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POLICY PAPER

Compensation for Wrongful Injury in Ireland: Principles, Practice and Cost to the State

Shane F Whelan*
University College Dublin

Maeve Hally
University College Cork

Abstract: Compensation for future loss due to wrongful injury in Ireland is currently determined at discount rates that do not take account of current market conditions and on a historic mortality basis. We quantify the impact of assessing damages using a more appropriate discount rate, mortality basis, and method of capitalising the loss. This results in the quantum of damages increasing significantly, and figures are given quantifying the increase by the term of the loss. Total outstanding liabilities of the State Claims Agency now exceed €3 billion, about half of which is in respect of catastrophic birth injuries caused by negligence in the delivery of maternity services. The change in the basis by which compensation is calculated outlined in this paper would increase the estimate of outstanding liabilities by over €1 billion and perhaps closer to €2 billion. We argue the current under-compensation of plaintiffs incentivises the State to settle by way of lump sum and is therefore an obstacle to the required legislation for appropriately indexed periodic payment orders.

I INTRODUCTION

This paper reviews the legal principles to determine compensation for future loss in wrongful injury cases in Ireland. The judgement in the landmark case, *Gill Russell v Health Service Executive* case, is analysed and applied to current

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* Corresponding author: shane.whelan@ucd.ie

circumstances. We show that awards made by Irish courts should be materially higher than at present when this precedent is properly reflected in the determination of lump sum compensation.

The principles of risk minimisation set by the precedent to investment risk can equally be applied to the longevity risk currently borne by the plaintiff (that is the risk the plaintiff lives longer than expected in the lump sum calculation). We explore how this might be achieved now that the long-awaited legislation anticipated to transfer longevity risk to the State proved unsatisfactory. It is shown that reducing the longevity risk to the plaintiff further increases the quantum of damages.

We outline the impact this judgement has on the discount rate, mortality basis, and approach to longevity risk. We estimate that the required change in basis by which compensation is calculated increases the outstanding liabilities of the State by more than €1 billion, and perhaps closer to €2 billion.

The paper is divided into eight sections. First, we outline the rise in claims against the State over the last decade. It is shown that the growth of both claim settlements and the rise in outstanding liabilities has averaged more than 15 per cent per annum since 2010. Second, we overview the principles of how compensation for future loss should be estimated under Irish law. We apply the principles to current market conditions in the subsequent two sections and quantify the extent to which lump sum compensation is currently undercompensating the plaintiff due to outdated investments assumptions. Consistent with legal principles and precedent, this paper shows that the real discount rate for wage-related loss should be –2.5 per cent, as opposed to the +1 per cent discount rate currently used.

Third, we analyse the longevity risk imposed on the plaintiff by the current lump sum form of compensation. The life table, which determines the probability of survival and therefore the likelihood of each future loss being incurred, should, we show, be based on cohort mortality rates and not the period mortality rates generally employed. Also, the method of capitalising the future loss into a lump sum award should make explicit the longevity risk borne by the plaintiff. We show that the current method of allowing for this risk gives a probability of greater than 50 per cent that the lump sum form of compensation will be exhausted before the death of the plaintiff and therefore undercompensates the plaintiff. We quantify the increase in compensation necessary to ensure, at probability of 50 per cent or higher, that the lump sum will not be exhausted.

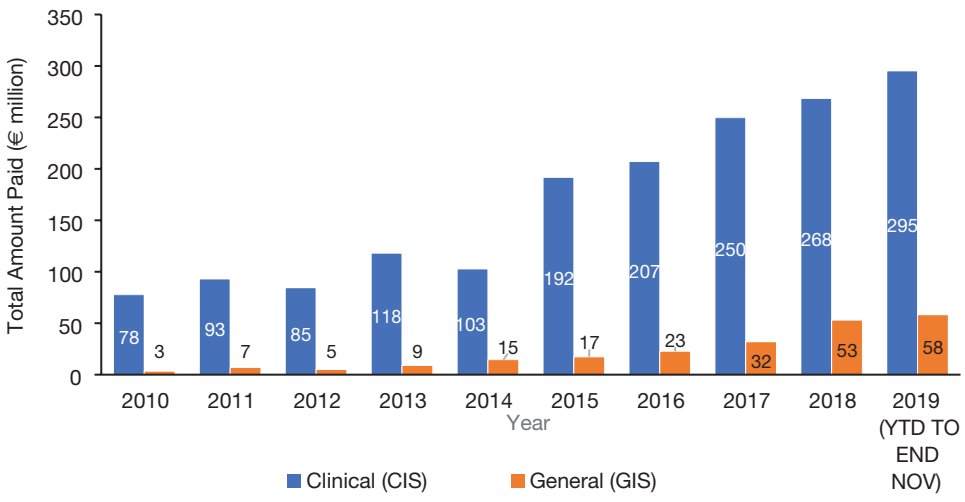
The paper then considers why the long-awaited legal reform to allow periodic payments for the remainder of the plaintiff's lifetime proved inadequate, highlighting how the current practice in capitalising future loss is an obstacle that should first be removed. We quantify the increase in outstanding liabilities to the State when compensation is calculated at current market conditions consistent with legal principles and show the increase in the current outstanding liability exceeds €1 billion and perhaps is closer to €2 billion.

We conclude by reiterating the need for appropriate legislation to effect periodic payment orders to replace lump sum compensation. We also suggest that it might be more cost-effective for the State to invest more in the delivery of sound maternity services when proper account is taken of the cost of maternity claims.

II BACKGROUND

The State Claims Agency (SCA) operates two insurance schemes, the Clinical Indemnity Scheme (CIS) and the General Indemnity Scheme (GIS). The CIS covers all clinical claims against the Health Service Executive, and some other parties. The GIS covers all non-clinical claims against the State, State authorities, and various other bodies such as community and comprehensive schools, the Garda Síochána, and the prison service. Since the start of 2010, total claims settled by the State Claims Agency exceeded €1.9 billion. A total of €1.69 billion was paid out in respect of the Clinical Indemnity Scheme (CIS), which represented 89 per cent of total payments since 2010. Figure 1 illustrates the rising costs of claim settlements each year since 2010.

Figure 1: Total Claims Amounts Paid under the Clinical and General Schemes in € million, 2010 to November 2019 (includes Damages, Legal Fees and Other Expert Costs)



Source: Data from Memo prepared by the SCA in answer to Dáil Question on 5 December 2019 by Deputy Michael McGrath, https://www.oireachtas.ie/en/debates/question/2019-12-05/57.

The number of new claims in recent years has been increasing at a faster rate than the number being resolved, so the number of outstanding claims continues to rise. Figures from the Annual Reports and Accounts of the National Treasury Management Agency of which the SCA is a division, show that the estimated total liabilities to outstanding claims under both schemes amounted to €3.15 billion at the end of 2018, up from €783 million in June 2010. In 2011, the Director of the SCA estimated that cases of cerebral palsy at birth, although only 3 per cent of the claims by number, accounted for two-thirds of the CIS liability (Breen, 2011, pp. 37-38). The most recent breakdown of accounts is given in the Annual Report and Accounts for 2017, where some 53 per cent of the value of outstanding claims (of both CIS and GIS) were in respect of claims against maternity services (€1.4 billion compared to total estimated outstanding claims then of €2.66 billion).

The rate of growth of claim settlements and the rise in outstanding liabilities has averaged more than 15 per cent per annum since 2010. The bigger part of this increase is due to the growth in the number of notified claims, especially claims against maternity units for catastrophic brain injuries at birth. However, another contributor to the growth in value is due to a change in how the judiciary determines the lump sum compensation for future pecuniary loss. Future wage or inflation-linked losses were discounted at 3 per cent per annum at the start of the decade, following the ruling in *Luke Boyne v Bus Átha Cliath and James McGrath* [High Court Record No. 2000/12133P] (see Whelan, 2009). However, the discount rate was contested in 2014 in the case *Gill Russell v Health Service Executive* (High Court Record No. 2009 1918P), when it was reduced to 1 per cent per annum for wage-link loss and 1.5 per cent per annum for inflation-linked loss. These discount rates were later upheld by the Court of Appeal (Appeal No. 2015/49). This reduction in discount rate puts a higher value on the present value of future losses and therefore the lump sum compensation. This ruling by the courts caused the SCA to raise its estimate of outstanding liabilities by €300 million or about 17 per cent[1] and of course, raises the value of all new claims.

The judgement in *Gill Russell v Health Service Executive* is generally summarised by the impact it has on the discount rate, as above. However, a more accurate summary is that the judiciary made explicit the principles by which discount rates are to be determined. In short the original High Court judgement, developed and clarified by the Court of Appeal, states that the discount rate for inflation-linked loss should be determined using the real yield on index-linked bonds and, for wage-linked loss, this real discount rate should be further reduced.

[1] NTMA Annual Report and Accounts, 2015, p. 37.

III PRINCIPLES OF CAPITALISING DAMAGES FOR LUMP SUM COMPENSATION

Compensation for personal injury in Ireland is based on the fundamental principle that as far as possible the wronged party should be restored to the position that he or she was in prior to the incident giving rise to the claim (*restitutio in integrum*). The same principle also applies in the UK, US, and many other jurisdictions (Thornton and Ward, 2009).

Until October 2018, compensation in Ireland for any injury had to be paid by way of a single lump sum. From October 2018, claims for catastrophic injury could be settled by way of annual payments for the remainder of the plaintiff's lifetime. A total of six such periodic payment orders had been put in place before the High Court ruled in November 2019 that the legislation was a "dead letter" as "no judge charged with protecting plaintiffs' best interests could recommend such a scheme" [Judgement in *Jack Hegarty v Health Service Executive*, High Court Record No 2015/10520P]. Given that periodic payments orders are currently in abeyance, we shall first consider how precedent has determined lump sums are calculated. We shall reconsider in a later section what amendment to the legislation is required to achieve periodic payment orders that deliver fair compensation.

Once the court determines from the evidence presented the amount, term and nature of the future loss, then it must calculate a present value of the future stream of losses to give a capitalised value. This capitalised value is then added to the amounts determined in respect of losses suffered to the time of trial (past losses) and non-pecuniary losses (e.g. compensation for pain and suffering, life expectancy curtailed, quality of life impaired) to give the overall lump sum compensation. The quantum in respect of future loss comprises most of the ultimate lump sum award for brain-damaged infants.

There are two different approaches to estimating the real return on a lump sum award invested to meet future losses, generally referred to as the "fair value" approach and the "best estimate" approach.

