Income Dynamics & Mobility in Ireland: Evidence from Tax Records Microdata

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Income Dynamics & Mobility in Ireland 2015

Revenue
Cáin agus Custaim na hÉireann
Irish Tax and Customs

Who earns what?
Gross income thresholds, 2015

	PAYE	Self Employed
Top 10%	€75,824	€102,548
Top 1%	€182,360	€444,640
Top 0.1%	€476,965	€1,501,750

How do earnings change over the life-cycle?
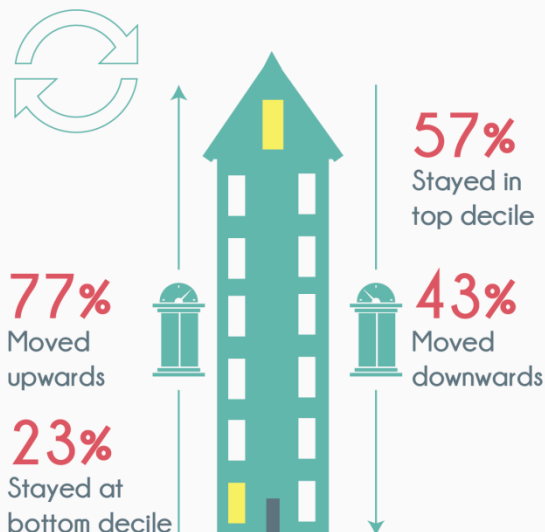Median income, 2015 (€27,898), at age:

25	45	65
€19,807	€40,808	€32,150

Who has moved up and down the income ladder?
Income Mobility, 2006 - 2015

57% Stayed in top decile

77% Moved upwards

43% Moved downwards

23% Stayed at bottom decile

How does Ireland compare internationally?
Share of income earned by the top 10%

US 47%
UK 39%
Ireland 36%
Australia 32%
New Zealand 31%

0   10   20   30   40   50

How much tax do high earners pay?
Tax contributions of the top 10% of earners, 2015

61%
of all Income Tax

59%
of all USC
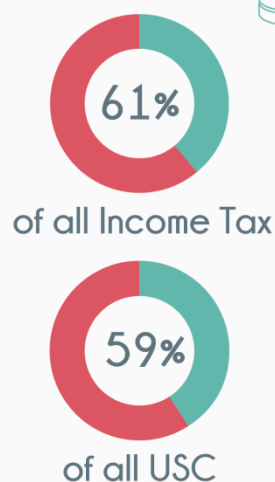
Executive Summary

Global income shares have risen among the top 1% (Alvaredo et al., 2013) in recent decades. In most countries, income inequality is measured at a moment in time using survey data due to its availability (Jäntti and Jenkins, 2014). By contrast, the current paper examines distributional and income mobility dynamics using the full population of 2.2 million tax units in Ireland from 2006 to 2015. The purpose of the paper is to make the best use of the tax record data and to improve the evidence base for policy making.

According to the analysis, in 2015 the top 10% earn one-third of all income (36 per cent). Internationally this is below the UK (39 per cent) and the US (47 per cent) but above Australia (32 per cent) and New Zealand (31 per cent) in 2013. In Ireland, this top 10% group paid two-thirds of all Income Tax (61 per cent) and half of the Universal Social Charge (51 per cent). By comparison, all other deciles 1 through 9 produce two-thirds (64 per cent) of all income and paid 39 and 49 per cent of Income Tax and USC respectively.

Real income thresholds in 2015 for the top 10%, 1% and 0.1% are €77,530, €203,389 and €618,296 respectively (Figure 1). The thresholds differ greatly by sector. For example, the threshold for the top 10% in the professional sector (€110,320) is more than double that of administrative and support services (€52,390). Similarly, the same threshold is a third higher for self-assessed (~€100,000) compared to PAYE (€75,000).

According to an analysis of Income Tax stability, of those in the top 10% of contributors in 2006, under half (43 per cent) remained in the top 10% of contributors 10 years later. Of those in the top 0.1% of contributors in 2006, one-quarter (22 per cent) remained in the top 0.1% by 2015. This group of just fewer than 1,500 taxpayers have consistently paid 3 to 6 per cent of all Income Tax in the State.
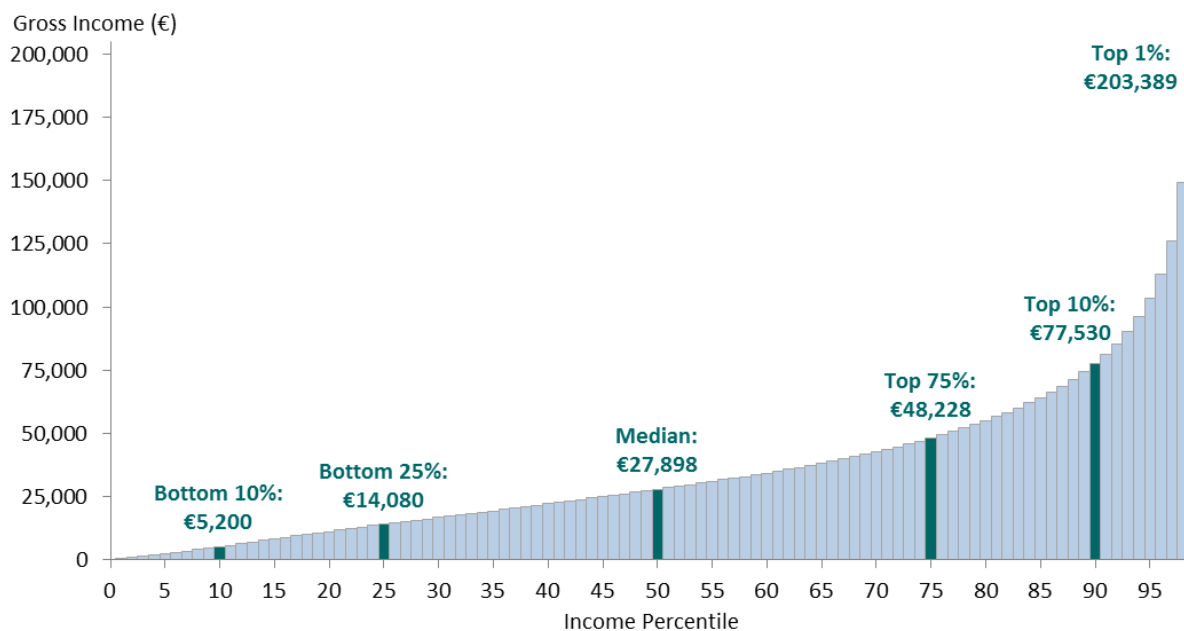
A further analysis of income mobility shows that of those in the top decile in 2006, over half (57 per cent) had remained by 2015. Between 2006 and 2009, a period of high incomes growth, incomes grew much faster among lower percentiles compared to higher percentiles. Between 2012 and 2015, the trend reversed, with increases largest at the top of the distribution.

An analysis of incomes by age shows that incomes typically peak between 40 and 55 years, similar to trends in the US. Further, only 18 per cent of 25 year old new entrants pay Income Tax compared to 60 per cent of all 25 year olds.

