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POLICY PAPER

Taxes, Income and Economic Mobility in Ireland: New Evidence from Tax Records Data*

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Abstract: This paper analyses income inequality in Ireland using a new panel dataset based on the administrative tax records of the Revenue Commissioners for Ireland. High inequality of market incomes in Ireland by international standards appears to be driven by both ends of the income distribution. An analysis of income mobility over time shows it has been low at both ends of the income distribution, although it increased at the low end once the crisis began, reflecting the sharp deterioration of the labour market. The data confirms that the income tax system is highly progressive at the high end of income distribution and the welfare system provides the most significant support to lower income deciles in Ireland. The redistributive function in the tax and benefit system was enhanced during the last decade, not only because more income support was necessitated with the crisis, but also due to reforms which made the statutory tax rate more progressive.

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I INTRODUCTION

A detailed understanding of the distribution of incomes, the role played by the tax-transfer system, as well as income mobility over time can help to inform better policy that promotes growth and equity simultaneously. The present paper uses a unique micro-level dataset on incomes, taxes and transfers; the dataset covers 15 years (1997-2012), thus giving a unique opportunity to evaluate the impact of the business cycle, the financial crisis and changes in policy settings in the evolution of the income distribution over time. This medium-term perspective is particularly important because a highly unequal income distribution is of less concern if coupled with income mobility across time.

The study of the distribution of incomes, and particularly the concentration of incomes among the top 1 per cent, has seen a marked revival in the research literature in recent years (Picketty, 2014). According to Atkinson, Piketty, and Saez (2011), internationally top income shares have increased dramatically over the past thirty years. In Ireland, the distribution of income before tax and transfers ("market income") is one of the most unequal in the OECD (OECD, 2015a; O'Connor and Staunton, 2015). There is a high concentration of income at the top of the distribution, though less so than in some other countries (Haugh *et al*., 2016). High market income inequality by international standards appears to be driven to a greater extent by the lower end of the distribution: the income share of the bottom 20 per cent households is the lowest in the OECD (Haugh *et al*., 2016, drawing on the OECD Income Distribution Database). However, it is noteworthy that the distribution of income becomes significantly more equal, and is below the OECD average, after the effects of taxes on income and welfare payments are taken into account (Fitzgerald, 2014).

This paper documents the distribution of income and income mobility over time in Ireland, based essentially on micro data from the administrative tax records kept by the Revenue Commissioners. It also uses tax record micro-data to document taxation and social charges in Ireland and reports that the tax and benefit system has become more progressive in the past decade. An important negative side-effect of progressivity is a relatively strong disincentive to increase work due to high marginal tax rates. A companion paper, O'Connor, Hynes, Haugh and Lenain (2015), informed by the analysis here and other empirical work (for example Callan *et al*., 2015), discusses a set of policy simulations designed to enhance both the efficiency of the tax and welfare system in terms of making it more growth friendly, while also protecting those on lower incomes.

The main findings from the analysis of the Revenue Commissioners' administrative tax data include the following:

Income Inequality and Mobility

- The concentration of market income at the top of the distribution is high: in 2012, 36.8 per cent and 10.5 per cent of market income went to the 10 per cent and the 1 per cent of tax units respectively. The way market income is distributed across different individuals has been possibly affected by the growth pattern.
- Until 2002, when growth showed a sustainable pattern, labour earnings grew in a similar way across income groups. By contrast, those in the highest group saw disproportionately strong growth during the property bubble period. After the property bubble burst, aggregate labour earnings declined sharply, essentially reflecting the deterioration at the low end of distribution.
- Capital income has been highly concentrated at the top of the distribution, especially during the property bubble period. The crisis alleviated the intensity of capital income concentration but it remains above pre-bubble period levels.
- Around 43 per cent of tax units remained in the same quintile income groups between 2004 and 2012. Income mobility is low at both ends of the income distribution, in line with findings in other countries. It increased however at the low end of income distribution once the crisis began, as more people moved down into the lowest income group, reflecting the sharp deterioration of the labour market. This was offset by relative upward mobility of the rest of the population within the distribution, but shifted the entire distribution downward.
- The very highest income tax units in the top 1 per cent are characterised by a very high share of income coming from capital and particularly low income mobility over time. Around half of the top 1 per cent tax units in 2007 remained in the same position in 2012, partly explained by a number of outstanding tax units with extraordinarily high incomes.
- The share of the top 1 per cent tax units in the finance, insurance and real estate sectors has increased to around one-third. In contrast, the share of the top 1 per cent tax units in the construction sector has markedly declined after the crisis.

Income Redistribution

- Ireland's tax system is progressive. The average effective tax rate for the top 10 per cent and 1 per cent of tax units was 24.5 per cent and 31.1 per cent, against 14.4 per cent for total tax units in 2012. The top 10 per cent of tax units paid 59 per cent of total income tax in 2012, while its share of market

income was 37 per cent, which seems to be comparatively high by OECD standards.[1]

- Those up to the 8th income decile saw their share of income increased after redistribution (including the Universal Social Charge) in 2012: as a whole they accounted for 46.1 per cent of the share of market income and 54.1 per cent of the share of after tax income (an increase by 8 percentage points before and after redistribution.
- Such progressivity was increased in the decade to 2012, reflecting both the macroeconomic situation (for example more unemployment benefits) and changes in the tax and benefit system: the increase in the income share of the bottom 8 deciles after redistribution was by 4 percentage points in 2002 (against 8 percentage points in 2012).

The changes in the tax and benefit system include, notably, the introduction of the Universal Social Charge with progressive tax rates and the abolition of certain flat rate contributions; increased social benefits; and increased tax credits reducing the tax liabilities of those in low- to middle-income groups.

II WHAT DO TAX RECORDS TELL US ABOUT INCOME INEQUALITY AND THE TAX BURDEN IN IRELAND?

2.1 *The Revenue Commissioners*

The Revenue Commissioners ("Revenue" hereafter), as the Irish tax and customs administration, plays an important role in the Irish economy by collecting taxes and duties due to the State. Revenue also provides policy and technical advice at the national level to support the Department of Finance in the formulation of tax policy and internationally to advance Irish economic development. In this joint project, Revenue's role is to provide tax knowledge and economic analysis on the data.

2.2 *Revenue's Income Distribution Statistics (IDS) Data*

Revenue's Income Distribution Statistics (IDS) data is the most comprehensive source of information on income distribution in Ireland. The data is constructed using various tax records including self-assessed taxpayer returns and returns by employers on behalf of employees.[2] The data is used to produce

[1] This is higher than the 52 per cent of total federal taxes paid by the top 10 per cent taxpayers in the United States (CBO, 2012), although direct comparison is difficult due to large difference in data coverage and classification.

[2] Revenue's IDS data is constructed using information from a range of tax forms including P35, P60, P45 and 11. Various calculations are performed to construct variables in the dataset. Form P35 is an employer's annual declaration of liability for PAYE and PRSI contributions. Form P60 is

Revenue's IDS report, which is published annually.[3] The unit of analysis in the data are tax units rather than taxpayers. The difference arises in the case of married couples who elect for joint assessment. These cases represent two taxpayers and either one or two incomes but only count as one tax unit.

The tax administration data consists of the entire population of 2.1 million tax units (these can be individuals or couples). It is important to note that the data is confined to those who fill in tax returns and thus does not cover those entirely reliant on untaxed benefits or undeclared income. Therefore, it can be seen as under-representing lower-income groups. Nevertheless, it is a rich and detailed population data set and is complementary to household survey data, the other main source of micro data on income inequality. Such household surveys are based on samples and also have representativeness issues, especially of the highest income groups, which the tax record data is better at capturing (OECD, 2013a).

2.3 *How Unequal is Income Distribution in Ireland and How Has It Changed Over Time?*

As in Spain, the income distribution in Ireland broadly conforms to an 80-20 rule, 50 per cent of income goes to the bottom 80 per cent of the income distribution with the remaining 50 per cent going to the top 20 per cent. (Haugh and Martínez-Toledano, 2016). Inequality developments appear to be affected by macroeconomic conditions.[4] During the "Celtic tiger" period (1994-2002), in which Ireland experienced one of the highest growth rates in the OECD thanks to sound drivers such as attractiveness to FDI and export performance, the income share of each decile remained relatively stable (Table 1).[5] Subsequently, during the property bubble period (2002-2007), only the highest income group saw a rise in its share at the expense of all the other income groups. Polarisation increased during this period, as shown by the S90/S10 and S80/S20 ratios in Table 1. In the aftermath of the property-bubble-burst (2007-2012), concentration at the high end was alleviated but the overall inequality increased when it is measured in terms of the S90/S10 ratio (due to a larger percentage change at the low end).

[2] *contd.* an employee's certificate of pay, PAYE and PRSI for the year. Form P45 relates to a cessation certificate and particulars of an employee leaving employment. Under the self-assessment system, self-assessed taxpayers are required to complete the full Form 11 (or if all of the information relevant to them is contained in one of the shorter versions, Form 11S and Form 11P).

[3] http://www.cso.ie/px/pxeirestat/pssn/rv01/homepagefiles/rv01_statbank.asp

[4] "Market income" consists of labour earnings (identified as "PAYE" total earnings in Revenue's dataset) and "Capital income" as defined in footnote 6. The Pay As You Earn (PAYE) system is a method of tax deduction under which an employer calculates and deducts any income tax due each time a payment of wages, salary etc. is made to an employee.

[5] The income deciles hereafter are calculated in terms of gross income (including social benefits) on which tax is liable.

Table 1: *Distribution of Market Income in Ireland, Tax Administration Data*

	1997	*2002*	*2007*	*2012*
Decile 1	0.7	0.7	0.6	0.6
Decile 2	2.0	2.1	2.0	2.1
Decile 3	3.2	3.3	3.2	3.1
Decile 4	4.6	4.7	4.6	4.6
Decile 5	6.4	6.4	6.0	5.8
Decile 6	8.2	8.1	7.7	7.7
Decile 7	10.3	10.1	9.6	9.7
Decile 8	13.3	12.8	12.3	12.5
Decile 9	17.6	17.1	16.8	17.1
Decile 10 (Top 10%	33.7	34.6	37.2	36.8
of which: Top 1%	8.7	9.5	11.2	10.5
of which: Top 0.1%	2.6	2.7	3.5	3.3
S90/S10	51.1	46.2	60.5	63.4
S80/S20	19.1	18.4	20.7	20.0

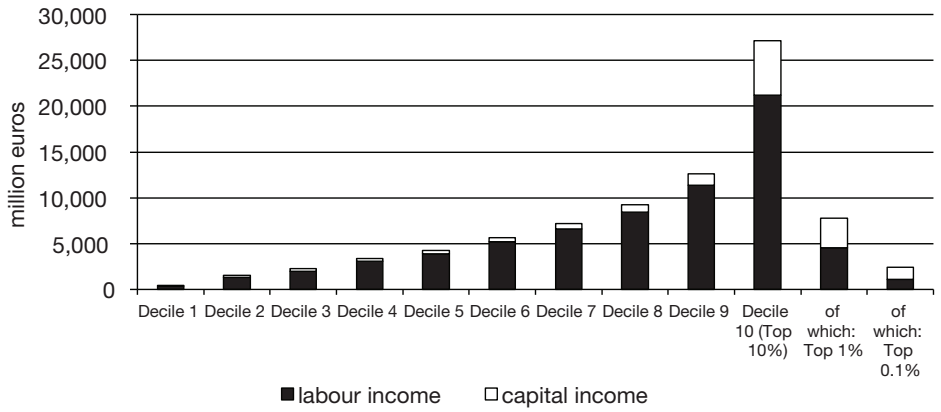
Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

Labour income is the main source of earnings for most people, while capital income is highly concentrated at the top end of the distribution.[6] Capital income accounts for around 10 per cent of total market income for deciles 1 to 9 and only becomes significant for the top decile (21.8 per cent of their gross income). The share increases to 40.9 per cent and 54.0 per cent at the top 1 per cent and the top 0.1 per cent, respectively. The share of capital income in the aggregate (i.e. all the tax units) has been relatively stable: between 16 per cent and 17 per cent until 2007, with an apparent drop to 14 per cent in 2012 after the burst of the property bubble.

The distribution of labour earnings is uneven (Table 2). The share of labour income across groups remained relatively stable during the "Celtic tiger" period (up to 2002). By contrast, only the highest income group saw its share meaningfully increase during the property bubble period. Even after the property bubble burst, the highest income group continued to increase its share along with the 8th and 9th income deciles.

[6] "Capital income" consists of interest, the tax on which (Deposit Interest Retention Tax, or D.I.R.T.) is deducted at source by deposit takers; income from a trade or profession (Case I and II); interest and income from foreign property (Case III, Schedule D); miscellaneous income not falling under any other heading (Case IV,); rental income (Case V); dividend income (Schedule F). Capital gains are not included.

Figure 1: *Composition of Personal Income, 2012*



Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

Table 2: *Distribution of Labour Income*

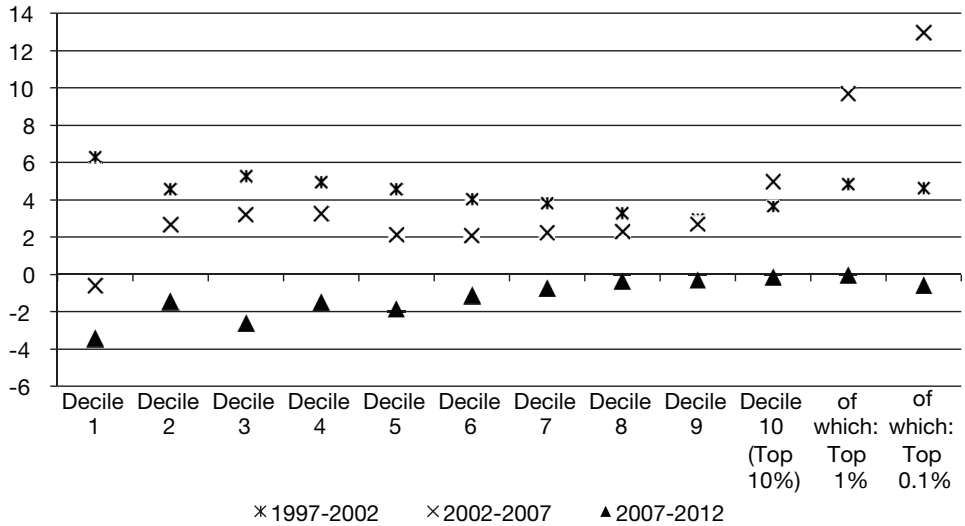
	1997	*2002*	*2007*	*2012*
Decile 1	0.8	0.8	0.7	0.6
Decile 2	2.2	2.3	2.2	2.1
Decile 3	3.2	3.5	3.5	3.1
Decile 4	4.7	5.0	5.0	4.8
Decile 5	6.6	6.9	6.5	6.2
Decile 6	8.7	8.8	8.3	8.1
Decile 7	10.9	10.9	10.4	10.4
Decile 8	14.1	13.7	13.1	13.3
Decile 9	18.8	18.1	17.6	17.9
Decile 10 (Top 10%)	30.1	30.0	32.6	33.4
of which: Top 1%	4.9	5.2	7.0	7.2
of which: Top 0.1%	1.1	1.1	1.8	1.8

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

The 5-year average annual growth rate in labour income for each income group (per tax unit at constant euro prices) shows that the benefits of growth were more evenly distributed during the Celtic tiger period as generally low- to middle- income people experienced higher growth (Figure 2). However, labour income evolved quite differently during the property boom period, as labour income growth disproportionally favoured the highest income groups, while it was weak in the rest of the distribution. In the aftermath of the property-

bubble-burst, labour income decreased in aggregate by 14 per cent from 2007 to 2012 in real terms, with the impact disproportionately borne by people in lower income groups. This reflects the sharp deterioration in the labour market: OECD (2015b) finds that the Gini coefficient at market income in Ireland increased by 0.05 points after the crisis and this is essentially due to the employment effect.

Figure 2: *Labour Income, 5-Year Average Annual Growth Rate*



Source: OECD Secretariat's calculation based on Tax administration data from the Revenue Commissioners, Ireland.

Policies have also played a role in these movements: relatively high growth among low deciles in the early 2000s is likely to be related to the introduction of the minimum wage in 2000. Nolan *et al*. (2012) note the positive effect of a higher hourly wage rate resulting from higher minimum wages. They also point out that the downward pressure on labour earnings in the lower half of the distribution in the mid-2000s was probably influenced by the larger inflow of low-skilled migrants following the expansion of the European Union in 2004.

