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Income Adequacy and Quality of Life in Older Age:

Evidence from the First Three Waves of The Irish Longitudinal Study on Ageing

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Staidéar Fadaimseartha na hÉireann um Dhul in Aois

The Irish Longitudinal Study on Ageing

Income Adequacy and Quality of Life in Older Age:

Evidence from the First Three Waves of The Irish Longitudinal Study on Ageing

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Key Findings

This report investigates the relationship between income and quality of life in older age in Ireland. The analysis is based on the first three waves of The Irish Longitudinal Study on Ageing (TILDA). In TILDA, like in many other international studies on ageing, quality of life is indexed using the CASP-12 measure, which is a brief self-report inventory specifically developed for use with older people. Of particular interest in this report is the relationship between retirement income replacement rate and quality of life. The retirement income replacement rate is expressed as the ratio of post-retirement pension income to pre-retirement labour income. The key findings of this report are as follows:

• Income is positively associated with quality of life in older age. Individuals in the highest quintile of household income score on average 29.6 on CASP-12. This compares to an average CASP-12 score of 26.2 for individuals in the lowest income quintile of household income.

• All aspects of quality of life (control, autonomy, self-realisation and pleasure) increase consistently with household income.

• Around 13% of Irish retirees report that 'shortage of money often prevents them from doing the things they would like to do'. This compares to around 31% reporting that 'shortage of money never prevents them from doing the things they would like to do'.

• Retirement income replacement rates are calculated for each individual transitioning from employment to retirement between 2009 and 2015. The median replacement rate for individuals in the sub-sample who retired in TILDA between 2009 and 2015 is 51.4%.

• On average, individuals with higher socio-economic status have higher pre-retirement incomes, higher post-retirement incomes and lower retirement income replacement rates than individuals with lower socio-economic status.

• Higher income is associated with higher quality of life for people transitioning into retirement between 2009 and 2015. Retirement income replacement rates are not associated with quality of life post-retirement.

Contents

1 Introduction

Population ageing is a global phenomenon and it is projected that a doubling of the size of the Irish population aged 65 years and over will occur between 2011 and 2046 (Central Statistics Office, 2013). This demographic shift brings with it a number of challenges, one of which is how to ensure that gains in longevity are matched by gains in quality of life so that the ageing population have enough health and monetary resources to continue to participate in society and enjoy life into old age. Researchers are interested in investigating older people's quality of life, the factors that contribute to it, and the potential ways in which it can be enhanced. As summarised by Netuveli and Blane (2008), the interest in quality of life in old age stems from the belief that the aged are more vulnerable in this regard. The vulnerability stems from:

1. Declining physical and mental health status;
2. Exit from the labour market coupled with loss of income;
3. Changes in family circumstances (e.g. migration of children); and
4. Isolation due to death of contemporaries or the inability to participate as an active member of the community.

This report focuses on the second source of vulnerability and provides an in depth investigation of the relationship between income and quality of life in old age, using data from the first three waves of The Irish Longitudinal Study on Ageing (TILDA). Many governments and international organisations have expressed concerns about the sustainability and adequacy of financial provision for old age (Department of Social and Family Affairs, 2002, 2010; OECD, 2013; European Commission, 2015). Rules of thumb have been developed about what constitutes an adequate level of retirement resources (Engen et al., 1999; Moore and Mitchell, 1997; Scholz et al., 2006; Poterba, 2014). This benchmark level is often expressed as a fraction of pre-retirement income that is replaced by retirement income – a measure called the retirement income replacement rate (Nivakoski, 2014). Of particular interest in this report is the relationship between retirement income replacement rate (RR) and quality of life.

1.1 Structure of the Report

The analysis of this report is two-fold.

The analysis in Chapter 2 investigates the cross-sectional relationship with quality of life from the first wave of TILDA. This Chapter introduces the concept of quality of life and illustrates the CASP-12 measure, a brief self-report inventory that incorporates four dimensions of quality of life (control, autonomy, pleasure, self-realisation) specifically developed for use with older people. The analysis in Chapter 2 aims to uncover how quality of life is related to income and how this relationship varies between workers and retirees. Examinations of the relationship between income and the different domains of quality of life are also carried out.

Chapter 3 uses the first three waves of TILDA. The analysis draws from the longitudinal aspect of TILDA, following the same individuals over time as they age – and as some of them transition from work into retirement. The focus of the analysis is on the extent to which labour income is replaced by income from pensions, and how quality of life is related to income levels and changes in income around the time of retirement. Retirement income replacement rates, defined as the ratio of post-retirement pension income to pre-retirement labour income, are calculated for each individual transitioning from work to retirement during TILDA data collection.

Chapter 4 concludes and provides some insights on the findings of the analysis of Chapters 2 and 3.

1.3 Data

TILDA is a large-scale, nationally representative study on ageing in Ireland and collects information on all aspects of health, economic and social circumstances from people aged 50 and over in a series of data collection waves carried out every two years. It is modelled closely on the Health and Retirement Study (HRS), the English Longitudinal Study on Ageing (ELSA) and the Survey of Health, Retirement and Ageing in Europe (SHARE). TILDA's multidisciplinary and longitudinal design makes it a uniquely powerful resource to study processes in later life (Kearney et al., 2011; Whelan and Savva, 2013).

The first wave of data was collected between October 2009 and July 2011. A total of 8,504 participants were recruited: 8,175 aged 50 and over, and 329 younger partners of eligible

individuals. Respondents first completed a computer-assisted personal interview (CAPI) in their own home. At the end of the CAPI interview, each respondent was asked to fill in a self-completion questionnaire (SCQ) and return it by post (in a prepaid envelope) to the TILDA study. This questionnaire asked a range of potentially sensitive questions, including questions on quality of life, emotional well-being and health behaviours. The overall household response rate to the CAPI at Wave 1 was 62%. A total of 85% of respondents completing the CAPI also returned the SCQ.

The second wave of data was collected between April 2012 and January 2013. An overall response rate of 86% was achieved and 84% of Wave 2 respondents returned the SCQ (Dooley, 2014). The third wave of data was collected between March 2014 and October 2015. The overall response rate was 85% and 85% of Wave 3 respondents returned the SCQ. Importantly for this report, TILDA contains detailed information about sources of income (self-reported by the respondents) and the amounts received from each source, at the individual level, recorded at each wave of the survey.

1.4 Statistical Methods and Weighting

The tables and figures of this report present scores (mean, median, 25th percentile, 75th percentile) on the different outcome scales or the percentage of respondents classified into different groups. Most estimates are provided with a 95% confidence interval. The estimates are also presented in full in Tables A1 to A7 in the Appendix. In order to make the data representative of the older Irish population as a whole, all estimates, where possible, are weighted according to participants' age, sex and educational attainment in the 2010 Irish Quarterly National Household Survey. Data are further weighted to account for respondents who did not return a self-completion questionnaire.

2 Cross-sectional Analysis of the Relationship between Income and Quality of Life

2.1. Quality of Life in Older Age

Quality of life in TILDA is indexed using the CASP-12 measure, which is a brief (12-item) self-report inventory specifically developed for use with older people. The CASP-12 instrument has been used to measure quality of life in other longitudinal ageing studies such as the English Longitudinal Study of Ageing and the Survey of Health, Ageing and Retirement in Europe (Netuveli et al., 2006; von dem Knesebeck, 2005).

Participants indicate the extent to which they agree with each of the 12 statements on a four-point frequency scale ('often', 'sometimes', 'rarely' and 'never'). Responses are scored such that the most positive responses are given a score of 3 and the most negative responses are given a score of 0. The instrument produces scores for each of four subscales: control, autonomy, self-realisation and pleasure. A total quality of life score is calculated by summing scores across the four subscales with a higher score indicating a higher quality of life (range 0-36). A description of the dimension of quality of life that is measured by each subscale and of the items and score ranges of each subscale is provided in Table 1.