The fair value approach takes the view that if there exists a freely traded asset whose proceeds exactly reproduce the future pecuniary loss (i.e. a replicating asset), then the market price of the replicating asset gives the capitalised value. In the situation that there is no freely traded asset, then the fair value approach is to estimate the value of such a replicating asset if it was freely traded on the market. So, suppose that the plaintiff's loss is a series of future payments that rise in line with general inflation for the remainder of their lifetime. If there exist index-linked gilts (ILGS), of very long maturities, issued by the State (or another organisation with a good credit rating), then a judiciously selected portfolio of such bonds can provide a future inflation-linked stream of payments that closely match the future loss. The fair value approach takes the market value of such a portfolio of index-linked bonds to be the amount of the compensatory lump sum for future loss. This

solution not only derives a present value for the inflation-linked pecuniary loss but also gives a method to invest the lump sum to restore the plaintiff's lost cash flows.

Alternatively, the best estimate approach estimates the expected real return on an investment portfolio that is deemed appropriate to provide for the future loss given the risk appetite of the plaintiff.

The key difference in the two approaches is how investment risk is treated. The fair value approach is based on minimising the investment risk to the plaintiff and gives the same answer as the best estimate approach when the plaintiff is assumed to be risk averse. The best estimate approach assumes that the plaintiff can tolerate some level of investment risk and constructs an investment strategy that maximises the expected return based on that assumed level of risk. Typically, the best estimate approach gives a higher expected return than the fair value approach and thus a lower level of damages, as future loss is discounted at this higher rate. In short, the best estimate approach assumes that the plaintiff can tolerate investment risk to some extent, and reduces the lump sum determined by the fair value approach by the extent of investment risk to be borne by the plaintiff.

Before the hearing of *Gill Russell v Health Service Executive* in the High Court in 2014 (High Court Record No. 2009 1918P), the precedent on how discount rates were to be determined was set by Mr Justice Finnegan in 2002 in the case of *Luke Boyne v Bus Átha Cliath and James McGrath* [High Court Record No. 2000/12133P]. Here it was established that a prudent investor would invest in a mixed portfolio of higher risk equities and lower risk gilts, the mix reflecting the circumstances of the plaintiff. He judged that a portfolio consisting of 70 per cent in equities and 30 per cent in gilts was prudent for the plaintiff Mr. Boyne and such a portfolio would reasonably mitigate the damages. On the basis of evidence presented, he assessed that the real rate of return on such a portfolio would be 3 per cent, and therefore set 3 per cent as the discount for any loss rising with inflation.

The two different approaches to estimating the real return on a lump sum award were reconsidered in 2014 in the case *Gill Russell v Health Service Executive.* This case determined that the fair value approach is preferable over the previous best estimate approach adopted. The judgement was contested but upheld by the Court of Appeal (Appeal No. 2015/49). The ruling is best summarised in some key quotes from the judgement in the High Court trial and the elaboration and clarifications given by the subsequent ruling in the Court of Appeal.

Finding of Cross J. in High Court:

- "I favour the plaintiff's experts' conclusions not because I have any capacity to be an economic forecaster but rather because they have demonstrated that investment in ILGS [Index-linked Gilts] is more risk adverse than any mixed fund. You do not have to be in any sense an expert in economics to come to that conclusion." (para 2.73).

- "…I consider that over Gill's lifetime, the price of ILGS will as a matter of probability increase and accordingly, I hold that a figure of 1.5 per cent (i.e. 0.5 per cent being the present price plus 1 per cent to represent the future) is a fair figure for a multiplier on the basis of investment in ILGS." (para 2.65)

Findings of Court of Appeal

- "Quite correctly, in the view of this Court, Cross J. determined that the assessment of the real rate of return is to be made on the assumption that the plaintiff should be entitled to invest his award in as risk free an investment strategy as is available and which will likely meet his future care needs. In particular, we agree with his conclusion that the plaintiff is not to be treated as an ordinary prudent investor for the purposes of calculating the likely return on the investment of his lump sum. In adopting this approach, the High Court judge appropriately adopted the reasoning of the House of Lords in *Wells."* (para 83)

- "It follows that we are satisfied that his conclusion that the plaintiff's lump sum should be calculated by reference to ILGS, was well founded on the evidence as was his conclusion that wage inflation in the health care sector is likely to outstrip general inflation in early course and is likely to continue in that vein over his lifetime." (para 160).

In 2017, the Supreme Court refused to allow the HSE leave to appeal against the Court of Appeal Judgment.

So both Courts concluded that the fair value approach, which minimises the investment risk for the plaintiff, is the better of the two approaches to determine the real return on any lump sum award. Both Courts also agreed, based on the evidence presented, that the real rate of return should be estimated with reference to the real return on Index-Linked Gilts (ILGS) issued in euros by a low risk country. The judgement in the *Russell v HSE* case also distinguished between inflation-linked loss and wage-linked loss, with a lower discount rate to be applied to the latter as wages can be expected to increase at a faster rate than prices in the future.

It is now five years on from that High Court judgement of Cross J. so it may be opportune to consider again the real rate available on ILGS as the real rate has changed over the intervening years. Also, the allowance for wage escalation should also be reviewed, as the ruling in that case was time limited:

> this Court is satisfied that the High Court judge's downward adjustment of the real rate of return by 0.5 per cent to take account of future wage inflation, for the purpose of the calculation of the plaintiff's claim for future wage inflation, was appropriate. He was clearly entitled to conclude that wage

> inflation in general would, over the period of the loss, exceed CPI at a minimum of 1 per cent and that if no adjustment was made, the plaintiff would not receive full compensation. Further, given that wage inflation in the care sector would not fall into line with general wage inflation for a period of approximately five years, that being the opinion of Prof Walsh's [expert witness called by plaintiff], he was entitled to reduce the adjustment required in the real rate of return to 0.5 per cent to take this factor into account.
>
> *Quote from paragraph 155 in the Judgement of the Court of Appeal delivered by Ms Justice Irvine.*

Box 1 outlines how, in practice, the lump sum compensation for future loss is determined by Irish courts.

Box 1: How Courts in Ireland Determine Lump Sum Compensation for Future Monetary Loss

Damages for future monetary loss are generally computed using a "multiplicand" and a "multiplier", with the quantum of loss found by multiplying the two figures. The multiplicand is the estimated monthly (or weekly or annual) loss and the multiplier is the capitalised value of a monthly (or weekly or annual) loss of €1. If expected losses are dependent on different contingencies, reoccur at different frequencies, or increase at different rates, then separate multipliers are computed for each category of loss and the overall capitalised amount is the sum of their products.

The multiplicand

In an injury case, the monetary loss would include loss of earnings and perquisites of employment, loss of pension benefits, additional healthcare and living expenses arising from injury. The onus is on the plaintiff to take reasonable measures to minimise the loss by, say, finding suitable alternative employment. Accordingly, the calculation is not strictly made on the actual loss but on the loss when minimised. This is qualified somewhat further as an Irish statute[i] stipulates that the hypothecated "loss" or better, the multiplicand, is not to be reduced by the proceeds of a contract of insurance or, in certain circumstances, by social insurance benefits payable, as a result of the wrongful action (presumably on the justification that plaintiffs provided for these latter benefits themselves).

Sometimes precision is impossible in determining the loss sustained, such as the future loss of earnings for a child incapacitated by an accident long before their career path is clear. Even in these cases, the Irish courts generally impute a loss of earnings from when the child could have been expected to enter the workforce, to be capitalised with a suitable multiplier.

The loss of earnings and other losses determined above are all net of income tax, social insurance contributions or any other deductions that would have been payable by the plaintiff. The offsets are similarly the net receipts in the hand of the plaintiff.[ii]

Say the court accepts, on the basis of evidence presented, that the plaintiff has suffered the following monetary loss in the future under different headings (all values in present day terms)

1. Cost of Employing a caregiver from now for life: €1,000 per week
2. Loss of Earning from Age 21 to Age 68: €500 net per week
3. Loss of Pension from age 68 for remainder of life: €250 net per week
4. Cost of Aids and Appliances (e.g. wheelchair, hoists, car adaptations) from now for life: €100 per week for life.

The multiplier

The multiplier to be applied to the multiplicand is to capitalise the loss of a €1 per week (or other frequency of the loss) over the total period of the loss. Specialist actuaries are retained to determine the multiplier and estimate the lump sum compensation for future loss. The actuary must make assumptions on:

(i) The probability that each future payment is made. This typically requires assumptions on the mortality rates for the plaintiff, but it could involve other contingencies.
(ii) The amount by which the net loss of €1 in present day terms might increase to by the time of payment. This assessment, in turn, typically requires assumptions on the general level of future inflation, the general level of real salary increases (that is salary increases above inflation), the probability that the salary level of the plaintiff might have changed other than by the general level as a result of, say, promotion.
(iii) The discount rate that must be applied to each future payment so that its present value is determined. This is the assumed return from investing the lump sum.
(iv) The rate and manner of taxation of income and capital gains in the future, both to determine the net future loss and the net proceeds from investing the compensating lump sum to replicate those net future losses.
(v) Other assumptions, such as investment expenses, loss ceasing on contingencies other than death or reaching a certain age (such as on redundancy).

Determining the Lump Sum

Let us further assume in our example earlier that the plaintiff is a female currently ten years old. The precedent in such cases is that wage-linked loss is discounted at 1 per cent per annum and inflation-linked loss at 1.5 per cent per annum. So

the loss under headings 1-3 are discounted at 1 per cent per annum while the loss under heading 4 is discounted at 1.5 per cent per annum. Then, allowing for mortality using Irish Life Table 16 as is commonly used (see later), the actuary would calculate the following multiplier under each heading of loss:

		Multiplier
1.	Capitalised Cost of Employing a caregiver for €1 per week from now for life:	2,691
2.	Capitalised Value of Loss of Earning of €1 per week from Age 21 to Age 68:	1,718
3.	Capitalised Value Loss of Pension for €1 per week from age 68:	430
4.	Capitalised Cost of Aids and of €1 per week from now for life:	2,304

Hence

1.	Capitalised Cost of Employing caregiver from now for life: €1,000 times 2,691 =	€2,691,000
2.	Capitalised Value of Loss of Earning from Age 21 to Age 68: €500 times 1,718 =	€859,000
3.	Capitalised Value Loss of Pension from age 68: €250 times 430 =	€107,500
4.	Capitalised Cost of Aids from now for life: €100 times 2,304 =	€230,400
	Lump Sum to Compensate for Future Monetary Loss:	€3,887,900

[i] Section 2 of the Civil Liability (Amendment) Act, 1964; Social Welfare Consolidation Act 1993.
[ii] *Cooke v Walsh* (1984) ILRM 208.

