21,529	2,206	6,459	1,367	2,662	48	94	2,567	24,097
2024	35	53,845	7,538	29,068	2,261	8,720	1,898	4,560	67	161	4,399	33,466
2025	36	55,191	7,727	36,794	2,318	11,038	2,472	7,031	87	248	6,783	43,577
2026	37	56,570	7,920	44,714	2,376	13,414	3,090	10,121	109	358	9,763	54,478
2027	38	57,985	8,118	52,832	2,435	15,850	3,756	13,877	133	490	13,386	66,218
2028	39	59,434	8,321	61,153	2,496	18,346	4,472	18,349	158	648	17,701	78,854
2029	40	60,920	8,529	69,682	2,559	20,904	5,243	23,592	185	834	22,758	92,440
2030	41	62,443	8,742	78,424	2,623	23,527	6,071	29,663	215	1,048	28,615	107,039
2031	42	64,004	8,961	87,384	2,688	26,215	6,960	36,623	246	1,294	35,329	122,713
2032	43	65,604	9,185	96,569	2,755	28,971	7,914	44,537	280	1,574	42,963	139,532
2033	44	67,244	9,414	105,983	2,824	31,795	8,937	53,474	316	1,889	51,584	157,567
2034	45	68,926	9,650	115,633	2,895	34,690	10,033	63,507	354	2,244	61,263	176,895
2035	46	70,649	9,891	125,523	2,967	37,657	11,207	74,714	396	2,640	72,074	197,597
2036	47	72,415	10,138	135,662	3,041	40,698	12,464	87,178	440	3,080	84,098	219,759
2037	48	74,225	10,392	146,053	3,117	43,816	13,809	100,987	488	3,568	97,419	243,472
2038	49	76,081	10,651	156,704	3,195	47,011	15,247	116,234	539	4,107	112,127	268,832
2039	50	77,983	10,918	167,622	3,275	50,287	16,785	133,019	593	4,700	128,319	295,941
2040	51	79,933	11,191	178,813	3,357	53,644	18,428	151,447	651	5,351	146,096	324,909
2041	52	81,931	11,470	190,283	3,441	57,085	20,183	171,630	713	6,064	165,566	355,849
2042	53	83,979	11,757	202,040	3,527	60,612	22,056	193,686	779	6,844	186,843	388,883
2043	54	86,079	12,051	214,091	3,615	64,227	24,056	217,742	850	7,694	210,049	424,140
2044	55	88,231	12,352	226,443	3,706	67,933	26,190	243,932	925	8,619	235,313	461,756
2045	56	90,436	12,661	239,104	3,798	71,731	28,465	272,397	1,006	9,625	262,772	501,876
2046	57	92,697	12,978	252,082	3,893	75,625	30,891	303,288	1,091	10,716	292,572	544,654
2047	58	95,015	13,302	265,384	3,991	79,615	33,477	336,765	1,183	11,899	324,866	590,250
2048	59	97,390	13,635	279,019	4,090	83,706	36,233	372,998	1,280	13,179	359,819	638,838
2049	60	99,825	13,975	292,994	4,193	87,898	39,169	412,167	1,384	14,563	397,604	690,598
2050	61	102,320	14,325	307,319	4,297	92,196	42,295	454,463	1,494	16,058	438,405	745,724
2051	62	104,878	14,683	322,002	4,405	96,601	45,624	500,087	1,612	17,670	482,417	804,419
2052	63	107,500	15,050	337,052	4,515	101,116	49,168	549,255	1,737	19,407	529,848	866,900
2053	64	110,188	15,426	352,478	4,628	105,743	52,940	602,195	1,871	21,278	580,917	933,395
2054	65	112,943	15,812	368,290	4,744	110,487	56,952	659,147	2,012	23,290	635,857	1,004,148
2055	66	115,766	16,207	384,497	4,862	115,349	61,221	720,369	2,163	25,453	694,916	1,079,413
2056	67	118,660	16,612	401,110	4,984	120,333	65,762	786,130	2,324	27,777	758,353	1,159,463
2057	68	121,627	17,028	418,138	5,108	125,441	70,589	856,720	2,494	30,271	826,449	1,244,586
2058	69	124,667	17,453	435,591	5,236	130,677	75,722	932,442	2,676	32,946	899,496	1,335,087
2059	70	127,784	17,890	453,481	5,367	136,044	81,179	1,013,620	2,868	35,815	977,806	1,431,287

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	3.00%
Fees charged to the annual contributions (%)	3.00%
Value of Pension at present (€)	€0
Annuity Rate	3.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees	2021 Value of Pension
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	223	223	197	7,197	211
2022	33	51,250	7,175	14,175	2,153	4,253	862	1,282	457	680	603	14,778	422
2023	34	52,531	7,354	21,529	2,206	6,459	1,328	2,610	704	1,383	1,227	22,756	634
2024	35	53,845	7,538	29,068	2,261	8,720	1,818	4,428	963	2,347	2,081	31,149	847
2025	36	55,191	7,727	36,794	2,318	11,038	2,333	6,760	1,236	3,583	3,177	39,972	1,060
2026	37	56,570	7,920	44,714	2,376	13,414	2,873	9,634	1,523	5,106	4,528	49,242	1,274
2027	38	57,985	8,118	52,832	2,435	15,850	3,442	13,076	1,824	6,930	6,146	58,978	1,488
2028	39	59,434	8,321	61,153	2,496	18,346	4,038	17,113	2,140	9,070	8,043	69,196	1,704
2029	40	60,920	8,529	69,682	2,559	20,904	4,663	21,777	2,472	11,542	10,235	79,917	1,920
2030	41	62,443	8,742	78,424	2,623	23,527	5,320	27,096	2,819	14,361	12,735	91,159	2,136
2031	42	64,004	8,961	87,384	2,688	26,215	6,007	33,104	3,184	17,545	15,559	102,943	2,354
2032	43	65,604	9,185	96,569	2,755	28,971	6,728	39,831	3,566	21,111	18,721	115,290	2,572
2033	44	67,244	9,414	105,983	2,824	31,795	7,482	47,314	3,966	25,076	22,237	128,220	2,790
2034	45	68,926	9,650	115,633	2,895	34,690	8,272	55,586	4,384	29,460	26,125	141,758	3,010
2035	46	70,649	9,891	125,523	2,967	37,657	9,099	64,685	4,822	34,283	30,402	155,925	3,230
2036	47	72,415	10,138	135,662	3,041	40,698	9,964	74,648	5,281	39,564	35,085	170,746	3,451
2037	48	74,225	10,392	146,053	3,117	43,816	10,868	85,517	5,760	45,324	40,193	186,246	3,672
2038	49	76,081	10,651	156,704	3,195	47,011	11,814	97,331	6,261	51,585	45,745	202,450	3,894
2039	50	77,983	10,918	167,622	3,275	50,287	12,802	110,133	6,785	58,370	51,762	219,384	4,117
2040	51	79,933	11,191	178,813	3,357	53,644	13,834	123,967	7,332	65,703	58,265	237,077	4,340
2041	52	81,931	11,470	190,283	3,441	57,085	14,913	138,880	7,904	73,606	65,274	255,557	4,565
2042	53	83,979	11,757	202,040	3,527	60,612	16,039	154,919	8,501	82,107	72,812	274,852	4,790
2043	54	86,079	12,051	214,091	3,615	64,227	17,214	172,133	9,124	91,230	80,902	294,993	5,015
2044	55	88,231	12,352	226,443	3,706	67,933	18,441	190,574	9,774	101,004	89,570	316,013	5,241
2045	56	90,436	12,661	239,104	3,798	71,731	19,720	210,294	10,452	111,456	98,838	337,943	5,468
2046	57	92,697	12,978	252,082	3,893	75,625	21,055	231,349	11,159	122,615	108,734	360,816	5,696
2047	58	95,015	13,302	265,384	3,991	79,615	22,447	253,796	11,897	134,512	119,284	384,668	5,925
2048	59	97,390	13,635	279,019	4,090	83,706	23,898	277,695	12,666	147,178	130,516	409,535	6,154
2049	60	99,825	13,975	292,994	4,193	87,898	25,411	303,105	13,468	160,646	142,459	435,454	6,384
2050	61	102,320	14,325	307,319	4,297	92,196	26,987	330,092	14,303	174,949	155,143	462,462	6,614
2051	62	104,878	14,683	322,002	4,405	96,601	28,629	358,721	15,173	190,122	168,599	490,601	6,846
2052	63	107,500	15,050	337,052	4,515	101,116	30,339	389,060	16,080	206,202	182,858	519,910	7,078
2053	64	110,188	15,426	352,478	4,628	105,743	32,120	421,180	17,024	223,225	197,955	550,433	7,310
2054	65	112,943	15,812	368,290	4,744	110,487	33,975	455,155	18,007	241,232	213,923	582,213	7,544
2055	66	115,766	16,207	384,497	4,862	115,349	35,905	491,060	19,030	260,262	230,798	615,296	7,778
2056	67	118,660	16,612	401,110	4,984	120,333	37,914	528,974	20,095	280,356	248,618	649,728	8,013
2057	68	121,627	17,028	418,138	5,108	125,441	40,005	568,980	21,203	301,559	267,420	685,558	8,249
2058	69	124,667	17,453	435,591	5,236	130,677	42,181	611,160	22,356	323,915	287,245	722,836	8,485
2059	70	127,784	17,890	453,481	5,367	136,044	44,444	655,604	23,555	347,470	308,134	761,615	8,722