Key Findings

Figure 1: Selected Graphical Findings

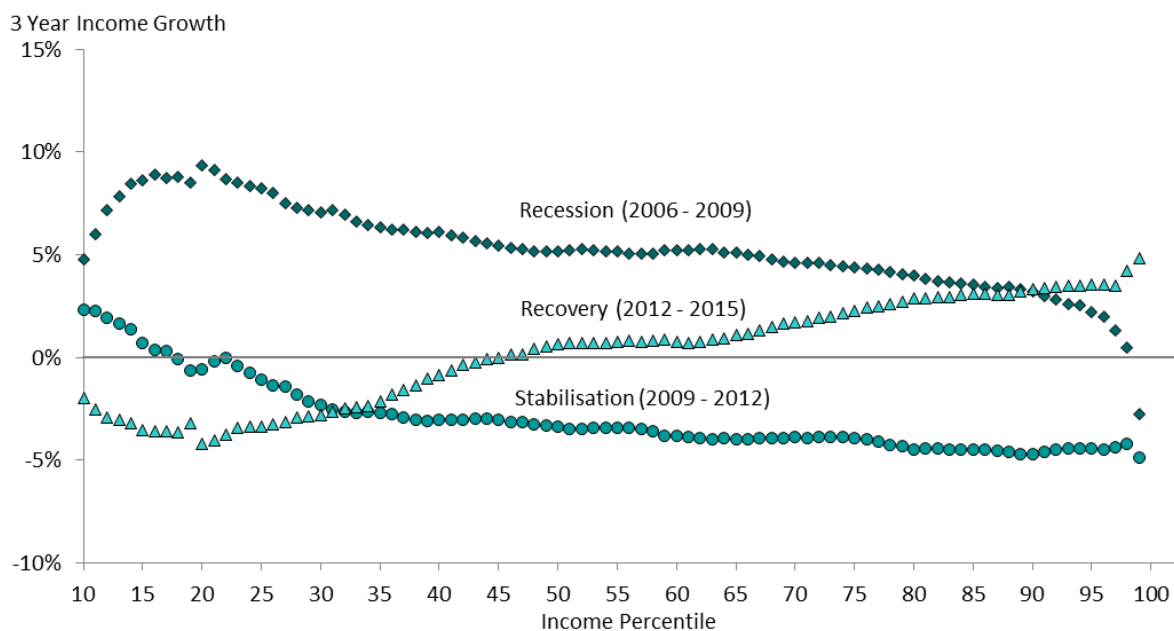### Distribution of Gross Income 2015

Three Year Growth in Gross Income

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1 Introduction

In recent decades, global income shares have risen among the top 1% (Alvaredo et al., 2013). The trend has generated policy discussion on the extent to which citizens participate in national prosperity. The analysis in this paper is based on Revenue's administrative Income Tax records, which follow the entire population of approximately 2.2 million tax units over the 10 year period from 2006 to 2015.[1] The data are compiled using Income Tax returns filed by self-assessed taxpayers (Form 11) and employers on behalf of PAYE employees (Form P35).

1.1 Data

The unit of analysis in the data are tax units and not individual taxpayers. The difference arises in the case of married couples or civil partners who elect for joint assessment. These cases represent two taxpayers and either one or two incomes but only count as one tax unit.[2] Tax units are categorised under six personal statuses by law: single males, single females, married two-earners, married one-earners, widowers and widows. For simplicity, the word taxpayer is used to refer to tax unit hereafter.

An important distinction is whether taxpayers are predominantly PAYE employees or self-assessed individuals. In this dataset taxpayers are assigned to one of the two categories conditional on which category comprises a greater proportion of overall income. It is important to note that PAYE employees in a Revenue context includes individuals in receipt of occupational pensions. In addition, in the self-assessed taxpayer population, there is a wide diversity of taxpayers ranging from local part-time businesses with small incomes to high net worth individuals employing many employees. On sector of employment, this relates to the sector of the employer (not the employee).[3] Each taxpayer is associated with one sector in each year. Taxpayers may have multiple trades or businesses, the data here are based on the primary trade identified by the taxpayer.

In an attempt to broadly examine the impact of the recession on incomes and mobility in Ireland, three equal length overlapping periods are chosen: 2006 to 2009, 2009 to 2012 and 2012 to 2015. The period from 2006 to 2009 captures the initial impact of the recession from close to peak economic activity to the bottom. While the economy began to

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[1] The same population data are also used to produce Revenue's income distributions statistics, available at: http://www.cso.ie/px/pxeirestat/Database/eirestat/Income%20Tax%20and%20Corporation%20Tax%20Distribution%20Statistics/Income%20Tax%20and%20Corporation%20Tax%20Distribution%20Statistics_statbank.asp?SP=Income Tax and Corporation Tax Distribution Statistics&Planguage=0&ProductID=DB_RV01

[2] Married one-earning and married two-earning couples represent approximately 17 per cent and 21 per cent of taxpayers in 2015.

[3] For self-assessed taxpayers, sector relates to the sector of the business taxpayer.

expand after 2009, household income and employment continued to fall until 2012.[4] Between 2012 and 2015 employment and household income increased and the rate of output growth accelerated. For simplicity, these three periods are loosely referred to hereafter as the recession, stabilisation and early recovery periods.[5]

1.2   Estimation Sample

The mobility analysis in Section 3 restricts the sample to taxpayers aged 25 to 100 leaving approximately 1.5 million observations in each year. This follows common practice in the mobility literature which attempts to remove from the analysis changes in income that are attributable to the transition from school to work. The distributional analysis in Section 2 makes no such restrictions to a taxpayer's age and contains approximately 2.2 million tax cases in each year.

1.3   Tax Record and Survey Data

Compared with survey data, tax record data has several advantages (Jenkins, 2001). First, coverage of the full taxpayer population allows for specific sub-group analysis while retaining adequate sample size. Second, it is an offence to submit a false tax return so incomes are mostly free from measurement error such as misreported incomes or response bias. Third, as noted by Jenkins, tax records are often 'used as a validation gold standard against which to assess measurement error in survey-based income data'.

There are also limitations. First, the data is confined to those who complete tax returns and does not cover those entirely reliant on untaxed benefits or undeclared income. Therefore it can be seen as under-representing lower-income groups. Second, tax data are collected for the purposes of calculating tax liabilities. Unlike most survey data, tax record data have limited demographic data, such as educational attainment. Third, while the tax records are based on the gross incomes of tax units, survey data are typically based on an equivalisation of the disposable incomes of households.[6]

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[4] Median equivalised real disposable income reached the bottom in 2013. Household income refers to the median real household disposable income according to SILC 2015, available at (Table SIA12): http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=SIA12&PLanguage=0.
[5] While economic output hit the bottom in 2009, earnings and employment lagged output and reached the bottom in 2012. As this paper is concerned with income distributions and mobility, the year 2012 is chosen as the cut-off between the recession and recovery period.
[6] Equivalisation usually involves summing up all income in a tax-unit/household, and dividing it by an equivalence scale to take account of the total needs of the members of the unit, so for example a family of 2 adults with 1 child with the same total income as a childless couple would have a lower equivalised income than the childless couple.