IV DETERMINING THE REAL RETURN USING THE FAIR VALUE APPROACH AT THE PRESENT TIME

It is not straightforward to construct a portfolio of assets, the proceeds of which will match the plaintiff's future inflation-linked loss. Two problems arise in constructing such a portfolio to replicate future loss:

(i) There are essentially no index-linked bonds linked to future inflation in Ireland.
(ii) Index-linked bonds in countries that issue them do not span the maturity range needed to match the plaintiff's loss which might continue for several decades.

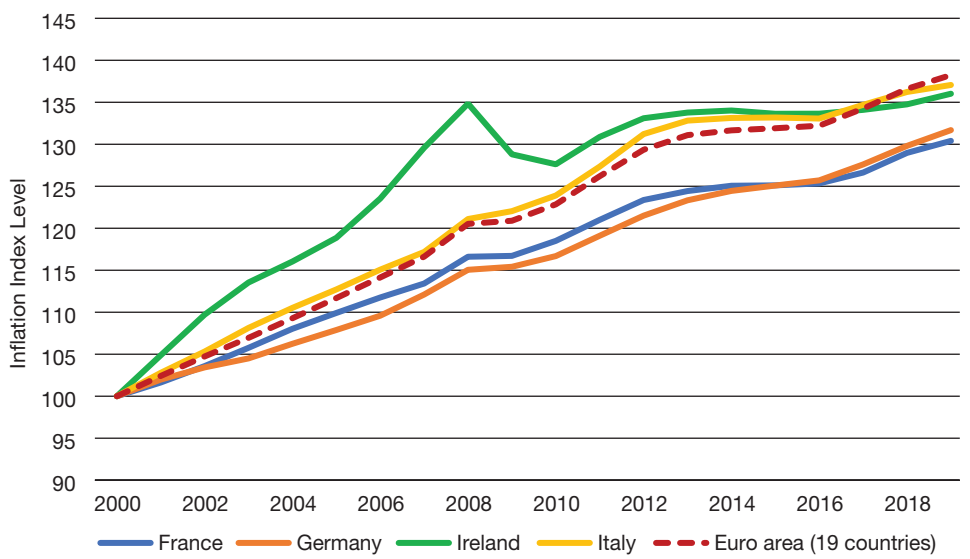
We treat each of these issues in turn.

While the market of bonds with proceeds linked to inflation has not developed in Ireland, it has in other countries with the euro as their currency. In particular,

France, Germany and Italy have issued such bonds with inflation linked to Eurozone inflation (the Harmonised Index of Consumer Prices excluding tobacco) and the market for index-linked bonds constitutes a growing part of the large euro-denominated bond market. An Irish plaintiff can consider investing in such index-linked bonds with no currency risk. The key risk with such an investment is how inflation across Europe might differ from Irish inflation in the future.

Studies of how inflation differs in different regions with the same currency suggest that inflation rates do not differ very significantly over the long term (Whelan, 2005). So, for instance, when the Irish pound was linked to the UK pound from the political independence of Ireland at the end of 1921, to the breaking of the one-to-one parity between the currencies in early 1979, inflation in Ireland and the UK was very similar year-on-year, with accumulated differences of less than 7 per cent over the entire 58-year period or, equivalently, less than 0.12 per cent per annum. More recently, inflation in Ireland can be compared to the Euro Area since the euro came into being. Inflation across the Eurozone has averaged almost the same from 2000 to the end of 2019, with annualised inflation of 1.6 per cent in Ireland, 1.7 per cent across the euro region, 1.5 per cent in Germany and 1.4 per cent in France (see Figure 2). These similarities in inflation over the period are despite the boom and bust in Ireland over the last two decades, not unrelated to the low interest rates caused by the introduction of euro.

Figure 2: Inflation in Ireland, the Euro Area, and Selected Countries, 2000-2019



Source: OECD Database of National Consumer Price Indices, https://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=PRICES_CPI&ShowOnWeb=true&Lang=en

Accordingly, it can be reasonably maintained that the average inflation rate in Ireland will be similar to the Eurozone inflation rate over the longer term. Furthermore, over such long periods it is not obvious which region would have slightly higher or slightly lower rates of inflation. While investing in bonds with payments linked to Eurozone inflation to match Irish inflation-linked cash flows does involve an element of risk, the risk is of an order of magnitude lower than the risk introduced by investing in equities or other securities.

The strategy of investing in such Eurozone inflation-linked gilts is the optimum strategy of all possible strategies in the sense that it minimises the risk in replicating the lost inflation-linked cash flows to the plaintiff. It was accepted in the *Gill Russell v Health Service Executive* that ILGS issued in euros and linked to Eurozone inflation by France and others constituted the least risk investment portfolio. The overall size of the French Government's outstanding ILGS debt as at end of 2018 was €220 billion. The overall size of the Eurozone Sovereign Inflation-Linked Bond market exceeds €660 billion.[2] Note that inflation linkage is to the Euro Area Harmonised Index of Consumer Prices excluding tobacco.

The longest dated stock linked to Euro Area inflation currently issued by France is to the year 2047 (Germany is to year 2046). So, at the present time, it not possible to construct a matching portfolio from existing index-linked stock to cover inflation-linked losses extending from the calendar year 2047, which might be necessary if the plaintiffs' losses are expected to continue beyond 2047. However, the associated investment risk can be minimised, as we now outline.

The management agency of the French national debt, Agence France Trésor, undertakes to execute 10 per cent of its issuance programme each year with inflation-linked securities (Agence France Trésor, 2014). With other euro governments also issuing such securities, there will be a considerable ongoing supply of index-linked bonds linked to Euro Area inflation.

An investment strategy to provide for the inflation-linked losses which fall after the calendar year 2047 consists of a number of steps. Step 1 is to invest that part of the lump sum that is deemed to meet the loss over these years in the 2047 dated French index-linked bond at the current real yield. Step 2 is to sell these index-linked stock holdings and use the proceeds to buy longer dated index-linked stock when such longer dated bonds are issued. By this strategy, the duration of the portfolio can be extended, and longer-term losses matched over time. A feature of long-term interest rates or yields (whether real or nominal) is that such interest rates or yields generally show very little change from maturities of 30 years to 40 years and longer. This observation entails that, at the future time when a longer-dated stock is issued, the real yield that the plaintiff sells the 2047 stock at is very close

[2] See https://us.spindices.com/indices/fixed-income/sp-eurozone-sovereign-inflation-linked-bond-index.

to the real yield that he is simultaneously buying at. In short, he is in effect swapping two securities at a future unknown price – but we know that the prices will be very similar. In market parlance, it is "hedging the risk" of future price movements of the currently unavailable longer dated stock by investing temporarily in the 2047 stock.

The hedging strategy reduces the future reinvestment risk markedly but does not eliminate it altogether. There is a residual risk. If this residual risk were passed on to a third party, they would charge a risk premium for accepting it. It can be shown that following this investment strategy will lead to a gain to the plaintiff if real yields increase from current levels. Alternatively, if real yields fall from current levels then the plaintiff is exposed to a loss. However, it is the best strategy as it minimises the risk.

The above considerations show that it is a straightforward matter to estimate the appropriate discount rate for inflation-linked loss to a plaintiff. Simply, estimate the average real yield on index-linked stock over the future term of the loss. Table 1 shows the real yields available on French sovereign ILGS over different future periods as at end October 2019.

Table 1: Real Yields on selected French Index-Linked Gilts linked to Euro Inflation Index (excluding Tobacco) at End October 2019

Term from Now	*Real Yield*	*Stock*
1 Years	–1.6%	France OAT€i 2.25% 2020
5 Years	–1.3%	France OAT€i 0.25% 2024
11 Years	–1.0%	France OAT€i 0.7% 2030
21 Years	–0.8%	France OAT€i 1.8% 2040
28 Years	–0.7%	France OAT€i 0.10% 2047

Source: https://www.aft.gouv.fr/en/oateuroi-key-figures and prices and real yield calculations by Frankfurt Stock Exchange on 30 October 2019. See http://www.boerse-frankfurt.de/en/bonds/.

Note: Real yield on the German 0.10 per cent inflation-linked Federal bond 2015 (2046) is –1.1 per cent on 31 October 2019 See https://www.deutsche-finanzagentur.de/en/fact-sheet/sheet-detail/productdata/sheet/DE0001030575/ and https://www.deutsche-finanzagentur.de/en/institutional-investors/federal-securities/inflation-linked-securities/

The real yield varies with the duration. As cerebral palsy claimants tend to have life expectancies of several decades, a gross real yield of the order of –0.75 per cent per annum appears reasonable to use, but it could be lower for those with short life expectancies. This real yield ignores portfolio management costs. An additional allowance of 0.25 per cent to 0.5 per cent per annum could be made for all costs associated with investment – advisory fees, trading costs, and management costs. Hence, at a conservative estimate, the net real yield to discount future inflation-

linked loss is of the order of –1.0 per cent at the present time, after some allowance is made for the costs of implementing the investment strategy.[3]

V DISCOUNT RATE FOR WAGE-LINKED LOSS

It is important to distinguish between a wage-related loss and a price-related loss as wage and price indices have exhibited quite different characteristics over time since the industrial revolution. Over the last 200 years or so, wages have increased faster than inflation, a key factor leading to the dramatic rise of living standards of workers over time in Ireland, UK, Europe, US and the rest of the world. Rising real wages are generally attributed to the productivity gains unleashed since the industrial revolution which ensure that the same inputs of labour, resources and capital continue to produce more outputs over time. Labour, through increasing real wages, is rewarded for its part in the increase in productivity over time.

In any event, there is overwhelming evidence that wages have increased faster than inflation in the past, in Ireland and elsewhere, and that it is appropriate to make allowance for such differences in the future. As mentioned earlier, an allowance to be made for increases in real wages in the future in Ireland was considered and ruled on in 2014 in the case *Gill Russell v Health Service Executive*, later upheld by the Court of Appeal. However, as was made clear in the judgements in that case, the long-term assumed real rate of wage increases was reduced to allow for the exigencies at that time.