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	3.00%
Fees charged to the annual contributions (%)	3.00%
Value of Pension at present (€)	€0
Annuity Rate	4.5%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees	2021 Value of Pension
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	223	223	197	7,197	316
2022	33	51,250	7,175	14,175	2,153	4,253	862	1,282	457	680	603	14,778	633
2023	34	52,531	7,354	21,529	2,206	6,459	1,328	2,610	704	1,383	1,227	22,756	951
2024	35	53,845	7,538	29,068	2,261	8,720	1,818	4,428	963	2,347	2,081	31,149	1,270
2025	36	55,191	7,727	36,794	2,318	11,038	2,333	6,760	1,236	3,583	3,177	39,972	1,590
2026	37	56,570	7,920	44,714	2,376	13,414	2,873	9,634	1,523	5,106	4,528	49,242	1,911
2027	38	57,985	8,118	52,832	2,435	15,850	3,442	13,076	1,824	6,930	6,146	58,978	2,233
2028	39	59,434	8,321	61,153	2,496	18,346	4,038	17,113	2,140	9,070	8,043	69,196	2,556
2029	40	60,920	8,529	69,682	2,559	20,904	4,663	21,777	2,472	11,542	10,235	79,917	2,880
2030	41	62,443	8,742	78,424	2,623	23,527	5,320	27,096	2,819	14,361	12,735	91,159	3,205
2031	42	64,004	8,961	87,384	2,688	26,215	6,007	33,104	3,184	17,545	15,559	102,943	3,531
2032	43	65,604	9,185	96,569	2,755	28,971	6,728	39,831	3,566	21,111	18,721	115,290	3,858
2033	44	67,244	9,414	105,983	2,824	31,795	7,482	47,314	3,966	25,076	22,237	128,220	4,186
2034	45	68,926	9,650	115,633	2,895	34,690	8,272	55,586	4,384	29,460	26,125	141,758	4,515
2035	46	70,649	9,891	125,523	2,967	37,657	9,099	64,685	4,822	34,283	30,402	155,925	4,845
2036	47	72,415	10,138	135,662	3,041	40,698	9,964	74,648	5,281	39,564	35,085	170,746	5,176
2037	48	74,225	10,392	146,053	3,117	43,816	10,868	85,517	5,760	45,324	40,193	186,246	5,508
2038	49	76,081	10,651	156,704	3,195	47,011	11,814	97,331	6,261	51,585	45,745	202,450	5,841
2039	50	77,983	10,918	167,622	3,275	50,287	12,802	110,133	6,785	58,370	51,762	219,384	6,175
2040	51	79,933	11,191	178,813	3,357	53,644	13,834	123,967	7,332	65,703	58,265	237,077	6,511
2041	52	81,931	11,470	190,283	3,441	57,085	14,913	138,880	7,904	73,606	65,274	255,557	6,847
2042	53	83,979	11,757	202,040	3,527	60,612	16,039	154,919	8,501	82,107	72,812	274,852	7,184
2043	54	86,079	12,051	214,091	3,615	64,227	17,214	172,133	9,124	91,230	80,902	294,993	7,523
2044	55	88,231	12,352	226,443	3,706	67,933	18,441	190,574	9,774	101,004	89,570	316,013	7,862
2045	56	90,436	12,661	239,104	3,798	71,731	19,720	210,294	10,452	111,456	98,838	337,943	8,203
2046	57	92,697	12,978	252,082	3,893	75,625	21,055	231,349	11,159	122,615	108,734	360,816	8,544
2047	58	95,015	13,302	265,384	3,991	79,615	22,447	253,796	11,897	134,512	119,284	384,668	8,887
2048	59	97,390	13,635	279,019	4,090	83,706	23,898	277,695	12,666	147,178	130,516	409,535	9,231
2049	60	99,825	13,975	292,994	4,193	87,898	25,411	303,105	13,468	160,646	142,459	435,454	9,576
2050	61	102,320	14,325	307,319	4,297	92,196	26,987	330,092	14,303	174,949	155,143	462,462	9,921
2051	62	104,878	14,683	322,002	4,405	96,601	28,629	358,721	15,173	190,122	168,599	490,601	10,268
2052	63	107,500	15,050	337,052	4,515	101,116	30,339	389,060	16,080	206,202	182,858	519,910	10,616
2053	64	110,188	15,426	352,478	4,628	105,743	32,120	421,180	17,024	223,225	197,955	550,433	10,966
2054	65	112,943	15,812	368,290	4,744	110,487	33,975	455,155	18,007	241,232	213,923	582,213	11,316
2055	66	115,766	16,207	384,497	4,862	115,349	35,905	491,060	19,030	260,262	230,798	615,296	11,667
2056	67	118,660	16,612	401,110	4,984	120,333	37,914	528,974	20,095	280,356	248,618	649,728	12,019
2057	68	121,627	17,028	418,138	5,108	125,441	40,005	568,980	21,203	301,559	267,420	685,558	12,373
2058	69	124,667	17,453	435,591	5,236	130,677	42,181	611,160	22,356	323,915	287,245	722,836	12,728
2059	70	127,784	17,890	453,481	5,367	136,044	44,444	655,604	23,555	347,470	308,134	761,615	13,083

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	1.00%
Fees charged to the annual contributions (%)	1.00%
Value of Pension at present (€)	€0
Annuity Rate	4.5%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees	2021 Value of Pension
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	74	74	346	7,346	322
2022	33	51,250	7,175	14,175	2,153	4,253	871	1,291	154	228	1,063	15,238	653
2023	34	52,531	7,354	21,529	2,206	6,459	1,356	2,647	239	468	2,179	23,709	991
2024	35	53,845	7,538	29,068	2,261	8,720	1,875	4,522	331	799	3,723	32,790	1,337
2025	36	55,191	7,727	36,794	2,318	11,038	2,431	6,953	429	1,228	5,724	42,519	1,691
2026	37	56,570	7,920	44,714	2,376	13,414	3,026	9,979	535	1,763	8,216	52,930	2,054
2027	38	57,985	8,118	52,832	2,435	15,850	3,663	13,642	647	2,410	11,232	64,064	2,425
2028	39	59,434	8,321	61,153	2,496	18,346	4,343	17,985	767	3,177	14,808	75,960	2,805
2029	40	60,920	8,529	69,682	2,559	20,904	5,069	23,054	896	4,073	18,981	88,663	3,195
2030	41	62,443	8,742	78,424	2,623	23,527	5,844	28,899	1,032	5,105	23,793	102,217	3,593
2031	42	64,004	8,961	87,384	2,688	26,215	6,671	35,569	1,178	6,284	29,285	116,670	4,001
2032	43	65,604	9,185	96,569	2,755	28,971	7,551	43,120	1,334	7,618	35,502	132,071	4,419
2033	44	67,244	9,414	105,983	2,824	31,795	8,489	51,610	1,500	9,118	42,492	148,475	4,847
2034	45	68,926	9,650	115,633	2,895	34,690	9,487	61,097	1,676	10,794	50,303	165,936	5,285
2035	46	70,649	9,891	125,523	2,967	37,657	10,550	71,647	1,864	12,658	58,989	184,513	5,733
2036	47	72,415	10,138	135,662	3,041	40,698	11,679	83,326	2,063	14,721	68,605	204,266	6,192
2037	48	74,225	10,392	146,053	3,117	43,816	12,879	96,205	2,275	16,996	79,209	225,262	6,662
2038	49	76,081	10,651	156,704	3,195	47,011	14,155	110,360	2,501	19,497	90,863	247,567	7,143
2039	50	77,983	10,918	167,622	3,275	50,287	15,509	125,869	2,740	22,237	103,632	271,254	7,635
2040	51	79,933	11,191	178,813	3,357	53,644	16,947	142,816	2,994	25,231	117,585	296,398	8,140
2041	52	81,931	11,470	190,283	3,441	57,085	18,472	161,288	3,263	28,494	132,794	323,077	8,656
2042	53	83,979	11,757	202,040	3,527	60,612	20,090	181,378	3,549	32,043	149,334	351,374	9,185
2043	54	86,079	12,051	214,091	3,615	64,227	21,806	203,183	3,852	35,896	167,288	381,379	9,726
2044	55	88,231	12,352	226,443	3,706	67,933	23,624	226,807	4,174	40,069	186,738	413,181	10,280
2045	56	90,436	12,661	239,104	3,798	71,731	25,551	252,358	4,514	44,583	207,775	446,879	10,847
2046	57	92,697	12,978	252,082	3,893	75,625	27,591	279,949	4,874	49,458	230,491	482,573	11,428
2047	58	95,015	13,302	265,384	3,991	79,615	29,753	309,702	5,256	54,714	254,988	520,372	12,022
2048	59	97,390	13,635	279,019	4,090	83,706	32,040	341,742	5,660	60,374	281,368	560,386	12,631
2049	60	99,825	13,975	292,994	4,193	87,898	34,462	376,204	6,088	66,463	309,741	602,735	13,254
2050	61	102,320	14,325	307,319	4,297	92,196	37,024	413,227	6,541	73,004	340,224	647,543	13,892
2051	62	104,878	14,683	322,002	4,405	96,601	39,734	452,961	7,020	80,023	372,938	694,940	14,545
2052	63	107,500	15,050	337,052	4,515	101,116	42,599	495,560	7,526	87,549	408,011	745,063	15,214
2053	64	110,188	15,426	352,478	4,628	105,743	45,629	541,190	8,061	95,610	445,580	798,058	15,899
2054	65	112,943	15,812	368,290	4,744	110,487	48,832	590,022	8,627	104,237	485,785	854,075	16,600
2055	66	115,766	16,207	384,497	4,862	115,349	52,217	642,239	9,225	113,462	528,777	913,274	17,317
2056	67	118,660	16,612	401,110	4,984	120,333	55,793	698,032	9,857	123,319	574,713	975,823	18,052
2057	68	121,627	17,028	418,138	5,108	125,441	59,571	757,603	10,524	133,843	623,760	1,041,897	18,804
2058	69	124,667	17,453	435,591	5,236	130,677	63,561	821,164	11,229	145,072	676,092	1,111,683	19,574
2059	70	127,784	17,890	453,481	5,367	136,044	67,774	888,938	11,973	157,046	731,893	1,185,374	20,363

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	0.20%
Fees charged to the annual contributions (%)	0.20%
Value of Pension at present (€)	€0
Annuity Rate	4.5%