The distribution of capital income is even more uneven (Table 3). Until 2007, with a few minor exceptions, the share of capital income attributed to the 9th decile and above has consistently risen, while the opposite was true for the 1st to 8th decile income group. The concentration of capital income in the highest income group was reinforced during that time. After the burst of the property bubble, the shares of the top decile and 1 per cent have decreased, but

remained above the pre property bubble period. In contrast, the share for the top 0.1 per cent continued to rise.

Table 3: *Distribution of Capital Income*

	1997	*2002*	*2007*	*2012*
Decile 1	0.2	0.3	0.1	0.4
Decile 2	1.2	1.1	0.9	2.1
Decile 3	2.8	2.4	1.9	2.8
Decile 4	3.9	3.2	2.6	3.2
Decile 5	5.1	4.0	3.2	3.7
Decile 6	5.9	4.8	4.2	4.6
Decile 7	7.5	6.2	5.6	5.8
Decile 8	9.3	8.4	7.7	7.6
Decile 9	11.8	12.2	12.3	11.9
Decile 10 (Top 10%)	52.3	57.5	61.7	58.1
of which: Top 1%	28.1	30.7	34.0	31.0
of which: Top 0.1%	10.3	10.3	12.6	12.9

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

Over the sample period, capital income has also evolved differently across income groups (per tax unit at constant euro prices). During the Celtic tiger period, virtually all income groups saw positive growth in capital income (Figure 3). Then, in the economy fuelled by the property bubble, only those at the 9th income decile and above benefited from rising capital income increases, with the strongest gains accruing at the highest end of the income distribution. The decrease in capital income, following the property bubble burst, was experienced by a wider range of people, i.e., across the entire upper half of the distribution.

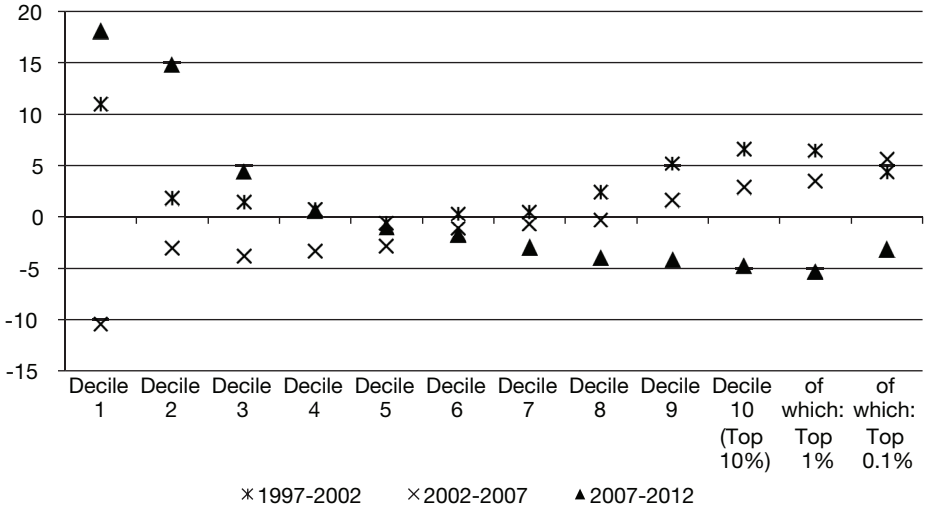
2.4 *How Are Social Benefits Spread Across the Income Distribution?*[7]

Total social benefits stated in tax returns reached 5.0 billion euros in 2012 (up by 158.1 per cent from 2002 and 62.0 per cent from 2007 in real terms).[8] This is around one quarter of total benefits paid by the government, not all of which have tax paid on them. An important caveat is that most social welfare

[7] The redistribution system plays a strong role in reducing inequality: Ireland has the largest decrease in the OECD between in the Gini index measured at market and post-tax and transfer disposable incomes. Around three-quarters of this reduction is due to cash transfers, while the rest comes from household taxation (OECD, 2015a, drawing on the OECD Income Distribution Database). Due to the caveat below, the analysis in this paper cannot fully take account of social benefits as a whole in reducing market income inequality.

[8] The figure reported here contrasts with the total expenditure of the Department of Social Protection of €19 billion, as detailed in the latest Revised Estimates Volume for 2015.

Figure 3: *Capital Income, 5-Year Average Annual Growth Rate*



Source: OECD Secretariat's calculation based on tax administration data from the Revenue Commissioners.

payments (and recipients) are not captured on the tax records, which especially under-represents the lowest income groups.[9] Many welfare payments are not required to be declared to Revenue. Individuals may also be in employment for part of the year and claim benefits for another part of the year. Therefore, the figures reported here, which are based on the tax records, represent only a small proportion of the total expenditure of the Department of Social Protection (DSP).

The share of social benefits to gross income identified in the tax administration dataset increased from 3.1 per cent in 2002 to 6.4 per cent in 2012 (Table 4).[10]

Social benefits received other than the State Pension Contributory have increased notably. They rose by around 55 per cent in real terms since 2007, which can be partly attributed to an increase in unemployment benefit recipients, as the unemployment rate has reached 15.1 per cent at its peak in 2012 from very low levels. From a longer-term perspective, the large increase

[9] In this dataset, benefit dependence is the highest in low- to middle- income classes but it is low in the lowest income classes, i.e., the first and second deciles. This largely reflects the low take-up rate of benefits, due to the demography of deciles 1 and 2: it is composed of various kinds of groups but typically those with low earned income but no eligibility to welfare payment (for instance, tertiary students living with their parents).

[10] Watson and Maître (2013) found that 30 per cent of household income in 2011 was from social welfare sources, based on the data from EU-*SILC*.

Table 4: *Social Benefits as a Percentage of Gross Income at Each Decile*

	Social Benefits (Excluding State Pension Contributory)		
	2002	*2007*	*2012*
Decile 1	0.4	0.5	1.9
Decile 2	1.6	2.2	4.7
Decile 3	1.5	2.6	4.5
Decile 4	1.1	1.9	3.3
Decile 5	0.7	1.4	2.4
Decile 6	0.6	1.0	1.9
Decile 7	0.5	0.9	1.7
Decile 8	0.5	0.9	1.4
Decile 9	0.3	0.6	0.9
Decile 10	0.1	0.2	0.2
		State Pension Contributory	
	2002	*2007*	*2012*
Decile 1	0.4	0.2	1.0
Decile 2	8.3	2.8	3.3
Decile 3	13.2	10.5	15.3
Decile 4	11.9	8.9	10.3
Decile 5	6.5	7.0	12.9
Decile 6	3.9	4.5	9.7
Decile 7	2.5	3.2	7.3
Decile 8	1.5	2.3	5.0
Decile 9	0.9	1.3	3.0
Decile 10	0.3	0.5	1.0

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

in this category of social benefits, almost tripled since 2002, can be explained by increases in benefit rates and thresholds before 2009. This includes the increased generosity of family benefits such as Family Income Supplement. These factors are reflected in a large number of households receiving these benefits, including those in higher income groups (Table 5).

These benefits target certain household types. Many of them set certain income thresholds for eligibility and are paid as a function of earned income. For example, the beneficiaries of Family Income Supplement (FIS) receive 60 per cent of the difference between their earned income and the income limit fixed depending on their family structure. However, the way FIS is abated results in high marginal effective tax rates at modest incomes, creating a low-income trap disincentive to work more for those in receipt of the payment (O'Connor *et al*., 2015).

Table 5: *Take-up Rate of Taxed Social Benefits*

	Social Benefits (Excluding State Pension Contributory)		
	2002	*2007*	*2012*
Decile 1	0.5	0.9	2.6
Decile 2	3.2	4.5	10.5
Decile 3	4.8	7.5	15.4
Decile 4	4.7	7.7	16.5
Decile 5	4.0	7.0	14.8
Decile 6	3.6	6.2	14.5
Decile 7	3.9	6.5	15.0
Decile 8	4.5	7.9	16.1
Decile 9	4.3	7.9	15.6
Decile 10	2.9	4.8	9.5
	State Pension Contributory		
	2002	*2007*	*2012*
Decile 1	0.4	0.3	1.0
Decile 2	8.7	2.9	4.1
Decile 3	19.9	14.1	19.8
Decile 4	21.5	14.6	17.0
Decile 5	15.3	13.7	21.3
Decile 6	11.4	10.8	19.9
Decile 7	9.1	9.4	19.2
Decile 8	7.1	8.5	18.0
Decile 9	5.4	6.9	15.8
Decile 10	4.0	5.2	11.9

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

The total amount of the State Pension Contributory has also increased over the period 2002-2012. This is related to the fact that pension payments were protected from welfare cuts even during the crisis. The rise in the take-up rate across income groups between 2007 and 2012 markedly exceeds the increase in the share of population aged 65 and over (Table 5). This likely reflects the loss of other income earning opportunities in the wake of the crisis.[11]

Ireland is one of the few countries in the OECD that operates a pure basic pension scheme that pays the same amount of benefits regardless of their pre-retirement earnings level (thus higher replacement ratios for low-income recipients OECD, 2013b). Such a scheme has redistribution effects over a long

[11] The increase in the State Pension is also partly due to the reclassification of the data: in 2011, illness benefit and the widow's pension was reclassified from a social welfare benefit to a social welfare pension. This had the effect of causing a reduction in social welfare benefit in 2011 and an associated increase in the social welfare pension in the same year. This then explains the decrease in the social welfare benefit in 2011 and the increase in the pension after 2011.

time period. The total amount of benefits has been relatively evenly distributed across income groups. This means, in turn, that the share of pension benefits to gross income at each income decile is more important toward lower income deciles (except for the two first deciles which consist of those with low earned income but no eligibility to welfare payment; instead those entirely rely on untaxed social benefits are less likely to be in the lowest deciles as they generally do not fill in tax returns).

2.5 *Who Benefits from Tax Allowances and Credits?*

Overall the difference between gross income and taxable income is large at €5.5 billion in 2012, mainly due to many tax allowances. Among them, the details of nine specific tax allowances could be precisely quantified from Revenue's dataset prepared for this paper. Excluding those essentially related to business, these tax allowances are:

- Expenses: Certain work expenses deducted from income before it is assessed for tax.
- Top Slicing Relief: This ensures that an individual's lump sum was not taxed at a rate higher than their average rate of tax for the three years prior to redundancy or retirement.
- Permanent Health Benefit Schemes: Premiums paid by taxpayers to the approved schemes to secure income during disablement through accident, injury or sickness.
- Actual Losses: Assets sold at a loss.
- Retirement Annuity Premiums: Premiums under a Retirement Annuity Contract, for either self-employed or in a non-pensionable employment. Tax relief is given at the individual's highest rate of tax.
- Personal Retirement Savings Accounts: Saving in PRSA, a long-term savings account designed to assist people to save for their retirement. Tax relief is given at the individual's highest rate of tax.

A large share of the tax allowances listed above is enjoyed by top income groups, as 53.1 per cent of these tax allowances accruing to the top 10 per cent of tax units (Table 6). Among the tax allowances listed above, the amount of those on retirement annuity premium and assets sold at a loss are very large: accounting for 24.5 per cent and 18.1 per cent of all the tax allowances within this income group (which in turn accounts for 13.0 per cent and 9.6 per cent of the tax allowances for all tax units identified in the dataset). Business related tax allowances are also important, accounting for 39.8 per cent to all the tax allowances within the top income group (or 21.2 per cent of the tax allowances for all tax units in the dataset). These findings suggest that the tax allowance system may disproportionately favour the self-employed.

Table 6: *Tax Allowances at Each Income Decile*

	Distribution of Tax Allowances		
	2002	*2007*	*2012*
Decile 1	1.1	0.3	0.4
Decile 2	1.1	0.7	1.3
Decile 3	1.8	1.4	2.1
Decile 4	2.4	1.9	2.6
Decile 5	3.1	2.5	3.4
Decile 6	4.0	3.6	4.7
Decile 7	5.5	5.1	6.8
Decile 8	8.1	8.0	9.7
Decile 9	12.6	13.7	15.7
Decile 10 (Top 10%)	60.2	62.8	53.1
of which: Top 1%	31.9	30.6	19.8
of which: Top 0.1%	11.0	9.6	6.3
	Total Tax Allowance / Gross Income		
	2002	*2007*	*2012*
Decile 1	7.2	1.6	1.9
Decile 2	2.3	1.2	1.7
Decile 3	2.2	1.2	1.5
Decile 4	2.1	1.2	1.4
Decile 5	2.1	1.3	1.4
Decile 6	2.2	1.5	1.5
Decile 7	2.5	1.7	1.8
Decile 8	2.9	2.1	2.1
Decile 9	3.4	2.7	2.5
Decile 10 (Top 10%)	7.5	5.5	4.1
of which: Top 1%	13.2	8.4	5.3
of which: Top 0.1%	14.1	7.6	5.4

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

The tax allowances identified in the dataset decreased by 23.4 per cent in real terms between 2002 and 2012. Among them, significant changes occurred for the Retirement Annuity Premium, Actual Losses and Expenses. The Retirement Annuity Allowance declined due to the ceiling amount, which has been lowered since 2008. The allowance on actual losses, after its peak in 2008, has declined sharply due to a smaller number of taxpayers making losses in construction related sectors. The expenses allowance has also declined, due to the phasing out of unused losses and capital allowances for rental properties from the mid-2000s period.

Overall, the tax allowance system in Ireland seems to follow the same declining trend, including for categories, which are not precisely quantified in

Revenue's dataset but are reflected in the difference between the gross income and the taxable income. Between 2006 and 2014, the scope for tax relief to all forms of pension saving was reduced, especially for high income earners (including the above mentioned retirement annuity allowance). Also, many property-related allowances have been curtailed (for example, tax incentives for property investment).

The High Earners Restriction (HER), taking effect in 2007, limits the total amount of tax reliefs that can be used by high-income individuals to a maximum amount each year. The restrictions currently in place may be summarised as follows: the relief limits the use of some tax expenditures where income before tax expenditures is more than €125,000 and full restriction applies for incomes in excess of €400,000, while no restriction is applied if eligible tax expenditures do not exceed €80,000. According to Collins and Walsh (2010), the number of cases where such restrictions apply was not necessarily large but generated additional tax revenue of €39 million in 2009.

The total amount of tax credits is even larger than allowances and the four main tax credits account for some €8.6 billion in 2012. These tax credits are:[12]

- Personal credit, which is due to every individual who is resident in the state. The tax credit due depends on family structure (i.e., single, married, etc.);
- PAYE credit, which is due to every individual in the Pay As You Earn (PAYE) System, earning above certain income thresholds depending on family structure;
- One parent family credit, which is available to a single parent, or a person who has custody of and maintains a child;[13]
- Age credit, which is available when a taxpayer, their spouse or civil partner reach 65 years of age, at any time during a tax year.

These tax credits are much more evenly distributed across income groups. Tax allowances reduce taxable income so their value increases with taxpayers' marginal tax rates. Tax credits, on the other hand, have the same value for all taxpayers because they directly reduce taxpayers' tax liability by a fixed amount. The cost of the tax credit system, however, has been mitigated somewhat by tax credits not being refundable, so the amount exceeding the household's total tax liabilities is not paid out to households.

The total amount of tax credits has increased markedly since 2002 by 72.8 per cent in constant euro prices compared to a 27 per cent change in gross

[12] This paper focuses on a set of principal tax credits.
[13] It has been replaced by Single Person Child Carer Credit.

income. This increase in tax credits took place essentially until mid-2000s, in exchange for what used to be tax allowances, and benefited especially those in lower income brackets (Table 7). The transition from an allowance at marginal tax rate to a credit at fixed amounts rebalanced benefits from high income to low income tax units.