Table 1: Measures of Control, Autonomy, Self-Realisation and Pleasure in the CASP-12

Scale	Description	Item	Score Range
Control	The ability to actively participate in one's environment	My age prevents from doing the things I would like to I feel that what happens to me is out of my control I feel free to plan for the future I feel left out of things	0-12
Autonomy	The right of the individual to be free from the unwanted interference of others	I feel that I can please myself in what I can do My health stops me from doing the things I want to do Shortage of money stops me from doing the things I want to do	0-9
Self-realisation	The fulfilment of one's potential	I feel satisfied with the way my life has turned out I feel that life is full of opportunities	0-6
Pleasure	The sense of happiness or enjoyment derived from engaging with life	I look forward to each day I feel that my life has meaning I enjoy being in the company of others	0-9

Many factors influence the quality of life of older people (McGee et al., 2011). Figure 1 investigates variation in quality of life with age (<60; 60-69; 70+), educational attainment (primary/none; secondary; third/higher), marital status (married; not married) and labour market status (employed; retired; other including unemployed, permanently sick and disabled, looking after home or family and in education or training) at TILDA Wave 1 interview. Figure 1 shows that quality of life is highest amongst individuals aged 60 to 69, with a tertiary education, those who are married and those in employment. The results of Table A1 in Appendix also show that women report a slightly better quality of life than men and that older people who rate their health as fair or poor have the lowest quality of life score in the survey, a score substantially worse than those who rate their health as excellent or good. Table A1 also illustrates the socio-economic composition of the Irish population aged 50 years and older at TILDA Wave 1, by providing the number of observations in each sub-group.

Figure 1: Distribution of CASP-12 Score by Socio-economic Characteristics, TILDA Wave 1

Error bars correspond to 95% confidence intervals
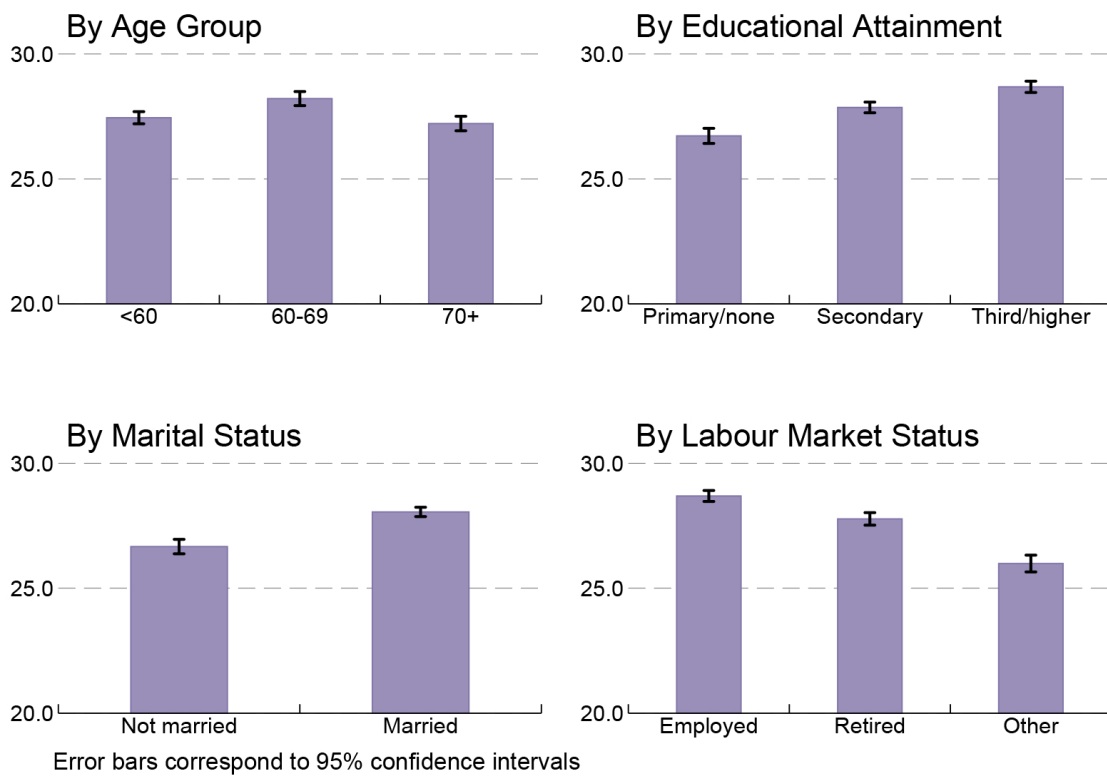
2.2. The Relationship between Household Income and Quality of Life

The relationship between household income and quality of life is investigated in Figure 2. In TILDA, information on household income is collected through the question:

"Could you say about how much income in total these people [people aged 16 years or over in receipt of income of any kind] received during the last 12 months? I am thinking of the total income of the household after tax. An approximate figure is all we need".

To take account of the economies of scale in consumption, it is common practice to equalivalise household income rather than simply divide household income by the number of household members. In this report, household income is equivalised by dividing the household income figure by the square root of household size (Avendano et al., 2009; Huisman et al., 2003; Hudson et al., 2015). Figure 2 shows that quality of life increases consistently with household income: individuals in the highest quintile of household income (with median annual after-tax income of around €40,400) score on average 29.6 on CASP-12. This compares to an average CASP-12 score of 26.2 for individuals in the lowest

income quintile of household income (with a median annual after-tax income of around €7,200).

Figure 2: Distribution of CASP-12 Score by Household Income Quintile, TILDA Wave 1

Error bars correspond to 95% confidence intervals
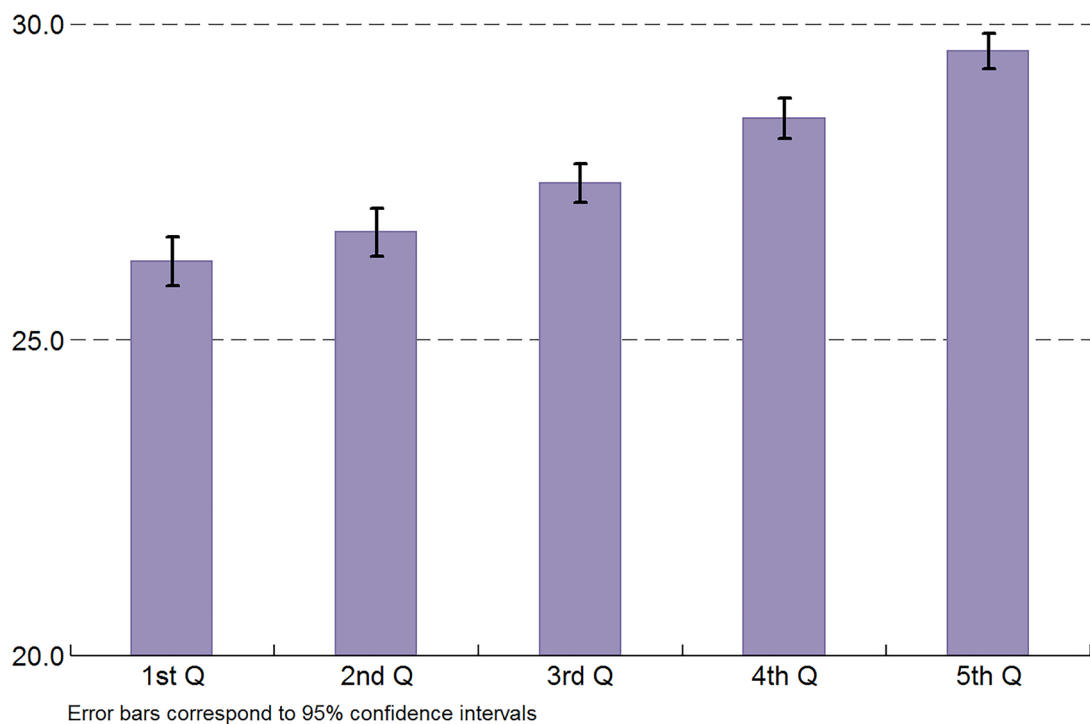
Figure 3 investigates whether the positive association between household income and quality of life holds for all of the four CASP-12 subscales: control, autonomy, self-realisation, and pleasure. Figure 3 shows that quality of life measured by each of the four domains increases consistently with household income. For example, individuals in the highest quintile of household income score on average 9.3 on the control subscale, compared to an average score of 8.0 for individuals in the lowest quintile of household income.