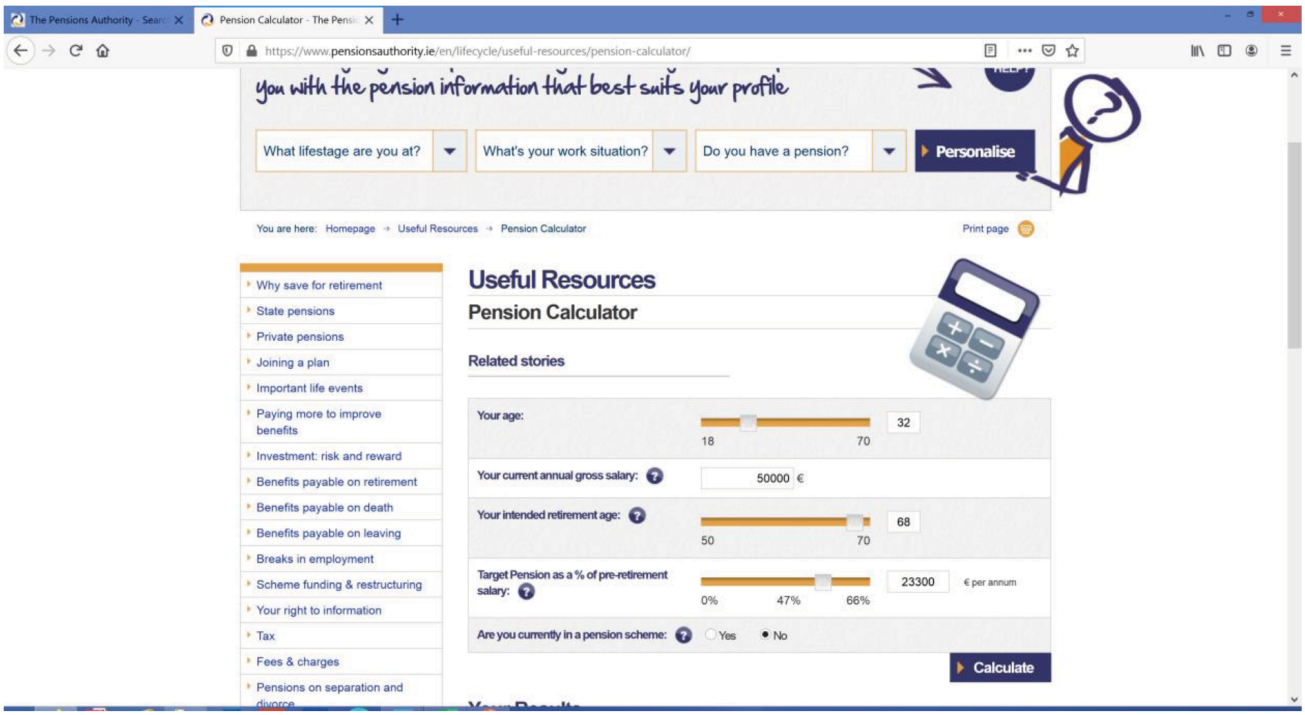
Exercise care when filling in these boxes. Remember garbage in equals garbage out.

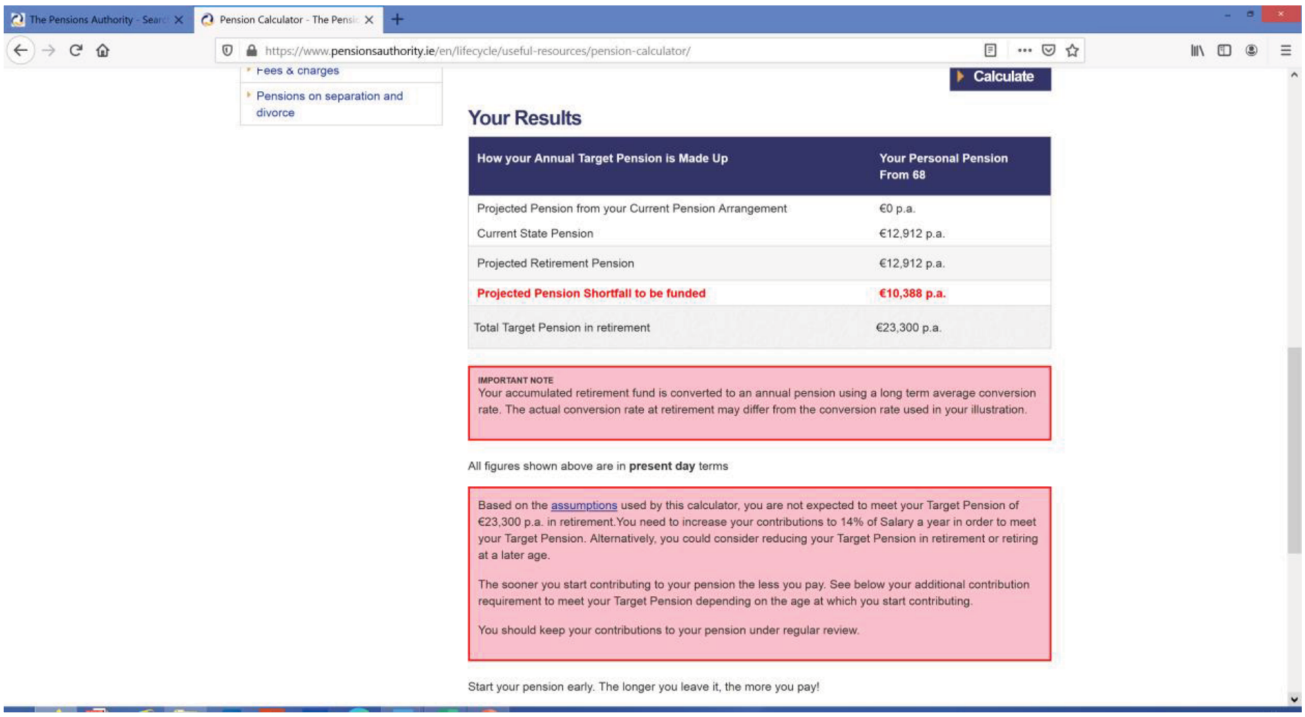
Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees	2021 Value of Pension
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	15	15	405	7,405	325
2022	33	51,250	7,175	14,175	2,153	4,253	875	1,295	31	46	1,249	15,424	661
2023	34	52,531	7,354	21,529	2,206	6,459	1,367	2,662	48	94	2,567	24,097	1,007
2024	35	53,845	7,538	29,068	2,261	8,720	1,898	4,560	67	161	4,399	33,466	1,364
2025	36	55,191	7,727	36,794	2,318	11,038	2,472	7,031	87	248	6,783	43,577	1,733
2026	37	56,570	7,920	44,714	2,376	13,414	3,090	10,121	109	358	9,763	54,478	2,114
2027	38	57,985	8,118	52,832	2,435	15,850	3,756	13,877	133	490	13,386	66,218	2,507
2028	39	59,434	8,321	61,153	2,496	18,346	4,472	18,349	158	648	17,701	78,854	2,912
2029	40	60,920	8,529	69,682	2,559	20,904	5,243	23,592	185	834	22,758	92,440	3,331
2030	41	62,443	8,742	78,424	2,623	23,527	6,071	29,663	215	1,048	28,615	107,039	3,763
2031	42	64,004	8,961	87,384	2,688	26,215	6,960	36,623	246	1,294	35,329	122,713	4,209
2032	43	65,604	9,185	96,569	2,755	28,971	7,914	44,537	280	1,574	42,963	139,532	4,669
2033	44	67,244	9,414	105,983	2,824	31,795	8,937	53,474	316	1,889	51,584	157,567	5,144
2034	45	68,926	9,650	115,633	2,895	34,690	10,033	63,507	354	2,244	61,263	176,895	5,634
2035	46	70,649	9,891	125,523	2,967	37,657	11,207	74,714	396	2,640	72,074	197,597	6,140
2036	47	72,415	10,138	135,662	3,041	40,698	12,464	87,178	440	3,080	84,098	219,759	6,662
2037	48	74,225	10,392	146,053	3,117	43,816	13,809	100,987	488	3,568	97,419	243,472	7,200
2038	49	76,081	10,651	156,704	3,195	47,011	15,247	116,234	539	4,107	112,127	268,832	7,756
2039	50	77,983	10,918	167,622	3,275	50,287	16,785	133,019	593	4,700	128,319	295,941	8,330
2040	51	79,933	11,191	178,813	3,357	53,644	18,428	151,447	651	5,351	146,096	324,909	8,923
2041	52	81,931	11,470	190,283	3,441	57,085	20,183	171,630	713	6,064	165,566	355,849	9,534
2042	53	83,979	11,757	202,040	3,527	60,612	22,056	193,686	779	6,844	186,843	388,883	10,165
2043	54	86,079	12,051	214,091	3,615	64,227	24,056	217,742	850	7,694	210,049	424,140	10,816
2044	55	88,231	12,352	226,443	3,706	67,933	26,190	243,932	925	8,619	235,313	461,756	11,488
2045	56	90,436	12,661	239,104	3,798	71,731	28,465	272,397	1,006	9,625	262,772	501,876	12,182
2046	57	92,697	12,978	252,082	3,893	75,625	30,891	303,288	1,091	10,716	292,572	544,654	12,898
2047	58	95,015	13,302	265,384	3,991	79,615	33,477	336,765	1,183	11,899	324,866	590,250	13,637
2048	59	97,390	13,635	279,019	4,090	83,706	36,233	372,998	1,280	13,179	359,819	638,838	14,399
2049	60	99,825	13,975	292,994	4,193	87,898	39,169	412,167	1,384	14,563	397,604	690,598	15,186
2050	61	102,320	14,325	307,319	4,297	92,196	42,295	454,463	1,494	16,058	438,405	745,724	15,998
2051	62	104,878	14,683	322,002	4,405	96,601	45,624	500,087	1,612	17,670	482,417	804,419	16,837
2052	63	107,500	15,050	337,052	4,515	101,116	49,168	549,255	1,737	19,407	529,848	866,900	17,702
2053	64	110,188	15,426	352,478	4,628	105,743	52,940	602,195	1,871	21,278	580,917	933,395	18,595
2054	65	112,943	15,812	368,290	4,744	110,487	56,952	659,147	2,012	23,290	635,857	1,004,148	19,516
2055	66	115,766	16,207	384,497	4,862	115,349	61,221	720,369	2,163	25,453	694,916	1,079,413	20,468
2056	67	118,660	16,612	401,110	4,984	120,333	65,762	786,130	2,324	27,777	758,353	1,159,463	21,449
2057	68	121,627	17,028	418,138	5,108	125,441	70,589	856,720	2,494	30,271	826,449	1,244,586	22,462
2058	69	124,667	17,453	435,591	5,236	130,677	75,722	932,442	2,676	32,946	899,496	1,335,087	23,508
2059	70	127,784	17,890	453,481	5,367	136,044	81,179	1,013,620	2,868	35,815	977,806	1,431,287	24,587