Table 7: *Tax Credits at Each Income Decile*[14]

	Distribution of Tax Credits		
	2002	*2007*	*2012*
Decile 1	1.6	8.0	7.3
Decile 2	5.0	8.4	7.9
Decile 3	8.1	8.7	8.6
Decile 4	9.9	9.1	9.2
Decile 5	10.7	9.5	9.9
Decile 6	10.7	9.7	10.1
Decile 7	11.8	10.2	10.6
Decile 8	12.7	11.1	11.2
Decile 9	14.2	12.3	12.3
Decile 10 (Top 10%)	15.4	13.1	13.0
of which: Top 1%	1.4	1.1	1.2
of which: Top 0.1%	0.1	0.1	0.1
	Tax Credits / Gross Income		
	2002	*2007*	*2012*
Decile 1	18.6	148.3	143.0
Decile 2	18.5	45.9	39.8
Decile 3	17.9	27.2	25.0
Decile 4	15.6	20.3	19.3
Decile 5	13.2	16.6	16.4
Decile 6	10.7	13.7	13.6
Decile 7	9.6	11.6	11.6
Decile 8	8.2	10.0	9.8
Decile 9	6.9	8.2	8.1
Decile 10 (Top 10%)	3.5	3.9	4.1
of which: Top 1%	1.1	1.1	1.3
of which: Top 0.1%	0.3	0.3	0.4

Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

2.6 *How is the Personal Income Tax Burden Spread?*

The structure of the Irish income tax system is unique. Income tax operates using a two rate structure with different thresholds depending on family type.

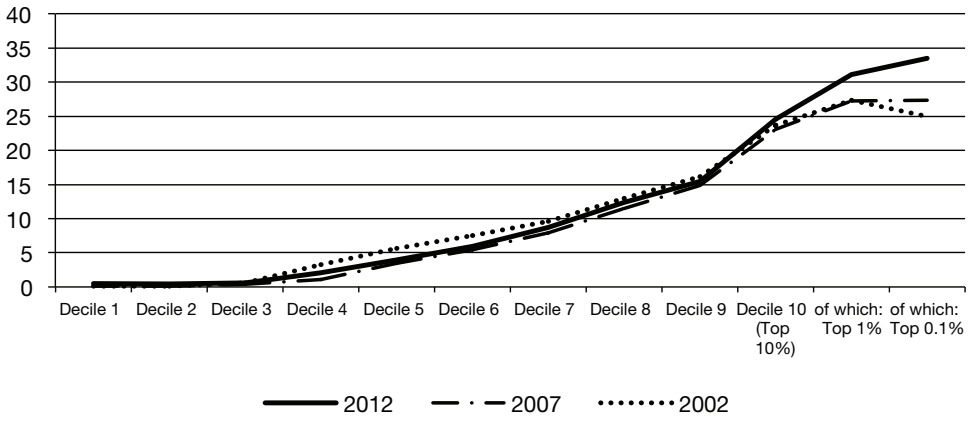
[14] The tax credits are not refundable, so the amount exceeding the household's total tax liabilities is not paid out to households.

A lower rate of 20 per cent applied on all income up to a band threshold, whereupon income was taxed at a higher rate of 41 per cent in 2012. [15] Thus, the Irish tax system combines high marginal rates at lower income with tax credits. The tax credit system plays a crucial role in reducing the tax liabilities of low income households, reducing disincentives to increase work.

The data show the personal income tax system is progressive in Ireland, which is shown by the average effective tax rate – the income tax paid as a percentage of gross income – which increases with income. The average effective tax rate (excluding social security contributions and the universal social charge which will be considered below) ranges from 0.5 per cent in the first income decile, 4.0 per cent in the fifth income decile and 24.5 per cent in the tenth income decile (Figure 4). At the top 1 per cent and 0.1 per cent income group, this rate rises to 31.1 per cent and 33.5 per cent, respectively.

Between 2007 and 2012, the taxation system became more progressive at the highest end (i.e., at the top 1 per cent and 0.1 per cent level where the progressivity almost abated in the previous system, which seems to have resulted from the changes in the tax allowance system). Also, between 2002 and 2007, the tax burden of middle income classes was reduced in the middle of the 2000s (by around 2 percentage points for those in the 4th through to 7th deciles), which seems to have resulted from the changes in the tax credit system.

Figure 4: *Average Effective Tax Rates By Income Decile*

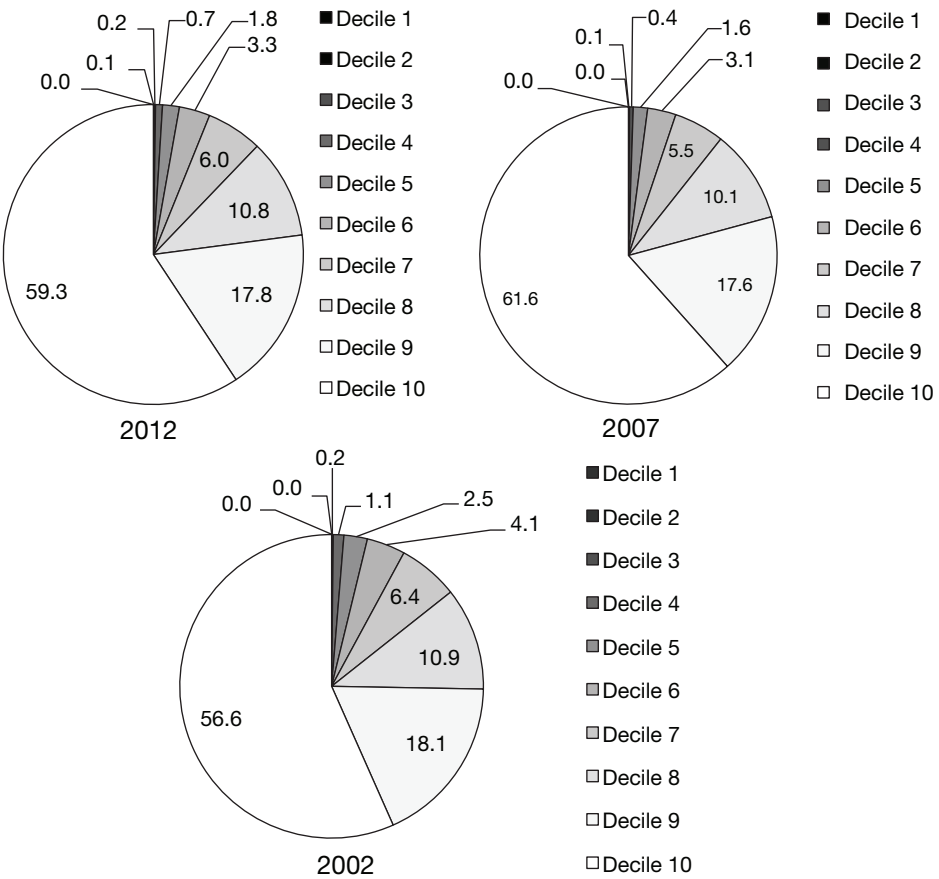


Source: OECD Secretariat's calculation based on Tax administration data from the Revenue Commissioners, Ireland.

[15] The higher rate was reduced to 40 per cent in the 2015 Budget.

The progressivity in the Irish tax system is also confirmed by the contribution of total tax receipts by each income decile. In 2012, 59.3 per cent of income tax was paid by the top 10 per cent tax units, with the top 1 per cent and 0.1 per cent tax units accounting for slightly above 21.3 per cent and 7.2 per cent of income tax payments, respectively (Figure 5). This is significantly higher than their share of gross incomes. Although the average effective tax rate was increased at the highest end of the income spectrum between 2007 and 2012, there was a slight reduction in the share of tax receipts accounted for by the top 10 per cent tax units. This decrease in share in spite of the increase in the average effective tax rate for this income group seems to be the result of the reduction in their market income itself.

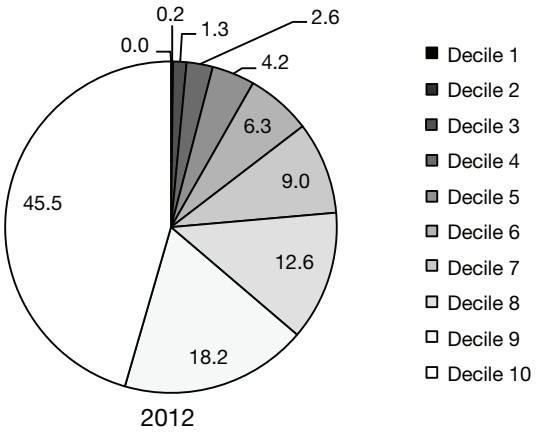
Figure 5: *Contribution of Each Income Decile to Total Tax Receipts*



Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

Part of the personal income tax system is the Universal Social Charge (USC), which was introduced in 2011 and replaced the health and income levies.[16] The USC has some unique features: it has four income bands for employees, corresponding to the rates of 1.5 per cent, 3.5 per cent, 7 per cent and 8 per cent, respectively[17] and the tax base is broader than the personal income tax base allowing fewer tax allowances and no reduction arising from tax credits. Overall, the USC increased the progressivity of the income tax system, compared with the previous health and income levies, which had flat contribution rates (Figure 6 and 7).

Figure 6: *Contribution of Each Income Decile to Total USC Receipts*

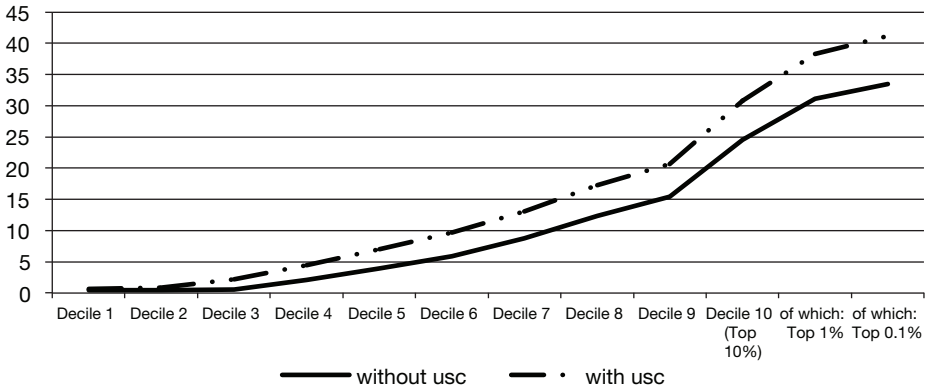


Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

[16] The USC is collected by Revenue and as such the data on USC is also integrated in the tax administration data. This paper is based on the tax system up until and including 2012, the last year with data available. The government announced in Budget 2016 that it would reduce the Universal Social Charge (USC) from 2016. These changes reduced the bottom three USC rates from 1.5 per cent to 1 per cent, 3.5 per cent to 3 per cent and 7 per cent to 5.5 per cent respectively. The threshold between the second and third bands was increased from €17,576 to €18,669.

[17] There are five bands for self-employed – the fifth is in excess of €100 000, corresponding to the rate of 11 per cent.

Figure 7: *Average Effective Tax Rates with USC, 2012*



Source: OECD Secretariat's calculation based on tax administration data from the Revenue Commissioners, Ireland.

Due to the redistribution system, the share of after-tax income (including USC) is higher than the share before tax-income up to the eighth decile. The share of income of the first to the eighth deciles as a whole is increased from 48.7 per cent of pre-tax income to 54.1 per cent in after tax income (Table 8). By contrast, the share of the top decile is reduced by almost the same extent and the tax units within this group bear an increasing burden as their pre-tax income rises up to the top 1 per cent income group. However, the additional tax burden seems to be relatively limited at the highest point, the top 0.1 per cent group.

2.7 *What Role Do Social Insurance Charges Play?*

Part of the effective personal marginal tax rate, which affects the incentive to work more, is made up of employee social charges. In Ireland this is the Pay Related Social Insurance (PRSI), which funds pension and a wide variety of other benefit payments including disability, maternity, widows and illness. The data for PRSI are classified separately and are not fully comparable with the tax administration data described above.[18] However, the separate dataset from the Department of Social Protection reports almost identical earnings distribution patterns as the tax administration data, suggesting at least broad comparability. It shows that overall individuals in different income groups pay the amount of PRSI contribution proportional to their earnings. This result is intuitive since except for a minimum earnings threshold, PRSI does not have a progressive rate structure being levied at a single rate of 4 per cent on gross income.

[18] Data is classified by individuals rather than tax units.

Table 8: *Income Distribution Before and After Tax*

	Gross Income (Including Social Security Benefits)			
	1997	*2002*	*2007*	*2012*
Decile 1	0.6	0.7	0.6	0.6
Decile 2	2.0	2.1	2.0	2.2
Decile 3	3.6	3.6	3.5	3.8
Decile 4	5.1	5.1	4.9	5.2
Decile 5	6.5	6.5	6.3	6.6
Decile 6	8.1	8.0	7.8	8.1
Decile 7	10.1	9.9	9.6	10.0
Decile 8	12.9	12.4	12.1	12.5
Decile 9	17.1	16.5	16.4	16.6
Decile 10 (Top 10%)	33.9	35.3	36.8	34.7
of which: Top 1%	9.2	10.6	11.7	9.8
of which: Top 0.1%	2.8	3.4	4.1	3.1
Decile 1-8	49.0	48.3	46.9	48.7
Decile 9-10	51.0	51.7	53.1	51.3
	After Tax Income			
	1997	*2002*	*2007*	*2012*
Decile 1	0.8	0.8	0.7	0.7
Decile 2	2.6	2.5	2.3	2.6
Decile 3	4.2	4.2	4.1	4.6
Decile 4	5.8	5.7	5.7	6.1
Decile 5	7.3	7.2	7.0	7.5
Decile 6	8.8	8.7	8.5	9.0
Decile 7	10.5	10.4	10.3	10.7
Decile 8	12.9	12.6	12.4	12.8
Decile 9	16.8	16.2	16.2	16.3
Decile 10 (Top 10%)	30.3	31.6	32.8	29.7
of which: Top 1%	7.8	9.1	9.9	7.5
of which: Top 0.1%	2.4	3.0	3.4	2.2
Decile 1-8	52.9	52.2	51.0	54.1
Decile 9-10	47.1	47.8	49.0	45.9

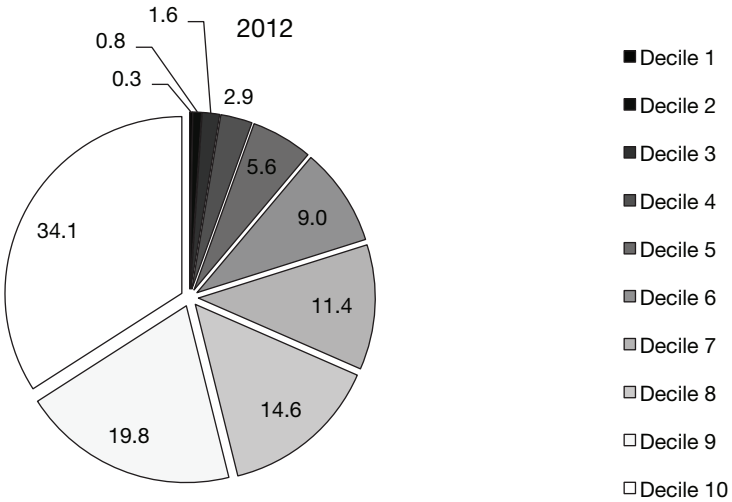
Source: OECD Secretariat's calculation using tax administration data from the Revenue Commissioners, Ireland.

The contribution to total PRSI receipts from each income decile is closely related to the share of gross income of each income group (Figure 8). The average effective tax rate arising from PRSI is slightly progressive up to the 9th decile, while it drops at the top decile, presumably because capital income, on which PRSI is not levied, is a much more significant income resource for that group (Figure 9).[19] The health contribution was charged at the rate of 2 per cent

[19] From 2014 onwards, PRSI is payable on all earned and unearned income. Therefore, income from investments, rents, interest, etc. are subject to PRSI. However, this was not the case in 2012.

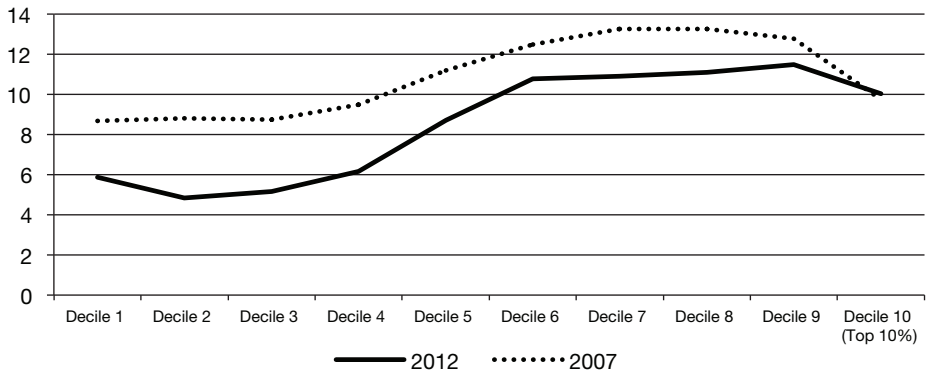
in 2007, on top of the 4 per cent on pension and social insurance. The health contribution was replaced by the Universal Social Charge (which also integrated other contributions) in 2011.