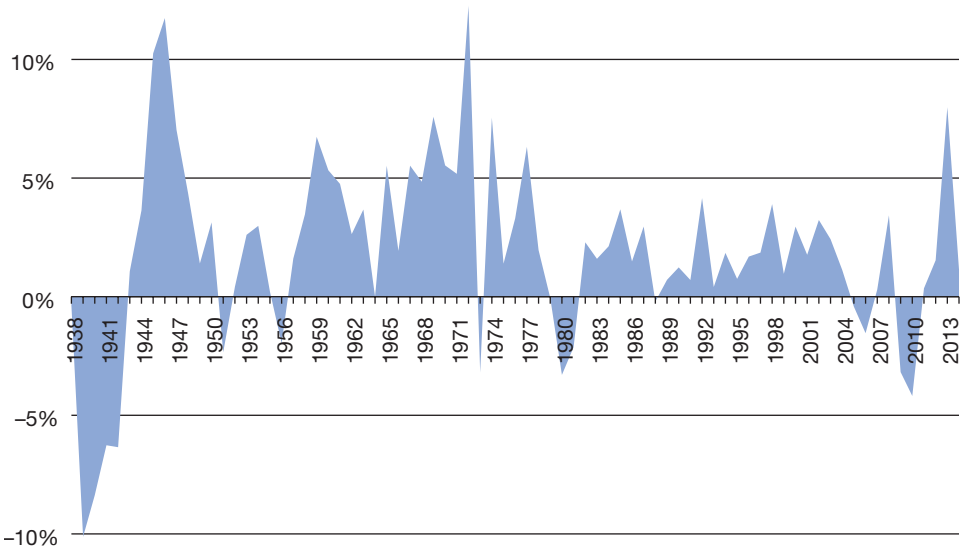
There are considerable data, national and international, to show the trends in real wages over long and short periods in the past. The Central Statistics Office (CSO) in Ireland has compiled and published wage or earnings or labour cost indices since the 1930s; other national statistics offices have done the same for their national economy; and bodies such as the International Labour Organisation have collected wage data by occupation around the world since 1924 (the "October Inquiry").

The CSO has published a historic analysis of wage trends in Ireland from 1938 to 2015 (CSO, 2017), in aggregate and broken down by industries and sectors,

[3] The allowance for such costs was considered recently in the UK in the Government Actuary's advice to the Lord Chancellor on the personal discount rate (Government Actuary UK, 2019, see pp. 50-53). Table 9 (p. 52) of this report suggests an adviser fee of 0.25 per cent to 0.5 per cent p.a., fund manager fees of 0.25 per cent to 0.5 per cent p.a., and platform fees of 0.1 per cent to 0.2 per cent p.a. Including an allowance for tax of 0.0 per cent to 0.5 per cent, the UK Government Actuary advised an overall allowance of 0.75 per cent per annum. Subsequently, the Lord Chancellor in his reasons for adopting the new –0.25 per cent discount rate for personal injury claims in the England and Wales agreed with the Government Actuary's advice on such charges, stating that "...the Government Actuary's conclusion that a figure of plus 0.75 per cent for tax and expenses is a reasonable one" (paragraph 13). Accordingly, the 0.25 per cent p.a. allowance suggested above for Irish cases is at the lower end of what was recently suggested and adopted in the UK.

occupations, age, and gender. This publication records that real earnings in Ireland (that is, earnings above inflation) grew by an average of 1.9 per cent per annum over the 77 years ending 2015. It varied by decade, ranging from a low of 0.9 per cent real per annum in the 1980s to a high of 4.8 per cent real per annum in the 1970s. The gender pay gap for women in the industrial sector (the only one recorded for such a length of time) fell from 44 per cent in 1943 to 23 per cent in 2014, meaning that the real rate of increase in women's wages in this sector was greater than for men over this period.

Figure 3: Real Wage Increases in Ireland for Industrial Workers, each year, 1938-2015



Source: Data from CSO average weekly earnings data for each year under all industries category (CSO, 2017). This comprises all industrial occupations working in the manufacturing, mining and quarrying, transportable goods, and electricity, water and waste sectors. The mean annual increase was 1.9 per cent.

The rate of the increase in real earnings in Ireland also varies by sector and occupation. In Table 2, we take an abstract from Table 3.1 in CSO (2017) that highlights how real increases in wages varied by occupation over the 30 years ending 2015.

However, there are issues when applying such historic wage or earnings indices to estimate the actual wage increases experienced by an individual throughout their working life or for the cost of specialised labour services, such as caregivers. Trends in wage indices might not be reliable for four reasons:

(a) First, the composition of general earnings or wage indices might be different to the required occupation.

Table 2: Real Average Weekly Earnings in the Industry Sector by Occupational Group in Ireland, 1985-2015

	Real average weekly earnings (€)		
Year	*Managerial & Professional*	*Clerical, Sales & Service Workers*	*Production & Machinery*
1985	801.16	506.08	450.34
2015	1,451.89	754.51	685.53
Real Increase per annum, 1985-2015	2.0%	1.3%	1.4%

Source: Figures for real average earnings sourced from Table 3.1 in CSO (2017). The industry sector comprises all working in the manufacturing, mining and quarrying, transportable goods, and electricity, water and waste sectors.

(b) Second, the composition of the wage index might change over time so, say, greater weight is given to newer occupations with different skills over time.
(c) Third, there can be changes to the skills demanded over time, even in occupations with the same title, so the index is not comparing like-with-like over time.
(d) Fourth, often there are inconsistencies in how the data are collected over time in respect of bonuses, pension, holiday pay, and other benefits of working.

These issues tend to be compounded when making international comparisons due to currency differences and the possibility that the same job title might not correspond to the same work in different countries.

Academic studies of real wage trends over long period are often structured to remove distortions found in general wage indices. Typically, such studies follow wages in one occupation that has altered little over the very long term (and also their experienced inflation by following the change in prices and composition of the wage-earners consumption basket). Detailed accounts have often been kept of building projects (such as universities or cathedrals), which allow academics to study the long-term trends in skilled (e.g. carpenters) and unskilled labourers wages over time. Clark (2005), for instance, traces the real wage trends for such workers in England for 800 years (1209 to 2004), using some 46,000 wage observations and 110,000 price observations and shows, since the industrial revolution, wages have persistently increased at a higher rate than inflation.

Clark (2005) reports that the annualised real wage increase for craftsmen (labourers) was 1.3 per cent (1.4 per cent) over the two hundred years since 1805, 1.4 per cent (1.6 per cent) over the last hundred years, 2.1 per cent (2.1 per cent) since 1945, 2.7 per cent (2.4 per cent) since 1965 and 2.0 per cent (1.8 per cent) since 1985. Similar findings have been found when studying construction workers real wages in European cities (Allen, 2008) and for wages in the United Kingdom

(see for instance Feinstein, 1995, which includes wages in Ireland prior to 1920). Indeed, there is a considerable body of evidence that real wages have averaged between 1 per cent and 2 per cent above inflation over long periods in the past. Whelan (2002) traces the long history of the wages for carpenters in Ireland over the twentieth century and shows that, over long periods, the average has been between 1 per cent and 2 per cent over inflation.

There is an important point to be made about the results of calculating real increases in wages over long periods of time. Put simply, the average real wage rise from different occupations tend to converge to a very similar annualised rate as the time period increases. So, in the long term, despite different wage levels and differing wage trends in the short term, the average increase in real wages for skilled and unskilled men are seen to converge over time. To illustrate why this is the case mathematically, consider Occupation A and Occupation B, with the renumeration from Occupation A being, say, 75 per cent of that of Occupation B. Let us further say that after a period of 50 years that the renumeration for both occupations is the same. This means that the wage rate for Occupation A increased faster than Occupation B, by an accumulated 33 per cent over the 50 years. This translates to an annualised increase of 0.58 per cent. So the annualised rate of the wage increase of Occupation A is just 0.58 per cent higher than that of Occupation B, and this annualised difference will fall as the time period increases. In short, there is a common main driver affecting both wage series that, over time, dominates over any (reasonable) change in relative wages levels. Hence, the annualised rate of increase of both wage series converge to the same value as the time period increases.

An analysis of historic wages in Ireland over the last hundred years or so shows that wages increased faster than inflation over any long-term period. The relationship has varied in the past, by period studied, by sector, by occupation, and by gender. However, across all these variables, it is a fair assessment to summarise the historic statistics as showing that wages exceeded inflation by an average of between 1 per cent and 2 per cent per annum over periods of several decades. Trends in real wages in the past are not unique to Ireland – similar trends have been observed in most economies in the world (see, for instance, Officer and Williamson, 2012, or Williamson, 1992, and earlier cited sources). It appears reasonable to conclude that wage escalation has been about 1.5 per cent higher than general price inflation over the long-term past in Ireland.

Arguments have been advanced by some economists, notably Gordon (2016), suggesting that productivity improvements in the past are difficult to maintain in the future and recent trends are giving warning signs. However, there is somewhat of a consensus that real wage increases in Ireland over the long-term future will be similar to the long-term past according to long-term forecasters. The *Actuarial Review of The Social Insurance Fund* assumes that wages will increase at an average of about 1.5 per cent per annum above inflation over the next several decades (Department of Employment Affairs and Social Protection, 2017;

Department of Social Protection, 2012). Other projections assume salaries will tend to rise by 2 per cent real per annum over the long term (e.g. Pensions Board, 2005; 2006). Assumptions regarding the real rate of increase in staff nurse wages in the long term were made in Appendix 8 (pp. 191-240) in *Report of the Public Service Benchmarking Body (2007)*. In this actuarial report, the actuary pointed out that "both historic trends and economic projections point to pay increases of 2 per cent p.a. above inflation" (p. 210) and, in addition to these general pay increases, staff nurses would have, on average, promotional increases of about 0.8 per cent per annum (p. 214). In a less comprehensive but more up-to-date report, the *Report of the Public Service Pay Commission May 2017*, suggest that general pay increases could reasonably be modelled as 1 per cent above inflation (p. 100) increased with allowances for promotional increases, which for nurses appear to be about 0.5 per cent per annum (see commentary on p.105).

These assumptions are in line with actuarial practice in countries such as the UK and US where allowance is typically made that wages will increase faster than inflation over the long-term future, generally by between 1 per cent and 2 per cent per annum (e.g. see actuarial valuations of social security or public service pension schemes in these countries). Courts in these jurisdictions have also had to decide on what is a reasonable allowance to make for future real earnings increases. The Guernsey Court of Appeal and the Judicial Committee of the Privy Council have considered this issue in depth recently in the matter of *Helmont v Simon* [Privy Council Appeal No. 0064 of 2011]. The Judicial Committee of the Privy Council upheld the decision that the economic evidence justified a differential between price and wage inflation of 2 per cent.

Assuming real wages increase at +1.5 per cent per annum on average over the long-term future, then the discount rate used in capitalising wage-linked loss in Irish courts should be –2.5 per cent (that is –0.75 per cent for inflation-linked losses, reduced by 0.25 per cent to allow for portfolio managements costs and reduced by a further 1.5 per cent to allow for the real increase in wages).