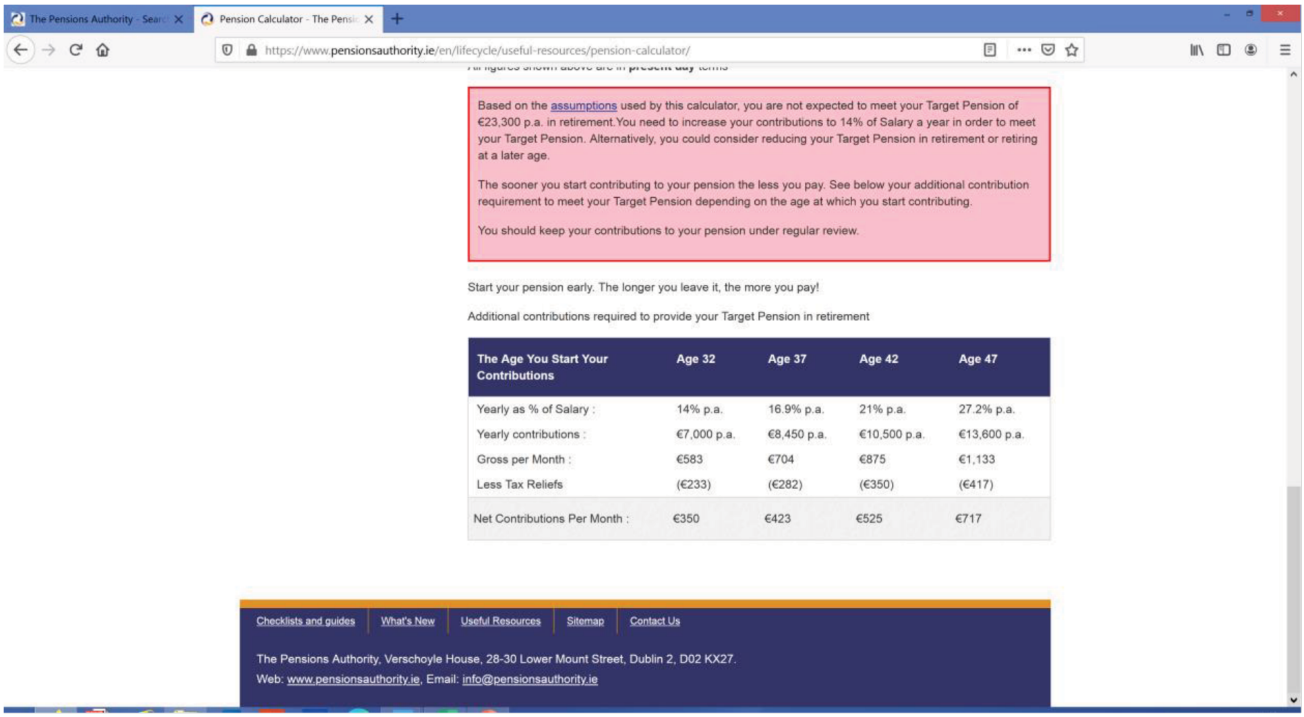
Appendix 8

Output from sample of Online Pension Calculators

Pensions Authority – January 2021



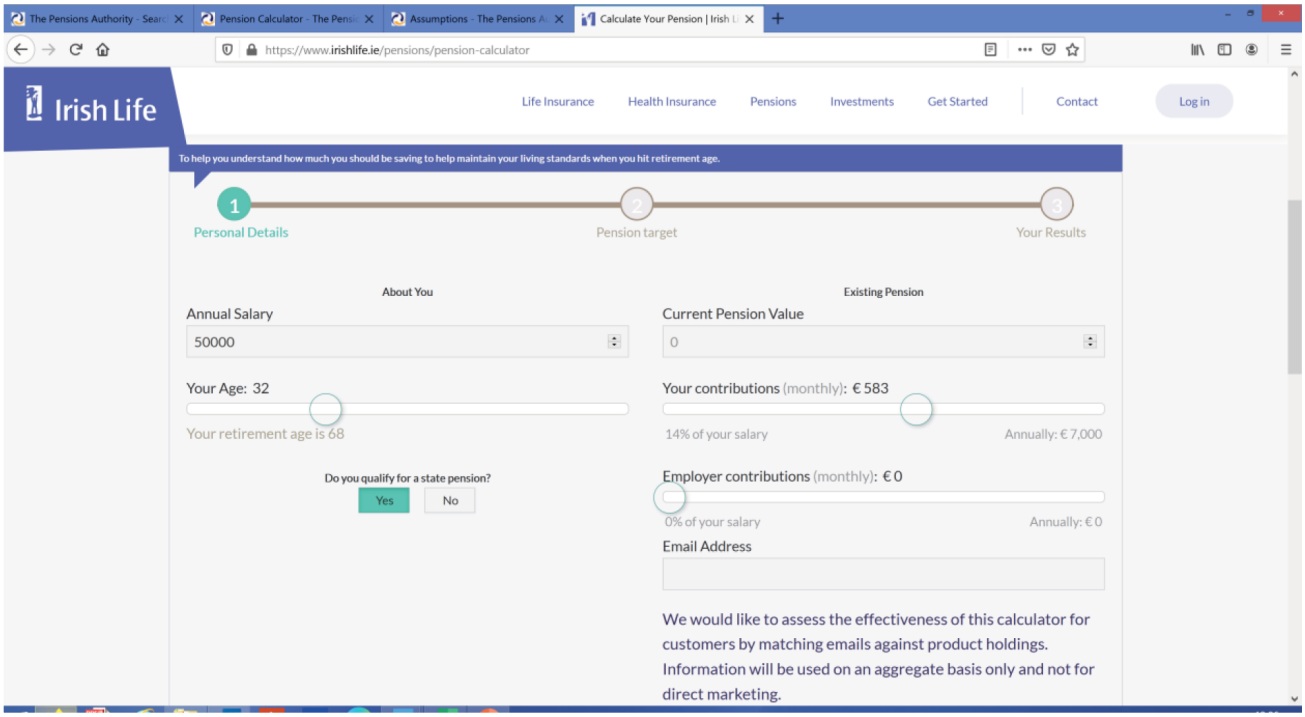


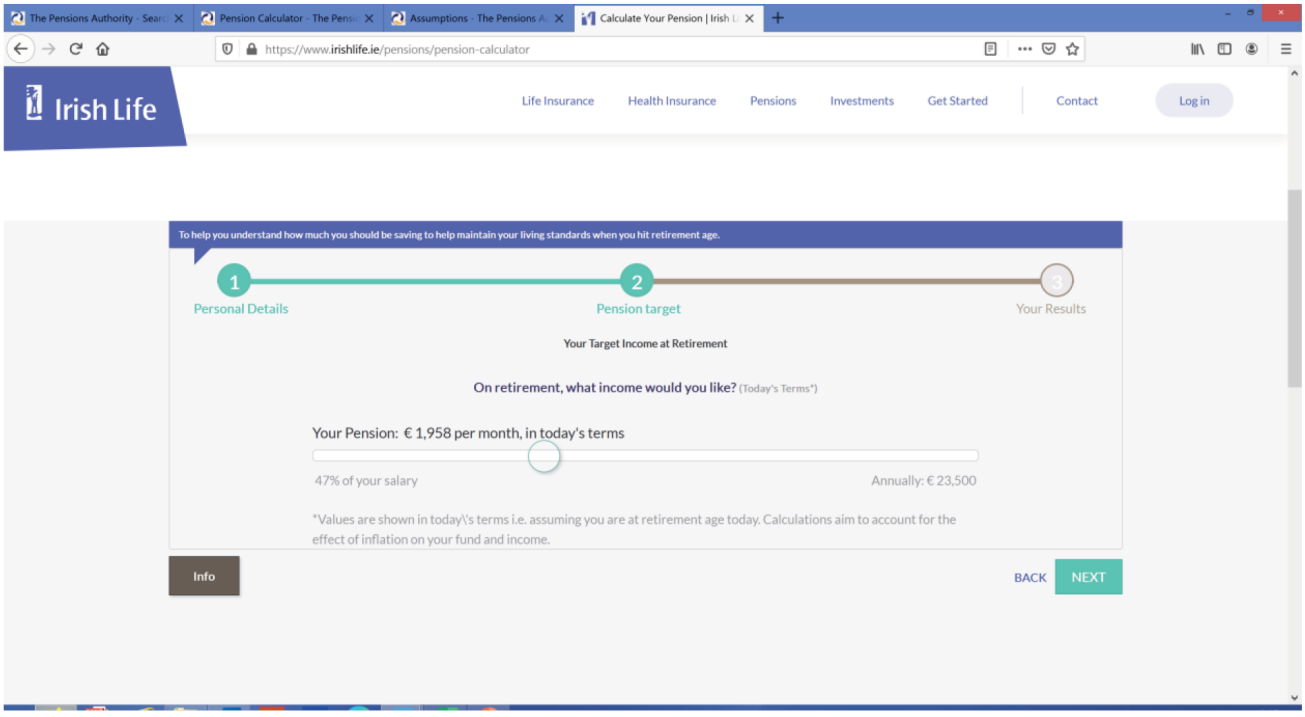


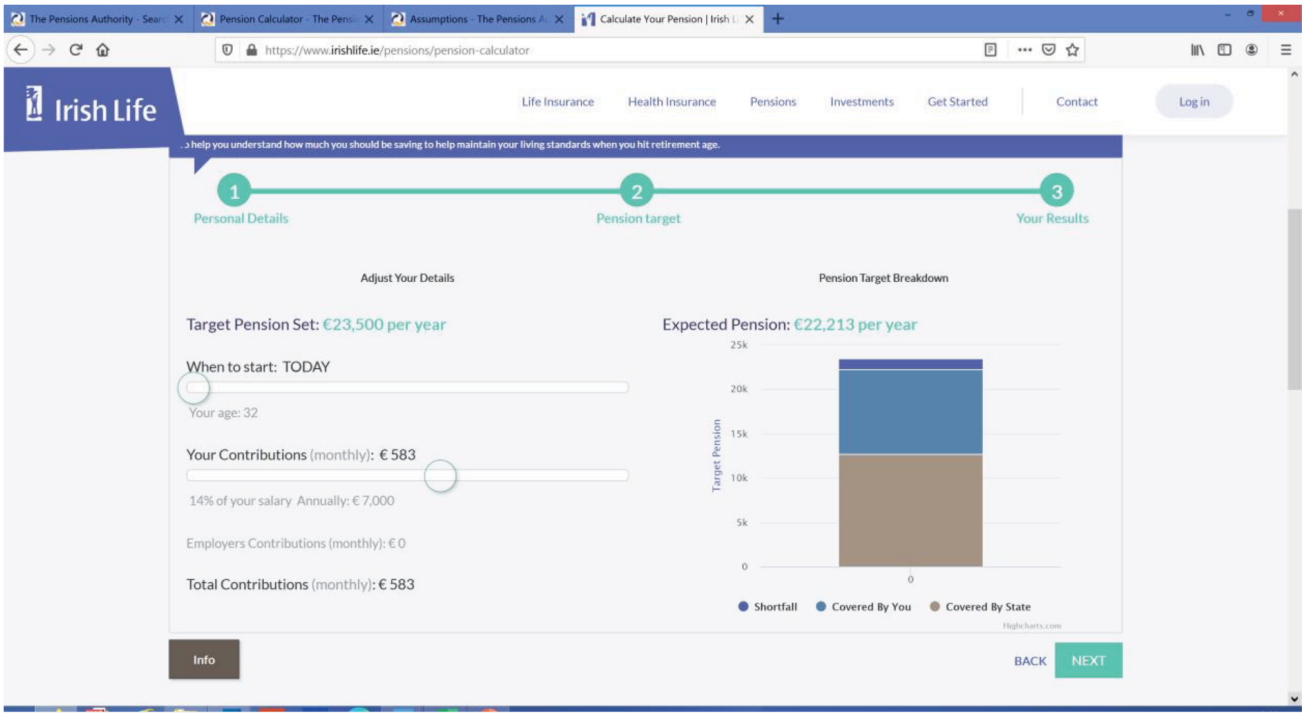
Assumptions

1. All values shown are in present day money terms, i.e. the calculations aim to take account of inflation between now and your retirement date.
2. You are assumed to be eligible to receive the State Pension from your state pension age. The current state social welfare pension is €12,912 per year (or €248.30 per week).
3. The calculator assumes that your retirement fund pays an annual management charge of 1% per annum. In addition, a 5% contribution charge is assumed to be paid on each regular contribution (based on Standard PRSA fees and charges maximum limits). You should contact your pension provider to confirm what charges you are actually paying as these can have a significant impact on your retirement fund which determines your retirement income. Please refer to the fees and charges section of our website for further detail.
4. Regular monthly contributions are assumed to continue to your retirement age and are assumed to increase by 2.5% per annum over the term to your retirement date.
5. Investment return is assumed to be 4% per annum after expenses until 10 years before your retirement date. The investment return is then assumed to reduce annually to the post- retirement interest rate over the 10 year period prior to retirement. This is intended to reflect a common investment strategy of defined contribution pension scheme members and allows for a reduction in risk during the 10 year period leading up to retirement. The investment return earned on your fund is estimated to be 3.7% per annum after expenses from now until your retirement date.
6. The annuity rate used to calculate your pension at retirement uses a post-retirement interest rate of 2% per annum after expenses. Your pension is assumed to increase at 1.5% per annum in retirement and is assumed to be guaranteed to be paid for a minimum of 5 years.
7. The annuity rate used in the calculations is a long term average rate. The actual annuity rate at retirement may differ from the annuity rate used in your illustration
8. Mortality post-retirement is assumed to be in line with 50% of the ILT15 (female) table with allowance for future improvements in mortality. Under this mortality assumption the average life expectancy at age 65 is approximately 28 years in 2039. Spouses' mortality in retirement is assumed to be in line with 42% of the ILT15 (male) table. This is in line with current guidelines recommended by actuarial guidance in Ireland.
9. The calculations assume a 50% spouse's pension on death in retirement. You and your spouse are assumed to be the same age.
10. Your existing pension arrangement (if any) permits benefits in line with those selected.
11. If your earnings are less than €35,300, your marginal tax rate is assumed to be 20%. Alternatively, if you are earning more than €35,300 your marginal tax relief is assumed to be 40%.

Irish Life – January 2021



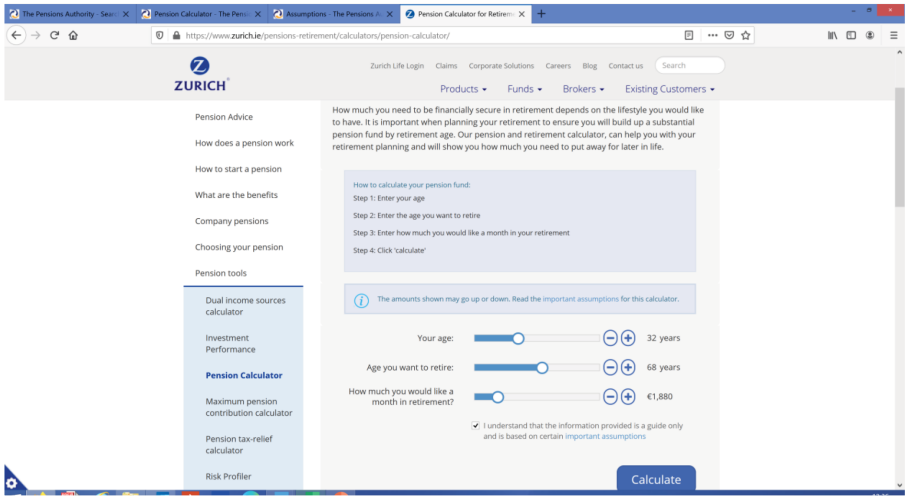


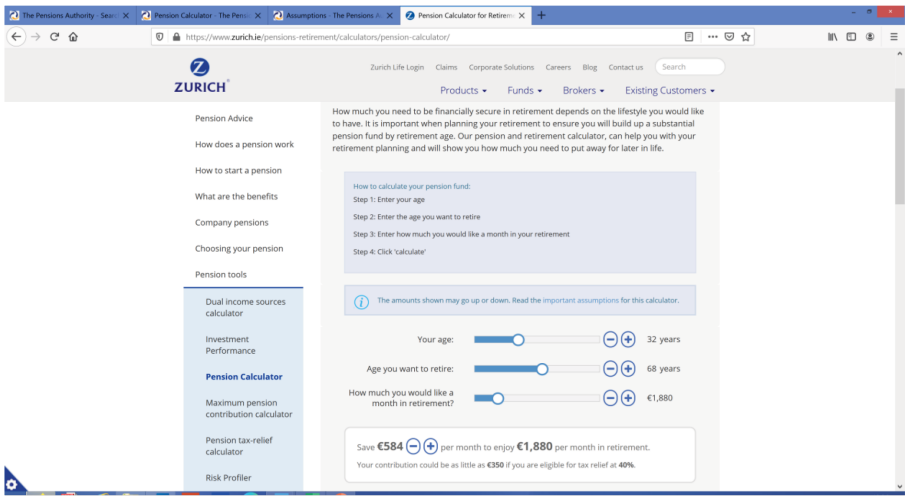


Pension calculator assumptions Information