Figure 8: *Contribution of Each Income Decile to Total PRSI Receipts*



Source: OECD Secretariat's calculation based on data from the Department of Social Protection, Ireland.

Figure 9: *Average Effective Tax Rate, PRSI*



Source: OECD Secretariat's calculation based on data from the Department of Social Protection, Ireland.

III HOW MUCH MOBILITY IS THERE ACROSS THE INCOME DISTRIBUTION AND WHAT DETERMINES THIS?

While income mobility has multiple conceptual dimensions and associated approaches to measurement (Jäntti and Jenkins, 2013), one approach is to measure the positional change of individuals in the income distribution over time. In this section, the mobility of tax units is examined through transition matrices across the gross income distribution for selected periods. Transitions show the evolution of each tax unit's income position relative to all other tax units. Any upward transition implies at least some associated downward counterpart. The gross income figures used in the transition matrix are nominal rather than real values.

3.1 *Methodological Approach*

The research literature shows a number of approaches are possible to calculating transition matrices. In this paper, the following standard approach is adopted. First, the group of tax units to be examined is identified. For example, tax units reporting an age between 25 and 65 or those who are classified as married for tax purposes. In the literature, it is common practice to truncate the sample to only those cases that are aged 25 and over in the initial year or sometimes over the full period (Sawhill-Condon, 1992, Auten and Gee, 2009). The principal reason for this is to exclude the unrepresentative 'school-to-work-transition' cohort. Second, tax units observed in either of the comparison years are identified and only tax units observed in both years are selected. Each tax unit, therefore, has both an origin and destination position. It is also noteworthy that retaining only individuals of certain characteristics, for example, the number 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 (quintiles or percentiles) are then calculated for each year. Finally, the tax unit transition matrix is calculated across the two years.

The calculation approach has several important implications. First, the matrices calculate relative changes in the income distribution position of tax units at two points in time rather than absolute changes. For this reason, it is possible for a unit's relative position in the distribution to fall while their absolute income increases and vice versa. Second, examination at two points in time does not allow for observing units who frequently change their distributional position over the course of the reference period and such changes are not captured in the analysis. Consequently, the analysis does not capture those who leave the workforce for various reasons over the period (for example due to deaths, unemployment, emigration and retirement) or those who enter

the workforce in the later period (for example, through employment and immigration). Third, tax units observed in both years are on average less likely to be those units with a propensity to 'fall-off' the tax records in a given year. For this reason, the matrices may be more representative of full-time employees rather than part-time employees or students. Fourth, all transition matrices calculated are biostochastic, that is, the rows and columns sum to one.

The transition matrices can be interpreted as follows. If there was no mobility, the data was time-invariant, the diagonal entries would be 100 per cent and off-diagonals would be 0 per cent. A high diagonal entry indicates that tax units remain in the same income decile over the period. Similarly, low diagonal entries indicate higher mobility – tax units have moved from that decile to another decile. The number of years between the two periods selected is also important. In general, it is expected that annual transitions are more likely to have less mobility while longer horizon transitions will have greater mobility. Based on the literature, it might be expected that there would be relatively less mobility at the upper and lower ends of the decile distributions and relatively greater mobility in the middle deciles.

3.2 *Data Description*

The analysis in this section is based on a representative sample of about 175,000 tax units, each observed in 5.7 years on average (a total of about 993,000 year-tax unit observations) drawn from a population dataset of 3.4 million unique tax units over the period 2004 to 2012 (see Annex for further sampling details and data description). For the purposes of the transition matrix analysis, three periods are examined as follows: the full period 2004 to 2012, 2004 to 2007 and 2007 to 2012. While the latter two periods are uneven in length, they allow for a broad assessment of income mobility in the run-up to, and in the aftermath of, the economic crisis. Ireland experienced an exceptional level of economic growth between 2004 and 2007. By contrast, the 2007 to 2012 period was characterised by a severe recession in 2008 followed by a period of relative stabilisation to 2012. For simplicity, these three periods are referred to as the full, pre-2007 and post-2007 periods respectively. Additional transition matrices have been calculated using the same number of years before and after the crisis. These show that the main mobility results are robust to the choice of break point (Annex).

3.3 *Mobility of the Taxpayer Population as a Whole*

Table 9 shows the transition probabilities by decile for tax units observed in the full period 2004 to 2012 (there are a total of 66,560 tax units in both years). The analysis shows that in the first, second and third deciles, 25 per cent, 23 per cent and 23 per cent of tax units remained in that decile eight years

later in 2012. In other words, among the bottom three deciles, approximately one in four tax units remained in the same decile over the full period. In the top decile, 55 per cent of tax units remained in the top decile eight years later, while 30 per cent remained in the ninth decile.

Table 9: *Income Mobility of Tax Units by Decile, 2004–2012 (66,560)*

	Deciles 2012									
Deciles 2004	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	25.3	18.3	13.3	11.9	8.7	8.9	6.2	3.7	2.2	1.3
2	19.3	23.0	14.0	12.5	9.6	7.9	6.1	4.0	2.5	1.2
3	15.0	19.0	23.0	13.7	9.4	7.5	5.4	3.6	2.3	1.3
4	11.3	11.6	18.7	20.8	14.3	8.9	6.4	4.2	2.9	1.0
5	8.0	9.0	10.1	15.5	20.8	13.9	9.4	6.4	4.8	2.2
6	6.0	6.8	6.8	8.8	14.7	20.4	16.0	9.8	7.1	3.5
7	5.2	5.0	5.8	6.5	8.7	13.4	21.8	17.3	10.2	6.1
8	4.2	3.7	4.4	5.6	7.0	9.2	14.4	24.7	18.0	8.8
9	3.2	2.2	2.7	3.4	5.0	7.1	9.3	17.5	30.3	19.3
10	2.6	1.4	1.2	1.4	1.8	2.7	5.0	8.9	19.7	55.4

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units in 2004 and 2012 were 99,885 and 107,801 respectively. In both years 66,560 were observed.

3.4 *2004–2007 Period*

Table 10 shows the transition probabilities by decile for tax units observed in both years 2004 and 2007. Compared with the previous longer time-horizon matrix, there is relatively less mobility, which is expected. There are a total of 81,250 tax units in both years and therefore, by construction, 8,125 units in each row and column.[20] Of those in the bottom decile in 2004, 44 per cent remained in that decile by 2007. And 21 per cent progressed upwards to the next decile and 12 per cent progressed upwards by two deciles. Less than 1 per cent progressed to the top decile. Of those in the 5th decile in 2004, one in four (27 per cent) remained in the same decile, while 14 per cent progressed to the 6th decile. Of those in the top decile, about three-quarters (73 per cent) remained in the top decile, 17 per cent dropped to the 9th decile and 4 per cent to the 8th. Only 6 per cent dropped to the 7th decile or below.

[20] Note that there are small rounding discrepancies in the case of some rows and columns which may not have exactly 8,125. In the case of this transition matrix, the largest discrepancy is decile row five which has 8,129 units. Similar small discrepancies also arise in the remaining transition matrices.

Table 10: *Income Mobility of Tax Units by Decile, 2004–2007 (81,250)*

	2007 Deciles									
2004 Deciles	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	44.3	20.5	11.9	8.1	5.4	4.4	2.6	1.3	0.8	0.6
2	24.2	29.3	14.8	11.5	8.0	5.7	3.7	1.6	1.0	0.3
3	11.1	25.6	25.1	14.7	9.0	6.3	4.2	2.3	1.2	0.6
4	7.2	10.0	28.3	24.9	12.8	7.7	4.8	2.4	1.4	0.4
5	4.3	6.0	9.4	24.0	27.0	14.3	7.9	4.5	1.9	0.8
6	3.3	3.7	4.7	8.4	23.6	28.6	14.8	7.9	3.7	1.3
7	2.2	2.3	2.7	4.2	7.9	22.2	33.0	16.3	7.2	2.2
8	1.5	1.4	1.7	2.4	3.6	7.0	21.1	39.3	16.9	5.2
9	1.0	0.8	1.0	1.3	2.0	2.9	6.2	20.1	48.7	16.0
10	0.9	0.4	0.5	0.6	0.7	0.9	1.8	4.3	17.4	72.6

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units in 2004 and 2007 were 99,885 and 120,799 respectively. An observation of 81,250 in both years.

3.5 *2007–2012 Period*

Table 11 shows the transition probabilities by decile for tax units observed in both years 2007 and 2012. There are a total of 82,948 tax units observed in both years. According to the analysis, 65 per cent remained in the top decile over the period while 35 per cent remained in the bottom decile.

Comparing the pre- and post-2007 periods, income mobility has increased among the lower deciles post-2007. A smaller proportion of tax units remained entrenched in the bottom decile (35 per cent compared to 44 per cent) while a higher proportion moved upwards to the second, third and fourth deciles (47 per cent compared to 41 per cent). Similarly, relatively larger proportions moved upwards in the second, third and fourth deciles (54 per cent compared to 47 per cent; 42 per cent compared to 38 per cent and 39 per cent compared to 30 per cent).

Among the top deciles, relatively smaller proportions of tax units managed to remain in those deciles in the post-2007 period. For example, in the 8th, 9th and 10th deciles, the proportions retaining the same decile were 32 per cent, 39 per cent and 65 per cent in the post-2007 period compared to 39 per cent and 49 per cent and 73 per cent in the pre-period.

Furthermore, there was a much higher transition from the highest to the lowest deciles in the post-2007 period reflecting the dramatic nature of the economic crisis where some 'high-flyers' were hit hard. Among the top deciles, the proportions dropping to the bottom decile were more than twice as high post-2007 compared to pre-2007. For example, 0.9 per cent, 1.0 per cent and 1.5 per cent dropped to the bottom decile from the 10th, 9th and 8th deciles pre-2007. This compares to 2 per cent, 2.3 per cent and 3.1 per cent in the post-

period. A similar trend is observed dropping from the top deciles to the 2nd and 3rd deciles. These trends are also correlated with a higher transition from the 9th to the 10th decile as the former decile 10 cohorts are replaced by those from decile 9.

Table 11: *Income Mobility of Tax Units by Decile, 2007–2012 (82,948)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	34.8	21.7	15.0	10.1	7.0	4.9	3.2	1.8	0.9	0.6
2	19.1	26.5	17.6	13.1	8.7	6.7	4.4	2.3	1.1	0.5
3	13.5	18.0	26.3	17.4	9.8	6.1	4.7	2.5	1.3	0.5
4	9.0	11.6	15.3	25.0	17.9	9.4	5.8	3.5	1.8	0.7
5	6.9	7.4	9.0	13.9	24.8	19.0	9.7	5.5	2.8	0.9
6	5.2	5.0	6.2	8.1	13.5	25.3	20.5	9.4	5.4	1.6
7	4.1	4.2	4.5	5.2	7.9	13.1	26.6	21.3	9.1	3.8
8	3.1	2.9	3.0	3.6	5.7	8.4	14.0	31.5	21.0	6.9
9	2.3	1.6	2.1	2.2	3.4	5.4	8.1	15.8	39.1	20.0
10	2.0	0.9	1.0	1.3	1.3	1.8	3.2	6.3	17.6	64.6

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units in 2007 and 2012 were 120,799 and 107,801 respectively. An observation of 82,948 in both years.

3.6 *A Closer Look at Mobility for Different Population Cohorts*

In addition to the overall transition matrices, a number of further matrices are presented for different tax unit cohorts. These include taxpayers who report an age of between 25 and 65, taxpayers who might best be described as employees or self-assessed[21] and taxpayers of various personal statuses (for example, married or single).

3.7 *Mobility by Age, 2004 – 2007*

This section considers the income mobility of tax units who report an age between 25 and 65. As mentioned, this has the advantage of excluding the 'school-to-work-transition' cohort and is in line with the literature. However, it should be noted that some taxpayers do not report an age on their tax return. These cases are excluded from the analysis in addition to those taxpayers reporting an age of 25 or below or 65 and over. The transition matrices relating to age should be interpreted in this context.[22]

[21] As mentioned previously, employees are defined as tax units with PAYE income greater than 50 per cent of gross income and self-assessed are defined as tax units with Schedule D income greater than 50 per cent of gross income.

[22] A discussion, including a distributional comparison against persons over the age of 15 in Ireland, is provided in the Annex (Figure A1).

Tables 12 and 13 below show the transition probabilities by decile and quintile for tax units who report an age between 25 and 65 and are observed in both periods for the years 2004 to 2007. The analysis shows that 41 per cent of tax units in the bottom decile and 66 per cent of those in the top decile remained in that decile for the period.

Table 12: *Income Mobility of Tax Units by Decile, 2004–2007, Aged 25 to 65 (20,447)*

2004 Deciles	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	40.7	17.5	11.6	8.9	6.3	6.3	3.4	2.9	1.8	0.6
2	21.9	30.9	16.3	9.7	7.3	4.9	3.9	2.8	1.4	0.9
3	12.8	24.4	27.4	14.3	7.3	5.9	4.1	2.1	1.4	0.5
4	7.6	11.2	23.6	25.7	13.3	7.2	4.8	3.9	1.9	0.9
5	5.8	6.2	9.5	22.4	25.7	13.8	7.8	5.3	2.2	1.3
6	4.2	3.7	5.2	9.9	24.0	24.3	13.6	8.7	4.0	2.5
7	2.9	2.6	2.9	4.7	9.8	23.0	28.0	13.9	8.4	3.7
8	1.7	1.9	1.6	2.3	3.4	10.4	24.4	31.4	16.4	6.6
9	1.4	1.1	1.5	1.4	2.4	3.2	8.2	23.4	40.8	16.7
10	1.1	0.6	0.4	0.7	0.6	1.1	1.7	5.6	21.9	66.4

Source: Analysis of tax administration data by the Revenue Commissioners. The analysis is based on 28,091 and 67,014 tax units who report an age between 25 and 65 (and have no data quality issues) in 2007 and 2012 respectively. Of these, 20,447 are observed in both years.

According to the quintile analysis, 56 per cent of tax units who were in the bottom 20 per cent in 2004 remained in the bottom 20 per cent by 2007. Almost three in four tax units (73 per cent) in the top 20 per cent remained in the top 20 per cent by 2012.

Table 13: *Income Mobility of Tax Units by Quintile, 2004–2007, Aged 25 to 65 (20,447)*

	2007 Quintiles				
2004 Quintiles	*1*	*2*	*3*	*4*	*5*
1	55.5	23.3	12.4	6.6	2.4
2	28.0	45.5	16.9	7.4	2.3
3	10.0	23.5	43.9	17.7	4.9
4	4.6	5.8	23.3	48.9	17.5
5	2.1	2.0	3.6	19.4	72.9

Source: Analysis of tax administration data by the Revenue Commissioners. The analysis is based on 28,091 and 67,014 tax units who report an age between 25 and 65 (and have no data quality issues) in 2007 and 2012 respectively. Of these, 20,447 are observed in both years.

3.8 *Mobility by Age, 2007–2012*

Table 14 shows the transition probabilities by decile for the post-2007 period. Compared to the pre-2007 period, once again the results show that there is a greater overall level of mobility. For example, in the first three deciles 36 per cent, 28 per cent and 25 per cent stayed in the same decile compared to 41 per cent, 31 per cent and 27 per cent in the post-2007 period. There is also evidence to suggest that a consistently greater proportion of tax units have moved from the top deciles to the bottom deciles in the post-2007 period, which again reflects the dramatic nature of the economic crisis in that period. Furthermore, the crowding of these previously high income tax units into the lower deciles has the effect of increasing upward mobility for tax units already in those cohorts, in comparative terms. This partly explains the increased mobility in the bottom decile over the period.