2 Developments in Income Distributions

2.1 Income Distribution in Ireland

Table 1 shows real gross income thresholds between 2006 and 2015. The median gross income is €27,898 in 2015. The income threshold for the top 0.1% is €618,296 in the same year. Median gross income peaked in 2009 and reached the bottom in 2014, which is a year later than household survey data.[7] Also, incomes measured using surveys declined by more compared to incomes on the tax records. This may be because the tax records do not fully capture the fall in income when moving from employment to unemployment as the data does not include those entirely reliant on untaxed benefits.

Table 1: Income Thresholds

Real Gross Income

Year	Bottom Decile €	Bottom 25% €	Median €	Top 75% €	Top Decile €	Top 1% €	Top 0.1% €
2006	4,951	13,614	27,281	47,025	76,296	209,727	745,580
2007	5,056	13,906	27,320	46,965	76,537	209,355	727,120
2008	5,154	14,198	27,491	47,275	76,641	205,148	666,102
2009	5,186	14,733	28,696	49,091	78,730	203,963	617,971
2010	5,134	14,684	28,597	48,582	77,542	201,722	614,329
2011	5,306	14,847	28,171	47,703	75,921	196,417	578,927
2012	5,306	14,572	27,720	47,155	75,025	193,998	562,067
2013	4,721	13,901	27,347	47,098	75,130	193,569	564,260
2014	4,672	13,724	27,332	47,249	75,611	195,331	573,449
2015	5,200	14,080	27,898	48,228	77,530	203,389	618,296

Nominal Gross Income

Year	Bottom Decile €	Bottom 25% €	Median €	Top 75% €	Top Decile €	Top 1% €	Top 0.1% €
2006	4,576	12,582	25,214	43,462	70,515	193,835	689,085
2009	5,000	14,204	27,666	47,329	75,904	196,642	595,791
2012	5,284	14,514	27,609	46,967	74,726	193,224	559,825
2015	5,200	14,080	27,898	48,228	77,530	203,389	618,296

Source: Revenue analysis. Note: 2015 prices; previous years deflated by the consumer price index.

2.2 Income Thresholds by Decile

Table 2 shows income thresholds by decile for gross income, PAYE income and self-assessed income in 2015. PAYE taxpayers generally earn more at the bottom half of the

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[7] Median equivalised real disposable income reached the peak in 2008 according to SILC 2015, available at: http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=SIA12&PLanguage=0.

income distribution while self-assessed taxpayers earn increasingly more further up the distribution. For instance, the top 10% of self-assessed taxpayers earn over €100,000 while the top decile of PAYE taxpayers earns over €75,000.

Table 2: Income Thresholds by Decile 2015

	Gross Income €	PAYE Income €	Self-Assessed Income €
Bottom Decile	5,200	5,200	5,052
Decile 2	11,224	11,445	9,613
Decile 3	16,777	16,992	14,344
Decile 4	22,147	22,297	20,288
Decile 5	27,898	27,969	27,022
Decile 6	34,334	34,282	35,212
Decile 7	42,702	42,428	46,747
Decile 8	54,989	54,304	64,860
Top Decile	77,530	75,824	102,548
Top 1%	203,389	182,360	444,640
Top 0.1%	618,296	476,965	1,501,750

Source: Revenue analysis.

2.3 Income Growth

Three year income growth rates are shown by percentile in Figure 2 for incomes greater than the 10th percentile. A downward sloping curve, from left to right, indicates that income growth is larger for lower earning taxpayers while an upward sloping curve indicates that those at the top experience higher income growth.

There is significant real income growth between the years 2006 and 2009. Income growth at the median is 5 per cent over the period and is greater at lower percentiles and smaller at higher percentiles, perhaps in part due to a shift towards part-time employment during the recession. Incomes for the top 1% and top 0.1% decline over the period (the latter is not presented).

Real incomes generally decline from 2009 to 2012 (the stabilisation period) as median. Median income fell by 3 per cent over the period and the decline in incomes are larger for higher earning taxpayers. However, incomes below the 15th percentile increased.

This situation reverses during the recovery period from 2012 to 2015. Median incomes have increased by 1 per cent and the increases are largest at the top of the distribution. Those below the 40th percentile experience a decline in income over the period.

Figure 2: Three Year Growth in Gross Income
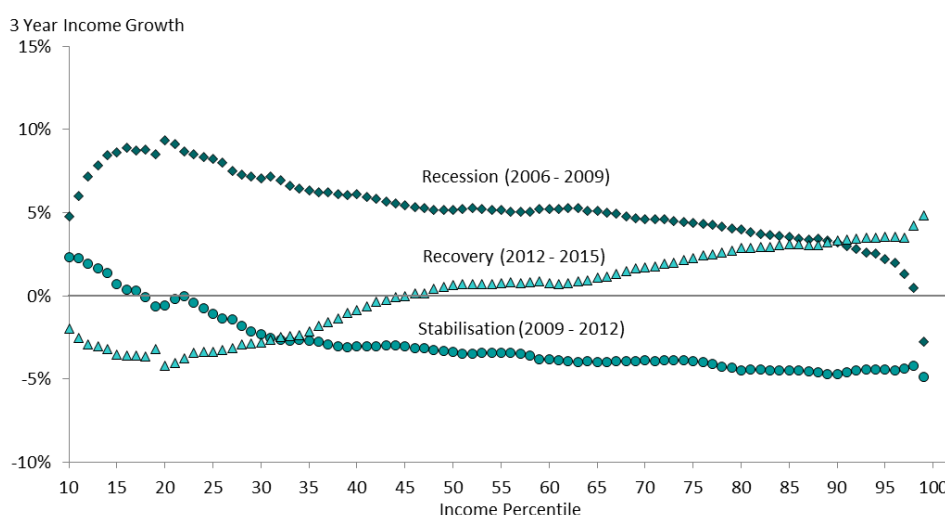
Source: Revenue analysis. Note: 2015 prices; previous years deflated by the consumer price index.

2.4   Income Distribution by Taxpayer Type

This section examines the distribution of gross income in 2015 for selected taxpayer cohorts. Figure 3 plots the income threshold for each decile for various taxpayer types. Overall, the analysis shows that the highest earning tax units (top 0.1%) in Ireland are self-assessed, married one-earning couples.

The top panel of Figure 3 shows that single females earn slightly more than males up to the median.[8] At the top of the income distribution single males earn more than their female counterparts. The difference is most pronounced for the top 1% and top 0.1% thresholds where males respectively earn 18 per cent and 44 per cent more.

The second panel of Figure 3 plots the income threshold for each decile for self-assessed and PAYE taxpayers in 2015. While PAYE taxpayers generally earn more at the bottom half of the income distribution, self-assessed taxpayers earn increasingly more further up the distribution.[9] The top 1% of self-assessed taxpayers earns over twice that of PAYE taxpayers, while the top 0.1% earn over three times.

The final panel of Figure 3 shows the distribution of single and joint-assessed taxpayers. Married taxpayers with one income earn more than those unmarried. In turn, married taxpayers with two earners earn more than their single earning counterparts, reflecting dual incomes. However the gap between one and two income couples narrows for the top 1% and reverses for the top 0.1%.