- Regulator contributions go up by 2.5% each year over the term of your plan. Contributions are invested in a standard PRSA product, which has a fund management charge of 1% per annum and a contribution charge of 5% of each contribution.
- The projected values assume an investment return before retirement of 5.00% per annum. This rate is for illustrative purposes only and is not guaranteed. Actual investment growth will depend on the performance of the underlying investments and may be more or less than illustrated.
- An inflation rate of 2.5% per annum is used to express future values in today's terms.
- The estimated annuities quoted are payable monthly in advance. The guaranteed period is 5 years, so in the event of early death during these five years, the income will continue to be paid for the balance of this period.
- Annuity payments increase by 1.5% per annum.
- The annuity rate at your retirement date will depend on long-term interest rates and life expectancy assumptions at that time and is likely to be different from the annuity rate used in the illustration. Different annuity options can be chosen at retirement.
- Under the finance Act 2012, the age at which people qualify for the state pension will increase over time – to 66 years of age in 2014, 67 in 2021 and 68 in 2028.
- The state pension (Contributory) for a single person is €12,132 p.a. as of January 2016

Zurich – January 2021





Important Assumptions

- For the purpose of determining the term over which pension contributions are made, we have assumed your birthday was exactly six months ago.
- If your target retirement age is lower than the age at which the Social Welfare pension commences (age 68 if you are born on/after 01/01/1961, age 67 if born before this date but on/after 01/01/1955 and age 66 if born before 01/01/1955) the calculations allow for funding for this gap, in addition to the cost of the annuity.
- You are entitled to a full Social Welfare pension of €248.30 per week as at March 2019 which is assumed to increase by 2.5% per year.
- You are saving for the difference between the Social Welfare pension and your target monthly income in retirement.
- We have allowed for inflation of your target monthly income of 2.5% per annum between now and your retirement date.
- Any other private pension provision you may have in place has not been taken into account.
- Your monthly pension contribution increases by 2.5% each year up until your retirement age and is invested in a pension plan with an annual management charge of 1% and a 5% charge on each contribution, in line with the Standard PRSA fees and charges maximum limit.
- A Gross Investment Return of 4.2% per annum on your savings. This is not a forecast because the value of your investment may grow at a faster or slower rate than assumed and the value of your investment may be expected to fall from time to time as well as rise.
- On retirement you purchase an annuity which escalates at 1.5% each year, has a 5-year guarantee and is payable monthly in advance. The annuity rate assumes a post retirement interest rate of 2% per annum and no spouse's pension. The actual annuity rate will depend on the selection of dependant's pension, guaranteed period and the escalation rate, as well as interest rates prevailing when the annuity is purchased.