7

Figure 3: Distribution of CASP-12 Subscale Score by Household Income Quintile, TILDA Wave 1

Error bars correspond to 95% confidence intervals
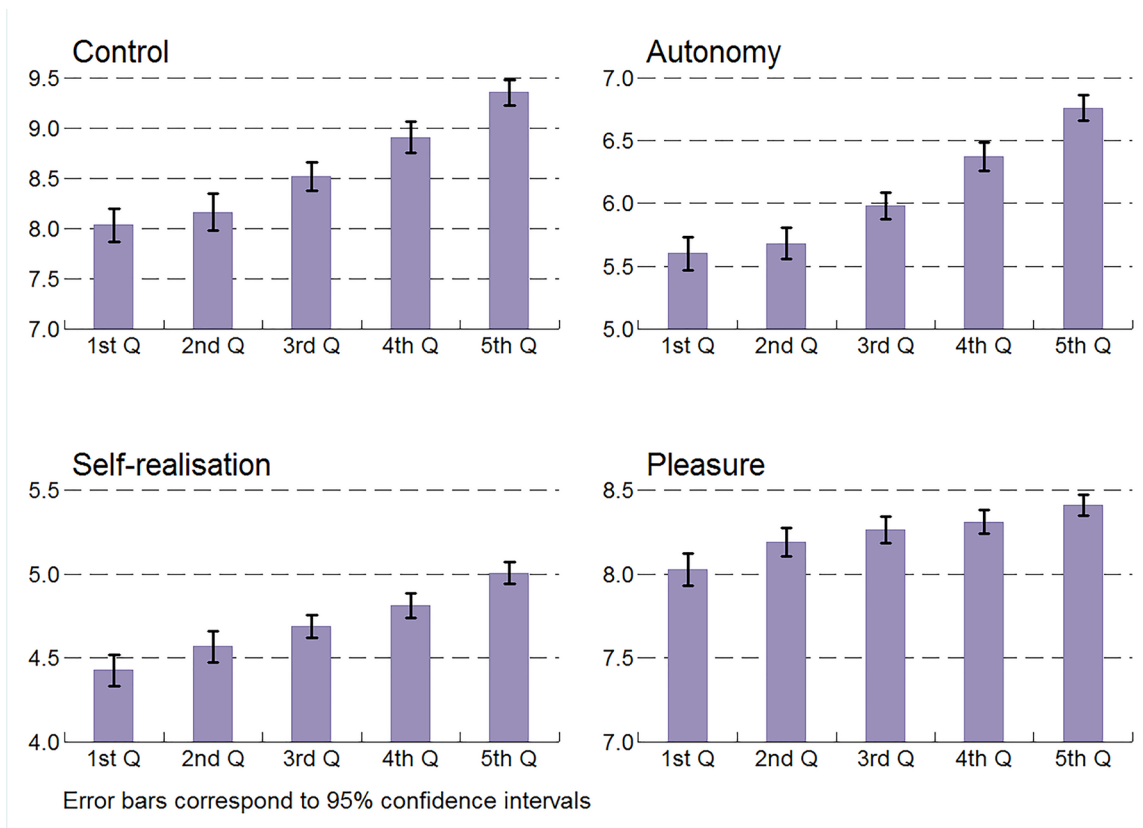
Examining the individual questions of the CASP-12 measure, the question which is most closely related to financial resources is "Shortage of money stops me from doing the things I want to do". This question is part of the autonomy subscale. Figure 4 shows the proportion of individuals answering 'often', 'sometimes', 'rarely' and 'never' to this specific CASP-12 question by household income quintile. Around 29% of individuals in the highest quintile of household income report that shortage of money never stops them from doing the things they want to do, compared to 18% of individuals in the lowest quintile of household income. Also, around 8% of individuals in the highest quintile of household income report that shortage of money often stops them from doing the things they want to do compared to 29% of individuals in the lowest quintile of household income.

Figure 4: Frequency of "Shortage of money stops me from doing the things I want to do" by Household Income Quintile, TILDA Wave 1
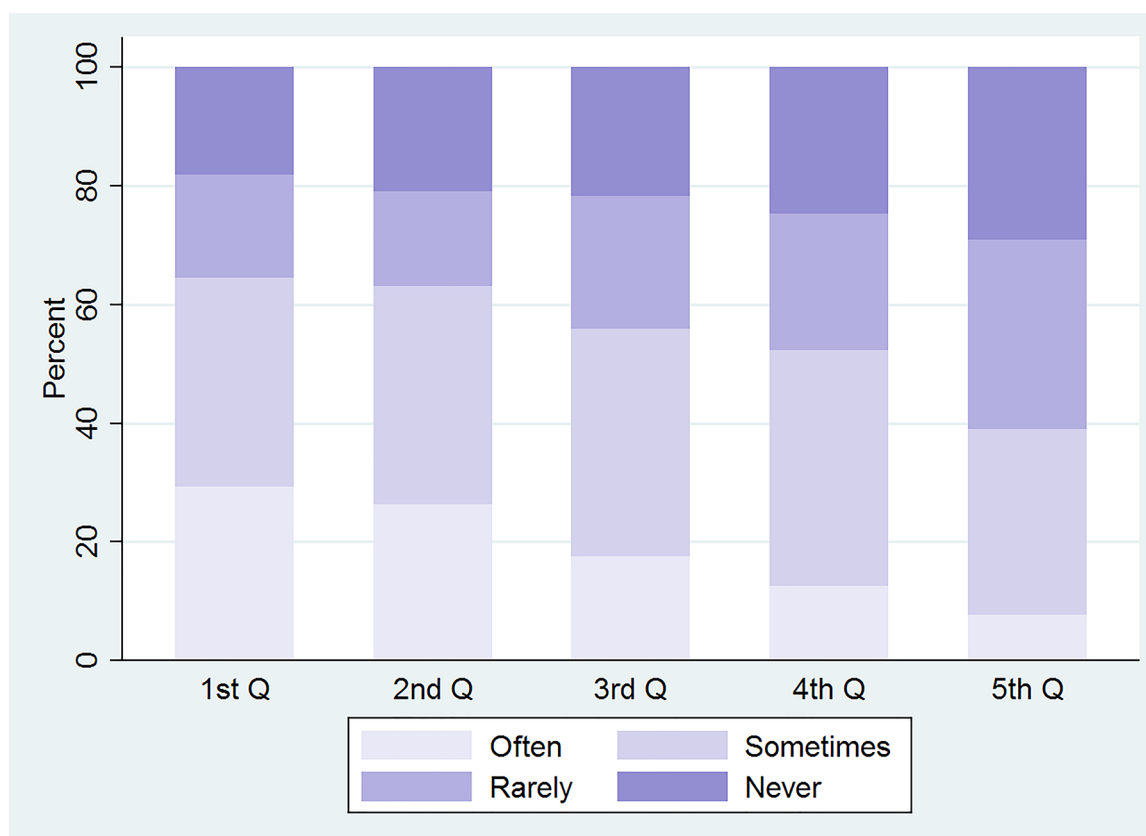
2.3. The Relationship between Household Income, Labour Market Status and Quality of Life

Figure 5 shows the proportion of individuals with different answers to the question "Shortage of money stops me from doing the things I want to do" by labour market status. Interestingly, compared to individuals who are in employment at the time of data collection, retirees are less likely to report that they often have problems with shortage of money (13% versus 15%) and more likely to report they never have problems with shortage of money (31% versus 20%). Unsurprisingly, the highest proportion of individuals who often suffer from shortage of money is found among individuals who are neither working nor in retirement. This category includes individuals who are unemployed, permanently sick and disabled, looking after home or family and in education or training.