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[8] The difference in means within each joint decile is significant at the 1% level for deciles 4, 6, 8 and 9.
[9] The difference in means within each joint decile is significant at the 1% level for deciles 2, 3, 9 and 10.

Figure 3: Income Thresholds 2015

Males and Females

PAYE and Self-Assessed

Single and Joint-Assessed
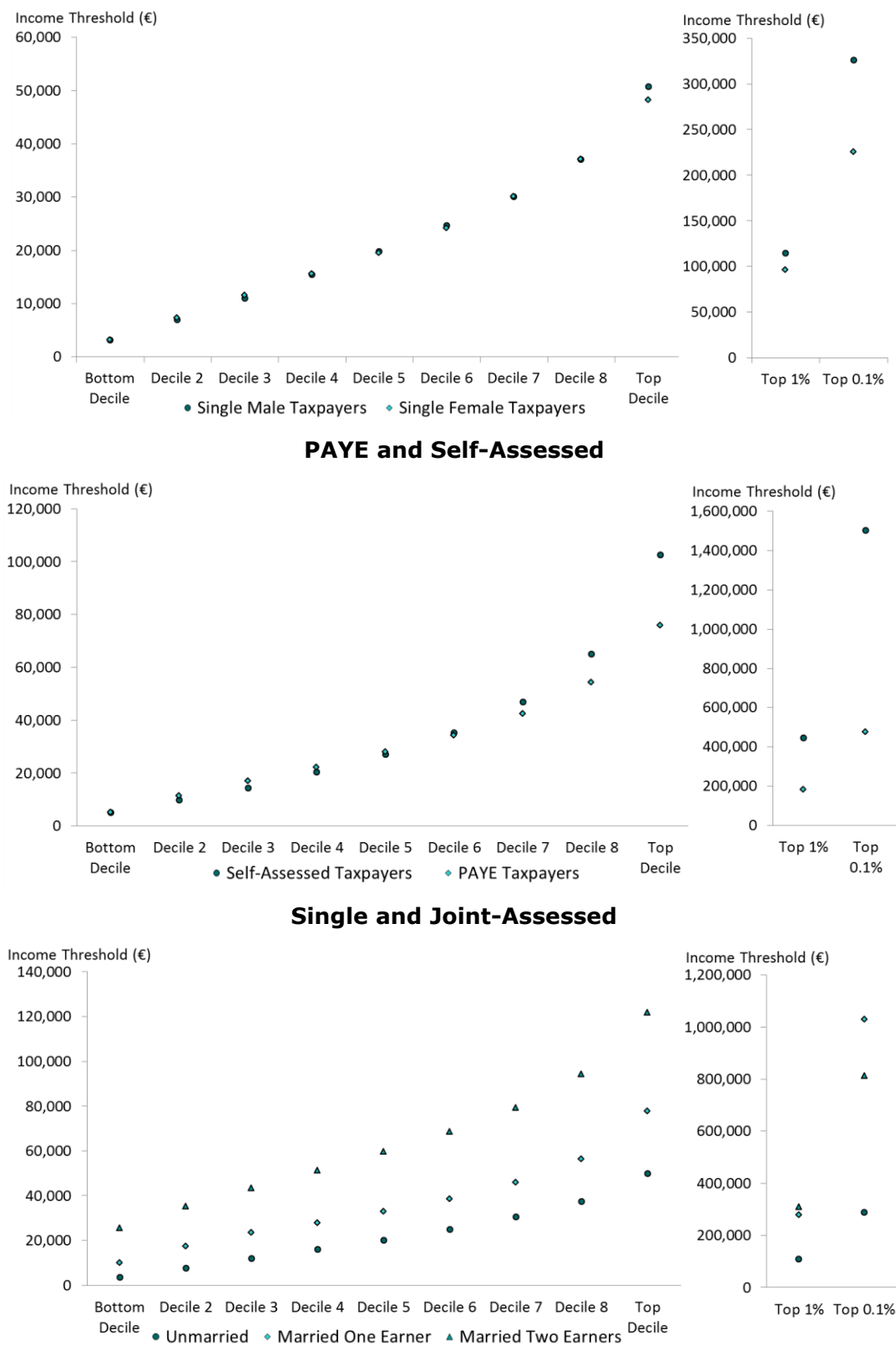
Source: Revenue analysis.

2.5   Income Distribution by Age and New Entrants

Figure 4 shows the income distribution of taxpayers aged 15 to 90 in 2015 using the 10th, 25th, 50th, 75th and 90th percentiles. The effect of the life-cycle is apparent, in that, incomes (above the 25th percentile) typically peak between 40 to 55 years of age.

Two general life-cycle trends appear broadly similar to earlier research from the US, albeit this is based on 2007 data (Auten et al., 2013). First, income growth is strong among young taxpayers. Second, the rate of growth is larger for the higher percentiles. However, the income by age profile below differs to the US with respect of older taxpayers.

At each percentile in Figure 4, taxpayers' gross incomes increase at 66 years, coinciding with eligibility of the state pension and many private pensions. This increase in income at 66 is sustained for a number of years for incomes below the 25th percentile which may indicate that some taxpayers continue working for a number of years while in receipt of a pension. It is worth reiterating that the data cannot distinguish between part-time and full-time employment and does not extend to those entirely reliant on untaxed benefits.

Figure 4: Income Distribution by Age 2015
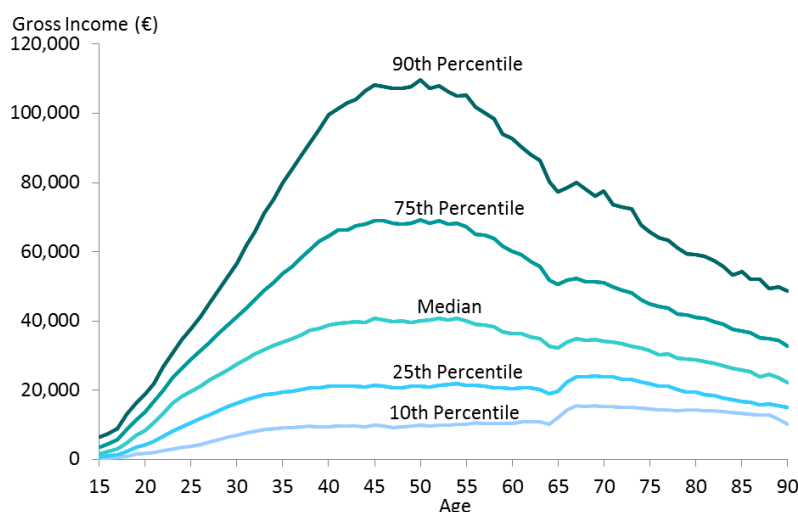
Source: Revenue analysis. Note: The number of observations for taxpayers over the age of 90 falls below 2,000 and are not presented.

New entrants to the tax records are examined by age cohort in Table 3 in terms of the proportion and median income for each age group. For reference, the proportion and median incomes are shown in each of the first columns for all taxpayers while the second column shows the proportion and median incomes of new entrants in 2015. To account for the possibility that taxpayers may only be employed during part of their first year, the third column presents the income for those who are recorded on the tax records for their second year in 2015.