VI LONGEVITY RISK

Each future payment will be made only if the injured party is then alive, so a mortality basis is needed to estimate the survival probability. Accordingly, the part of the lump sum to compensate for future loss is dependent not only on the discount rate but also on the mortality basis assumed.

Longevity risk is the risk that the plaintiff will live longer or shorter than expected (and thus be under- or over-compensated). Longevity risk can usefully be decomposed into three distinct components. First, the mortality basis or life table give average rates of survival for a group. So, even assuming the life table is correct, applying any life table to one individual in the group gives rise to random error, as

that particular individual may be the one who dies later or earlier than average. Second, determining the appropriate life table for a group, such as the male or female population of Ireland, requires actuarial judgement as, amongst other things, it involves projecting mortality rates into the long-term future. Third, the plaintiff will typically differ from an average person due to injury and disabilities, so adjustment is required to the life table of the average person. Typically, expert medical opinion is sought by the courts on this third issue to determine what reduction to normal life expectancy, if any, is required for the particular impairments of the plaintiff.

It is possible to estimate statistically the extent of the random error in applying a group average to an individual. It is also possible to give an indication of the size of the risk in projecting mortality rates for the population of Ireland. However, the third risk is obviously specific to the individual's impairments so can only be done, if at all, on a case-by-case basis.

The Central Statistics Office (CSO) publishes life tables for the Irish population following each census. The most recent life table is Irish Life Table 16 based on the mortality experience observed over the calendar years 2010 to 2012. These tables give a period life expectancy at birth of 78.4 years for males and 82.8 years for females. These population tables are frequently used as the mortality basis in estimating the present value of future loss court cases in Ireland (Whelan, 2009).

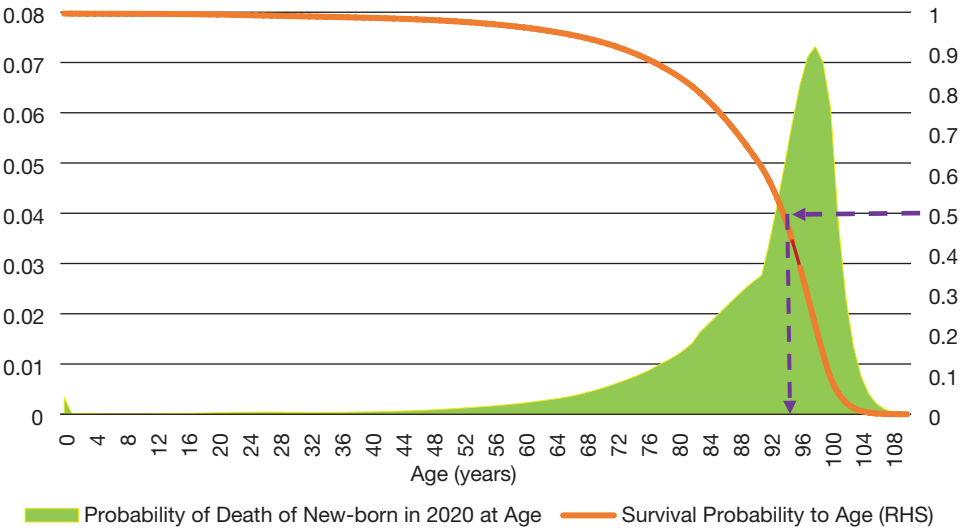
However, period life expectancies do not give a measure of how long a person will live because, as the CSO states: "Period expectation of life… is therefore not the number of years someone of that age could actually expect to live because death rates are likely to change in the future" (CSO, 2015). The cohort life expectancy directly addresses the issue of how long a person can be expected to live as it estimates life expectancy not from historic mortality rates but from the (projected) mortality rates the person can be expected to experience as they go through life. So, for instance, a new-born in calendar year 2020 will be aged 60 years in calendar year 2080, so in estimating the cohort life expectancy, the current mortality rate of a 60-year-old is adjusted to reflect how that mortality rate is expected to change over the next 60 calendar years. The resultant projected mortality rates are used in the calculation of the cohort life expectancy. There is generally a significant difference between the life expectancies calculated using the two different approaches, with the cohort life expectancy greater than the period life expectancy as mortality rates are forecast to continue to decline in the future.

The CSO projects future mortality rates for the population of Ireland as part of an exercise in population and labour force projections undertaken following each census (CSO, 2018). These projected mortality rates are widely used by actuaries and others (e.g. in estimating public and private pension liabilities) and can be used to estimate cohort life expectancies. Full details of the approach used by the CSO and of alternative approaches are given in Naqvi and Whelan (2019), together with a table of cohort life expectancies in Ireland. The cohort life expectancy for a

new-born in Ireland in calendar year 2020 is 90.4 years for a male and 92.7 years for female – some 15 per cent and 12 per cent respectively higher than period life expectancies according to Irish Life Table 16.

Figure 4 graphs the probability that a male born in 2020 will survive to each age and the probability of death in each year of age using the most recent mortality projection basis of the CSO.

Figure 4: Probability that a New-Born Male in Ireland in 2020 will Die at Each Future Age, Together with Probability of Survival to that Age



Source: Authors' calculations following the methodology employed by the Central Statistics Office (CSO, 2018). For details see Naqvi and Whelan (2019). The cohort life table on which the graph is based is shown in Appendix 1.

When an increasing number of similar lives are grouped together, then the average lifetime of the group converges to the life expectancy. However, when considering an individual life, one must consider the distribution of the age at death as shown in Figure 4. The distribution is negatively skewed, so the mean will be lower than the median. This is a typical feature in human life tables, both period and cohort, with for instance the life expectancy (the mean) of Irish Life Table 16 being 78.4 years for a male at birth but the median being 81.4 years.

The negative skewness of the distribution of the age of death, illustrated in Figure 4, is an important consideration when mortality tables are used to estimate the lump sum to compensate a plaintiff for future loss. The cohort life expectancy for a male in Ireland is 90.4 years but the probability that the individual will live longer than 90.4 years is 66 per cent, from the cohort life table tabulated in Appendix 1. Accordingly, a lump sum calculated based on the life expectancy will

be adequate for only 34 per cent of individuals. Therefore, the funds available from this lump sum will run out for the majority before they die.

A better alternative to basing the term of the loss on the remaining life expectancy of the plaintiff is to set an explicit probability (or confidence level) that the plaintiff will be adequately compensated. We can then, using the life table, determine the corresponding duration of the loss. So, for instance, if the probability that the plaintiff is not undercompensated is set at, say, 0.5 (and therefore a corresponding 0.5 probability of not overcompensated) then we simply solve for the age in the life table for the term of the loss that matches this probability. This is shown in Figure 4, where the probability is selected on the right-hand scale at 0.5 and then we find at what age the survival probability is equal to the given probability. This is can done at various probability levels. Table 3 gives the results at selected levels for both males and females.

Table 3: Duration of Lifetime Loss (in years) of a New-Born in 2020 at Different Confidence Levels to Ensure Not Undercompensated Compared with Life Expectancy

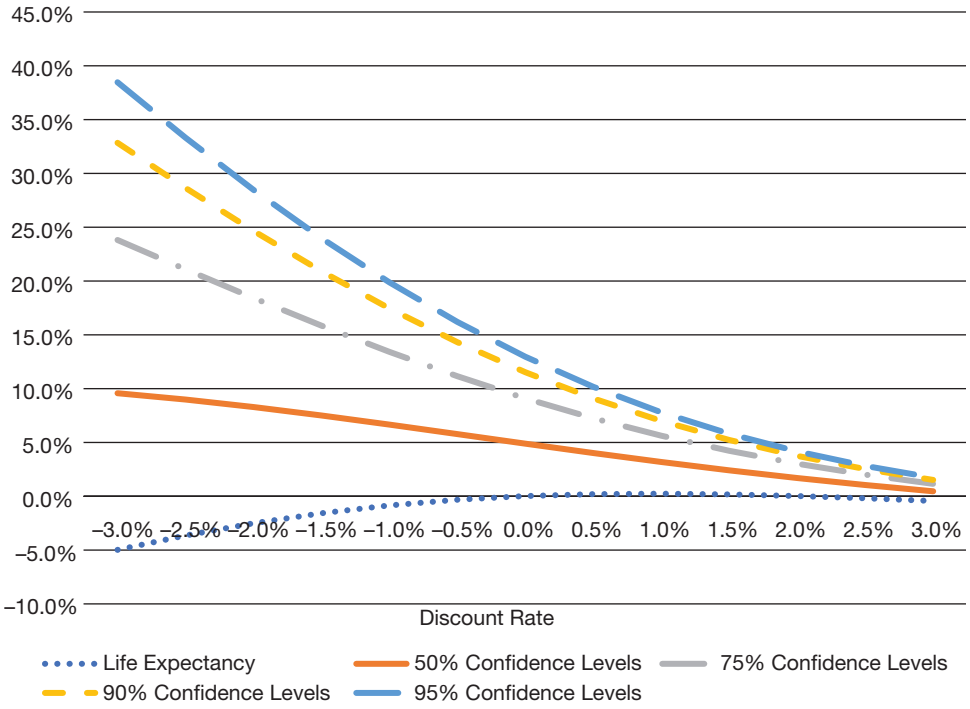
	Life Expectancy	*Probability Not Undercompensated*			
	(Mean)	*50% (Median)*	*75%*	*90%*	*95%*
Male	90.4	94.8	98.6	100.8	102.1
Female	92.7	96.2	99.6	101.7	103.0

Source: Authors' calculations based on the cohort life tables in Appendix 1.

Applying this approach, we can calculate the lump sum required to compensate the individual plaintiff with any associated degree of confidence. Annuity and annuity-certain values are calculated at various discount rates and presented in Figure 5. The exercise shows that estimating the loss at the 75 per cent confidence level rather than estimating it using a life annuity increases the present value of the loss by 21 per cent for a new-born male when the discount rate is –2.5 per cent. At the 90 per cent confidence level and a discount rate of –2.5 per cent, the increased loss above the life annuity approach is 29 per cent for a new-born male. Similar increases are observed for females.