Figure 5: Frequency of "Shortage of money stops me from doing the things I want to do" by Labour Market Status, TILDA Wave 1
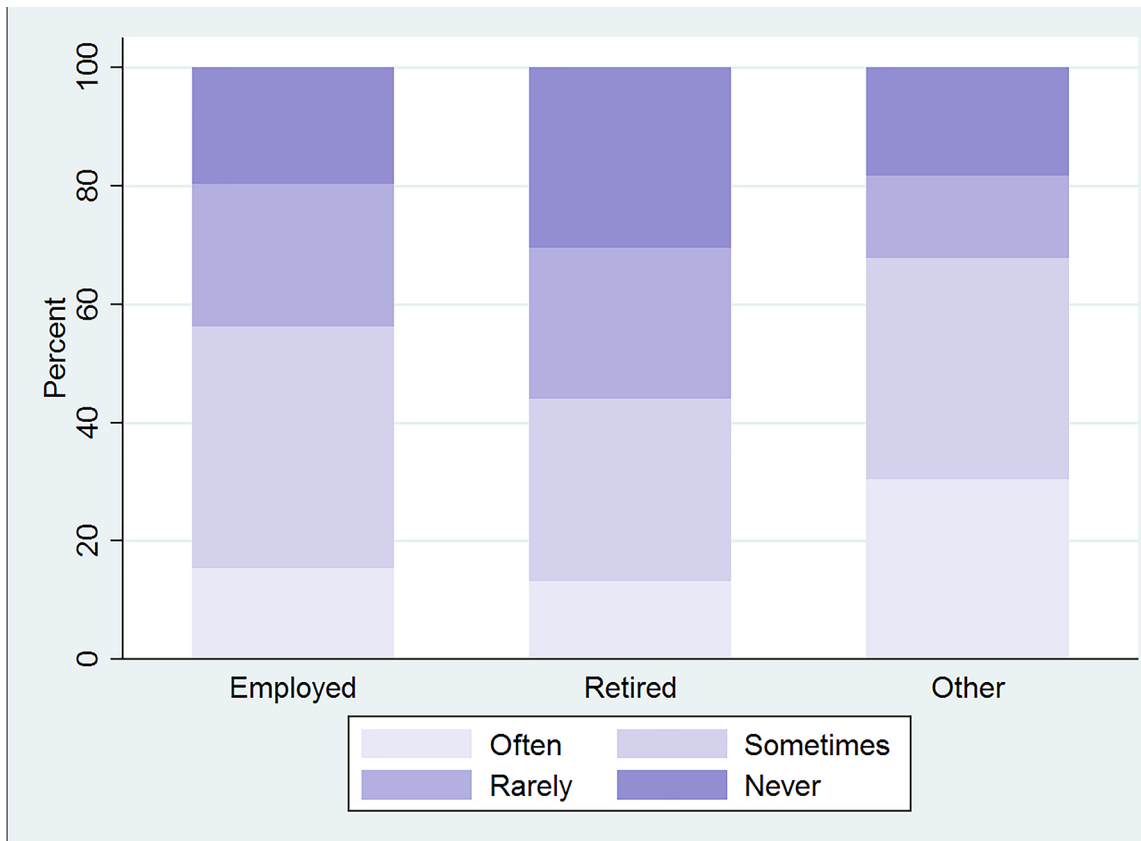
The finding that retirees are less likely to report financial difficulties than people who are still working is somewhat surprising, considering the drop in income usually experienced at the time of retirement. In order to check if this finding could be driven by systematic differences in which retirees compared to workers respond to the CASP-12 questionnaire items, the response differentials across the various CASP-12 questions are examined. The patterns of response differentials to the other questions are as expected: for example, Figure 6 shows the higher rates of retirees reporting restrictions to their lives brought by their level of health. To illustrate, around 35% of retirees report that their health never stops them from doing the things they want to do, compared to around 58% of those in employment. Naturally, the differentials between those in pre- and post-retirement are driven by differences in age, to a large extent.

Figure 6: Frequency of "My health stops me from doing the things I want to do" by Labour Market Status, TILDA Wave 1

Figure 7 investigates the responses to the question "Shortage of money stops me from doing the things I want to do" by labour market status and household income quintiles. Income quintiles for individuals in employment and in retirement are constructed separately, by including only individuals in employment and only individuals in retirement, respectively. The data presented in Figure 7 suggest that retirees that are more affluent are more likely to never have problems with shortage of money than employees that are more affluent, although in absolute terms retirees have substantially lower incomes. Around 40% of retirees in the highest quintile of household income report that shortage of money never stop them from doing the things they want to do, compared to 27% of individuals in employment in the highest quintile of household income. The median equivalised household income among the individuals in the top quintile of the workers is around €49,500, whereas the median equivalised income among the top-quintile retirees is €38,900.

Figure 7: Frequency of "Shortage of money stops me from doing the things I want to do" by Labour Market Status and Household Income Quintile, TILDA Wave 1
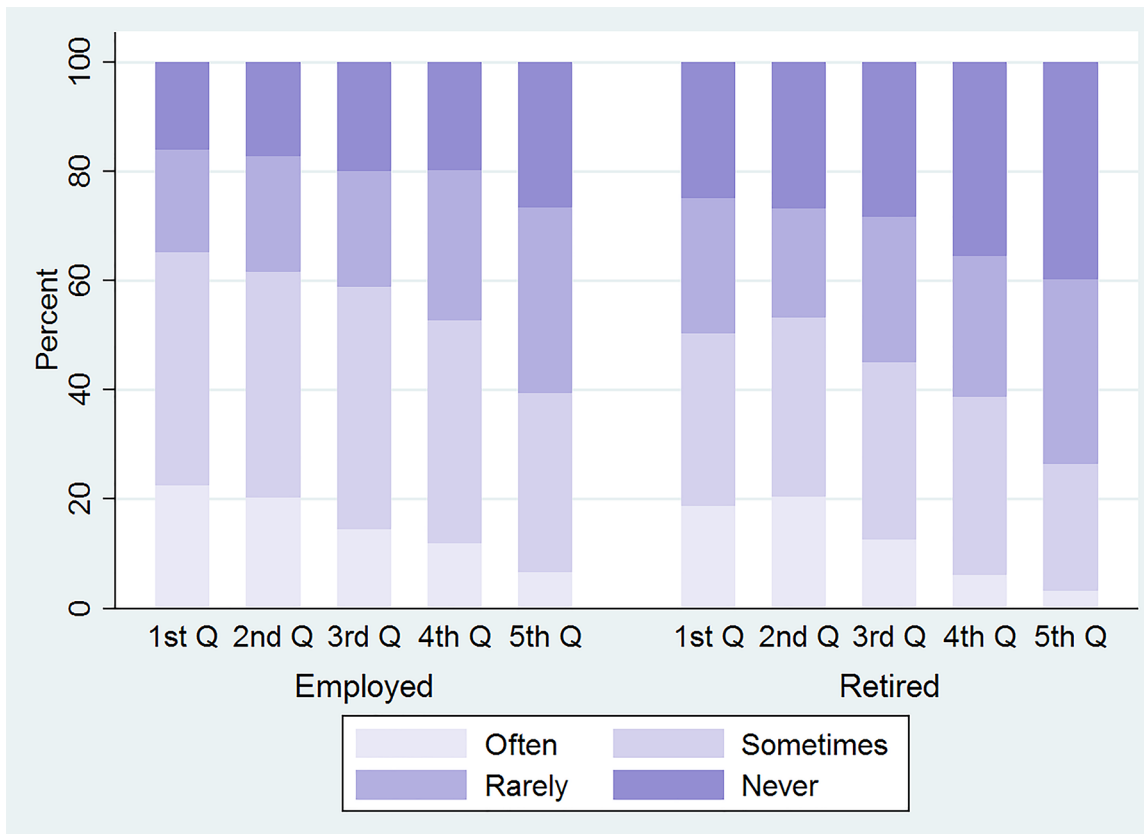
3 Longitudinal Analysis of the Relationship between Income and Quality of Life around Time of Retirement

Replacement rates aim to capture people's ability to maintain their standard of living as they transition from working life into retirement. Standard of living is difficult to quantify, and therefore economists have used data on consumption or income as proxy measures for living standards. Longitudinal consumption data for individuals is not readily available, and therefore longitudinal income data have been most widely used to examine living standards across time (MacDonald et al., 2016). Empirical examinations of consumption and income patterns suggest that neither is constant across the life cycle (Banks et al., 1998; Mason and Lee, 2013; Bloom et al., 2003). Different reasons have been suggested for this variation, including borrowing constraints, uncertainties about future events, variation in individuals' risk aversion, the bequest motive, as well as behavioural biases such as hyperbolic discounting. Hyperbolic discounting refers to the tendency for people to increasingly choose a smaller-sooner reward over a larger-later reward.