New entrants are more likely to be the youngest taxpayers. 60 per cent of new entrants are aged 15 to 24 compared to 17 per cent for all taxpayers. New entrants also earn significantly less than other taxpayers across all age categories. For instance, a new entrant aged 15 to 24 typically earns €3,424 compared to €9,022 for all taxpayers that age. However, the gap narrows for taxpayers on the tax records for a second year in 2015 perhaps reflecting that new entrants (in their first year) commence employment during the tax year.

Table 3: Income by Age for New Entrants 2015

	Proportion			Median Gross Income €		
	All Taxpayers	New Entrant (1st Year)	New Entrant (2nd Year)	All Taxpayers	New Entrant (1st Year)	New Entrant (2nd Year)
Age 15 – 24	17.2%	59.9%	57.9%	9,022	3,424	7,064
Age 25 – 34	25.5%	21.0%	21.5%	26,152	8,486	17,597
Age 35 – 44	20.4%	8.5%	8.8%	37,304	9,681	17,794
Age 45 – 54	13.8%	4.9%	5.2%	40,297	9,963	16,145
Age 55 – 64	10.4%	2.5%	2.8%	36,883	11,241	15,663
Age 65 +	12.8%	3.1%	3.8%	31,047	19,948	23,472

Source: Revenue analysis. Note: New entrants are recorded as the year in which they first appear on the tax records. The analysis only considers those taxpayers' whose first registration with Revenue is in 2015 (1st year new entrant in 2015) and in 2014 (2nd year new entrant in 2015).

New entrants to the tax records are examined further by age with respect to their entry into the tax net in Figure 5. For instance, only 18 per cent of new entrants aged 25 pay Income Tax compared to 60 per cent of all 25 year olds. For 25 year olds on the tax records for two years in 2015, 48 per cent pay Income Tax.

A higher proportion of young new entrants pay Universal Social Charge (USC). 30 per cent of 25 year old new entrants pay USC in their first year and 60 per cent pay USC in their second year. For comparison, 69 per cent of all 25 year olds paid USC in 2015.

Figure 5: Percent of Taxpayers in the Tax Net by Age 2015

Income Tax

USC
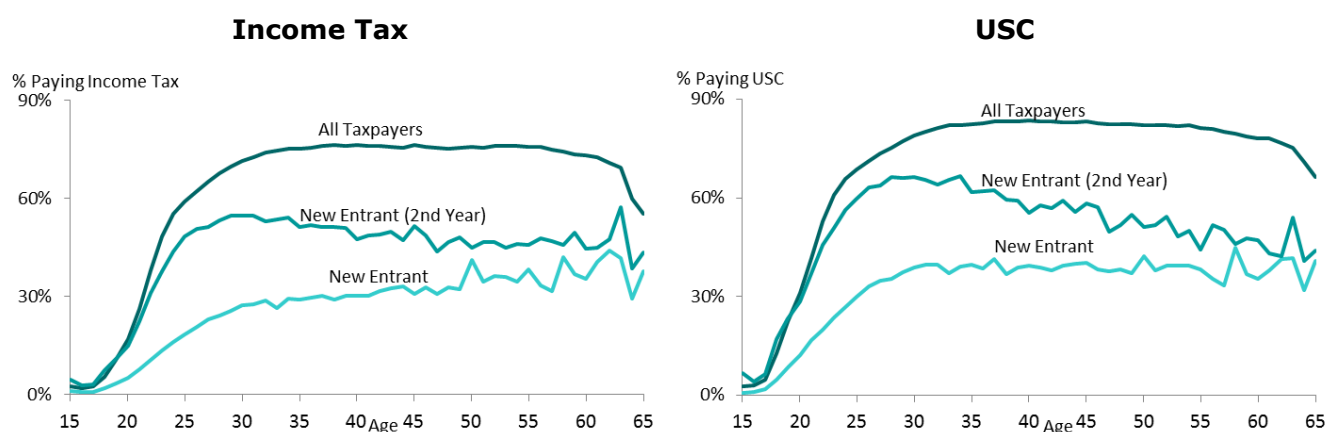
Source: Revenue analysis. Note: The number of observations for new entrants generally falls below 100 for taxpayers over 65 and are not presented. Income Tax does not include PRSI. Note: New entrants are recorded as the year in which they first appear on the tax records. The analysis only considers those taxpayers' whose first registration with Revenue is in 2015 (1st year new entrant in 2015) and in 2014 (2nd year new entrant in 2015).

2.6   Taxpayers Changing Employment

Taxpayers who change employment in 2015 are examined in Table 4 in terms of the proportion and median income for each quintile.[10] Nearly 20 per cent of taxpayers between the age of 25 and 65 have multiple employments in 2015, of which, 4 per cent have three or more employments. To simplify the analysis, consideration is only given to taxpayers who have one employment before and after changing employers in 2015.[11]

Overall, taxpayers who change employers earn more than those who remain with the same employer. Taxpayers changing employers earn more before changing and subsequently experience higher income growth than those remaining with the same employer. Across quintiles, the extent of earnings growth diminishes for those on higher incomes whether they change employer or not.

Taxpayers in the bottom quintile are least likely to change employers. These taxpayers in 2014 experience the strongest earnings growth irrespective of whether they change employer or not. This may reflect the effect of transitory income insofar as their position in the bottom quintile was the result of a temporary income shock.

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[10] The income quintile is calculated in 2014, before the taxpayer changes employment (in 2015) and the same taxpayers' incomes are reported for 2015 and 2016.

[11] Thus consideration is only given to taxpayers who only have one employment in 2014, two employments in 2015 and one employment in 2016. Taxpayers who change employment in 2015 will have two records of employment for that year. These restrictions account for 3 per cent of all taxpayers.

Table 4: Median Income for Taxpayers Changing Employment 2015

14	Proportion Changing Employer	Median Taxable Income €							
		Not Changing Employer				Changing Employer			
	2015	2014	2015	2016	Change	2014	2015	2016	Change
Total	**100%**	**25,853**	**26,727**	**27,879**	**7.8%**	**26,115**	**27,650**	**29,785**	**14.1%**
Bottom Quintile	15%	4,872	8,331	10,273	110.8%	5,619	10,423	13,808	145.7%
Quintile 2	23%	15,836	17,299	18,498	16.8%	16,039	17,758	19,524	21.7%
Quintile 3	22%	25,871	26,796	27,862	7.7%	25,738	26,776	28,235	9.7%
Quintile 4	19%	37,216	37,964	38,909	4.5%	37,137	38,872	39,803	7.2%
Top Quintile	22%	59,684	60,633	61,802	3.5%	61,375	64,284	64,143	4.5%

Source: Revenue analysis. Note: Proportion changing employer in 2015; 2016 prices; previous years deflated by the consumer price index. Taxpayers here refer to individual taxpayers according to the P35 records.

2.7   Income by Sector

The income thresholds in Table 1 mask heterogeneity across sectors in the economy. Table 5 shows the proportions of taxpayers working in each sector for 2006 and 2015 together with the income thresholds for the median and the top 10% of taxpayers. The wholesale & retail trade sector accounts for the greatest proportion of employment in 2015 (14 per cent) which has been stable since 2006. The construction sector observed the greatest relative contraction during this period, accounting for 11 per cent of employees in 2006 and 5 per cent in 2015.