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	3.7%
Annual fees charged to existing fund (%)	0.00%
Fees charged to the annual contributions (%)	0.00%
Value of Pension at present (€)	€0
Annuity Rate	3.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees	2021 Value of Pension
2021	32	50,000	7,000	7,000	2,100	2,100	259	259	0	0	259	7,259	212
2022	33	51,250	7,175	14,175	2,153	4,253	534	793	0	0	793	14,968	427
2023	34	52,531	7,354	21,529	2,206	6,459	826	1,619	0	0	1,619	23,148	645
2024	35	53,845	7,538	29,068	2,261	8,720	1,135	2,754	0	0	2,754	31,822	865
2025	36	55,191	7,727	36,794	2,318	11,038	1,463	4,218	0	0	4,218	41,012	1,087
2026	37	56,570	7,920	44,714	2,376	13,414	1,810	6,028	0	0	6,028	50,742	1,313
2027	38	57,985	8,118	52,832	2,435	15,850	2,178	8,206	0	0	8,206	61,038	1,540
2028	39	59,434	8,321	61,153	2,496	18,346	2,566	10,772	0	0	10,772	71,925	1,771
2029	40	60,920	8,529	69,682	2,559	20,904	2,977	13,749	0	0	13,749	83,431	2,004
2030	41	62,443	8,742	78,424	2,623	23,527	3,410	17,159	0	0	17,159	95,583	2,240
2031	42	64,004	8,961	87,384	2,688	26,215	3,868	21,028	0	0	21,028	108,412	2,479
2032	43	65,604	9,185	96,569	2,755	28,971	4,351	25,379	0	0	25,379	121,948	2,720
2033	44	67,244	9,414	105,983	2,824	31,795	4,860	30,239	0	0	30,239	136,222	2,965
2034	45	68,926	9,650	115,633	2,895	34,690	5,397	35,636	0	0	35,636	151,269	3,212
2035	46	70,649	9,891	125,523	2,967	37,657	5,963	41,599	0	0	41,599	167,123	3,462
2036	47	72,415	10,138	135,662	3,041	40,698	6,559	48,158	0	0	48,158	183,819	3,715
2037	48	74,225	10,392	146,053	3,117	43,816	7,186	55,344	0	0	55,344	201,397	3,971
2038	49	76,081	10,651	156,704	3,195	47,011	7,846	63,189	0	0	63,189	219,894	4,230
2039	50	77,983	10,918	167,622	3,275	50,287	8,540	71,729	0	0	71,729	239,352	4,492
2040	51	79,933	11,191	178,813	3,357	53,644	9,270	81,000	0	0	81,000	259,812	4,757
2041	52	81,931	11,470	190,283	3,441	57,085	10,037	91,037	0	0	91,037	281,320	5,025
2042	53	83,979	11,757	202,040	3,527	60,612	10,844	101,881	0	0	101,881	303,921	5,296
2043	54	86,079	12,051	214,091	3,615	64,227	11,691	113,572	0	0	113,572	327,663	5,571
2044	55	88,231	12,352	226,443	3,706	67,933	12,581	126,152	0	0	126,152	352,596	5,848
2045	56	90,436	12,661	239,104	3,798	71,731	13,514	139,667	0	0	139,667	378,771	6,129
2046	57	92,697	12,978	252,082	3,893	75,625	14,495	154,162	0	0	154,162	406,243	6,413
2047	58	95,015	13,302	265,384	3,991	79,615	15,523	169,685	0	0	169,685	435,069	6,701
2048	59	97,390	13,635	279,019	4,090	83,706	16,602	186,287	0	0	186,287	465,305	6,992
2049	60	99,825	13,975	292,994	4,193	87,898	17,733	204,020	0	0	204,020	497,014	7,286
2050	61	102,320	14,325	307,319	4,297	92,196	18,920	222,940	0	0	222,940	530,259	7,584
2051	62	104,878	14,683	322,002	4,405	96,601	20,163	243,103	0	0	243,103	565,104	7,885
2052	63	107,500	15,050	337,052	4,515	101,116	21,466	264,568	0	0	264,568	601,620	8,190
2053	64	110,188	15,426	352,478	4,628	105,743	22,831	287,399	0	0	287,399	639,877	8,498
2054	65	112,943	15,812	368,290	4,744	110,487	24,260	311,659	0	0	311,659	679,950	8,810
2055	66	115,766	16,207	384,497	4,862	115,349	25,758	337,417	0	0	337,417	721,915	9,126
2056	67	118,660	16,612	401,110	4,984	120,333	27,326	364,743	0	0	364,743	765,853	9,445
2057	68	121,627	17,028	418,138	5,108	125,441	28,967	393,709	0	0	393,709	811,847	9,768
2058	69	124,667	17,453	435,591	5,236	130,677	30,684	424,393	0	0	424,393	859,985	10,095
2059	70	127,784	17,890	453,481	5,367	136,044	32,481	456,875	0	0	456,875	910,356	10,426

Appendix 10

Annual Pension Contribution	Total Contributions to date	Annual growth in fund	Annual Fees Paid	Age	Cumulative growth in fund	Advisors cumulative share of growth	Rachel's cumulative share of growth
7,000	7,000	420	223	**32**	420	223	197
7,175	14,175	862	457	**33**	1,282	680	603
7,354	21,529	1,328	704	**34**	2,610	1,383	1,227
7,538	29,068	1,818	963	**35**	4,428	2,347	2,081
7,727	36,794	2,333	1,236	**36**	6,760	3,583	3,177
7,920	44,714	2,873	1,523	**37**	9,634	5,106	4,528
8,118	52,832	3,442	1,824	**38**	13,076	6,930	6,146
8,321	61,153	4,038	2,140	**39**	17,113	9,070	8,043
8,529	69,682	4,663	2,472	**40**	21,777	11,542	10,235
8,742	78,424	5,320	2,819	**41**	27,096	14,361	12,735
8,961	87,384	6,007	3,184	**42**	33,104	17,545	15,559
9,185	96,569	6,728	3,566	**43**	39,831	21,111	18,721
9,414	105,983	7,482	3,966	**44**	47,314	25,076	22,237
9,650	115,633	8,272	4,384	**45**	55,586	29,460	26,125
9,891	125,523	9,099	4,822	**46**	64,685	34,283	30,402
10,138	135,662	9,964	5,281	**47**	74,648	39,564	35,085
10,392	146,053	10,868	5,760	**48**	85,517	45,324	40,193
10,651	156,704	11,814	6,261	**49**	97,331	51,585	45,745
10,918	167,622	12,802	6,785	**50**	110,133	58,370	51,762
11,191	178,813	13,834	7,332	**51**	123,967	65,703	58,265
11,470	190,283	14,913	7,904	**52**	138,880	73,606	65,274
11,757	202,040	16,039	8,501	**53**	154,919	82,107	72,812
12,051	214,091	17,214	9,124	**54**	172,133	91,230	80,902
12,352	226,443	18,441	9,774	**55**	190,574	101,004	89,570
12,661	239,104	19,720	10,452	**56**	210,294	111,456	98,838
12,978	252,082	10,528	10,843	**57**	220,822	122,299	98,522
13,302	265,384	10,917	11,245	**58**	231,739	133,544	98,195
13,635	279,019	11,316	11,656	**59**	243,055	145,200	97,855
13,975	292,994	11,725	12,077	**60**	254,781	157,277	97,504
14,325	307,319	12,145	12,509	**61**	266,926	169,786	97,139
14,683	322,002	12,574	12,951	**62**	279,500	182,738	96,762
15,050	337,052	13,014	13,405	**63**	292,514	196,143	96,372
15,426	352,478	13,465	13,869	**64**	305,980	210,012	95,968
15,812	368,290	13,928	14,346	**65**	319,907	224,358	95,550
16,207	384,497	14,401	14,833	**66**	334,309	239,191	95,118
16,612	401,110	14,887	15,333	**67**	349,196	254,524	94,671
17,028	418,138	15,384	15,846	**68**	364,580	270,370	94,210
0	418,138	15,370	15,832	**69**	379,950	286,202	93,749
0	418,138	14,408	14,840	**70**	394,358	301,042	93,316
0	418,138	13,423	13,825	**71**	407,781	314,867	92,914
0	418,138	12,414	12,786	**72**	420,195	327,654	92,541
0	418,138	11,381	11,723	**73**	431,576	339,376	92,200
0	418,138	10,324	10,633	**74**	441,900	350,010	91,890
0	418,138	9,241	9,518	**75**	451,141	359,528	91,613
0	418,138	8,133	8,377	**76**	459,273	367,905	91,369
0	418,138	6,998	7,208	**77**	466,271	375,112	91,159
0	418,138	5,836	6,011	**78**	472,107	381,123	90,984
0	418,138	4,646	4,785	**79**	476,752	385,908	90,844
0	418,138	3,427	3,530	**80**	480,180	389,438	90,742
0	418,138	2,179	2,245	**81**	482,359	391,683	90,676
0	418,138	902	929	**82**	483,260	392,611	90,649
0	Pot is now empty			**83**			
0				**84**			
0				**85**			
0				**86**			
0				**87**			
0				**88**			
0				**89**			
0				**90**			