There is a wide consensus in the replacement rate (RR) literature that a 100% RR is not necessary for standard of living to remain constant as people transition into retirement. People's consumption patterns mean that less income can provide the same standard of living to a retiree compared to a working individual. In retirement, less financial resources are taken up by work-related expenses, mortgage repayments, children who need financial support, and expenditure on durable goods. Retired persons also have more leisure time to shop around and compare prices, and saving for retirement does not require financing after retirement. In Ireland, like in many other countries, retired individuals also receive supports, such as free travel, from the government, and lower taxes (e.g. PRSI) are levied on pension income. On the other hand, expenditure on other items such as medical services, travel, and insurance may increase in retirement.

Under the current system, Irish State welfare pensions are not related to individual's labour earnings levels. Supplementary pensions (occupational and private pensions) are used to replace labour earnings in retirement. Membership of a supplementary pension scheme is not currently mandatory for private sector employees. The National Pensions Policy Initiative set a target rate for supplementary pension coverage at 70 per cent for the total workforce over the age of 30 (Pensions Board, 1998). A target of 50 per cent of gross

pre-retirement income was also set for retirement income replacement rates, subject to a minimum of 34 per cent of average industrial earnings (Pensions Board, 1998; Department of Social and Family Affairs, 2007).

Research involving retirement preparedness and RRs has commonly focused on either the calculation of RRs itself, or the various factors that determine RRs. To our knowledge, no previous research has examined the relationship between quality of life and retirement income replacement rates[1].

3.1. TILDA Sub-sample Transitioning from Employment to Retirement

The sub-sample of TILDA respondents examined in this section of Chapter 3 are the individuals who are working in Wave 1 and retired in Wave 2, or working in Wave 2 and retired in Wave 3, and for whom both income and quality of life measures are recorded both before and after retirement. Figure 8 illustrates the numbers of individuals included in the analysis and how the sample was chosen. The final sample is made up of 325 individuals who transition from work into retirement during the study period, and for whom both income and quality of life measures are recorded before and after retirement. There are 549 transitions from work into retirement over the study period. All the necessary data are available for 325 of these individuals.

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1   MacDonald et al. (2016) examined the link between living standards continuity and replacement rates, finding low correlation between the two measures. Panis (2003) examined the link between types of retirement wealth (annuity wealth in particular) and life satisfaction. Bender (2012) examined the relationship between retirement well-being and income, reason for retirement, health and pension type. Netuveli et al. (2006) examined the extent to which quality of life in older age is explained by indicators of economic well-being, among other things.

Figure 8: Sub-sample Transitioning from Employment to Retirement between 2009 and 2015, TILDA

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┌─────────────────────┐
│  TILDA respondents  │
│    in any of the 3  │
│    waves: 8,703     │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Observed in at least 3 │
│  consecutive waves:  │
│     N = 7,421       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Retired between waves: │
│      N = 549        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Income data available: │
│      N = 392        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Quality of life data available: │
│      N = 334        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Other covariates available: │
│      N = 325        │
└─────────────────────┘
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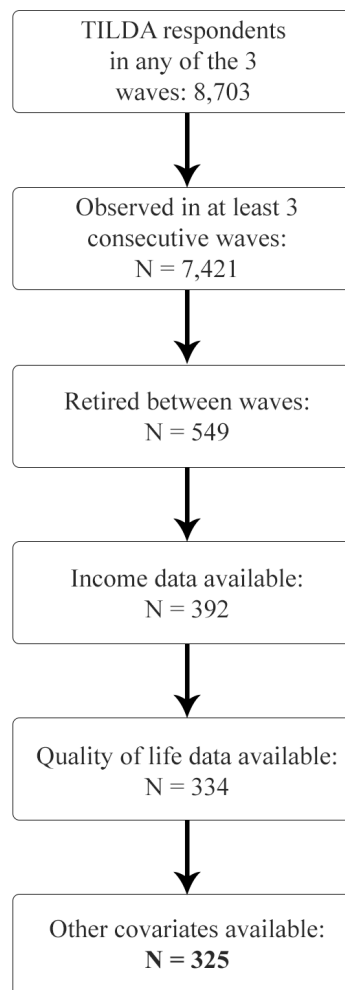
3.2. TILDA Retirement Income Replacement Rates

The retirement income replacement rate is calculated as a ratio of (post-retirement) individual pension income to (pre-retirement) individual labour earnings:

$$\text{Retirement Income Replacement Rate (RR)} = \frac{\text{Pension Income}}{\text{Labour Income}} * 100$$

Labour Income is defined as a sum of gross weekly income from labour. Pension Income is defined as a sum of gross weekly income from:

1.   State welfare pension income (pillar I)

2.   Occupational pension income (pillar II)

3.   Private pension income (pillar III)

As the RR aims to capture the permanent income, one-off payments from pension lump sums (in first year of retirement) are not included in the calculation of pension income.

Table 3 illustrates the distribution and variation in pre-retirement labour income, post-retirement pension income and RR with sex (male; female); age group (<60; 60-69; 70+); educational attainment (primary/none; secondary; third/higher); marital status (married; never married; separated, divorced or widowed); pre-retirement worker type (private sector; public sector; self-employed); type of retirement (not early retirement; early retirement) and receipt of lump-sum at retirement (no; yes). Estimates are shown at the 25th percentile; 50th percentile (median) and 75th percentile. The estimates are expressed in € for pre-retirement labour income and post-retirement pension income; and as a percentage ratio for the RR.

A number of interesting results emerge from Table 3. First, the median replacement rate in individuals who transitioned into retirement between 2009 and 2015 is 51.4% and ranges from 46.1% for individuals who took early retirement to 71.3% for those in the oldest age category. Second, individuals with primary or no education have lower pre-retirement incomes, lower post-retirement incomes and higher RRs. For example, individuals with no or primary education have a median gross pre-retirement income of €397 per week; a median gross post-retirement income of €230 per week; and a RR of 64.2%. The corresponding figures for individuals with third or higher education are €1000; €450 and 48%, respectively. So although individuals with third or higher education have lower RRs, in real terms their median retirement income is almost double.

Third, while men and women have similar RRs, women have lower pre-retirement incomes, lower post-retirement incomes and more widely spread RRs. Fourth, slightly more than half of respondents are early retirees and slightly less of one fifth also received a lump-sum at retirement. Compared to individuals who took normal retirement, early retirees have higher pre-retirement incomes, higher post-retirement incomes and

16

lower RRs. Similarly, compared to those who did not receive a lump-sum at retirement, individuals who received a lump-sum have higher pre-retirement incomes, higher post-retirement incomes and lower RRs.

Table 3: Distribution of Pre-retirement Income, Post-retirement Income and Replacement Rates for Various Groups

	Pre-retirement labour income			Post-retirement Pension income			Replacement Rate			% in sample
	P25	Median	P75	P25	Median	P75	P25	Median	P75	
	€	€	€	€	€	€	%	%	%	
All	*345.0*	*657.0*	*1062.5*	*195.0*	*285.0*	*587.3*	*30.0*	*51.4*	*76.7*	*100.0*
Sex										
Male	475.0	800.0	1168.8	230.0	363.9	600.0	34.2	51.5	74.0	43.1
Female	250.0	500.0	1000.0	140.0	239.5	550.0	21.0	51.4	87.5	56.9
Age Group										
<60	750.0	1000.0	1291.5	193.0	475.0	691.5	27.5	47.5	55.2	39.7
60-69	234.8	489.3	800.0	194.0	238.0	471.5	30.0	56.2	96.5	54.8
70+	212.5	340.0	500.0	228.0	230.0	363.8	60.6	71.3	110.7	5.5
Educational Attainment										
Primary/none	212.5	397.1	650.0	206.0	230.0	363.8	40.4	64.2	104.2	16.9
Secondary	337.5	600.0	900.0	115.0	246.9	495.5	22.6	52.3	82.0	41.2
Third/higher	500.0	1000.0	1350.0	225.0	450.0	700.0	31.1	48.0	63.6	41.8
Marital Status										
Married	368.0	700.0	1100.0	160.0	280.8	594.0	24.2	50.2	73.7	73.5
Never Married	400.0	850.0	1200.0	233.5	425.0	505.8	36.8	47.0	61.8	11.4
Sep./Div./ Widowed	208.0	355.0	900.0	225.0	240.0	545.0	45.5	69.0	122.7	15.1
Worker type										
Private sector	232.4	487.5	876.3	0.0	230.0	436.6	0.0	52.1	87.0	36.9
Public sector	500.0	900.0	1250.0	237.0	427.0	675.0	34.4	50.0	63.3	53.2
Self-employed	210.1	376.3	562.5	225.0	230.0	343.5	40.0	70.2	118.4	9.8
Early retirement										
No	272.5	500.0	851.3	225.0	255.5	508.5	41.4	59.6	93.4	47.5
Yes	477.5	900.0	1247.5	65.8	389.5	623.5	7.0	46.1	58.6	52.5
Receipt of Lump-Sum at Retirement										
No	317.3	615.4	1050.0	157.3	255.0	579.3	24.2	51.9	79.0	81.5
Yes	490.0	876.3	1131.3	263.0	396.0	611.0	36.9	48.1	74.3	18.5

3.3. The Relationship between Post-retirement Income and Quality of Life

The relationship between post-retirement pension income and post-retirement CASP-12 is investigated in Figures 9 and 10. The figures shows that the association between post-retirement income and post-retirement quality of life is positive. Figure 9 shows that individuals in the highest quintile of post-retirement income score on average 30.2 on CASP-12. This compares to an average CASP-12 score of 27.1 for individuals in the lowest income quintile of post-retirement income.