The income thresholds for the top 10% are largest for the finance, insurance & real estate and the professional, scientific & technical sectors. The lowest incomes are observed in the accommodation & food services sector.

Table 5: Sectoral Proportions and Gross Income

Sector (NACE code)	Proportion		Median Gross Income (€)		Top 10% Gross Income (€)	
	2006	2015	2006	2015	2006	2015
Agriculture, Forestry & Fishing (A)	6%	5%	27,041	32,767	73,386	83,705
Industry (B-E)	11%	8%	26,804	33,605	63,594	81,199
Construction (F)	11%	5%	23,454	27,272	58,047	66,112
Wholesale and retail trade (G)	15%	14%	16,362	20,603	48,226	59,866
Transportation & storage (H)	4%	4%	27,405	30,502	61,685	68,682
Accommodation & food services (I)	7%	8%	11,129	12,531	32,195	34,992
Information & communication (J)	4%	3%	28,966	36,492	73,285	96,408
Financial, insurance & real estate (K-L)	8%	13%	26,206	35,347	85,307	109,868
Professional, scientific & technical (M)	4%	5%	26,550	34,506	92,304	110,320
Administrative & support services (N)	5%	5%	16,890	19,814	47,435	52,390
Public administration & defence (O)	8%	7%	32,878	35,870	68,472	72,250
Education (P)	2%	5%	23,477	35,094	69,473	70,417
Human health & social work (Q)	7%	8%	27,516	29,664	67,823	73,065
Arts, Entertainment & Recreation (R)	1%	2%	17,072	18,560	48,522	60,473
Other Service Activities (S)	2%	3%	16,571	17,650	45,819	52,648

Source: Revenue analysis. Note: 2015 prices; gross income in 2006 deflated by the consumer price index. Columns may not sum to 100% due to rounding. NACE sectors T (Activities of households as employers) and U (activities of extraterritorial organisations) account for 4% of the proportion in 2006 and 2015 but not shown.

2.8   Income and Tax Shares by Decile

This section examines disposable income, gross income and Income Tax shares by decile. According to the analysis, the top decile holds over one-quarter (26 per cent) of disposable income in 2015.[12] The top 1% and 0.1% hold around 7.5 per cent and 2.8 per cent of disposable income.

The top decile earns over one-third (36 per cent) of gross income in 2015 and contributes 61 per cent of all Income Tax and 51 per cent of USC. The top 1% contributes a similar amount of Income Tax compared to their share of gross income (approximately 11 per cent) but the top 0.1% pay a larger share of Income Tax and a lower share of USC compared to their share of gross income.

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[12] Disposable income is calculated as gross income less Income Tax, USC and PRSI (PRSI is calculated as gross income times the appropriate rate based on the PRSI class of the tax unit).

Table 6: Shares of Gross Income and Income Tax 2015

	Disposable Income	Gross Income	Income Tax	USC
Deciles 1 - 9	73.8%	63.9%	39.3%	48.7%
Top Decile	26.2%	36.1%	60.7%	51.3%
Top 1%	7.4%	11.3%	10.6%	4.1%
Top 0.1%	2.8%	4.4%	5.7%	3.3%

Source: Revenue analysis. Note: The full shares for deciles 1 – 9 are shown in Table 7 and Table 8.

Income Shares

Table 7 reports the shares of gross income owing to each decile.[13] In 2015, the top decile held 36 per cent of all income. The share of the top 10% is similar to the share in the *World Wealth and Incomes Database (WID)* for Ireland and around the median for the 20 countries with available data.[14] It is below the United Kingdom (39 per cent) and the United States (47 per cent) but above Australia (32 per cent) and New Zealand (31 per cent) in 2013.[15] Compared to 2006 levels, income concentration at the top 10% of the distribution falls during the recession in 2009 and again in 2011. Data from the WID database shows a similar pattern of a falling share of the top 10% in other countries in the financial crisis period including Canada, Spain, the United Kingdom, and the United States.

During Ireland's boom period in 2006 the very top incomes shares, the top 0.1% of taxpayers earned 4.7 per cent of all income. By 2015, that share falls slightly to 4.4 per cent. Comparing internationally, this means that in 2006 the very top incomes share in Ireland was similar to that in the United States but has since fallen to levels more similar to the UK and slightly higher than France and Spain (Landais, 2008). The share earned by the top 1% also fell slightly over the period, from 12 per cent to 11 per cent. The 2015 result is similar to those in Germany (Jenderny, 2016).

Looking across all deciles over the recession and stabilisation periods, income concentration fell in the top decile and increased in all other deciles (with the exception of the bottom). However, the incomes accrued mostly to the deciles just below the top decile. The top cohorts experienced an increase in their share once the economy began to recover post-crisis, which is similar to other countries. Table 7 also reports a common measure of inequality that expresses the concentration of the income shares above the

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[13] Income shares are published on the Revenue website. Available at:
http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=rva01&ProductID=DB_rv01&PLanguage=0
[14] Data available at http://wid.world/.
[15] 2012 for the United Kingdom.

80th percentiles as a ratio of those below the 20th percentile (S80/20). By this measure, changes in inequality reflect changes at the top of the income distribution.

Table 7: Share of Income

	Gross Income				Disposable Income			
	2006	**2009**	**2012**	**2015**	**2006**	**2009**	**2012**	**2015**
Bottom Decile	0.6%	0.6%	0.6%	0.6%	3.9%	4.0%	4.1%	4.1%
Decile 2	2.0%	2.1%	2.2%	2.1%	4.9%	5.1%	5.2%	5.0%
Decile 3	3.5%	3.7%	3.8%	3.6%	5.7%	5.9%	6.1%	5.9%
Decile 4	4.9%	5.1%	5.2%	4.9%	6.5%	6.7%	6.9%	6.7%
Decile 5	6.2%	6.5%	6.6%	6.3%	7.3%	7.6%	7.7%	7.6%
Decile 6	7.8%	8.0%	8.1%	7.9%	8.2%	8.6%	8.7%	8.6%
Decile 7	9.6%	9.9%	9.9%	9.7%	9.4%	9.8%	9.9%	9.9%
Decile 8	12.1%	12.4%	12.4%	12.3%	11.1%	11.5%	11.7%	11.7%
Decile 9	16.2%	16.6%	16.5%	16.4%	13.8%	14.2%	14.3%	14.3%
Top Decile	37.1%	35.1%	34.6%	36.1%	29.3%	26.5%	25.4%	26.2%
Top 1%	12.4%	10.3%	9.8%	11.3%	10.0%	7.4%	6.6%	7.4%
Top 0.1%	4.7%	3.4%	3.1%	4.4%	4.0%	2.4%	2.0%	2.8%
S80/20	20.3	18.9	17.7	19.3	4.9	4.5	4.3	4.5

Source: Revenue analysis.

Income Tax and USC Shares

Income Tax and USC contributions are shown for each decile (in terms of gross income) in Table 8.[16] The top income deciles contribute a substantially higher share of the Income Tax and USC liability compared to lower deciles. Deciles above the 9th decile pay a higher share of Income Tax and USC receipts compared to their share of gross income, while the reverse is true for the lower deciles. The lower deciles contribute a larger share of USC receipts compared to their contributions to Income Tax receipts. However, the share paid by deciles below the top decile has fallen in 2015 compared to 2012 reflecting changes in the USC rates and bands in favour of those on lower incomes.