Table 14: *Income Mobility of Tax Units by Decile, 2007–2012, Aged 25 to 65 (40,428)*

	Deciles 2012									
Deciles 2008	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	35.5	23.2	15.3	8.4	5.7	4.9	3.0	1.9	1.1	1.0
2	18.7	28.4	22.6	11.6	7.1	4.8	3.4	2.0	1.1	0.4
3	13.0	16.0	25.0	21.8	10.1	5.7	4.1	2.5	1.5	0.5
4	8.9	10.0	13.2	24.5	21.2	10.0	6.2	3.5	1.8	0.7
5	6.7	7.6	8.0	13.7	23.6	20.0	10.1	5.7	3.9	0.7
6	5.0	5.3	5.8	7.7	12.6	24.7	20.0	10.2	6.3	2.2
7	4.7	4.3	4.5	5.1	8.7	14.7	26.2	19.1	8.9	3.8
8	3.0	2.8	3.0	3.7	5.7	7.7	16.5	31.3	19.5	6.7
9	2.6	1.5	1.7	2.2	3.9	5.3	7.8	17.8	38.7	18.4
10	2.0	1.1	0.9	1.2	1.3	2.3	2.8	5.8	17.1	65.6

Source: Analysis of tax administration data by the Revenue Commissioners. The analysis is based on 67,014 and 68,003 tax units who report an age of over 25 (and have no data quality issues) in 2007 and 2012 respectively. Of these, 40,428 are observed in both years.

Table 15 shows the transition probabilities by quintile for the post-2007 period. According to the analysis, half (53 per cent) of tax units who were in the bottom 20 per cent in 2007 remained in the bottom 20 per cent by 2012. Over two-thirds (70 per cent) of tax units in the top 20 per cent remained in the top 20 per cent by 2012. Compared to the pre-2007 period, a similar story emerges. There is greater overall mobility across all quintiles,[23] that is, a smaller

[23] It should be noted that greater mobility over a greater time horizon may to a certain extent be expected.

proportion of tax units are remaining entrenched within the same quintile. In the bottom quintile, 53 per cent remained in the same quintile in 2012 and 47 per cent moved upwards (compared to 56 per cent and 44 per cent in the pre-2007 period respectively). In the top quintile, 70 per cent remained in that quintile by the end of the period (compared to 73 per cent in the pre-2007 period).

Table 15: *Income Mobility of Tax Units by Quintile, 2007–2012, Aged 25 to 65 (40,428)*

	2012 Quintiles				
2007 Quintiles	*1*	*2*	*3*	*4*	*5*
1	52.9	28.9	11.2	5.2	1.8
2	23.9	42.2	23.5	8.1	2.2
3	12.2	17.7	40.5	23.0	6.6
4	7.4	8.2	18.4	46.6	19.5
5	3.6	3.0	6.4	17.1	69.9

Source: Analysis of tax administration data by the Revenue Commissioners. The analysis is based on 67,014 and 68,003 tax units who report an age of over 25 (and have no data quality issues) in 2007 and 2012 respectively. Of these, 40,428 are observed in both years.

Table 16 shows income mobility in Ireland compared to the United States for taxpayers reporting an age over 25. The Irish transition probabilities are by quintile, for the full period 2004 to 2012 and for those reporting an age between 25 and 65. The table also reproduces the results from a similar analysis for the United States (Auten and Gee, 2009) for the years 1996 to 2005. Notwithstanding that the analysis and periods under examination are different, some similar characteristics emerged: less mobility occurs at the low and high ends of income distribution, while mobility is more frequent in middle income classes. In Ireland, the mobility at the lowest end of income distribution increased during the crisis as more people crowded into that group after losing their job and main source of income (which resulted in comparative and incremental upward mobility of the rest of the population).

3.9 *Mobility by Tax Unit Type, 2008–2012*

A further important distinction, which may impact on mobility, is whether taxpayers are predominantly PAYE employees or self-assessed businesses. In the IDS data, tax units are assigned to one of the two categories conditional on which category type comprises a greater proportion of overall income.[24] Using

[24] Specifically, a tax unit is defined as a PAYE tax unit if 50 per cent or more of its gross income is comprised of PAYE income. Similarly, a tax unit is defined as a self-assessed tax unit if 50 per cent or more of its gross income is comprised of self-assessed income.

Table 16: *Income Mobility in Ireland and the United States by Quintile, Aged Over 25**

IRELAND					
	2012 Quintiles				
2004 quintiles	*1*	*2*	*3*	*4*	*5*
1	46.5	26.6	14.5	8.5	3.9
2	27.0	38.1	20.8	9.8	4.2
3	12.4	22.0	34.3	20.5	10.9
4	8.9	9.0	22.1	37.4	22.7
5	5.2	4.3	8.3	23.8	58.4
UNITED STATES *Reproduced from Auten and Gee (2009)*					
	2005 Quintiles				
1996 quintiles	*1*	*2*	*3*	*4*	*5*
1	57.7	24.1	10.1	5.3	3.0
2	25.1	36.3	23.3	11.2	4.1
3	10.5	24.1	33.7	23.6	8.1
4	5.6	12.4	23.2	36.7	22.2
5	3.6	4.7	10.0	21.9	59.8

Source: Analysis of tax administration data by the Revenue Commissioners.
*Irish income mobility quintiles are based on tax units reporting an age of between 25 and 65 while Auten and Gee analysis based on those reporting an age of over 25. The analysis is based on 28,091 and 68.003 tax units who report an age between 25 and 65 (and have no data quality issues) in 2004 and 2012 respectively. Of these, 14,939 are observed in both years.

this definition, it is possible to gain an understanding of mobility for both employees and businesses. Before presenting the analysis, it is important to note the wide diversity of different taxpayer types across the self-assessed taxpayer population. For instance, these taxpayers can range from local part-time businesses with very small incomes to high net worth individuals employing multiple employees.

According to the analysis, PAYE tax units make up the vast majority of tax units in all years; for example, over 90 per cent in 2012. Self-assessed taxpayers have consistently higher mean incomes. The relatively wider gap between the mean and the median for the self-assessed category signals a wider distribution and a greater number of outliers compared with PAYE employees.

Before considering these transition matrices, it is instructive to view the within and between variation of PAYE and self-assessed tax units over the period. Of the 174,584 tax units over the full period 2004 to 2012, 96 per cent were PAYE at least once and 10 per cent were self-assessed at least once. Overall, the analysis shows that PAYE tax units are close to time-invariant (96

per cent who were ever defined as PAYE were always PAYE) while self-assessed tax units changed status more often (65 per cent who were ever self-assessed units were always self-assessed).

Table 17: *Taxpayer Type, 2004–2012 (174,584)*

	Overall		*Between*		*Within*
	No.	*%*	*No.*	*%*	*%*
PAYE	903,552	91	166,739	96	96
Self-Assessed	89,624	9	21,691	12	65
Total	993,176	100	188,732	108	93

Source: Analysis of tax administration data by the Revenue Commissioners.

Tables 18 and 19 show income mobility for PAYE and self-assessed tax units in the post-2007 period. There are 72,722 PAYE tax units observed in both 2007 and 2012. According to the results, there is significantly less mobility in the bottom decile among tax units who are self-assessed (49 per cent remain in the bottom decile compared to 36 per cent for PAYE tax units) and marginally lower mobility in the top decile (72 per cent compared to 65 per cent). In the middle deciles, there is consistently more mobility among self-assessed tax units who are much less likely to remain in the same decile and much more likely to move upwards over the period.

Overall, mobility is relatively higher in the middle deciles for self-assessed tax units over the period and lower in the upper and lower deciles. This is consistent with the inherently higher risks and rewards faced by businesses and entrepreneurs relative to employees. However, a greater proportion of self-assessed tax units remain in the top decile over the period.

3.10 *Mobility by Status*

This section explores transitions in tax unit status over the full period. Tax units are categorised under six personal statuses as follows: single males, single females, married two-earners, married one-earners, widowers and widows. As mentioned, it is important to note that a married couple who has elected for joint assessment is counted as one tax unit.[25] As shown in Table 20, of the 174,879 tax units observed in 2008 and 2012, 75 per cent were single tax units at least once and 36 per cent were married tax units at least once. Of the samples, 11 per cent have been both single and married tax units over the period. Of tax units 93 per cent who were ever single remain so over the period.

[25] It is also possible that a married couple can also opt for single assessment in which case they would be counted as two single units.

Table 18: *Income Mobility of Tax Units by Decile, 2007–2012, PAYE* (72,722)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	36.0	22.0	14.4	10.0	6.7	4.8	3.2	1.6	0.9	0.4
2	20.3	26.4	17.2	12.9	8.8	6.5	4.5	2.2	1.0	0.3
3	13.8	19.6	26.6	16.2	9.5	5.8	4.7	2.4	1.0	0.5
4	9.0	11.1	17.6	26.2	16.0	9.1	5.4	3.2	1.8	0.6
5	7.1	7.3	9.0	15.0	26.3	17.2	9.2	5.3	2.7	0.9
6	4.7	5.0	6.2	8.5	14.9	27.0	18.6	8.9	4.7	1.5
7	3.6	4.1	4.2	4.9	7.7	14.8	28.1	19.9	8.7	4.0
8	2.6	2.5	2.6	3.5	5.6	8.2	15.2	33.1	19.8	6.8
9	1.8	1.2	1.6	1.8	3.3	5.0	7.9	17.3	40.4	19.6
10	1.2	0.8	0.7	0.9	1.2	1.7	3.2	6.1	18.9	65.3

Source: Analysis of tax administration data by the Revenue Commissioners.
* Of PAYE tax units as defined above, 110,336 and 98,683 were observed in 2007 and 2012 respectively. In both years 72,722 were observed.

Table 19: *Income Mobility of Tax Units by Decile, 2007–2012, Self-Assessed*(5,202)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	48.8	24.6	11.5	5.6	3.7	2.5	0.8	0.8	1.0	1.0
2	17.5	31.5	25.2	12.3	5.8	3.9	1.4	1.5	0.4	0.6
3	11.2	18.7	23.1	22.7	11.2	7.5	3.7	1.0	0.8	0.4
4	7.3	9.4	17.1	20.4	20.2	14.8	6.2	3.3	1.2	0.2
5	4.8	7.3	7.9	16.7	22.5	20.8	13.3	4.4	1.9	0.4
6	3.5	3.8	5.0	8.5	17.3	21.7	23.6	13.6	2.5	0.6
7	2.1	2.5	5.0	6.7	7.9	15.8	22.5	25.2	11.0	1.4
8	2.3	1.7	3.1	4.2	7.9	6.7	16.9	26.7	25.4	5.0
9	1.7	0.2	1.0	1.4	2.9	6.0	9.4	19.4	39.6	18.5
10	1.0	0.4	1.0	1.5	0.8	0.6	2.3	4.0	16.4	72.1

Source: Analysis of tax administration data by the Revenue Commissioners.
* Of self-assessed tax units as defined above, 10,463 and 9,118 were observed in 2007 and 2012 respectively. In both years 5,202 were observed.

Table 20: *Personal Status, Single and Married Tax Units (174,584)*

	Overall		*Between*		*Within*
	No.	*%*	*No.*	*%*	*%*
Single male (A)	315,751	32	68,103	39	91
Single female (B)	285,720	29	57,274	33	94
Married two earner (C)	186,630	19	35,626	20	71
Married one earner (D)	169,788	17	45,099	26	62
Widower (E)	9,659	1	1,962	1	77
Widow (F)	25,628	3	4,564	3	92
Total	993,176	100	212,628	122	82
Single (A + B + E + F)	638,974	64	130,770	75	93
Married (C + D)	356,639	36	62,818	36	84
Total	993,176	100	193,274	111	90

Source: Analysis of tax administration data by the Revenue Commissioners.

Table 21 shows that 84 per cent of single males and 92 per cent of single females had the same status in the subsequent period. For single males (females), 9 per cent (3 per cent) and 7 per cent (5 per cent) transitioned to married two-earners and married one-earners by 2012 respectively. Of married two-earners 80 per cent maintain that status and 17 per cent switch to married one-earners. Of widowers and widows 95 per cent and 99 per cent maintained that status over the period.

Table 21: *Transitions in Personal Status, 2007–2012*

	Single Male	*Single Female*	*Married Two Earner*	*Married One Earner*	*Widower*	*Widow*
Single Male	84.0	0.0	9.2	6.6	0.1	0.0
Single Female	0.0	91.5	3.4	4.7	0.0	0.3
Married Two-Earner	0.9	0.1	80.0	18.4	0.6	0.1
Married One-Earner	1.6	0.5	17.5	78.1	1.5	0.8
Widower	1.8	0.0	0.6	2.3	94.8	0.6
Widow	0.0	0.4	0.2	0.3	0.1	99.0

Source: Analysis of tax administration data by the Revenue Commissioners.

Tables 22 and 23 show the transition matrices for single and married tax units in the post-2007 period. In the bottom two deciles, single tax units were less likely to have stayed in the same decile (29 per cent and 19 per cent compared to 37 per cent and 27 per cent).

Table 22: *Income Mobility of Tax Units by Decile, 2007–2012, Single Tax Unit Status (45,140)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	29.2	21.3	15.4	9.9	6.8	5.3	4.3	4.3	2.0	1.5
2	19.2	18.8	13.6	14.1	10.2	7.5	5.8	6.0	3.3	1.5
3	12.3	16.0	22.0	13.2	11.8	9.0	5.9	5.1	3.3	1.2
4	10.1	13.1	16.8	21.9	13.3	9.6	5.8	4.5	3.4	1.6
5	8.1	9.9	10.0	16.8	23.8	13.8	7.6	5.2	3.1	1.6
6	5.6	7.3	8.0	8.9	15.1	24.4	15.2	8.4	4.8	2.4
7	5.2	5.1	5.5	6.6	9.0	15.6	26.6	15.6	7.5	3.2
8	4.0	4.1	3.7	4.2	4.8	8.0	16.9	29.3	18.7	6.3
9	3.2	2.9	3.1	2.9	3.5	4.3	7.6	15.8	37.8	19.0
10	3.1	1.6	1.7	1.6	1.6	2.4	4.3	5.8	16.2	61.9

Source: Analysis of tax administration data by the Revenue Commissioners. Of single tax units as defined above, there were 80,045 and 65,246 units in 2007 and 2012 respectively. In both years 45,140 were observed.

However, for subsequent deciles there is a consistently greater degree of upward mobility among married tax units with the exception of the top decile where it is approximately similar. In the middle income deciles, 4th to 7th, upward mobility is much more likely among married tax units compared to single tax units.

Table 23: *Income Mobility of Tax Units by Decile, 2007–2012, Married Tax Unit Status (31,009)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	37.3	26.8	16.9	8.6	4.8	2.1	1.4	0.7	0.8	0.7
2	17.5	26.6	27.1	13.7	7.9	3.9	1.4	1.1	0.5	0.3
3	12.2	14.7	19.3	24.7	15.5	6.9	3.6	1.9	1.0	0.3
4	8.7	10.1	11.6	18.1	22.9	16.4	6.7	3.6	1.7	0.3
5	7.5	7.9	8.7	11.6	17.6	23.6	13.9	5.3	2.9	1.1
6	4.9	4.8	6.9	9.1	11.4	19.3	24.8	12.7	4.8	1.4
7	4.1	3.7	4.1	6.3	9.2	11.9	21.2	26.1	10.5	2.9
8	3.0	2.6	2.7	4.1	5.8	7.9	14.1	26.1	27.5	6.2
9	2.2	1.6	1.8	2.2	3.0	5.4	9.5	15.4	35.3	23.5
10	2.7	1.2	0.8	1.6	2.0	2.7	3.6	7.2	14.9	63.4

Source: Analysis of tax administration data by the Revenue Commissioners. There were 40,754 and 42,555 tax units in 2007 and 2012 respectively. In both years 31,009 were observed.

Table 24 shows income mobility for married-two earner tax units for the same period. The general pattern is broadly the same – greater upward mobility among married tax units in the middle deciles but much lower mobility among married units in the bottom deciles. However, the magnitude of upward mobility is greater for married-two earner tax units compared to married tax units. The proportion of tax units in the top decile is the same as for married tax units.

Table 24: *Income Mobility of Tax Units by Decile, 2007–2012, Married Two Earners (14,443)*

	Deciles 2012									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	43.8	29.4	14.5	6.9	2.6	1.1	0.5	0.8	0.1	0.2
2	18.6	24.7	26.3	15.9	7.6	3.5	1.9	0.7	0.9	0.0
3	12.4	15.5	17.7	24.9	15.2	8.5	2.8	1.7	0.9	0.4
4	7.3	9.9	13.4	17.5	23.4	16.1	7.0	4.1	1.0	0.4
5	4.9	6.4	10.0	11.4	18.4	22.9	15.9	6.8	2.4	0.8
6	4.1	5.0	6.8	8.5	11.1	18.4	24.7	15.4	4.9	1.3
7	3.4	3.8	4.7	6.9	8.3	11.9	20.4	24.0	14.0	2.7
8	2.3	3.1	2.6	4.0	7.3	9.1	12.0	23.7	28.9	7.1
9	1.5	1.2	2.4	2.6	4.2	5.3	10.6	15.4	33.0	23.8
10	1.8	1.0	1.5	1.8	1.9	3.1	4.4	7.3	13.9	63.4

Source: Analysis of tax administration data by the Revenue Commissioners. Of tax units with a personal status of married two-earner, there were 21,142 and 22,212 units in 2007 and 2012 respectively. In both years 14,443 were observed.