Appendix 11

Annual Pension Contribution	Total Contributions to date	Annual growth in fund	Annual Fees Paid	Age	Cumulative growth in fund	Advisors cumulative share of growth	Rachel's cumulative share of growth
7,000	7,000	420	15	**32**	420	15	405
7,175	14,175	875	31	**33**	1,295	46	1,249
7,354	21,529	1,367	48	**34**	2,662	94	2,567
7,538	29,068	1,898	67	**35**	4,560	161	4,399
7,727	36,794	2,472	87	**36**	7,031	248	6,783
7,920	44,714	3,090	109	**37**	10,121	358	9,763
8,118	52,832	3,756	133	**38**	13,877	490	13,386
8,321	61,153	4,472	158	**39**	18,349	648	17,701
8,529	69,682	5,243	185	**40**	23,592	834	22,758
8,742	78,424	6,071	215	**41**	29,663	1,048	28,615
8,961	87,384	6,960	246	**42**	36,623	1,294	35,329
9,185	96,569	7,914	280	**43**	44,537	1,574	42,963
9,414	105,983	8,937	316	**44**	53,474	1,889	51,584
9,650	115,633	10,033	354	**45**	63,507	2,244	61,263
9,891	125,523	11,207	396	**46**	74,714	2,640	72,074
10,138	135,662	12,464	440	**47**	87,178	3,080	84,098
10,392	146,053	13,809	488	**48**	100,987	3,568	97,419
10,651	156,704	15,247	539	**49**	116,234	4,107	112,127
10,918	167,622	16,785	593	**50**	133,019	4,700	128,319
11,191	178,813	18,428	651	**51**	151,447	5,351	146,096
11,470	190,283	20,183	713	**52**	171,630	6,064	165,566
11,757	202,040	22,056	779	**53**	193,686	6,844	186,843
12,051	214,091	24,056	850	**54**	217,742	7,694	210,049
12,352	226,443	26,190	925	**55**	243,932	8,619	235,313
12,661	239,104	28,465	1,006	**56**	272,397	9,625	262,772
12,978	252,082	30,891	1,091	**57**	303,288	10,716	292,572
13,302	265,384	33,477	1,183	**58**	336,765	11,899	324,866
13,635	279,019	36,233	1,280	**59**	372,998	13,179	359,819
13,975	292,994	39,169	1,384	**60**	412,167	14,563	397,604
14,325	307,319	42,295	1,494	**61**	454,463	16,058	438,405
14,683	322,002	45,624	1,612	**62**	500,087	17,670	482,417
15,050	337,052	49,168	1,737	**63**	549,255	19,407	529,848
15,426	352,478	52,940	1,871	**64**	602,195	21,278	580,917
15,812	368,290	56,952	2,012	**65**	659,147	23,290	635,857
16,207	384,497	61,221	2,163	**66**	720,369	25,453	694,916
16,612	401,110	65,762	2,324	**67**	786,130	27,777	758,353
17,028	418,138	70,589	2,494	**68**	856,720	30,271	826,449
0	418,138	74,675	2,639	**69**	931,395	32,909	898,485
0	418,138	75,553	2,670	**70**	1,006,948	35,579	971,369
0	418,138	76,396	2,699	**71**	1,083,343	38,278	1,045,065
0	418,138	77,199	2,728	**72**	1,160,542	41,006	1,119,536
0	418,138	77,958	2,755	**73**	1,238,500	43,760	1,194,739
0	418,138	78,668	2,780	**74**	1,317,168	46,540	1,270,628
0	418,138	79,324	2,803	**75**	1,396,492	49,343	1,347,149
0	418,138	79,921	2,824	**76**	1,476,413	52,167	1,424,247
0	418,138	80,453	2,843	**77**	1,556,866	55,009	1,501,857
0	418,138	80,913	2,859	**78**	1,637,779	57,868	1,579,911
0	418,138	81,295	2,872	**79**	1,719,074	60,741	1,658,333
0	418,138	81,591	2,883	**80**	1,800,665	63,623	1,737,041
0	418,138	81,794	2,890	**81**	1,882,459	66,514	1,815,945
0	418,138	81,896	2,894	**82**	1,964,355	69,407	1,894,948
0	418,138	81,888	2,893	**83**	2,046,243	72,301	1,973,942
0	418,138	81,761	2,889	**84**	2,128,004	75,189	2,052,815
0	418,138	81,505	2,880	**85**	2,209,509	78,069	2,131,440
0	418,138	81,109	2,866	**86**	2,290,618	80,935	2,209,683
0	418,138	80,563	2,847	**87**	2,371,181	83,782	2,287,400
0	418,138	79,854	2,822	**88**	2,451,035	86,603	2,364,432
0	418,138	78,970	2,790	**89**	2,530,005	89,394	2,440,611
0	418,138	77,896	2,752	**90**	2,607,901	92,146	2,515,755

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	6.0%
Annual fees charged to existing fund (%)	1.00%
Fees charged to the annual contributions (%)	5.00%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

Exercise care when filling in these boxes. Remember garbage in equals garbage out.

Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	420	420	354	354	66	7,066
2022	33	51,250	7,175	14,175	2,153	4,253	854	1,274	438	792	482	14,657
2023	34	52,531	7,354	21,529	2,206	6,459	1,321	2,595	527	1,320	1,275	22,805
2024	35	53,845	7,538	29,068	2,261	8,720	1,821	4,416	623	1,943	2,473	31,541
2025	36	55,191	7,727	36,794	2,318	11,038	2,356	6,772	725	2,668	4,104	40,898
2026	37	56,570	7,920	44,714	2,376	13,414	2,929	9,701	834	3,502	6,198	50,913
2027	38	57,985	8,118	52,832	2,435	15,850	3,542	13,243	950	4,453	8,790	61,622
2028	39	59,434	8,321	61,153	2,496	18,346	4,197	17,439	1,074	5,527	11,912	73,065
2029	40	60,920	8,529	69,682	2,559	20,904	4,896	22,335	1,206	6,733	15,602	85,283
2030	41	62,443	8,742	78,424	2,623	23,527	5,642	27,976	1,346	8,079	19,897	98,321
2031	42	64,004	8,961	87,384	2,688	26,215	6,437	34,413	1,496	9,575	24,838	112,222
2032	43	65,604	9,185	96,569	2,755	28,971	7,284	41,698	1,654	11,229	30,468	127,037
2033	44	67,244	9,414	105,983	2,824	31,795	8,187	49,885	1,823	13,052	36,832	142,816
2034	45	68,926	9,650	115,633	2,895	34,690	9,148	59,033	2,002	15,054	43,978	159,611
2035	46	70,649	9,891	125,523	2,967	37,657	10,170	69,203	2,192	17,247	51,956	177,479
2036	47	72,415	10,138	135,662	3,041	40,698	11,257	80,460	2,394	19,641	60,819	196,480
2037	48	74,225	10,392	146,053	3,117	43,816	12,412	92,872	2,609	22,250	70,623	216,676
2038	49	76,081	10,651	156,704	3,195	47,011	13,640	106,512	2,836	25,085	81,427	238,131
2039	50	77,983	10,918	167,622	3,275	50,287	14,943	121,455	3,077	28,162	93,293	260,915
2040	51	79,933	11,191	178,813	3,357	53,644	16,326	137,781	3,332	31,494	106,287	285,100
2041	52	81,931	11,470	190,283	3,441	57,085	17,794	155,575	3,602	35,096	120,479	310,762
2042	53	83,979	11,757	202,040	3,527	60,612	19,351	174,926	3,889	38,985	135,941	337,981
2043	54	86,079	12,051	214,091	3,615	64,227	21,002	195,928	4,192	43,178	152,751	366,842
2044	55	88,231	12,352	226,443	3,706	67,933	22,752	218,680	4,514	47,691	170,989	397,432
2045	56	90,436	12,661	239,104	3,798	71,731	24,606	243,285	4,853	52,545	190,741	429,845
2046	57	92,697	12,978	252,082	3,893	75,625	26,569	269,855	5,213	57,758	212,097	464,179
2047	58	95,015	13,302	265,384	3,991	79,615	28,649	298,504	5,593	63,351	235,153	500,537
2048	59	97,390	13,635	279,019	4,090	83,706	30,850	329,354	5,996	69,347	260,007	539,026
2049	60	99,825	13,975	292,994	4,193	87,898	33,180	362,534	6,421	75,767	286,767	579,761
2050	61	102,320	14,325	307,319	4,297	92,196	35,645	398,179	6,870	82,638	315,541	622,860
2051	62	104,878	14,683	322,002	4,405	96,601	38,253	436,432	7,345	89,983	346,449	668,451
2052	63	107,500	15,050	337,052	4,515	101,116	41,010	477,442	7,847	97,830	379,612	716,664
2053	64	110,188	15,426	352,478	4,628	105,743	43,925	521,367	8,377	106,207	415,160	767,638
2054	65	112,943	15,812	368,290	4,744	110,487	47,007	568,374	8,937	115,144	453,230	821,520
2055	66	115,766	16,207	384,497	4,862	115,349	50,264	618,638	9,528	124,673	493,965	878,463
2056	67	118,660	16,612	401,110	4,984	120,333	53,705	672,342	10,152	134,825	537,518	938,627
2057	68	121,627	17,028	418,138	5,108	125,441	57,339	729,682	10,811	145,636	584,046	1,002,183
2058	69	124,667	17,453	435,591	5,236	130,677	61,178	790,860	11,506	157,142	633,718	1,069,309
2059	70	127,784	17,890	453,481	5,367	136,044	65,232	856,092	12,240	169,382	686,710	1,140,191

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	5.0%
Annual fees charged to existing fund (%)	1.00%
Fees charged to the annual contributions (%)	5.00%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