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[16] Income Tax does not include other taxes on income such as PRSI, health contribution or the income levy. Shares of the USC are shown separately for the years 2012 and 2015.

Table 8: Share of Income Tax and USC Contributions

	Income Tax				USC	
	2006	2009	2012	2015	2012	2015
Bottom Decile	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Decile 2	0.0%	0.0%	0.1%	0.1%	0.2%	0.0%
Decile 3	0.1%	0.1%	0.1%	0.1%	1.3%	0.8%
Decile 4	0.5%	0.4%	0.8%	0.8%	2.6%	1.9%
Decile 5	1.8%	1.6%	1.8%	1.9%	4.2%	3.4%
Decile 6	3.3%	3.1%	3.4%	3.4%	6.4%	5.5%
Decile 7	5.8%	5.5%	6.1%	5.8%	9.0%	8.0%
Decile 8	10.4%	10.2%	10.8%	10.2%	12.6%	11.6%
Decile 9	17.6%	18.0%	17.8%	17.0%	18.2%	17.4%
Top Decile	60.5%	61.1%	59.0%	60.7%	45.4%	51.3%
Top 1%	9.5%	7.8%	7.0%	10.6%	1.4%	4.1%
Top 0.1%	3.6%	3.5%	2.7%	5.7%	0.9%	3.3%

Source: Revenue analysis.
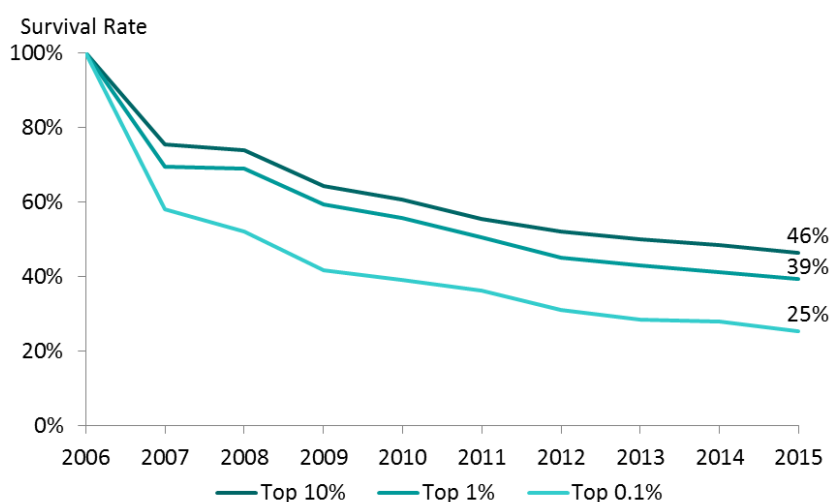
2.9 Survival Analysis

Figure 6 illustrates the survival rate of taxpayers in the top 10%, 1% and 0.1% for each year. Survival is calculated as the proportion of taxpayers that remain in a percentile given that they were in that percentile in the initial year (2006). For the top 10% this is 46 per cent after 10 years. This is similar to the United States for a similar length period where 38 per cent of those in the top 1% in 2000 remained there by 2009 (Auten and Gee, 2009) although this may have been reduced by a large recession by the end date. Indeed, over 5 year periods the survival rate (i.e., the percentage staying in the percentile) for the top 1% is on average 34 per cent when the period did not include a year with a recession and 30 per cent for all years (Auten and Gee, 2013).

For the top 10%, 1% and 0.1% cohorts, the survival rate in Ireland follows a similar trend over the period, declining sharply in the first year and falling by less in future years. For the top 0.1% the pattern of sharp decline in the initial years can also be observed in Canada and France. In both countries after three years around 40 per cent of the top 0.1% remain in that group as in Ireland (Saez and Vaell, 2005; Landais, 2008). In Germany, mobility of this high income group is lower with around 60 per cent of the 0.1% income bracket remaining there after 3 years (Jenderny, 2016).

The impact of the recession appears to have had an impact in 2009 on the top taxpayers as the rate of decile of taxpayers in these cohorts increased. The decline of taxpayers in the top 0.1% cohort is greater in 2007 and 2008 compared to the other cohorts perhaps

reflecting the possibility that the very top taxpayers were affected to a greater extent during the early stages of the recession. An analysis of the survival rate of the top taxpayers in terms of their Income Tax contributions is provided in Figure 7. Survival rates for the top contributors to Income Tax are similar to those for the top taxpayers over the full period.

Figure 6: Survival of Top Taxpayers over Time

Source: Revenue analysis.

Figure 7: Survival of Top Income Tax Contributors over Time
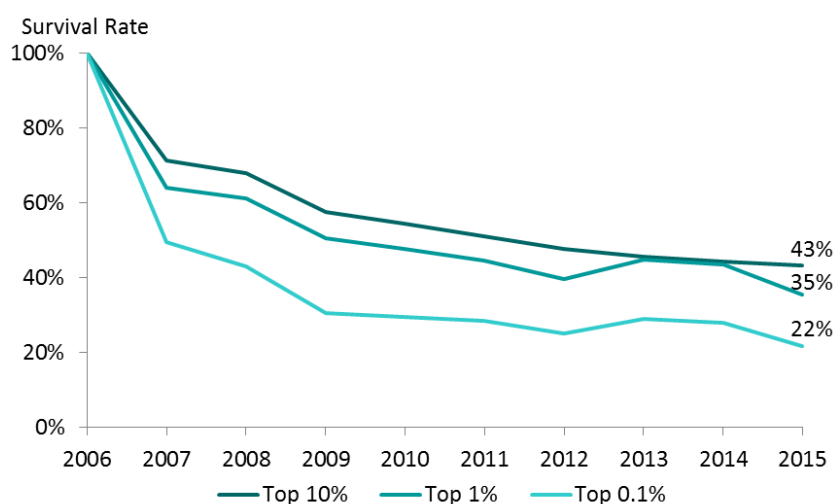
Source: Revenue analysis.

3 Income Mobility

3.1 Introduction

One way to measure income mobility is to examine the positional change of individuals in the income distribution over time (Jäntti and Jenkins, 2014). In this section, taxpayer mobility is measured using transition matrices.[17]

While the research literature suggests a number of approaches to calculating transition matrices, this paper employs the following approach. First, a group of taxpayers is identified, for example, PAYE taxpayers or those working in a particular sector. Taxpayers under 25 years of age are excluded from the analysis as recommended by the literature (Sawhill-Condon, 1992; Auten and Gee, 2009), in order to remove the unrepresentative 'school-to-work transition'. Second, two comparison years are chosen and only taxpayers observed in both years are kept. Keeping only individuals of certain characteristics, for example, of those who continued to complete tax returns for a certain period is in line with the literature (US Department of Treasury, 1992a, 1992b; Carroll et al., 2006). Third, two distinct gross income deciles are then calculated for each year. Finally, the taxpayer transition is calculated across the two years and presented graphically.