3.11 *Mobility by Percentile and Analysis of Top 1 Per Cent*

This section provides a more detailed examination of mobility at the upper and lower ends of the income distribution using percentile transition matrices. Specifically, the transition matrices are shown for tax units above the 90th percentile and for the 10th percentile and below. Consequently, the matrices do not sum to 100 per cent as before since these tax units can move out of the top and bottom deciles entirely. Notwithstanding this point, a similar overall methodology is adopted to the previous decile analysis.

3.12 *Mobility by Percentile, 2004–2007*

The previous decile analysis showed that 73 per cent or 5,898 tax units in the top decile in 2004 remained in the top decile by 2007. Table 25 extends the analysis by examining the same cohort of tax units using a percentile transition matrix. According to the analysis, a low degree of mobility is observed among the top 1 per cent cohort – approximately two in three (65 per cent) tax units in 2004 remained in that percentile in 2007. Among those in the top 1 per cent in

2004, 95 per cent remained within the top decile in 2007. Of those in the top 2 per cent, 37 per cent remained in that category in 2007, 16 per cent moved up to the top 1 per cent and 91 per cent remained in the top decile. It should be noted that low levels of mobility at the top end of the distribution may partly be due to outlier tax units with very large incomes; even a significant reduction in income for these tax units may not be sufficient to cause downward mobility.

Table 25: *Income Mobility of Tax Units by Percentile, Above 90th Percentile, 2004–2007 (5,898)*

					2007						
2004	*91*	*93*	*93*	*94*	*95*	*96*	*97*	*98*	*99*	*100*	*Total*
91	9.6	7.4	5.3	4.2	4.4	3.8	2.1	1.6	1.1	0.4	39.9
92	10.2	9.6	8.1	7.6	4.3	3.4	2.1	1.1	2.1	0.5	49.1
93	10.6	12.1	10.2	8.2	7.0	3.4	3.3	2.3	1.7	0.2	59.2
94	6.5	11.6	12.1	11.8	8.6	6.7	5.0	2.2	1.5	0.4	66.4
95	4.4	6.8	9.2	13.2	14.0	11.7	7.1	4.3	3.2	1.6	75.5
96	2.7	3.7	6.2	9.6	16.3	17.1	9.6	7.6	4.2	2.2	79.2
97	2.1	2.7	3.1	6.3	8.6	17.2	23.2	13.8	6.8	2.0	85.7
98	1.0	1.2	1.8	2.2	5.2	9.0	17.6	28.6	13.8	4.7	85.1
99	1.0	1.1	1.6	2.2	3.1	4.4	8.5	17.2	36.5	15.5	91.1
100 (Top 1%)	0.4	0.2	0.4	1.0	0.7	1.0	2.5	5.0	18.3	65.1	94.7

Source: Analysis of tax administration data by the Revenue Commissioners. In 2004 99,885 tax units were observed and 120,799 in 2007 and 81,250 were observed in both years. In the top decile 5,898 were observed in both years. The total column refers to the sum of all tax units in a given percentile in 2004 remaining in the top decile by 2007.

In the previous decile analysis, 44 per cent or 3,602 tax units in the bottom decile in 2004 remained in the bottom decile by 2007. Table 26 shows that, among the bottom one and two percentiles, one in six (16 per cent) and one in eight (13 per cent) tax units remained in that percentile over the period respectively. Of those in the bottom 1 per cent, one half (49 per cent) remained in the bottom decile while the other half (51 per cent) made it out of the decile by 2007. As expected, the data show that tax units which are relatively higher within the decile are less likely to remain within it over the period and are more likely to engage in upward mobility.

3.13 *Mobility by Percentile, 2007–2012*

In the previous analysis, 65 per cent or 5,357 tax units in the top decile in 2007 remained in that decile by 2012. Table 27 shows the percentile transition matrix over the period for tax units above the 90th percentile. The proportions remaining in the same percentiles are smaller in the post-2007 period

Table 26: *Income Mobility of Tax Units by Percentile, 10th Percentile and Below, 2004–2007 (3,602)*

					2007						
2004	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total*
1	16.1	4.2	4.4	4.7	4.3	3.2	3.3	2.8	2.5	3.0	48.5
2	4.9	13.1	5.4	5.5	5.0	3.9	4.7	3.8	4.4	2.2	53.1
3	3.3	10.2	5.9	5.5	3.3	5.4	4.3	4.8	3.8	4.2	50.7
4	3.3	4.3	11.8	4.6	5.3	5.1	3.9	4.2	2.5	2.6	47.6
5	2.9	3.4	9.1	7.0	3.6	5.0	3.6	4.7	3.6	3.1	45.9
6	2.8	3.0	5.3	10.1	3.5	4.0	4.9	3.8	4.3	4.2	45.9
7	2.8	2.7	3.8	5.8	6.5	6.7	3.3	2.8	3.9	2.2	40.6
8	2.3	2.8	2.3	4.7	7.5	5.6	2.7	4.1	4.1	3.8	40.0
9	2.5	1.8	2.9	3.3	6.0	6.0	4.7	3.8	2.7	2.5	36.2
10	2.2	3.3	2.5	2.3	4.4	6.4	5.6	3.0	2.8	2.2	34.8

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units of 99,885 were observed in 2004 and 120,799 in 2007 and 81,250 observed in both years, 3,602 observed for percentiles 10 and below. The total column refers to the sum of all tax units in a given percentile in 2004 remaining in the bottom decile by 2007. It should be noted that the sample size is somewhat smaller in this case.

Table 27: *Income Mobility of Tax Units by Percentile, Above 90th Percentile, 2007–2012 (5,357)*

					2012						
2007	*91*	*92*	*93*	*94*	*95*	*96*	*97*	*98*	*99*	*100*	*Total*
91	7.5	6.3	5.8	6.5	5.2	3.9	3.3	2.1	2.1	0.5	42.9
92	5.4	6.6	7.6	7.1	8.4	4.6	2.9	3.0	2.5	1.4	49.6
93	3.4	5.4	8.6	9.3	7.6	8.2	5.9	3.0	2.3	0.7	54.4
94	4.3	5.1	7.7	8.1	9.7	7.9	6.5	5.3	1.6	1.6	57.8
95	3.3	5.0	6.0	8.7	9.5	10.3	9.1	6.6	4.3	1.8	64.6
96	4.2	2.7	3.6	4.8	7.2	11.7	12.9	10.0	6.1	2.3	65.5
97	2.7	3.0	3.6	4.8	5.7	7.4	12.8	16.0	10.4	3.7	70.1
98	2.9	3.0	2.5	3.5	4.8	6.3	10.1	17.6	18.6	7.0	76.3
99	1.2	1.7	1.9	2.1	3.3	4.5	5.7	11.3	25.9	20.4	77.9
100 (Top 1%)	0.8	1.1	0.8	1.8	1.3	2.4	4.5	6.2	15.3	52.5	86.7

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units of 120,799 were observed in 2007 and 107,801 in 2012 and 82,948 observed in both years, 5,357 observed for percentiles above 90 in both years. The total column refers to the sum of all tax units in a given percentile in 2007 remaining in the top decile by 2012.

indicating a greater overall degree of mobility. However, direct comparison between the periods is somewhat challenging because of the substantial proportions dropping out of the top decile. Notwithstanding this, it is notable

that tax units are significantly more likely to drop out in the post-2007 period, particularly among tax units at the upper end of the top decile. For example, among the 95th, 99th and 100th percentiles in the pre-2007 period, 76 per cent, 91 per cent and 95 per cent managed to remain within the top decile respectively. Correspondingly, 24 per cent, 9 per cent and 5 per cent dropped out of the top decile from these percentiles over the period. By comparison in the post-2007 period, 35 per cent, 22 per cent and 13 per cent dropped out for the same percentiles. Overall, the evidence suggests that mobility was much greater post-2007 with proportionately more tax units falling out of the top percentiles, particularly among the highest earners near the top of the distribution.

Table 28 shows the percentile transition matrix for tax units in and below the 10th percentile between 2007 and 2012. In the previous decile analysis, 35 per cent or 2,886 tax units in the bottom decile in 2007 remained in the bottom decile by 2012. Table 28 shows that, among the bottom one and two percentiles, 11 per cent and 6 per cent of tax units remained in the same percentile over that period. Of those in the bottom one per cent, 52 per cent moved upwards outside the bottom decile compared to 59 per cent and 65 per cent for the 7th and 10th percentiles respectively. Compared to the pre-2007 period, tax units across all percentiles within the bottom decile are more likely to move upwards post-2007. Again, part of the explanation is the dramatic nature of the recession which reduced incomes sharply at the top end of the distribution. According to the analysis, there is greater mobility among the bottom one and two

Table 28: *Income Mobility of Tax Units by Percentile, 10th Percentile and Below, 2007–2012 (2,886)*

						2012					
2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total*
1	11.0	4.9	4.7	3.9	3.0	2.9	4.7	2.9	2.7	2.0	42.7
2	4.1	5.9	4.3	5.4	4.3	3.4	4.6	3.3	2.8	2.8	40.8
3	2.3	2.8	6.8	4.1	4.1	4.5	4.0	3.3	2.4	3.5	37.6
4	2.7	3.7	4.7	6.4	3.5	2.7	3.5	4.5	4.1	2.4	38.1
5	2.3	3.5	3.1	4.7	4.2	3.9	3.1	3.4	3.2	3.2	34.7
6	2.2	3.9	2.1	4.2	5.4	3.5	2.3	4.6	2.4	2.8	33.3
7	1.9	3.3	3.0	3.1	3.3	4.1	2.3	3.3	3.0	3.9	31.1
8	1.8	3.0	2.7	3.9	3.1	2.9	2.5	3.3	3.3	3.6	30.0
9	1.0	4.0	3.0	2.9	3.5	2.7	4.6	2.4	2.7	2.0	28.7
10	1.8	2.4	2.9	2.8	2.5	3.4	4.2	5.9	3.4	1.6	30.9

Source: Analysis of tax administration data by the Revenue Commissioners. Tax units of 120,79 were observed in 2007 and 107,801 in 2012 and 82,948 observed in both years, 2,886 observed for percentiles 10 and below for both years.

percentiles in the post-2007 period – these tax units are relatively less likely to remain entrenched in the same percentiles in the later period. Outside of these two deciles, similar, albeit small, proportions remain in the same percentiles.

3.14 *Sectoral Analysis*

This section examines the sector of employment of the general population of tax units and the top 1 per cent of tax units for the years 2004, 2007 and 2012. Before presenting the results, it should be noted that in the case of employees, the sector relates to the sector of the employer.[26] According to the analysis, the principal sectors of employment reported on the tax records are wholesale and retail trade, public administration, accommodation and food and health and financial activities. While the overall shares by sector have arguably not changed too dramatically, the most striking result, as expected, is that both the proportions and incomes of tax units in the construction sector dropped significantly between 2007 and 2012.

By comparison, the top 1 per cent of tax units are concentrated in a much smaller set of sectors, namely, financial, insurance and real estate (31 per cent in 2012), professional and scientific (18 per cent) and health and social work (17 per cent). There has been a notable rise in the proportions in the financial, insurance and real estate sector and a moderate decline in the professional and scientific sector over the period. There is also evidence that the rise in average gross incomes was greater among the top one percent between 2004 and 2007, while the subsequent decline after 2007 was much greater. For instance, in the general population of tax units in the construction sector, incomes rose by 9 per cent between 2004 and 2007 and declined by 14 per cent between 2007 and 2012. By comparison, among the top 1 per cent, incomes grew by 17 per cent and then declined by 61 per cent over the same periods. A similar trend is observed for many other sectors.

[26] In the analysis each tax unit is associated with one sector in each year. However, it should be noted that tax units may have multiple trades or businesses and this is not accounted for in this analysis.

Table 29: *Proportions and Gross Incomes of Tax Units by Sector, 2004–2012*

	Proportions			*Mean Gross Incomes*		
	2004	*2007*	*2012*	*2004*	*2007*	*2012*
	%	%	%			
Agriculture, forestry and fishing (A)	7	6	6	34,238	43,854	40,179
Construction (F)	10	11	5	32,678	35,769	30,861
Wholesale and retail trade (G)	15	15	15	22,652	24,874	27,050
Transportation and storage (H)	5	5	4	32,457	35,505	34,848
Accommodation and food service activities (I)	7	7	8	16,896	17,724	17,063
Information and communication (J)	4	4	3	36,780	42,628	43,762
Professional, scientific and technical activities (M)	4	4	5	51,146	57,442	55,695
Administrative and support service activities (N)	5	5	5	22,928	25,391	24,320
Public administration and defence (O)	9	9	11	37,615	41,698	41,345
Education (P)	2	2	3	31,846	34,258	31,776
Human health and social work activities (Q)	7	7	8	38,996	43,438	42,144
Industry (B to E)	13	11	8	32,546	36,899	40,954
Financial, insurance and real estate (K,L)	9	9	13	41,704	48,507	52,202
Arts, entertainment, recreation (R,S)	2	3	5	23,006	25,757	25,755
All NACE economic sectors	100	100	100	31,980	35,951	37,638

Source: Analysis of tax administration data by the Revenue Commissioners. The sample sizes for total tax units are 91,470, 114,864 and 104,012 for 2004, 2007 and 2012 respectively. Activities of households and sectors not stated are not included for the purposes of the analysis. Note that not all taxpayers report a sector of employment on their tax returns so the gross income figures differ slightly from the overall figures. A matching exercise was conducted due to a sector reclassification from Nace Rev 1 to Nace Rev 2 after 2010.

Table 30: *Proportions and Gross Incomes of Tax Units in the Top One Per Cent by Sector, 2004–2012*

	Proportions			*Mean Gross Incomes*		
	2004	*2007*	*2012*	*2004*	*2007*	*2012*
	%	%	%			
Agriculture, forestry and fishing (A)	7.1	7.3	2.9	318,589	489,222	360,626
Construction (F)	7.7	7.5	1.6	622,942	731,808	286,465
Wholesale and retail trade (G)	6.7	4.9	4.8	243,881	305,071	270,227
Transportation and storage (H)	2.2	1.0	0.8	212,093	262,083	240,874
Accommodation and food service activities (I)	3.0	1.8	1.1	358,317	344,882	274,405
Information and communication (J)	3.2	4.3	2.2	227,450	266,672	375,754
Professional, scientific and technical activities (M)	25.4	21.8	17.9	368,001	485,931	420,573
Administrative and support service activities (N)	0.9	1.3	1.2	217,371	290,847	318,289
Public administration and defence (O)	0.8	0.5	0.6	218,464	239,279	225,395
Education (P)	0.3	0.8	0.9	281,000	343,569	216,831
Human health and social work activities (Q)	19.1	20.0	17.1	296,461	355,400	343,551
Industry (B to E)	2.0	3.1	3.2	233,926	273,017	295,006
Financial, insurance and real estate activities (K,L)	20.2	24.7	31.2	456,218	432,903	378,143
Arts, entertainment, recreation (R,S)	0.9	0.8	0.9	500,755	604,324	308,657
All NACE economic sectors	100	100	100	367,238	431,361	362,978

Source: Analysis of tax administration data by the Revenue Commissioners. The sample sizes for the top one percent of tax units are 743, 910 AND 1,078 for 2004, 2007 and 2012 respectively. Note that not all taxpayers report a sector of employment on their tax returns, particularly in earlier years, so the gross income figures differ slightly from the overall figures. A matching exercise was conducted due to a sector reclassification from Nace Rev 1 to Nace Rev 2 after 2010.

IV CONCLUSIONS

The evidence in this paper suggests that there may be a relationship between the pattern of growth and changes in inequality and that sustainable growth may also be more inclusive. Labour earnings grew in a similar way across the income distribution during the sustainable growth period prior to 2002, while those in the highest group saw disproportionately strong growth during the property bubble period. In the aftermath of the property bubble burst, labour earnings in the aggregate declined sharply, reflecting essentially the deterioration at the low end of distribution. Capital income has been highly concentrated at the top of distribution, especially during the property bubble period. The crisis alleviated the intensity of capital income concentration but it remains above pre-bubble period levels.