Figure 9. Post-retirement CASP-12 Score by Post-retirement Pension Income, TILDA
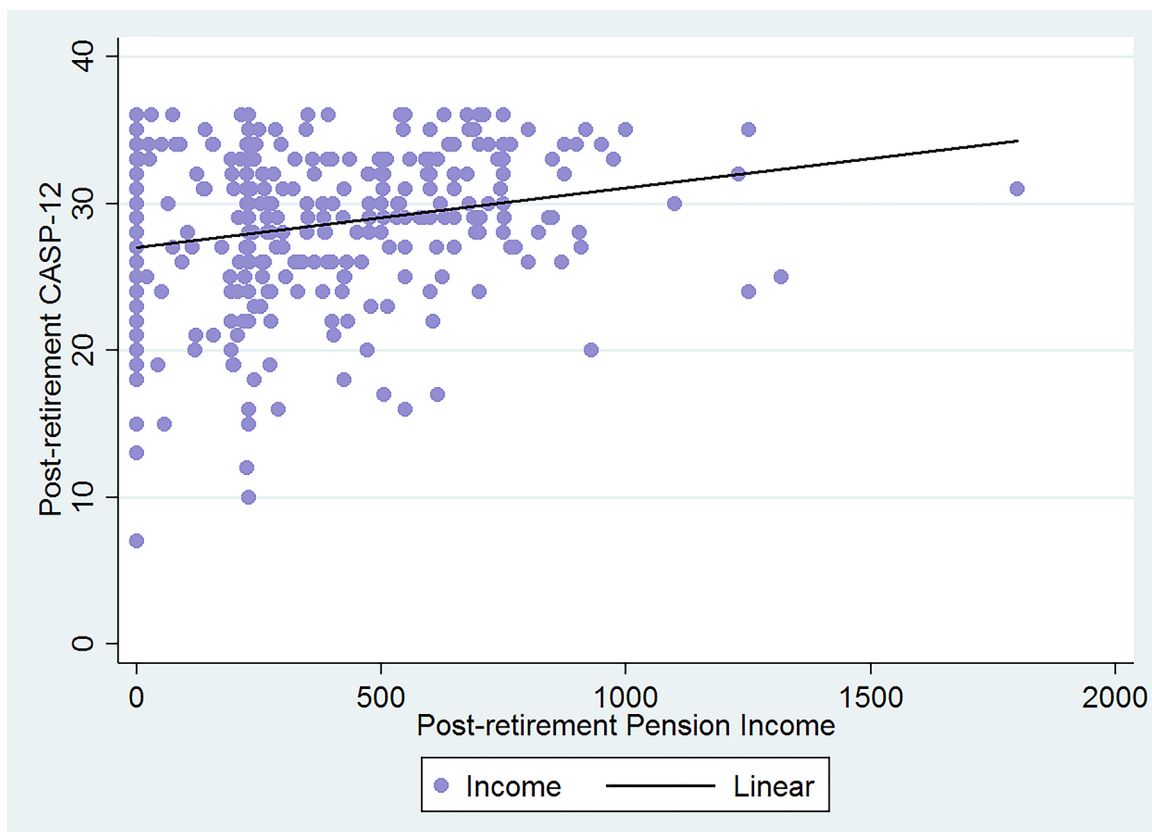
Figure 10. Post-retirement CASP-12 Score by Post-retirement Pension Income Quintile, TILDA
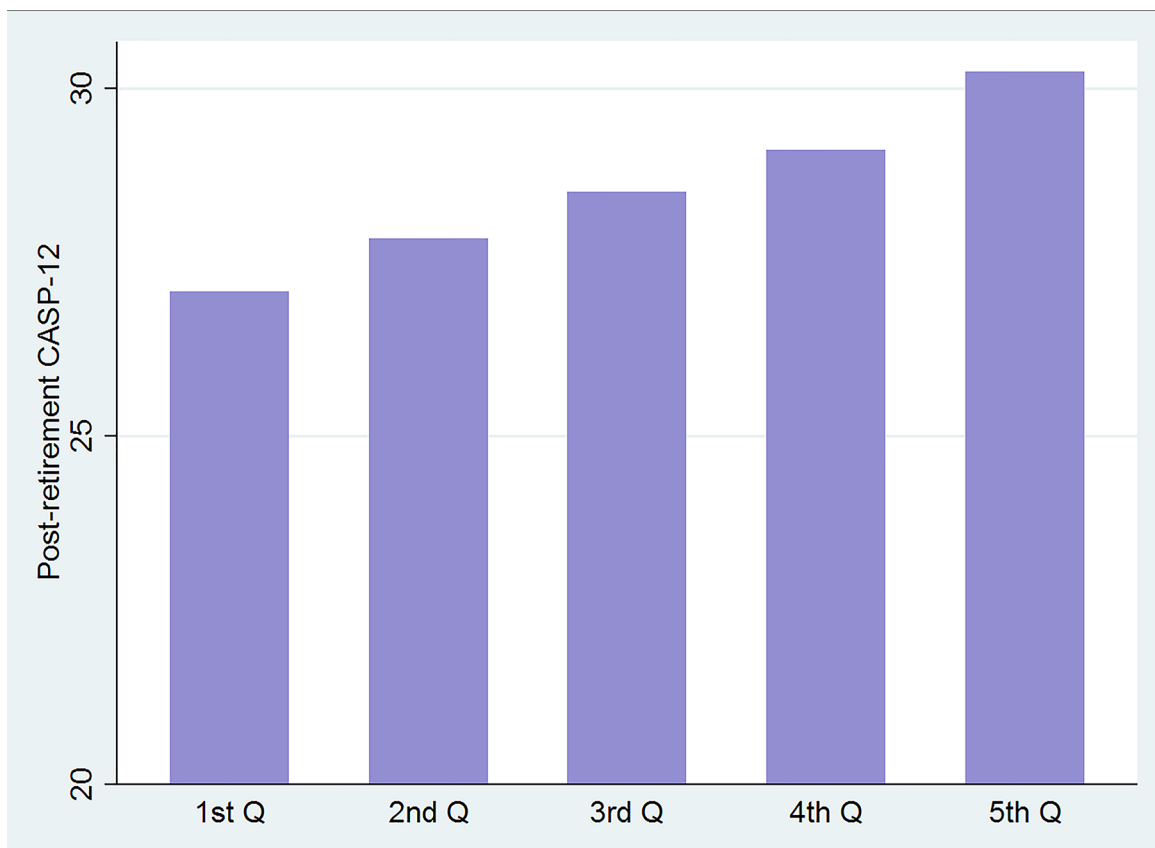
Figure 11 investigates the relationship between RR and post-retirement CASP-12. Figure 12 investigates the relationship between RR and change in CASP-12 score. For each individual, the change in CASP-12 score is the difference between the CASP-12 score post-retirement and the CASP-12 score before retirement. Both figures show that no clear relationship emerges between RR and post-retirement quality of life and between RR and change in quality of life around the time of retirement.