3.2 Mobility of Taxpayer Population

Figure 8 shows the transition probabilities for all taxpayers by the bottom, middle and top decile between 2006 and 2015.

Of those in the bottom decile in 2006, 1 in 5 (23 per cent) remain entrenched in that decile over the ten year period while 4 in 5 (77 per cent) move upwards. In the middle decile, there is more mobility upwards (43 per cent) than downwards (36 per cent). Of those in the top decile in 2006, over half (57 per cent) stay in that decile by 2015. This appears to be roughly similar to the United States, where around half of the top fifth of income earners remain in the top quintile after 11 years over the period 1970 to 1995 (Bradbury, 2011).[18]

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[17] Transitions measure relative, not absolute, changes in the income position of taxpayers. A taxpayer's relative position can fall even as their absolute income increases (and vice versa). Second, examination at two points in time does not allow for observing those who change their distributional position over the course of the reference period. Consequently, the analysis does not capture those who leave the workforce (due to deaths, unemployment, emigration and retirement) or those who enter it (through employment and immigration). Third, taxpayers observed in both years are less likely to 'drop-off'. They may be more representative of full-time than part-time employees. Finally, it is expected that annual transitions are more likely to exhibit less mobility, while longer horizon transitions will have greater mobility. Based on the literature, it is expected that there would be relatively greater mobility in the middle deciles.

[18] The international comparisons that are made in the paper should be treated as approximate as the literature uses a large range of different definitions for whose income, what type of income and over what period. This makes exact comparisons difficult. In this case the data used by Bradbury (2011) for the United States

Figure 8: Income Mobility for Selected Deciles 2006 – 2015

% Remaining in 2015 Decile: ■ Bottom ■ Middle ■ Top
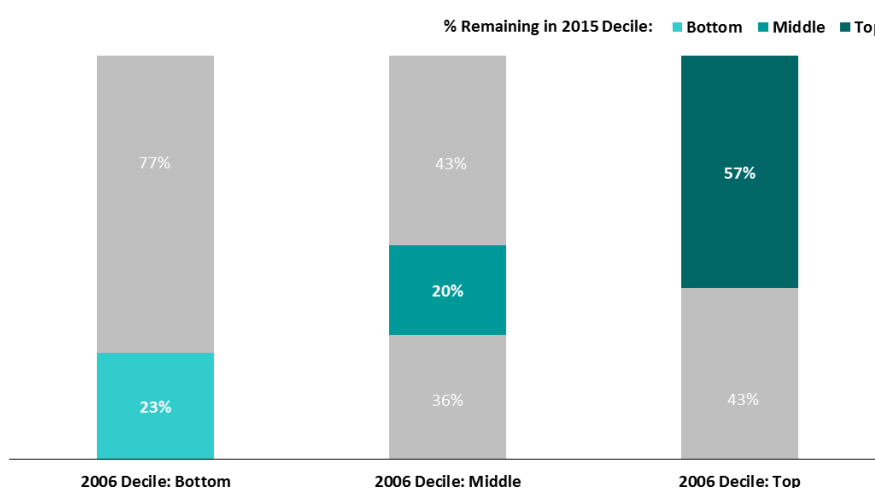
Source: Revenue analysis. Note: Survival rates in the previous section are smaller than the transition matrices since the taxpayers in the base year are dropped (who are not observed in both periods) for transition matrices while these observations are retained for the purposes of calculating survival rates.

3.3   Mobility in the Recession, Stabilisation and Early Recovery Periods

Mobility appears to vary over time, with changes correlated with large economic events and the business cycle. A comparison of the United States and the western states of Germany found intra-generational mobility over 5 year periods was higher in Germany prior to unification but subsequently is no different from the United States and possibly lower post 2000 (Bayaz-Ozturk et al., 2014).

Figure 9 disaggregates mobility over the full period from 2006 to 2015 into three periods coinciding with the recession, stability and early recovery periods (as outlined in the Section 1.1). Compared to the previous analysis, mobility is smaller because it is measured over a shorter timeframe. Mobility for those in the bottom decile increased after the recession period. During the recession (2006 to 2009) 45 per cent remained entrenched, while during the stability period (2009 to 2012) this fell to 37 per cent and to 39 per cent during the recovery (2012 to 2015). For the middle of the distribution, upward movement in the income distribution increased slightly to 36 per cent during the stability period compared to 35 per cent in the recession and 32 per cent in the recovery.

The proportions managing to stay in the top decile during the recession (71 per cent) is lower compared to the stability (75 per cent) and recovery (78 per cent) periods. The expansion period from 2012 to 2015 exhibit similar survival rates to Germany during

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calculation is different from that used in this paper in several respects. It is based on household data, it is post tax, post transfer and it is for the top quintile and it is during a different period.

expansion, where over 2001-2006 around 78 per cent of those in the top 10% remained there after 3 years (Jenderny, 2016).

Figure 9: Income Mobility for Recession, Stabilisation and Early Recovery Periods
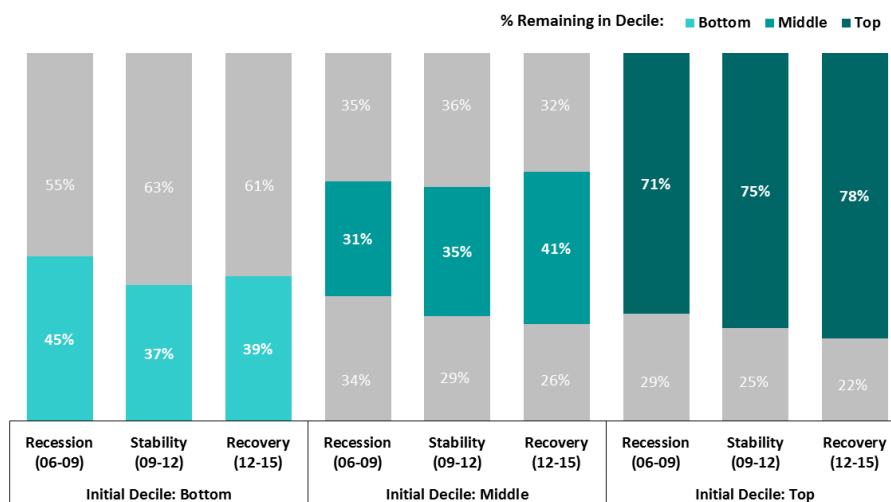
Source: Revenue analysis.

4 Conclusion

In recent decades, global income shares have risen among the top 1% (Alvaredo et al., 2013). The trend has generated policy discussion on the extent to which citizens participate in national prosperity.

Income inequality is measured in most countries based on a snapshot at a moment in time. Typically household survey data are used, in part due to its wide availability (Jäntti and Jenkins, 2014). In contrast, the current paper examines distributional and income mobility dynamics in Ireland using a unique longitudinal dataset drawn from administrative tax records. Compared to static survey data, longitudinal tax data have two significant advantages. First, the tax data allows for measuring intra-generational mobility over time: who moves up and down the income distribution over time and why. Second, it gives a scarce insight into income dynamics at the very top end, where the tax records are more comprehensive.

Overall, this analysis represents a new avenue of research for Revenue focusing on making the best use of the tax record data, strengthening public debate and improving the evidence base for policy making.

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