An analysis of income mobility over time shows mobility has been low at both ends of the income distribution. It increased, however, at the low end once the crisis began, reflecting the sharp deterioration of the labour market, as more people including those at the highest income groups moved down into the lowest income group, reflecting the sharp deterioration of the labour market. This relatively abrupt downward mobility was offset by relatively incremental upward mobility in the rest of the population within the distribution, while shifting the entire income distribution downward.

The very highest income households in the top 1 per cent are characterised by a very high share of income coming from capital and low income mobility over time. Around half of the top 1 per cent tax units in 2007 remained in the same position in 2012, partly explained by a number of outstanding tax units with extraordinarily high incomes. The share of the top 1 per cent tax units in the finance, insurance and real estate sectors has increased to around one-third, which is disproportionately high with respect to the total number of employment in these sectors. In contrast, the share of the top 1 per cent tax units in the construction sector declined markedly after the crisis.

The income tax and benefit system plays a strong role in reducing inequality in Ireland. The data show strong progressivity of taxation at the high end of distribution. The average effective tax rate at the top decile is 24.5 per cent, against 14.4 per cent for all tax units. Those who are at the top decile pay 59 per cent of total income tax, although their share of market income is 37 per cent. The progressivity in the tax and benefit system became steeper over the last decade by increased tax credits and reduced tax allowances (which used to disproportionately favour the highest income groups), both contributing to redistribution toward low- and middle-income groups. The welfare system provides the most significant support to households in lower income deciles.

Overall, the share of those who are up to the 8th decile becomes higher in after tax income than in market income.

The design of tax credits and benefits should be closely assessed, particularly for those that are withdrawn with income as they drive marginal effective tax rates up when they are withdrawn and can create disincentives to work/earn more (see O'Connor *et al*., 2015). Also, still a large share of total tax allowances is enjoyed by top income groups (as 53.1 per cent of the tax allowances identified in this paper accruing to the top 10 per cent of tax units). Scaling back some of these allowances could be good not only from a revenue-raising and efficiency perspective but also from an equity perspective.

Previously, income distributions based on the tax records have always been presented as an annual snapshot in Ireland. For the first time, this research draws from a newly developed longitudinal view of the tax records, which allows for measuring the extent of income mobility over time. This unique data has the potential to be used for important future work including for example a multivariate examination of the factors associated with income mobility.

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ANNEX

MOBILITY ANALYSIS SAMPLING ISSUES AND DATA DESCRIPTION

The Sample

Since the focus of the analysis is income inequality, it is particularly important to ensure that the sample accurately represents the income distribution of the taxpayer population in Ireland. To achieve this, a stratified randomisation approach was employed as follows. First, for each unique tax unit, a new variable was constructed summing gross income across all years from 2004 to 2012. There were a total of 3.4 million unique tax units over the period. Second, the variable was stratified into ten gross income deciles of 341,434. Third, simple randomisation was applied to each decile to obtain representative decile samples of 17,500 tax units. The deciles were then appended to give the total sample. A representative sample of 175,000 tax units was obtained; each observed in 5.7 years on average. To test the quality of the randomisation process, the distributions of certain variables are compared between the sample and the population (Table A1). Overall, the results show that block randomisation produces a sample that is representative of the approximately 2.1 million tax units each year in the total taxpayer population.

Table A1: *Comparison of Sample and Population, Average Gross Income Percentiles 2012*

	Sample (107,801)			*Population (2,107,099)*			
	N	*Mean*	*Median*	*N*	*Mean*	*Median*	*% Diff*
1	1,080	22	0	21,082	21	0	–3.77
2	1,083	346	346	21,063	344	345	–0.65
3	1,074	779	774	21,074	773	771	–0.71
4	1,076	1,233	1,236	21,064	1,226	1,225	–0.56
5	1,078	1,735	1,737	21,060	1,719	1,717	–0.91
6	1,079	2,256	2,255	21,101	2,244	2,244	–0.53
7	1,077	2,782	2,773	21,052	2,790	2,788	0.31
8	1,078	3,335	3,333	21,073	3,364	3,362	0.86
9	1,079	3,940	3,940	21,077	3,966	3,966	0.66
10	1,079	4,592	4,593	21,071	4,585	4,582	–0.15
11	1,077	5,207	5,200	21,053	5,200	5,200	–0.13
12	1,077	5,851	5,850	21,078	5,835	5,836	–0.27
13	1,078	6,490	6,470	21,062	6,489	6,485	–0.01
14	1,082	7,162	7,163	20,992	7,152	7,153	–0.14
15	1,076	7,840	7,846	21,150	7,816	7,814	–0.31
16	1,076	8,496	8,494	21,087	8,464	8,461	–0.38
17	1,079	9,156	9,152	21,072	9,129	9,128	–0.30
18	1,078	9,803	9,797	21,053	9,778	9,776	–0.26

Table A1: *Comparison of Sample and Population, Average Gross Income Percentiles 2012 (Contd.)*

	Sample (107,801)			*Population (2,107,099)*			
	N	*Mean*	*Median*	*N*	*Mean*	*Median*	*% Diff*
19	1,079	10,452	10,450	21,077	10,407	10,403	–0.43
20	1,077	11,059	11,051	21,077	10,989	10,973	–0.64
21	1,077	11,733	11,734	21,073	11,628	11,627	–0.89
22	1,079	12,360	12,371	21,063	12,255	12,258	–0.86
23	1,077	12,934	12,950	21,077	12,838	12,842	–0.75
24	1,078	13,458	13,460	21,084	13,383	13,381	–0.56
25	1,078	14,002	14,000	21,060	13,937	13,938	–0.46
26	1,078	14,571	14,586	21,079	14,497	14,497	–0.51
27	1,078	15,119	15,109	21,070	15,052	15,045	–0.44
28	1,081	15,673	15,670	21,062	15,604	15,600	–0.44
29	1,078	16,180	16,171	21,070	16,134	16,127	–0.28
30	1,078	16,705	16,695	21,071	16,661	16,656	–0.26
31	1,076	17,236	17,240	21,058	17,196	17,197	–0.23
32	1,077	17,737	17,735	21,085	17,712	17,712	–0.14
33	1,078	18,228	18,215	21,070	18,197	18,200	–0.17
34	1,079	18,741	18,739	21,061	18,697	18,699	–0.24
35	1,077	19,265	19,269	21,070	19,223	19,227	–0.21
36	1,079	19,784	19,787	20,904	19,742	19,743	–0.21
37	1,077	20,286	20,290	21,255	20,247	20,245	–0.19
38	1,078	20,774	20,784	21,064	20,739	20,742	–0.17
39	1,078	21,275	21,273	21,073	21,241	21,241	–0.16
40	1,078	21,786	21,780	21,070	21,764	21,761	–0.10
41	1,079	22,301	22,305	21,055	22,289	22,293	–0.05
42	1,077	22,828	22,828	21,096	22,820	22,821	–0.04
43	1,079	23,338	23,331	21,061	23,352	23,356	0.06
44	1,077	23,890	23,899	21,079	23,889	23,896	0.00
45	1,078	24,433	24,435	21,066	24,415	24,414	–0.07
46	1,079	24,964	24,971	21,064	24,948	24,959	–0.06
47	1,077	25,491	25,494	21,075	25,476	25,477	–0.06
48	1,078	26,028	26,021	21,073	26,012	26,000	–0.06
49	1,078	26,561	26,559	21,080	26,558	26,556	–0.01
50	1,078	27,116	27,109	21,059	27,122	27,120	0.02
51	1,079	27,692	27,704	21,070	27,699	27,702	0.03
52	1,077	28,255	28,247	21,075	28,282	28,280	0.09
53	1,079	28,874	28,878	21,068	28,895	28,896	0.07
54	1,077	29,527	29,534	21,082	29,529	29,531	0.00
55	1,078	30,152	30,145	21,053	30,150	30,141	0.00
56	1,078	30,775	30,778	21,073	30,784	30,784	0.03
57	1,078	31,415	31,417	21,080	31,419	31,420	0.01
58	1,078	32,075	32,076	21,079	32,072	32,066	–0.01
59	1,078	32,726	32,724	21,061	32,728	32,741	0.01
60	1,078	33,412	33,416	21,060	33,392	33,390	–0.06
61	1,078	34,130	34,115	21,094	34,102	34,098	–0.08

Table A1: *Comparison of Sample and Population, Average Gross Income Percentiles 2012 (Contd.)*

	Sample (107,801)			*Population (2,107,099)*			
	N	*Mean*	*Median*	*N*	*Mean*	*Median*	*% Diff*
62	1,078	34,854	34,864	21,056	34,824	34,829	–0.09
63	1,078	35,564	35,567	21,089	35,547	35,548	–0.05
64	1,078	36,290	36,295	21,063	36,281	36,280	–0.03
65	1,080	37,059	37,064	21,054	37,037	37,031	–0.06
66	1,076	37,830	37,828	21,070	37,814	37,814	–0.04
67	1,079	38,627	38,622	21,071	38,614	38,610	–0.03
68	1,077	39,497	39,494	21,080	39,448	39,447	–0.12
69	1,078	40,324	40,320	21,073	40,281	40,277	–0.11
70	1,078	41,224	41,216	21,070	41,162	41,161	–0.15
71	1,079	42,183	42,181	21,070	42,098	42,095	–0.20
72	1,077	43,159	43,172	21,072	43,066	43,061	–0.22
73	1,078	44,151	44,150	21,074	44,085	44,085	–0.15
74	1,080	45,155	45,147	21,065	45,124	45,116	–0.07
75	1,076	46,197	46,188	21,075	46,205	46,201	0.02
76	1,078	47,341	47,360	21,069	47,348	47,354	0.01
77	1,078	48,547	48,544	21,070	48,522	48,518	–0.05
78	1,078	49,787	49,783	21,066	49,740	49,746	–0.09
79	1,078	51,065	51,069	21,080	51,002	50,999	–0.12
80	1,078	52,429	52,417	21,068	52,346	52,339	–0.16
81	1,078	53,885	53,887	21,069	53,791	53,789	–0.17
82	1,078	55,466	55,474	21,078	55,359	55,350	–0.19
83	1,078	57,127	57,127	21,068	57,052	57,045	–0.13
84	1,079	58,909	58,924	21,072	58,854	58,848	–0.09
85	1,077	60,875	60,839	21,074	60,794	60,784	–0.13
86	1,078	62,940	62,897	21,067	62,885	62,876	–0.09
87	1,078	65,124	65,111	21,071	65,116	65,111	–0.01
88	1,078	67,555	67,563	21,073	67,510	67,500	–0.07
89	1,078	70,071	70,000	21,068	70,115	70,103	0.06
90	1,078	73,037	72,971	21,071	72,956	72,933	–0.11
91	1,078	76,401	76,379	21,087	76,205	76,181	–0.26
92	1,078	80,143	80,124	21,059	79,945	79,957	–0.25
93	1,078	84,397	84,431	21,069	84,258	84,229	–0.16
94	1,078	89,537	89,501	21,068	89,407	89,367	–0.15
95	1,078	95,954	95,938	21,071	95,675	95,637	–0.29
96	1,078	103,869	103,724	21,070	103,524	103,396	–0.33
97	1,078	114,553	114,212	21,072	114,323	114,100	–0.20
98	1,078	130,667	130,012	21,072	130,735	130,217	0.05
99	1,078	162,741	160,510	21,075	163,022	160,949	0.17
100	1,078	362,978	265,085	21,070	369,745	264,660	1.86
Total	107,801	37,638	27,392	2,107,099	37,668	27,411	0.07

Source: Source: Analysis of tax administration data by the Revenue Commissioners. Mean and medians reported refer to average incomes within the percentile ranges. Percentage difference column refers to mean percentage differences.

Balanced Panel

It is also possible to construct a balanced panel from the sample data, that is, a subset of the data in which only tax units observed in all 9 years are included. Descriptive statistics for a balanced panel are shown in table A2. The balanced panel consists of 50,144 tax units observed in all 9 years (451,296 pooled observations). According to the analysis, tax units observed in all years have significantly higher incomes at lower deciles, higher incomes at middle deciles and moderately higher incomes at higher deciles than those in the unbalanced panel. These differences arise as a result of a different distribution of characteristics among tax units in the balanced and unbalanced panels. For example, tax units in a balanced panel are likely to have been in full-time employment for the full 9-year period. In general, taxpayers who sustain employment over longer periods are more likely to increase their incomes through pay rises. Taxpayers in the balanced panel are less likely to be students, part-time workers and unemployed persons since these cohorts are much more likely to 'fall out of' the tax records in a given year. They also have much lower incomes on average, particularly at the lower end of the income distribution (it could also be that the likelihood of unemployment is higher at lower incomes although we do not have direct evidence for this).

Table A2: *Balanced Panel Mean Summary Statistics by Decile, 2004, 2008 and 2012*

Year	*Deciles*	*Gross Income*	*USC*	*Income Tax*	*Taxable Income*	*Personal Credit*	*PAYE Credit*
2004	1	4,282		404	4,383	879	83
	2	11,583		315	11,391	1,598	706
	3	17,471		895	17,106	1,761	971
	4	22,607		1,587	22,063	1,809	1,036
	5	27,708		2,426	26,988	1,858	1,080
	6	33,341		3,746	32,308	2,025	1,130
	7	40,286		5,614	38,916	2,212	1,213
	8	49,950		8,175	47,952	2,396	1,334
	9	64,826		12,227	61,760	2,627	1,487
	10	145,149		37,398	127,992	2,792	1,553
	Total	41,719		9,277	39,659	2,015	1,171
2008	1	9,238		605	9,196	2,192	1,834
	2	19,436		600	18,922	2,201	1,830
	3	25,700		1,281	24,986	2,184	1,861
	4	31,372		2,051	30,418	2,191	1,915
	5	37,280		3,112	36,032	2,264	2,009
	6	43,918		4,578	42,341	2,395	2,126
	7	52,499		6,538	50,325	2,630	2,347

Table A2: *Balanced Panel Mean Summary Statistics by Decile, 2004, 2008 and 2012 (Contd.)*

Year	*Deciles*	*Gross Income*	*USC*	*Income Tax*	*Taxable Income*	*Personal Credit*	*PAYE Credit*
	8	64,359		9,351	61,385	2,861	2,538
	9	83,075		14,218	78,081	3,143	2,735
	10	183,699		44,625	159,349	3,343	2,756
	Total	55,056		10,829	51,498	2,474	2,199
2012	1	8,624	316	556	8,360	2,023	1,698
	2	18,318	534	618	17,966	2,094	1,736
	3	24,289	819	1,287	23,619	2,188	1,818
	4	29,541	1,188	2,054	28,870	2,230	1,856
	5	34,944	1,499	2,925	34,225	2,292	1,922
	6	41,067	1,892	4,301	40,017	2,370	2,020
	7	48,683	2,424	6,366	47,395	2,482	2,134
	8	59,171	3,084	8,668	57,074	2,693	2,330
	9	76,379	4,285	13,338	73,283	2,910	2,557
	10	159,394	10,468	41,192	145,340	3,025	2,582
	Total	50,039	3,009	10,080	49,656	2,431	2,072

Source: Analysis of tax administration data by the Revenue Commissioners. Panel consists of 50,144 tax units observed in all 9 years.

Table A3 shows selected variables by decile for 2004 and 2012. Between 2004 and 2008, mean gross income shifted upwards significantly within all deciles with the exception of the first decile, which remained approximately the same. Between 2008 and 2012, most deciles saw a decline in mean gross income. The highest declines were in the 9th (–7 per cent), 1st (–6 per cent) and 10th (–3 per cent) deciles. The analysis also shows that the personal and PAYE credits have increased between 2004 and 2012 and are larger among higher decile tax units reflecting policy changes in tax credits over the period. Single (jointly-assessed) credits increased from €1,760 (€3,520) in 2007 to €1,830 (€3,360) in 2010 and were then reduced to €1,650 (3,300) in 2012.

Region, Taxpayer Type and Status

This section provides selected sample descriptive statistics by region, tax unit type and tax unit status. Before presenting the results, it is instructive to define the three classifications. First, Revenue has four regional divisions for the purposes of this analysis as follows: Dublin Region; Border, Midlands and West (BMW) Region; East South-East (ESE) Region and South-West Region (SW).[27]

[27] Revenue also has a fifth regional division, Large Cases Division (LCD), which is excluded from the analysis. LCD was created to be responsible for all taxes and duties by Revenue's biggest customers regardless of geographic location.