Figure 11. Post-retirement CASP-12 Score by Replacement Rate, TILDA

Figure 12. Longitudinal Change in CASP-12 Score by Replacement Rate, TILDA
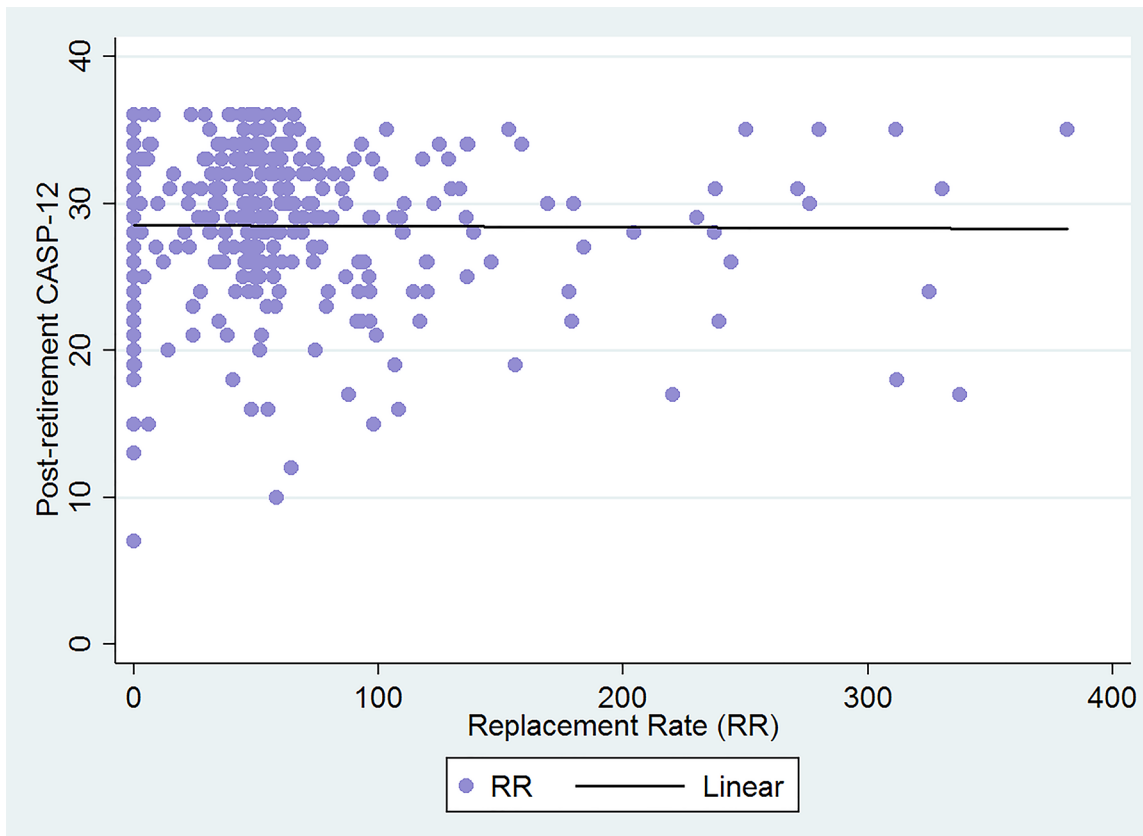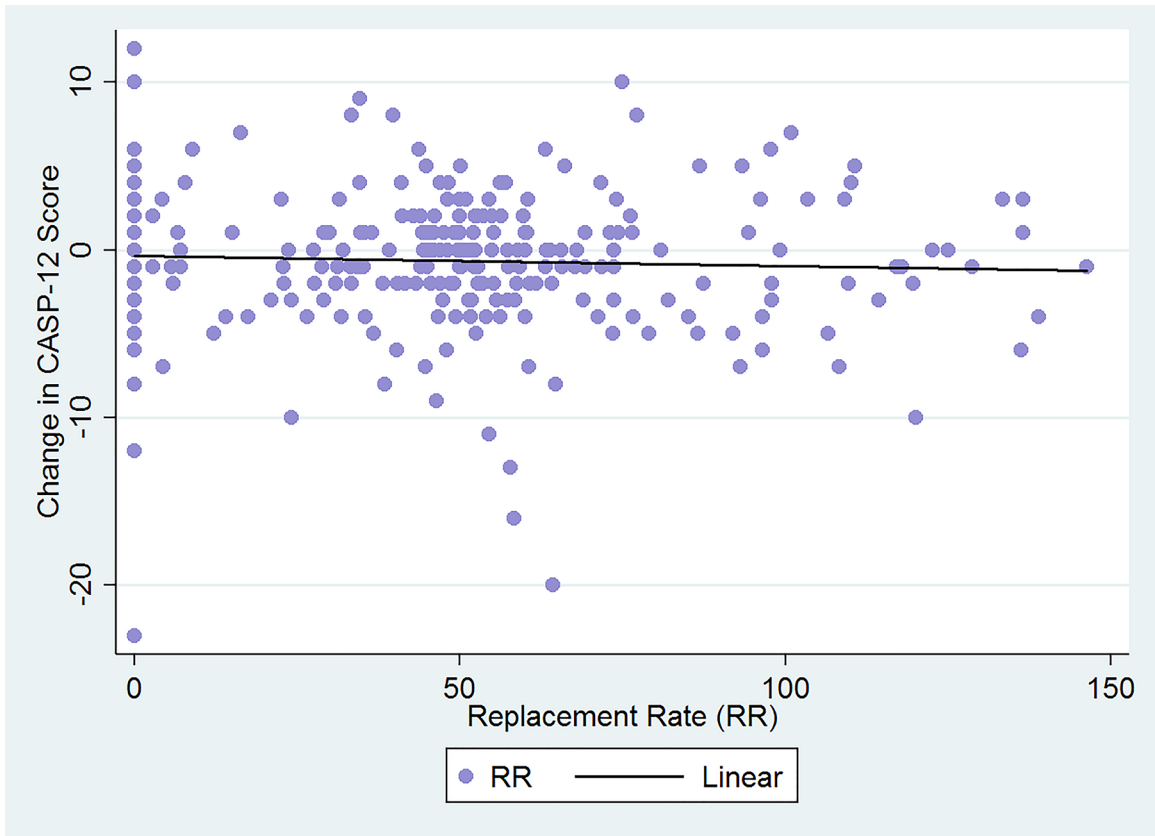
4 Conclusions

A key objective of the Irish pensions system, and of many other pensions systems in Europe and beyond, is to ensure people have an adequate replacement income in retirement. For some individuals, the social welfare pension provide an adequate replacement income and the main policy objective for this group is alleviation of the risk of poverty. For most people, some form of supplementary provision is necessary to facilitate the transition to retirement (Department of Social and Family Affairs, 2007).

The analysis of this report focuses on the relationship between income/retirement income adequacy and quality of life, using data from the first three waves of The Irish Longitudinal Study on Ageing. Chapter 2 uncovers how quality of life is related to income and how this relationship varies between workers and retirees. Chapter 3 focuses on the extent to which labour earnings are replaced by income from pensions, and how quality of life is related to income levels and changes in income around the time of retirement. Retirement income replacement rates, expressed as the ratio of post-retirement pension income to pre-retirement labour income, are calculated for each individual transitioning from employment to retirement between TILDA Wave 1 and Wave 3 (2009 to 2015).

In conclusion, the results of this report show that:

- Income is generally positively associated with quality of life among the Irish population aged 50 years or older.

- Around 13% of Irish retirees report that 'shortage of money often prevents them from doing the things they would like to do'. This compares to around 31% reporting that 'shortage of money never prevents them from doing the things they would like to do'.

- The median replacement rate for those who transition from work to retirement between Wave 1 and Wave 3 is around 51.4%.

- On average, individuals with higher socio-economic status have higher pre-retirement incomes, higher post-retirement incomes and lower retirement income replacement rates than individuals with lower socio-economic status.

- Higher income is associated with higher quality of life for people transitioning into retirement between 2009 and 2015. Retirement income replacement rates are not associated with quality of life post-retirement.

The conclusions above about income and quality of life are consistent with those of the international literature. For example, Netuveli and colleagues (2006) found that English older individuals in the top 40% of the income distribution enjoy higher quality of life. Bender (2012) found that while income does increase overall well-being of American retirees, the effect is small. The finding that shortage of money does not seem to be an important issue for the majority of Irish retirees might be attributable to the fact that consumption patterns do change over time. Compared to when in employment, retirees are more likely to have more time to shop around, to have paid off their mortgage, to have less/no dependants and not to have to save extra for their retirement.