The above methodology allows us to make explicit allowance for the longevity risk arising from random fluctuations in lifetimes. However, it still leaves the risk that the cohort life table employed differs from actual mortality that the new-borns in 2020 will experience in the future. The CSO expert group bases the cohort life table on its best estimate of future mortality improvements. However, these forecasts cannot be expected to be that reliable as they involve forecasting the path of mortality improvements for a hundred years and more. It is difficult to forecast medical advances (e.g. antibiotics) or pandemics (e.g. Spanish Flu) which in the past have had a significant impact on mortality rates, either permanently or

Figure 5: Increase in Present Value of an Annuity Certain with Different Confidence Levels above a Life Annuity, for a New-Born Male in Ireland in 2020, at Various Discount Rates



Source: Authors' calculations.

temporarily. In fact, official forecasts of life expectancies in Ireland and elsewhere have tended to be too conservative, with actual improvements exceeding those forecast (Keilman, 2008; Waldron, 2005; Oeppen and Vaupel, 2002). This tendency to underestimation is largely due to forecasters predicting a levelling off or slowdown in the rate of mortality improvements while rates of improvement tended, in actuality, to increase in most countries at least until 2011 (Navqi and Whelan, 2019).

The CSO does not give confidence bounds around its central estimate that might give an indication of the inherent uncertainty associated with its projections. However, the Population Division of the United Nations (UN) does forecast period life expectancies at birth for Ireland (and for every other country in the world), together with 80 per cent and 95 per cent prediction bounds for each calendar year 2020 to 2100 (UN, 2015). From the UN period life expectancies, Whelan and Naqvi (2020) derive consistent cohort life expectancies for Ireland with 80 per cent and 95 per cent prediction bounds. These are shown in Table 4.

Table 4: Male and Female Projected Cohort Life Expectancies in Ireland for New-Born in 2020, with 50%, 80% and 95% Prediction Intervals Consistent with UN 2019 Forecasts (Including CSO 2018 Projection).

	Lower 95%	*Lower 80%*	*Median*	*CSO 2018 Projection*	*Upper 80%*	*Upper 95%*
Male	83.9	86.0	89.7	90.4	93.4	95.2
Female	86.8	88.8	92.5	92.7	95.9	97.3

Source: Figures sourced from Table 1 in Whelan and Naqvi (2020).

The figures in Table 4 are, naturally, subject to future revision as they depend on the historic data-driven Bayesian hierarchical model used by the UN, which will change with new data (Raftery *et al.*, 2014). In short, the figures in Table 4 are best viewed as indicative only as it is not possible to be precise about our uncertainty over the future course of mortality improvements. Comparing Table 4 with Table 3 suggests that random error associated with applying an average cohort life table to an individual tends to be more significant than estimation errors associated with cohort life expectancies.

Finally, adjustments must be made to the cohort life table so that allowance is made for any increased mortality risk to the plaintiff due to their particular impairments. This adjustment often introduces considerably more uncertainty (and therefore risk) as the studies supporting any adjustment are based on relatively small and heterogenous groups. In cases of cerebral palsy, experts to Irish courts often rely on the percentage reduction to average population life expectancy estimated in a study of a Californian database of persons with cerebral palsy over a 28-year period (Brooks *et al*., 2014). This study has considerably less than 20,000 subjects at each age, and sub-divides this number further into ten subgroups based on motor skills and feeding skills and then further sub-divides each subgroup by sex. Inevitably, the sub-divisions ignore commonly associated cognitive and sensory impairments – important factors known to affect mortality rates such as IQ level and vision (e.g. Hutton *et al*., 2000; 2006; Hemming *et al*., 2005; Blair *et al.,* 2001). The key point is that the adjustment to be made to the population life table to allow for the mortality impact of the plaintiff's impairments is often an issue where evidence is scant and experts can reasonably differ, especially as some mortality impacts might be ameliorated by future care structures which are dependent on the eventual settlement.

There is large uncertainty associated with when an individual will die. The sources of error – the random error associated with the age of death of an individual subject to a life table and the estimation errors in determining the life table – add to the difficulty the plaintiff has in devising a draw-down strategy to ensure s/he will not outlive their financial resources. The analysis in this section is of practical significance to the plaintiff in designing a drawdown strategy so that, with an

acceptable degree of certainty, the money will not be exhausted before the plaintiff dies.

The mortality basis frequently used for capitalising future loss in Ireland to date is the most recent period life table of population, adjusted as necessary by medical opinion on the reduction in life expectancy of the plaintiff. The loss is capitalised using a life annuity. As we have shown, this approach tends to undercompensate the plaintiff in two ways. First, cohort rather than period life tables should be used. The resultant cohort life expectancy tends to be 10 per cent to 15 per cent higher than the period life expectancy, the exact uplift depending on sex and age. Second, life expectancies or life annuities should not be used in capitalising the loss, as the individual has a probability greater than 50 per cent of outliving the average life expectancy. To be, say, 75 per cent confident that the plaintiff will not live longer than allowed for in the loss calculations requires a further material increase to the lump sum. For a new-born in Ireland in 2020 the increase is marginally above 20 per cent using a discount rate of –2.5 per cent.

VII PERIODIC PAYMENTS ORDERS

The earlier sections highlight the difficulties in converting a lump sum award into a future stream of income that match the expected future outgoings for care costs and other loss. Investing in the least risk portfolio of index-linked gilts still leaves the plaintiff with (i) the small basis risk that Irish inflation will diverge from Eurozone inflation, (ii) the reinvestment risk which arises when future proceeds must buy future longer term index-linked bonds that are currently unavailable, and, (iii) the risk that future wage increases will exceed the annual average allowed for of 1.5 per cent. Added to those risks must be the significant uncertainty in estimating how long the plaintiff will survive, considered in the previous section. The judiciary in Ireland have long pointed out that due to these difficulties it is an impossible task to determine an award fair to both parties, or, in the words of Mr Justice Irvine:

> To state that the current law in this jurisdiction, which requires the court to award a lump sum intended to compensate the plaintiff for all past and future losses, and in particular future pecuniary loss, is inherently fallible and unjust cannot be disputed. It is also grossly outdated by reference to the approach now adopted by the courts in other Common Law and Civil Law jurisdictions.
>
> [Judgement of Court of Appeal, *Russell v HSE,* 2015]

The Irish judiciary would welcome a change in the law so that redress for future loss could be made by way of periodic payments over the future lifetime of the plaintiff. The Law Reform Commission (1996) and the Working Group on Medical

Negligence and Periodic Payments (2010) called for such reform to bring the system in Ireland in line with the UK, US, Canada, Australia and other EU countries. As noted earlier, the law was amended in Ireland so from October 2018 claims for catastrophic injury could be part settled by annual payments for the remainder of plaintiff's lifetime. Here a catastrophic injury is defined as one where the plaintiff is permanently disabled and needs to receive lifelong care (Civil Liability (Amendment) Act 2017). This mode of settlement, known as a Periodic Payment Order (PPO), was targeted to meet the growing number of cerebral palsy claims against the HSE. In fact, the SCA pioneered "interim" PPOs from 2010, in anticipation of such legislation being put in place for compensation by final PPOs. However, just 13 months later the High Court ruled that, as drafted, the legislation did not allow full compensation and therefore "no judge charged with protecting plaintiffs' best interests could recommend such a scheme" [Judgement in *Jack Hegarty v HSE* 2015/10520P]. At the time of that judgement in November 2019, the SCA had 83 such catastrophic injury cases where liability has been admitted awaiting final PPO or lump sum settlements.[4]

PPOs once decided by the court are not subject to review in the future in any jurisdiction where they have been introduced, no matter how the needs of the plaintiff subsequently change. However, the payments themselves increase at a pre-agreed rate of indexation. The flaw in the legislation introducing periodic payments in Ireland relates to the indexation applied to the regular payments. All payments for loss of wages, cost of care, cost of medical treatments and aids must be indexed with the Harmonised Index of Consumer Prices for Ireland. This is, of course, an inflation measure, which can be expected to lag wage increases by about 1.5 per cent per annum (see earlier). The consequence of indexing at inflation when a wage rate index is more appropriate is manifest in the long term from compounding the differences: inflation-linked payments are less than half wage-linked costs after 50 years (assuming an annualised differential of 1.5 per cent).

The rate of indexation of the PPO was obviously a key issue when drafting the legislation. The Working Group on Medical Negligence and Periodic Payments (2010) had make a key recommendation in this regard:

> Provision within the legislation must be made for adequate and appropriate indexation of periodic payments as an essential prerequisite for their introduction as an appropriate form of compensation. In particular, the Group recommends the introduction of earnings and costs-related indices which will allow periodic payments to be index-linked to the levels of earnings of treatment and care personnel and to changes in costs of medical and assistive aids and appliances. This will ensure that plaintiffs will be able to afford the cost of treatment and care into the future. *Executive Summary*, p.8.

[4] *Irish Times*, 19 November 2019, "Medical Negligence cases set to cost record €374 million next year".

However, when it came to drafting the legislation, the *Report of the Working Group on Legislation on Periodic Payment Orders* (2015) recommended the index should be the Harmonised Index of Consumer Prices for Ireland (HICP), influenced by an actuarial report commissioned by the SCA (Towers Watson, 2014).[5] The Working Group erroneously state that the actuarial report suggests indexation of the plaintiff's annual award at HICP plus a fixed percentage of 0.5 per cent "to take account of wage increases" (see p. 23 and also p. 21). The actuarial report, *Feasibility study on the introduction of PPOs in Ireland*, models the "indexation matching the claimant needs" – including wage inflation and range up to bespoke medical and living support care cost inflation – at HICP plus 1½ per cent per annum. In short, the Towers Watson report agrees that the appropriate indexation is best modelled at inflation plus 1.5 per cent per annum. This actuarial report also shows that introducing PPOs, whether indexed by inflation or a wage index, can be expected to increase market premiums (p. 53) and the cost of claims with "significant potential solvency issues for insurers" (p. 5). This is consistent with our findings earlier that lump sum compensation is currently reckoned on a basis that is lower than the fair value.

It is a simple matter to amend the legislation so that the indexation of PPOs is either determined by the courts (as in the UK, which deems a wage index appropriate) or a suitable wage index maintained by the CSO. Perhaps one obstacle to this simple remedy is that, if currently implemented, it would have a significant financial impact on the State. PPOs are simply a secure future series of payments rising in line with wages or some other index over some period. It is possible to put a market value on such a stream of future payments. The market value of the PPO, as developed earlier, is considerably greater than the lump sum award currently made by the courts. We may term the difference as the PPO uplift – the value of the PPO is higher than the value that the claim is currently settling. So the State is unlikely to amend the indexation in the current PPO legislation as long as the courts maintain a higher discount rate to capitalise future loss to a lump sum than the ruling market rate.