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Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	350	350	354	354	-4	6,997
2022	33	51,250	7,175	14,175	2,153	4,253	709	1,059	436	789	269	14,444
2023	34	52,531	7,354	21,529	2,206	6,459	1,090	2,149	523	1,312	836	22,366
2024	35	53,845	7,538	29,068	2,261	8,720	1,495	3,644	616	1,928	1,716	30,783
2025	36	55,191	7,727	36,794	2,318	11,038	1,926	5,569	713	2,641	2,928	39,722
2026	37	56,570	7,920	44,714	2,376	13,414	2,382	7,951	817	3,458	4,493	49,207
2027	38	57,985	8,118	52,832	2,435	15,850	2,866	10,818	927	4,385	6,433	59,265
2028	39	59,434	8,321	61,153	2,496	18,346	3,379	14,197	1,042	5,427	8,769	69,922
2029	40	60,920	8,529	69,682	2,559	20,904	3,923	18,119	1,165	6,592	11,527	81,209
2030	41	62,443	8,742	78,424	2,623	23,527	4,498	22,617	1,294	7,886	14,730	93,154
2031	42	64,004	8,961	87,384	2,688	26,215	5,106	27,723	1,431	9,317	18,406	105,790
2032	43	65,604	9,185	96,569	2,755	28,971	5,749	33,471	1,575	10,892	22,580	119,148
2033	44	67,244	9,414	105,983	2,824	31,795	6,428	39,899	1,726	12,618	27,281	133,264
2034	45	68,926	9,650	115,633	2,895	34,690	7,146	47,045	1,887	14,505	32,540	148,173
2035	46	70,649	9,891	125,523	2,967	37,657	7,903	54,948	2,055	16,560	38,388	163,912
2036	47	72,415	10,138	135,662	3,041	40,698	8,702	63,651	2,233	18,793	44,858	180,519
2037	48	74,225	10,392	146,053	3,117	43,816	9,546	73,196	2,420	21,213	51,983	198,036
2038	49	76,081	10,651	156,704	3,195	47,011	10,434	83,631	2,617	23,831	59,800	216,505
2039	50	77,983	10,918	167,622	3,275	50,287	11,371	95,002	2,825	26,655	68,347	235,969
2040	51	79,933	11,191	178,813	3,357	53,644	12,358	107,360	3,043	29,698	77,662	256,474
2041	52	81,931	11,470	190,283	3,441	57,085	13,397	120,757	3,272	32,970	87,787	278,070
2042	53	83,979	11,757	202,040	3,527	60,612	14,491	135,248	3,513	36,484	98,765	300,805
2043	54	86,079	12,051	214,091	3,615	64,227	15,643	150,891	3,767	40,251	110,640	324,731
2044	55	88,231	12,352	226,443	3,706	67,933	16,854	167,745	4,033	44,284	123,461	349,904
2045	56	90,436	12,661	239,104	3,798	71,731	18,128	185,874	4,313	48,598	137,276	376,380
2046	57	92,697	12,978	252,082	3,893	75,625	19,468	205,342	4,607	53,205	152,137	404,219
2047	58	95,015	13,302	265,384	3,991	79,615	20,876	226,218	4,916	58,121	168,097	433,481
2048	59	97,390	13,635	279,019	4,090	83,706	22,356	248,573	5,240	63,361	185,212	464,231
2049	60	99,825	13,975	292,994	4,193	87,898	23,910	272,484	5,580	68,941	203,542	496,536
2050	61	102,320	14,325	307,319	4,297	92,196	25,543	298,027	5,937	74,878	223,148	530,467
2051	62	104,878	14,683	322,002	4,405	96,601	27,258	325,284	6,311	81,190	244,094	566,096
2052	63	107,500	15,050	337,052	4,515	101,116	29,057	354,342	6,704	87,894	266,448	603,500
2053	64	110,188	15,426	352,478	4,628	105,743	30,946	385,288	7,116	95,010	290,278	642,757
2054	65	112,943	15,812	368,290	4,744	110,487	32,928	418,216	7,547	102,557	315,659	683,949
2055	66	115,766	16,207	384,497	4,862	115,349	35,008	453,224	8,000	110,557	342,667	727,165
2056	67	118,660	16,612	401,110	4,984	120,333	37,189	490,413	8,474	119,031	371,382	772,492
2057	68	121,627	17,028	418,138	5,108	125,441	39,476	529,889	8,971	128,002	401,887	820,024
2058	69	124,667	17,453	435,591	5,236	130,677	41,874	571,763	9,492	137,494	434,269	869,860
2059	70	127,784	17,890	453,481	5,367	136,044	44,387	616,150	10,037	147,531	468,620	922,100

Year (Present)	2021
Age	32
Current Annual Salary (€)	€50,000
Expected annual growth in Salary (%)	2.5%
Estimated annual inflation rate (%)	2.5%
Pension contribution as % of annual salary	14.0%
How much of your pension is paid by employer (%)	50.0%
Tax Relief	40.00%
Expected annual growth in pension fund (%)	4.0%
Annual fees charged to existing fund (%)	1.00%
Fees charged to the annual contributions (%)	5.00%
Value of Pension at present (€)	€0
Annuity Rate	0.0%

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Year	Age	Salary	Annual Pension Contribution	Total Contributions to date	Annual cost to you, after tax relief	Cumulative cost to you after tax relief	Annual Growth in fund	Cumulative Growth in fund	Annual Fees Paid	Advisors Cumulative share of growth	Your Cumulative share of growth	Fund size after Fees
2021	32	50,000	7,000	7,000	2,100	2,100	280	280	353	353	-73	6,927
2022	33	51,250	7,175	14,175	2,153	4,253	564	844	434	786	58	14,233
2023	34	52,531	7,354	21,529	2,206	6,459	863	1,708	519	1,305	402	21,932
2024	35	53,845	7,538	29,068	2,261	8,720	1,179	2,886	608	1,913	973	30,041
2025	36	55,191	7,727	36,794	2,318	11,038	1,511	4,397	702	2,615	1,782	38,576
2026	37	56,570	7,920	44,714	2,376	13,414	1,860	6,257	800	3,415	2,842	47,556
2027	38	57,985	8,118	52,832	2,435	15,850	2,227	8,484	904	4,319	4,165	56,997
2028	39	59,434	8,321	61,153	2,496	18,346	2,613	11,097	1,012	5,331	5,765	66,918
2029	40	60,920	8,529	69,682	2,559	20,904	3,018	14,114	1,126	6,457	7,657	77,339
2030	41	62,443	8,742	78,424	2,623	23,527	3,443	17,558	1,245	7,702	9,856	88,279
2031	42	64,004	8,961	87,384	2,688	26,215	3,890	21,447	1,370	9,072	12,376	99,760
2032	43	65,604	9,185	96,569	2,755	28,971	4,358	25,805	1,500	10,572	15,233	111,802
2033	44	67,244	9,414	105,983	2,824	31,795	4,849	30,654	1,637	12,209	18,444	124,428
2034	45	68,926	9,650	115,633	2,895	34,690	5,363	36,017	1,780	13,990	22,027	137,660
2035	46	70,649	9,891	125,523	2,967	37,657	5,902	41,919	1,930	15,920	25,999	151,522
2036	47	72,415	10,138	135,662	3,041	40,698	6,466	48,385	2,087	18,007	30,379	166,040
2037	48	74,225	10,392	146,053	3,117	43,816	7,057	55,443	2,251	20,257	35,185	181,238
2038	49	76,081	10,651	156,704	3,195	47,011	7,676	63,118	2,422	22,679	40,439	197,144
2039	50	77,983	10,918	167,622	3,275	50,287	8,322	71,441	2,601	25,279	46,161	213,783
2040	51	79,933	11,191	178,813	3,357	53,644	8,999	80,440	2,787	28,067	52,373	231,185
2041	52	81,931	11,470	190,283	3,441	57,085	9,706	90,146	2,982	31,049	59,097	249,379
2042	53	83,979	11,757	202,040	3,527	60,612	10,445	100,591	3,186	34,235	66,356	268,396
2043	54	86,079	12,051	214,091	3,615	64,227	11,218	111,809	3,399	37,634	74,175	288,266
2044	55	88,231	12,352	226,443	3,706	67,933	12,025	123,834	3,621	41,255	82,579	309,023
2045	56	90,436	12,661	239,104	3,798	71,731	12,867	136,701	3,852	45,106	91,595	330,699
2046	57	92,697	12,978	252,082	3,893	75,625	13,747	150,448	4,093	49,200	101,248	353,330
2047	58	95,015	13,302	265,384	3,991	79,615	14,665	165,114	4,345	53,545	111,569	376,953
2048	59	97,390	13,635	279,019	4,090	83,706	15,623	180,737	4,607	58,152	122,585	401,603
2049	60	99,825	13,975	292,994	4,193	87,898	16,623	197,360	4,881	63,033	134,327	427,321
2050	61	102,320	14,325	307,319	4,297	92,196	17,666	215,026	5,166	68,200	146,826	454,145
2051	62	104,878	14,683	322,002	4,405	96,601	18,753	233,779	5,463	73,663	160,116	482,118
2052	63	107,500	15,050	337,052	4,515	101,116	19,887	253,666	5,773	79,435	174,231	511,283
2053	64	110,188	15,426	352,478	4,628	105,743	21,068	274,734	6,095	85,530	189,204	541,682
2054	65	112,943	15,812	368,290	4,744	110,487	22,300	297,034	6,430	91,960	205,074	573,364
2055	66	115,766	16,207	384,497	4,862	115,349	23,583	320,617	6,780	98,740	221,877	606,374
2056	67	118,660	16,612	401,110	4,984	120,333	24,919	345,536	7,144	105,884	239,652	640,762
2057	68	121,627	17,028	418,138	5,108	125,441	26,312	371,848	7,522	113,406	258,442	676,580
2058	69	124,667	17,453	435,591	5,236	130,677	27,761	399,609	7,916	121,322	278,287	713,878
2059	70	127,784	17,890	453,481	5,367	136,044	29,271	428,880	8,326	129,648	299,232	752,713


PENSION