The finding of no clear relationship between retirement income replacement rates and quality of life, although surprising at first, can be explained in a number of different ways. First, individuals with zero/low RRs have, by definition, zero/low(er) post-retirement income and high(er) pre-retirement income. These include, among others, early retirees who are not yet in receipt of a state pension and individuals with no occupational/private pension who had generous salaries before retirement. A priori, it is difficult to predict whether these individuals experience improvements or dis-improvements in quality of life after retirement, especially if they can counteract income losses with large wealth or lump-sums. Second, individuals with high(er) RRs have, by definition, high(er) post-retirement income and low(er) pre-retirement income. These are likely to be individuals with generous occupational/private pensions who did not have a 'high-paid' job at the end of their career, possibly due to the fact that they reduced hours of work before retirement. Once again, it is difficult to predict whether a priori these individuals experience improvements or dis-improvements in quality of life after retirement. Third, it is important to remember that on average individuals with higher socio-economic status have higher pre-retirement incomes and higher post-retirement incomes but lower RRs. This implies that a high RR does not necessarily mean high post-retirement income.

Overall, the findings of this report suggest that it is actual income in retirement, rather than retirement income replacement rates, that seems to affect quality of life of Irish retirees. It is important to note, however, that a limitation of this analysis is that it only examines follow-up following retirement of up to a maximum of 2 years. More waves of TILDA will inform if these relationships between income and quality of life and RR and quality of life are sustained over time.

Despite both the conceptual and the empirical challenges of studying income adequacy in retirement, the last decade has witnessed important advances in the understanding of the factors that influence standard of living in retirement. A single "target" retirement income replacement rate is probably not appropriate given the heterogeneity of saving behaviour in the population (Poterba, 2015). The retirement income replacement rate should vary depending on the individual's health and family circumstances, on the individual's pre- and post-retirement income level, on the household composition, on the level and composition of household wealth accumulated over the lifetime and on the desired level of retirement consumption. The research of the last decade has improved the knowledge base on which to build policies to enhance retirement income security, and represents an important springboard for continuing study in this area.

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6 Appendix

Table A1: Distribution of CASP-12 Score by Socio-economic Characteristics, TILDA Wave 1

	Mean	(95% CI)	N
Age Group			
<60	27.45	(27.21,27.70)	2552
60-69	28.22	(27.94,28.50)	1976
70+	27.22	(26.93,27.51)	1539
Educational Attainment			
Primary/none	26.73	(26.42,27.03)	1563
Secondary	27.86	(27.65,28.08)	2477
Third/higher	28.69	(28.46,28.92)	2033
Marital Status			
Not married	26.67	(26.38,26.96)	1709
Married	28.06	(27.87,28.24)	436
Labour Market Status			
Employed	28.70	(28.48,28.92)	2335
Retired	27.78	(27.53,28.03)	2245
Other	25.99	(25.65,26.33)	1495
Sex			
Male	27.50	(27.29,27.71)	2847
Female	27.76	(27.55,27.97)	3228
Self-Rated Health			
Excellent/V. Good	29.68	(29.50,29.87)	2828
Good	27.49	(27.23,27.74)	1956
Fair/poor	24.06	(23.72,24.40)	1290

Table A2: Distribution of CASP-12 Score by Household Income Quintile, TILDA Wave 1

	Mean	(95% CI)	N
1st Quintile	26.24	(25.86,26.63)	1085
2nd Quintile	26.70	(26.32,27.09)	956
3rd Quintile	27.48	(27.17,27.79)	1189
4th Quintile	28.51	(28.18,28.83)	1143
5th Quintile	29.57	(29.30,29.85)	1240

Table A3: Distribution of CASP-12 Subscale Score by Household Income Quintile, TILDA Wave 1

	Mean (95% CI)							
	Control		Autonomy		Self-realisation		Pleasure	
1st Quintile	8.04	(7.87,8.20)	5.60	(5.47,5.73)	4.43	(4.33,4.52)	8.03	(7.93,8.12)
2nd Quintile	8.16	(7.98,8.35)	5.68	(5.56,5.81)	4.57	(4.47,4.66)	8.19	(8.11,8.27)
3rd Quintile	8.52	(8.37,8.66)	5.98	(5.87,6.09)	4.69	(4.62,4.75)	8.26	(8.19,8.34)
4th Quintile	8.90	(8.75,9.06)	6.37	(6.26,6.48)	4.81	(4.74,4.89)	8.31	(8.24,8.38)
5th Quintile	9.35	(9.22,9.48)	6.76	(6.65,6.86)	5.00	(4.94,5.07)	8.41	(8.35,8.47)

Table A4: Frequency of "Shortage of money stops me from doing the things I want to do" by Household Income Quintile, TILDA Wave 1

	Often		Sometimes		Rarely		Never		Total
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
1st Quintile	29	[26-32]	35	[32-38]	17	[15-20]	18	[16-21]	100
2nd Quintile	26	[24-29]	37	[34-40]	16	[14-18]	21	[18-24]	100
3rd Quintile	18	[15-20]	38	[36-41]	22	[20-25]	22	[19-24]	100
4th Quintile	13	[11-15]	40	[37-43]	23	[21-26]	25	[22-28]	100
5th Quintile	8	[6-10]	31	[28-34]	32	[29-35]	29	[26-32]	100
Total	*19*	*[18-21]*	*36*	*[35-38]*	*22*	*[21-23]*	*23*	*[21-24]*	100

Table A5: Frequency of "Shortage of money stops me from doing the things I want to do" by Labour Market Status, TILDA Wave 1

	Often		Sometimes		Rarely		Never		Total
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Employed	15	[14-17]	41	[39-43]	24	[22-26]	20	[18-21]	100
Retired	13	[12-15]	31	[29-33]	25	[24-27]	31	[28-33]	100
Other	30	[28-33]	37	[35-40]	14	[12-16]	18	[16-20]	100
Total	*19*	*[18-20]*	*36*	*[35-38]*	*22*	*[21-23]*	*23*	*[22-24]*	100

Table A6: Frequency of "My health stops me from doing the things I want to do" by Labour Market Status, TILDA Wave 1

	Often		Sometimes		Rarely		Never		Total
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Employed	4	[3-4]	15	[13-17]	23	[21-25]	58	[56-60]	100
Retired	15	[14-17]	28	[26-30]	22	[20-23]	35	[33-37]	100
Other	18	[16-20]	27	[25-30]	19	[17-21]	36	[34-39]	100
Total	*12*	*[11-13]*	*23*	*[22-24]*	*21*	*[20-22]*	*44*	*[43-45]*	100

Table A7: Frequency of "Shortage of money stops me from doing the things I want to do" by Labour Market Status and Household Income Quintile, TILDA Wave 1

	Often		Sometimes		Rarely		Never		Total
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Employed									
1st Quintile	22	[19-27]	43	[38-48]	19	[15-22]	16	[13-20]	100
2nd Quintile	20	[17-24]	41	[37-46]	21	[18-25]	17	[14-21]	100
3rd Quintile	14	[11-18]	44	[39-50]	21	[17-26]	20	[16-25]	100
4th Quintile	12	[9-15]	41	[36-45]	28	[24-32]	20	[16-24]	100
5th Quintile	7	[4-10]	33	[28-38]	34	[30-39]	27	[22-32]	100
Total	16	[14-17]	41	[38-43]	24	[22-26]	20	[18-21]	100
Retired									
1st Quintile	19	[15-23]	32	[27-36]	25	[20-29]	25	[21-30]	100
2nd Quintile	20	[17-25]	33	[28-37]	20	[16-24]	27	[23-31]	100
3rd Quintile	13	[10-16]	32	[28-37]	27	[23-31]	28	[25-32]	100
4th Quintile	6	[4-9]	33	[28-38]	26	[21-31]	35	[30-41]	100
5th Quintile	3	[2-5]	23	[19-28]	34	[29-38]	40	[35-45]	100
Total	13	[12-15]	31	[29-33]	26	[24-28]	30	[28-32]	100