We can estimate the impact of the PPO uplift on the State's current outstanding liability to clinical and general claims. Section V showed that, consistent with legal principles in Ireland, the annualised discount rate for future wage-linked loss should be –2.5 per cent (broken down as –0.75 per cent p.a. real yield on index-linked

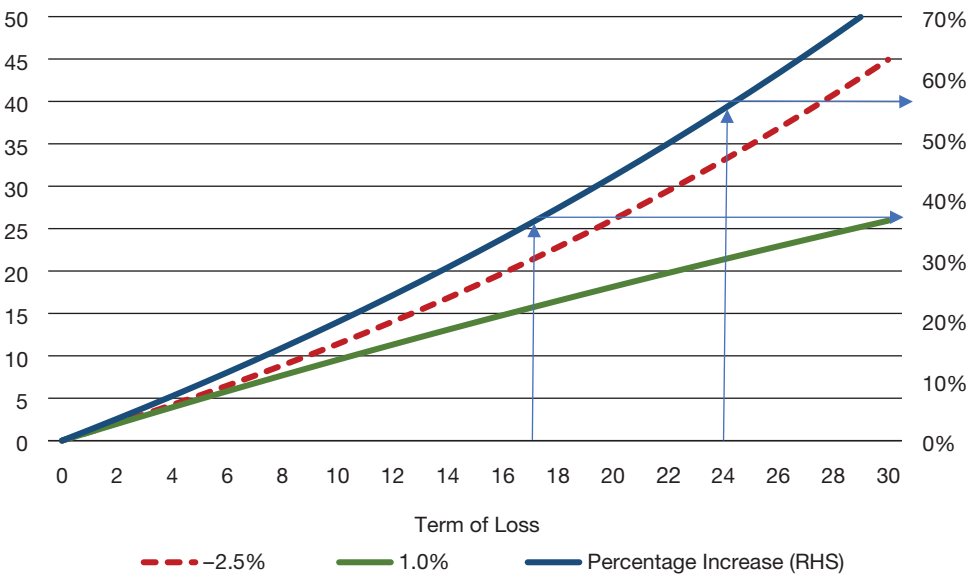
[5] The Working Group decided that it should specify the index in the legislation and not leave it up to the courts to decide (as it was in the UK where a wage index had been adopted by the courts). In making this decision, the Working Group (comprising of senior members of the SCA, Department of Finance and other public servants) expressed itself guided by the interests of the defendants, or in the words of the Report: "the Working Group did not favour leaving the choice of index to the discretion of the court as it could introduce a high degree of uncertainty as to potential financial liabilities both for the State and for the insurance industry ... the index chosen should provide as much certainty as possible for defendants in terms of projected increases in their financial liabilities" (Report of the Working Group on Legislation on Periodic Payment Orders, 2015, p.19).

stock, reduced by c. 0.25 per cent p.a. for investment charges, and reduced by a further 1.5 per cent p.a. to allow for the real rate of salary escalation). Currently awards by the courts are discounting future losses at between +1 per cent per annum (for wage loss) and +1.5 per cent per annum (for inflation-linked loss).

Now a simple but very crude estimate would be to note that the estimated total liability to the State jumped by 17 per cent in 2015 when the discount rate changed from 3 per cent to between 1.5 per cent and 1 per cent following the ruling in the *Russell v HSE* case as detailed in the Background section. If a change of between 1.5 per cent to 2 per cent in the interest rate leads to a 17 per cent increase in the liability then a change of 3.5 per cent (that is from +1 per cent to –2.5 per cent) might lead to an increase of double 17 per cent, that is about a one-third increase. A one-third increase to the outstanding liability of €3.15 billion is just over €1 billion. This estimate can be expected to underestimate the true figure as present values rise faster than linearly as discount rates fall.

A better estimate is to consider the weighted average duration of the loss. The present value of the loss depends on the duration of the loss. Figure 6 graphs the present value against the term of the loss at either discount rate and highlights the factor by which the present value increases when moving from a discount rate of +1.0 per cent to –2.5 per cent.

Figure 6: Present Value of an Annuity Certain of 1 per annum at Discount Rate of –2.5% and +1.0% (LHS) and Percentage Increase in Present Value in Change from +1.0% to –2.5% (RHS)



Source: Authors' calculation.

Now if a change in the discount rate from 3 per cent to between 1.5 per cent and 1.0 per cent increases the aggregate liability by 17 per cent, then, with some elementary computation, we can estimate that the weighted average duration of loss is between 17 and 24 years. Knowing the duration of the loss allows us to estimate the effect of any change in discount rate, as illustrated in Figure 6. The change in discount rate from between 1.5 per cent and 1.0 per cent down to –2.5 per cent when the duration of the loss is between 17 and 24 years entails an increase of between 33 per cent to 66 per cent. This in turn equates to an increase of between €1 billion to €2 billion on outstanding liabilities of €3.15 billion. These estimates are crude, but it does give a measure of the State's financial inertia to introducing PPOs. In short, it is difficult to envisage the State amending the PPOs legislation with any urgency when claims against it are currently settling for a fraction of their market value. An incentive for the State to settle by lump sum instead of appropriately indexed PPOs will persist as long as the discount rates for future loss are higher than ruling rates in the market.

VIII CONCLUSION

Damages inflicted by wrongful or negligent acts can, aside from pain and suffering, be pictured as a series of future costs or losses stretching for the remaining lifetime of the plaintiff, generally rising in line with inflation or wages in the economy. The most appropriate way to compensate the plaintiff is, obviously, to replace that stream of losses with periodic payments that match the amount and rate of increase of the loss. Such simple redress schemes are an important part of tort law in many jurisdictions in the world including the UK, US, and many EU countries. Legislation to achieve this end has not been satisfactorily introduced in Ireland. This paper suggests that one reason for such delay is that lump sum compensation in lieu of such future payments is, and has been, considerably lower than the market value of the stream of payments. Simply, the State which, directly or indirectly is a defendant in many such cases, is financially incentivised to delay any legislation until the lump sum awards are increased to the market value of future loss.

This paper demonstrates that the stakes are high when a change is made in how compensation is calculated. First, the discount rate applied to future loss should be reduced to bring it in line with legal precedent and current market conditions, from +1.5 per cent per annum to –1.0 per cent per annum for inflation-linked loss and from +1.0 per cent per annum to –2.5 per cent per annum for wage-linked loss. Second, the lump sum award should no longer be capitalised using the life annuity approach commonly used to date. Instead, to allow appropriately for longevity risk, the lump sum award should be calculated by way of an annuity-certain, the term set so that the plaintiff is not expected to live longer than their compensation allows with a pre-specified degree of confidence. Finally, the mortality basis used, before

adjustment for the plaintiff's life-shortening impairments, should be a cohort mortality basis incorporating likely changes in mortality rates over the lifetime of the plaintiff.

The changes if applied to capitalising the loss would have a significant impact on the quantum of awards, increasing with increasing term of the loss. Changing the mortality basis from a period to cohort approach can be expected to increase the term of the loss by about 10 per cent to 15 per cent. Changing how the term of the loss is estimated, from a life expectancy or life annuity approach to the annuity certain with pre-specified confidence level, can increase the term by a further 20 per cent or more. Changing the discount rate can be expected to have the biggest impact, increasing the award by more than one-third if the term exceeds 17 years, and more than double that if it exceeds 25 years (see Figure 6). Such changes, we estimate, will increase the State's liability to existing outstanding claims against it by more than €1 billion, and perhaps closer to €2 billion.

Despite the large sums involved, there are only losers when the comes to medical negligence cases. The plaintiff suffers a reduced quality of life, a suffering shared by parents and family of catastrophically damaged infants. Medical and other hospital staff are demoralised (Murphy, 2018). After the trauma of the incident itself follows the prolonged litigation process, giving years of stress and anxiety to all, and involving considerable work by legal teams and experts on either side. The State Claims Agency reports that the monetary costs associated with the legal process in clinical claims amounted to €67 million in 2018 while the awards for that year were €180 million (NTMA Annual Report and Accounts 2018, p. 44).

The State is perhaps misdirecting its attention in trying to reduce the size of each claim rather than reduce the number of claims. Tort law ideally should deter wrongful behaviour through the award of damages. Over the last decade there have been many incidences where the Irish courts have been satisfied that the standard of care in the maternity unit was unacceptably deficient in a manner that led to the injuries and compensation must be paid. Over the last decade there have also been several investigations into the operation of maternity services in Ireland, all highlighting significant scope for improvement. Helps *et al*. (2020), in a review of the ten national enquiries into maternity services Ireland between 2005 and 2018, report that all ten recommend staffing levels and staff training be increased and nine of them recommend the need for better risk management practices, recommendations reiterated again in the most recent review of maternity services (Health Information and Quality Authority, 2020). Whelan and Hally (2020) show that the rise of claims settlements has been so dramatic over the decade that more is now being paid out by way of claims against the maternity services than is actually spent in delivering the services and suggest that spending more on maternity services might be cost saving in the long run. A way must be found to ensure the HSE prioritises the reforms to the maternity services so obviously needed – be it by funding maternity services separately to ensure adequate staffing and

training, or by making the budget contingent on reform. Also, the Department of Public Expenditure and Reform, under whose remit this falls, should oversee the reform in maternity services and determine its separate budget.

The stakes are also high in non-pecuniary terms when the discount rate and appropriate approach to allow for longevity risk is contested in the Irish courts. For the judiciary, setting a discount rate in line with current market conditions and appropriately apportioning longevity risk would remove a key obstacle preventing the modernising of our system to allow compensation by life contingent periodic payments. For maternity and other clinical services, it could be the tipping point when the sums paid out by way of settlements for mismanagement become appreciably larger than the additional costs of operating a sound system. For the State, it means ensuring justice for its most vulnerable citizens.

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APPENDIX 1:

Cohort Life Table for Male and Females born in Ireland in 2020 based on CSO Mortality Projection Basis

		Male			Female		
Year	*Age*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New born in 2020 Surviving to End of Year*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New-born in 2020 Surviving to End of Year*
2020	0	0.00334	0.00334	0.99666	0.00274	0.00274	0.99726
2021	1	0.00015	0.00015	0.99650	0.00015	0.00015	0.99711
2022	2	0.00014	0.00013	0.99637	0.00011	0.00011	0.99700
2023	3	0.00010	0.00010	0.99627	0.00007	0.00007	0.99693
2024	4	0.00008	0.00007	0.99619	0.00006	0.00006	0.99687
2025	5	0.00006	0.00006	0.99613	0.00006	0.00006	0.99681
2026	6	0.00004	0.00004	0.99610	0.00004	0.00004	0.99677
2027	7	0.00004	0.00004	0.99606	0.00005	0.00005	0.99672
2028	8	0.00005	0.00005	0.99601	0.00005	0.00005	0.99667
2029	9	0.00005	0.00005	0.99596	0.00004	0.00004	0.99663
2030	10	0.00005	0.00005	0.99590	0.00004	0.00004	0.99659
2031	11	0.00005	0.00005	0.99585	0.00003	0.00003	0.99656
2032	12	0.00006	0.00006	0.99580	0.00003	0.00003	0.99653
2033	13	0.00008	0.00008	0.99572	0.00004	0.00004	0.99649
2034	14	0.00011	0.00011	0.99561	0.00005	0.00005	0.99644
2035	15	0.00014	0.00014	0.99548	0.00006	0.00006	0.99638
2036	16	0.00017	0.00017	0.99530	0.00007	0.00007	0.99631
2037	17	0.00020	0.00020	0.99510	0.00008	0.00008	0.99623
2038	18	0.00024	0.00024	0.99486	0.00009	0.00009	0.99615
2039	19	0.00028	0.00028	0.99458	0.00010	0.00009	0.99605
2040	20	0.00032	0.00032	0.99426	0.00010	0.00010	0.99595
2041	21	0.00036	0.00036	0.99390	0.00011	0.00011	0.99584
2042	22	0.00039	0.00038	0.99352	0.00012	0.00012	0.99572
2043	23	0.00041	0.00040	0.99311	0.00013	0.00013	0.99559
2044	24	0.00042	0.00042	0.99270	0.00013	0.00013	0.99546
2045	25	0.00043	0.00042	0.99227	0.00014	0.00014	0.99532
2046	26	0.00043	0.00043	0.99185	0.00014	0.00014	0.99518
2047	27	0.00043	0.00043	0.99142	0.00015	0.00015	0.99503
2048	28	0.00043	0.00042	0.99099	0.00016	0.00016	0.99486
2049	29	0.00041	0.00041	0.99058	0.00018	0.00018	0.99469
2050	30	0.00040	0.00039	0.99019	0.00019	0.00019	0.99450
2051	31	0.00039	0.00038	0.98981	0.00020	0.00020	0.99430

Cohort Life Table for Male and Females born in Ireland in 2020 based on CSO Mortality Projection Basis (Contd.)

		Male			*Female*		
Year	*Age*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New born in 2020 Surviving to End of Year*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New-born in 2020 Surviving to End of Year*
2052	32	0.00038	0.00038	0.98943	0.00021	0.00021	0.99409
2053	33	0.00038	0.00038	0.98905	0.00022	0.00022	0.99388
2054	34	0.00039	0.00038	0.98867	0.00022	0.00022	0.99366
2055	35	0.00039	0.00039	0.98828	0.00022	0.00022	0.99344
2056	36	0.00041	0.00040	0.98788	0.00023	0.00023	0.99321
2057	37	0.00042	0.00042	0.98746	0.00024	0.00024	0.99298
2058	38	0.00045	0.00044	0.98702	0.00025	0.00025	0.99273
2059	39	0.00047	0.00047	0.98655	0.00027	0.00027	0.99246
2060	40	0.00050	0.00050	0.98605	0.00029	0.00029	0.99217
2061	41	0.00054	0.00053	0.98552	0.00032	0.00031	0.99186
2062	42	0.00058	0.00057	0.98495	0.00035	0.00034	0.99151
2063	43	0.00062	0.00061	0.98435	0.00038	0.00037	0.99114
2064	44	0.00066	0.00065	0.98370	0.00041	0.00041	0.99073
2065	45	0.00070	0.00069	0.98301	0.00045	0.00045	0.99028
2066	46	0.00076	0.00074	0.98226	0.00050	0.00049	0.98979
2067	47	0.00082	0.00081	0.98146	0.00055	0.00054	0.98925
2068	48	0.00090	0.00088	0.98058	0.00060	0.00060	0.98865
2069	49	0.00098	0.00096	0.97961	0.00066	0.00066	0.98799
2070	50	0.00107	0.00105	0.97856	0.00073	0.00072	0.98727
2071	51	0.00117	0.00114	0.97742	0.00080	0.00079	0.98648
2072	52	0.00127	0.00124	0.97617	0.00088	0.00087	0.98561
2073	53	0.00138	0.00134	0.97483	0.00098	0.00097	0.98464
2074	54	0.00148	0.00144	0.97339	0.00110	0.00108	0.98356
2075	55	0.00159	0.00155	0.97184	0.00121	0.00119	0.98237
2076	56	0.00171	0.00167	0.97018	0.00132	0.00130	0.98107
2077	57	0.00185	0.00180	0.96838	0.00142	0.00140	0.97967
2078	58	0.00201	0.00194	0.96644	0.00150	0.00147	0.97820
2079	59	0.00216	0.00209	0.96434	0.00155	0.00152	0.97668
2080	60	0.00234	0.00225	0.96209	0.00161	0.00157	0.97511
2081	61	0.00253	0.00243	0.95966	0.00169	0.00165	0.97346
2082	62	0.00275	0.00263	0.95702	0.00182	0.00177	0.97169
2083	63	0.00297	0.00284	0.95418	0.00198	0.00193	0.96976
2084	64	0.00320	0.00305	0.95113	0.00218	0.00211	0.96765
2085	65	0.00345	0.00328	0.94785	0.00239	0.00232	0.96533

Cohort Life Table for Male and Females born in Ireland in 2020 based on CSO Mortality Projection Basis (Contd.)

		Male			*Female*		
Year	*Age*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New born in 2020 Surviving to End of Year*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New-born in 2020 Surviving to End of Year*
2086	66	0.00375	0.00356	0.94429	0.00264	0.00254	0.96279
2087	67	0.00412	0.00389	0.94041	0.00290	0.00279	0.95999
2088	68	0.00453	0.00426	0.93614	0.00318	0.00305	0.95694
2089	69	0.00498	0.00466	0.93148	0.00346	0.00331	0.95364
2090	70	0.00548	0.00510	0.92638	0.00377	0.00359	0.95004
2091	71	0.00603	0.00559	0.92079	0.00412	0.00392	0.94613
2092	72	0.00666	0.00613	0.91466	0.00454	0.00430	0.94183
2093	73	0.00731	0.00668	0.90797	0.00498	0.00469	0.93714
2094	74	0.00798	0.00724	0.90073	0.00543	0.00509	0.93205
2095	75	0.00871	0.00785	0.89288	0.00595	0.00554	0.92651
2096	76	0.00956	0.00854	0.88435	0.00657	0.00608	0.92042
2097	77	0.01056	0.00934	0.87501	0.00734	0.00676	0.91366
2098	78	0.01161	0.01016	0.86486	0.00820	0.00749	0.90617
2099	79	0.01267	0.01096	0.85390	0.00911	0.00825	0.89792
2100	80	0.01388	0.01185	0.84204	0.01014	0.00911	0.88881
2101	81	0.01536	0.01293	0.82911	0.01138	0.01012	0.87870
2102	82	0.01720	0.01426	0.81485	0.01290	0.01134	0.86736
2103	83	0.02018	0.01644	0.79841	0.01497	0.01298	0.85437
2104	84	0.02242	0.01790	0.78051	0.01683	0.01438	0.84000
2105	85	0.02484	0.01939	0.76112	0.01888	0.01586	0.82413
2106	86	0.02746	0.02090	0.74022	0.02114	0.01742	0.80671
2107	87	0.03026	0.02240	0.71782	0.02360	0.01904	0.78768
2108	88	0.03323	0.02385	0.69397	0.02628	0.02070	0.76698
2109	89	0.03637	0.02524	0.66873	0.02917	0.02237	0.74460
2110	90	0.03965	0.02651	0.64221	0.03227	0.02403	0.72057
2111	91	0.04305	0.02765	0.61457	0.03556	0.02563	0.69495
2112	92	0.05560	0.03417	0.58040	0.04631	0.03218	0.66277
2113	93	0.07169	0.04161	0.53879	0.06023	0.03992	0.62285
2114	94	0.09229	0.04972	0.48907	0.07820	0.04871	0.57414
2115	95	0.11858	0.05799	0.43107	0.10136	0.05819	0.51594
2116	96	0.15207	0.06555	0.36552	0.13110	0.06764	0.44831
2117	97	0.19463	0.07114	0.29438	0.16918	0.07584	0.37246
2118	98	0.24859	0.07318	0.22120	0.21779	0.08112	0.29135
2119	99	0.31689	0.07010	0.15110	0.27968	0.08148	0.20986

Cohort Life Table for Male and Females born in Ireland in 2020 based on CSO Mortality Projection Basis (Contd.)

		Male			*Female*		
Year	*Age*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New born in 2020 Surviving to End of Year*	*Mortality Rate*	*Probability of New-born in 2020 Dying in Year*	*Probability of New-born in 2020 Surviving to End of Year*
2120	100	0.40321	0.06093	0.09018	0.35827	0.07519	0.13467
2121	101	0.42361	0.03820	0.05198	0.38119	0.05134	0.08334
2122	102	0.44303	0.02303	0.02895	0.40342	0.03362	0.04972
2123	103	0.46137	0.01336	0.01559	0.42475	0.02112	0.02860
2124	104	0.47854	0.00746	0.00813	0.44501	0.01273	0.01587
2125	105	0.49448	0.00402	0.00411	0.46406	0.00737	0.00851
2126	106	0.50918	0.00209	0.00202	0.48182	0.00410	0.00441
2127	107	0.52264	0.00105	0.00096	0.49823	0.00220	0.00221
2128	108	0.53490	0.00052	0.00045	0.51327	0.00114	0.00108
2129	109	0.54600	0.00024	0.00020	0.52697	0.00057	0.00051
2130	110	0.55601	0.00011	0.00009	0.53936	0.00027	0.00023
2131	111	0.56498	0.00005	0.00004	0.55050	0.00013	0.00011
2132	112	0.57300	0.00002	0.00002	0.56048	0.00006	0.00005
2133	113	0.58015	0.00001	0.00001	0.56936	0.00003	0.00002
2134	114	0.58649	0.00000	0.00000	0.57724	0.00001	0.00001
2135	115	0.59211	0.00000	0.00000	0.58421	0.00000	0.00000

Source: CSO, 2018; Naqvi and Whelan, 2019.

Note: Please note that probability of new-born in 2020 dying in any future calendar year or surviving to the end of the same year do not sum to 1 after year 2020 as there is a probability that the new-born in 2020 will not survive to the calendar year in question.