Table A3: *Summary Statistics for Selected Variables by Decile, 2004 and 2012*

Year	*Deciles*	*Gross Income*	*USC*	*Income Tax*	*Taxable Income*	*Personal Credit*	*PAYE Credit*
2004	1	2,225		360	2,309	469	1,090
	2	6,935		460	6,870	1,318	166
	3	11,723		285	11,573	1,592	765
	4	16,459		720	16,196	1,732	972
	5	21,066		1,421	20,639	1,782	1,025
	6	26,127		2,165	25,533	1,820	1,068
	7	32,199		3,544	31,352	1,969	1,115
	8	40,498		5,810	39,244	2,182	1,212
	9	54,137		9,403	52,030	2,452	1,372
	10	119,012		29,733	107,492	2,735	1,527
	Total	33,037		7,874	31,914	1,823	1,105
2012	1	2,102	1,203	367	2,224	1,778	1,657
	2	8,152	239	505	8,002	1,813	1,672
	3	14,274	364	673	14,013	1,909	1,688
	4	19,512	608	625	19,225	1,988	1,717
	5	24,695	877	1,407	24,228	2,114	1,812
	6	30,491	1,259	2,237	29,930	2,197	1,876
	7	37,541	1,677	3,522	36,861	2,305	1,976
	8	47,003	2,311	5,949	45,923	2,450	2,117
	9	62,499	3,324	9,689	60,520	2,722	2,369
	10	130,065	8,233	31,860	121,214	2,980	2,579
	Total	37,633	2,479	8,575	37,307	2,226	1,957

Source: Analysis of tax administration data by the Revenue Commissioners.

Second, tax units are categorised into two types – PAYE employees and self-assessed businesses. In the IDS data, tax units are assigned to one of the two categories conditional on which category type comprises a greater proportion of overall income.[28] Third, tax units are categorised under six personal statuses as follows: single males, single females, married two-earners, married one-earners, widowers and widows. As mentioned, it's important to note that a married couple who has elected for joint assessment is counted as one tax unit.[29]

Table A4 shows average gross incomes and the number of tax units by region for 2004, 2008 and 2012. As expected, Dublin has the highest mean income for all years. While mean incomes are higher than median incomes across all regions, the difference is consistently highest in Dublin. This reflects

[28] Specifically, a tax unit is defined as a PAYE tax unit if 50 per cent or more of its gross income is comprised of PAYE income. Similarly, a tax unit is defined as a self-assessed tax unit if 50 per cent or more of its gross income is comprised of self-assessed income.

[29] It is also possible that a married couple can also opt for single assessment in which case they would be counted as two single units.

the relatively higher proportion of outlying taxpayers with very high incomes in the Dublin area. The Border, Midlands, West (BMW) region has the lowest incomes on average.

Table A4*: Summary Gross Income Statistics, by Region, 2004, 2008 and 2012*

	2004			*2008*			*2012*		
Region	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*
Dublin	35,940	24,686	32,122	43,114	28,708	38,681	41,286	28,828	34,792
Border, Midlands, West	29,393	21,770	20,645	34,515	25,885	24,429	33,184	25,847	22,194
East South-East	31,783	23,546	22,738	36,888	27,223	27,129	35,416	26,755	24,540
South-West	32,510	23,555	24,327	38,081	27,964	28,804	37,075	27,619	26,212
Total	32,804	23,525	99,832	38,713	27,591	119,043	37, 255	27,384	107,738

Source: Analysis of tax administration data by the Revenue Commissioners. LCD cases and those with erroneously reported locations are excluded.

Table A5 shows summary income statistics for PAYE employees and self-assessed business tax units for 2004, 2008 and 2012. PAYE tax units make up the vast majority of tax units in all years; over 90 per cent in 2012. Self-assessed taxpayers have consistently higher mean incomes. The relatively wider gap between the mean and the median for the self-assessed category signals a wider distribution and a greater number of outliers compared with PAYE employees.

Table A5*: Summary Gross Income Statistics, by Taxpayer Type, 2004, 2008 and 2012*

	2004			*2008*			*2012*		
Region	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*
PAYE	30,605	23,180	88,909	36,385	27,149	109,158	36,289	27,456	98,683
Self-Assessed	52,677	26,863	10,976	67,163	33,854	9,924	52,236	26,530	9,118
Total	33,031	23,522	99,885	38,954	27,592	119,082	37,638	27,392	107,801

Source: Analysis of tax administration data by the Revenue Commissioners.

Table A6 shows summary statistics for tax units by personal status for 2004, 2008 and 2012. According to the analysis, married two-earners consistently have the highest incomes across all years followed by married one-

earners. This is to be expected since these tax units represent two taxpayers. The analysis also shows that, on average, tax units with a single male status earned more than those with a single female status in 2004 and 2008. By 2012, the mean gap is no longer significant and, calculated on a median basis tax units with a single female status have higher gross incomes.

Table A6*: Summary Gross Income Statistics, by Status, 2004, 2008 and 2012*

	2004			*2008*			*2012*		
Region	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*	*Mean*	*Median*	*No. Tax Units*
Single Male	23,226	18,995	33,061	26,347	21,564	39,216	24,593	19,398	31,042
Single Female	20,682	17,125	29,138	24,673	20,450	34,568	24,586	20,259	29,966
Married Two-Earner	65,625	54,314	17,194	76,826	62,804	21,891	68,745	57,319	22,212
Married One-Earner	42,486	29,586	16,733	48,584	33,609	9,483	44,271	32,567	20,343
Widower	30,897	22,381	990	40,423	28,688	1,070	36,930	26,649	1,183
Widow	21,264	16,362	2,769	28,223	21,784	2,854	28,150	22,694	3,055
Total	33,031	23,522	99,885	38,950	27,592	119,082	37,638	27,392	107,801

Source: Analysis of tax administration data by the Revenue Commissioners.

Gross Income Percentiles and Ratio Analysis

Table A7 shows gross income thresholds[30] for different percentiles and ratios for selected points along the percentile income distribution. A full set of gross incomes by percentile is available in Table A8).

According to the analysis, developments in percentile income thresholds approximately followed economic activity in the economy more broadly. Median incomes for example rose from €23,522 in 2004 to €27,592 in 2008 before declining to €27,200 in 2010 and recovering moderately to €27,392 in 2012. Similar trends are observed in the 80th, 90th and 99th percentile cohorts. Between 2004 and 2008, income generally grew faster in the higher percentile cohorts. For example, in the 50th, 80th and 90th percentiles income grew by 16 per cent, 15 per cent and 16 per cent respectively over the period. By comparison, income growth in the 10th percentile cohort was only 10 per cent. The largest proportional declines between 2008 and 2010 were in the 10th percentile cohort (–7 per cent) and the top 1 per cent (–7 per cent). The 10th percentile cohort recorded the fastest relative income growth between 2010 and 2012.

[30] The maximum gross income reported for the percentile in question.

Table A7: *Gross Income Thresholds by Percentile (1 to 50), 2004–2012*

	2004	*2006*	*2008*	*2010*	*2012*
1	373	306	223	157	131
2	894	764	666	519	560
3	1,374	1,209	1,155	954	1,005
4	1,809	1,647	1,654	1,396	1,472
5	2,251	2,082	2,175	1,852	1,993
6	2,688	2,520	2,696	2,373	2,510
7	3,119	2,962	3,222	2,889	3,052
8	3,558	3,392	3,778	3,450	3,633
9	4,000	3,860	4,350	4,005	4,270
10	4,475	4,350	4,957	4,600	4,909
11	4,956	4,837	5,493	5,200	5,509
12	5,435	5,320	6,104	5,838	6,178
13	5,950	5,840	6,736	6,473	6,825
14	6,452	6,350	7,410	7,127	7,496
15	6,963	6,914	8,026	7,750	8,163
16	7,470	7,515	8,703	8,400	8,832
17	7,956	8,100	9,348	9,043	9,476
18	8,410	8,671	9,997	9,676	10,124
19	8,840	9,241	10,612	10,319	10,784
20	9,300	9,786	11,225	10,966	11,405
21	9,779	10,251	11,749	11,481	12,046
22	10,236	10,764	12,280	12,069	12,653
23	10,705	11,290	12,869	12,639	13,196
24	11,208	11,827	13,433	13,217	13,718
25	11,702	12,381	14,021	13,821	14,284
26	12,207	12,901	14,600	14,394	14,842
27	12,732	13,460	15,190	14,941	15,414
28	13,197	14,000	15,776	15,520	15,926
29	13,672	14,529	16,381	16,084	16,450
30	14,175	15,054	16,947	16,653	16,974
31	14,641	15,582	17,507	17,204	17,481
32	15,077	16,044	18,042	17,754	17,995
33	15,549	16,527	18,523	18,246	18,481
34	16,004	17,001	19,043	18,743	19,006
35	16,473	17,490	19,547	19,250	19,524
36	16,898	17,944	20,076	19,779	20,030
37	17,360	18,400	20,590	20,279	20,542
38	17,800	18,890	21,096	20,797	21,016
39	18,256	19,402	21,614	21,300	21,536
40	18,710	19,888	22,161	21,845	22,047
41	19,158	20,357	22,643	22,374	22,557
42	19,638	20,819	23,188	22,870	23,086
43	20,070	21,332	23,733	23,369	23,619
44	20,549	21,860	24,267	23,897	24,155

Table A7: *Gross Income Thresholds by Percentile (1 to 50), 2004–2012 (Contd.)*

	2004	*2006*	*2008*	*2010*	*2012*
45	21,026	22,370	24,816	24,427	24,703
46	21,501	22,886	25,353	24,954	25,226
47	22,003	23,395	25,888	25,494	25,758
48	22,506	23,920	26,449	26,016	26,292
49	23,028	24,457	27,027	26,600	26,836
50	23,522	25,000	27,592	27,200	27,392

Source: Analysis of tax administration data by the Revenue Commissioners. Note that thresholds refer to the maximum gross income reported in each percentile.

Table A8: *Gross Income Thresholds by Percentile (50 to 100), 2004–2012*

	2004	*2006*	*2008*	*2010*	*2012*
51	24,002	25,548	28,198	27,787	27,977
52	24,519	26,118	28,767	28,368	28,539
53	25,029	26,703	29,363	28,992	29,199
54	25,542	27,252	29,984	29,589	29,840
55	26,054	27,859	30,608	30,209	30,469
56	26,622	28,466	31,282	30,873	31,092
57	27,176	29,052	31,984	31,541	31,723
58	27,755	29,691	32,678	32,224	32,419
59	28,269	30,298	33,366	32,947	33,044
60	28,889	30,918	34,079	33,637	33,772
61	29,517	31,574	34,814	34,336	34,511
62	30,119	32,240	35,516	35,009	35,194
63	30,754	32,944	36,269	35,728	35,934
64	31,415	33,654	37,046	36,440	36,670
65	32,131	34,387	37,835	37,194	37,445
66	32,831	35,124	38,640	37,954	38,214
67	33,534	35,911	39,456	38,731	39,051
68	34,236	36,668	40,303	39,553	39,926
69	35,011	37,485	41,219	40,380	40,751
70	35,795	38,362	42,179	41,235	41,696
71	36,630	39,234	43,149	42,148	42,668
72	37,466	40,183	44,223	43,078	43,648
73	38,352	41,157	45,300	44,096	44,653
74	39,296	42,219	46,385	45,153	45,646
75	40,278	43,299	47,535	46,240	46,749
76	41,293	44,444	48,781	47,348	47,922
77	42,400	45,573	50,027	48,571	49,175
78	43,554	46,828	51,398	49,817	50,403
79	44,738	48,145	52,895	51,145	51,727
80	46,083	49,590	54,418	52,571	53,142
81	47,431	51,038	56,060	54,085	54,640

Table A8: *Gross Income Thresholds by Percentile (50 to 100), 2004–2012 (Contd.)*

	2004	*2006*	*2008*	*2010*	*2012*
82	48,834	52,611	57,742	55,729	56,291
83	50,311	54,239	59,573	57,436	57,969
84	51,929	56,129	61,547	59,274	59,889
85	53,669	58,101	63,749	61,339	61,940
86	55,487	60,191	66,061	63,495	63,979
87	57,327	62,429	68,493	65,901	66,289
88	59,376	64,749	71,184	68,306	68,754
89	61,742	67,269	74,136	70,963	71,477
90	64,522	70,366	77,469	73,951	74,722
91	67,682	73,892	80,970	77,361	78,182
92	71,037	77,911	85,057	81,339	82,121
93	75,095	82,362	90,095	85,943	86,758
94	80,052	87,775	96,259	91,430	92,541
95	86,334	94,760	103,975	98,480	99,501
96	94,538	104,072	113,855	107,517	108,648
97	105,860	117,393	127,448	120,453	121,373
98	123,742	137,864	150,298	141,951	142,246
99	172,776	194,307	205,965	191,975	192,479
Total	33,031	35,933	38,950	37,276	37,638

Source: Analysis of tax administration data by the Revenue Commissioners. Note that thresholds refer to the maximum gross income reported in each percentile.

ADDITIONAL TRANSITION MATRICES

This section examines two sets of transition matrices, before and after the recession, over an even length of years. The results are qualitatively similar to those in the main text but compared to the different length transition matrices (comparing 2004 to 2007 and 2007 to 2012), relatively less mobility is observed, evidenced by similar diagonal proportions post-crisis. Significant downward mobility from the top to the bottom deciles is also observed in the post-crisis period. Table A9 and A10 show the income transition matrices for the three year periods 2004 to 2007 and then 2007 to 2010.

Table A9: *Income Mobility of Tax Units by Decile, 2004–2007*

	Deciles 2007									
Deciles 2004	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	44.3	20.5	11.9	8.1	5.4	4.4	2.6	1.3	0.8	0.6
2	24.2	29.3	14.8	11.5	8.0	5.7	3.7	1.6	1.0	0.3
3	11.1	25.6	25.1	14.7	9.0	6.3	4.2	2.3	1.2	0.6
4	7.2	10.0	28.3	24.9	12.8	7.7	4.8	2.4	1.4	0.4
5	4.3	6.0	9.4	24.0	27.0	14.3	7.9	4.5	1.9	0.8
6	3.3	3.7	4.7	8.4	23.6	28.6	14.8	7.9	3.7	1.3
7	2.2	2.3	2.7	4.2	7.9	22.2	33.0	16.3	7.2	2.2
8	1.5	1.4	1.7	2.4	3.6	7.0	21.1	39.3	16.9	5.2
9	1.0	0.8	1.0	1.3	2.0	2.9	6.2	20.1	48.7	16.0
10	0.9	0.4	0.5	0.6	0.7	0.9	1.8	4.3	17.4	72.6

Source: Analysis of tax administration data by the Revenue Commissioners.

Table A10: *Income Mobility of Tax Units by Decile, 2007–2010*

	Deciles 2010									
Deciles 2007	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	45.1	22.4	12.8	7.5	4.7	3.6	2.1	0.9	0.5	0.4
2	18.5	31.9	19.8	12.5	7.1	4.7	3.2	1.4	0.5	0.4
3	11.8	15.4	30.1	20.8	10.1	5.4	3.6	1.7	0.8	0.3
4	7.1	10.8	13.8	29.2	22.5	7.9	4.7	2.5	1.1	0.4
5	5.5	6.2	8.8	12.5	28.7	22.9	8.8	4.0	2.0	0.6
6	4.0	5.2	5.6	7.2	12.3	30.0	23.5	7.6	3.5	1.0
7	3.3	3.5	3.6	4.9	6.5	12.8	31.8	24.0	7.3	2.4
8	2.4	2.6	3.0	2.9	4.3	7.0	13.5	37.5	22.2	4.5
9	1.4	1.2	1.6	1.6	2.7	4.2	6.5	15.3	46.5	19.0
10	0.9	0.8	0.8	0.8	1.1	1.6	2.4	5.0	15.7	71.1

Source: Analysis of tax administration data by the Revenue Commissioners.

Table A11 and A12 show the income transition matrices for the four year periods 2004 to 2008 and 2008 to 2012.

Table A11: *Income Mobility of Tax Units by Decile, 2004–2008*

	Deciles 2008									
Deciles 2004	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	39.6	20.2	12.5	9.5	6.2	5.7	2.9	1.8	1.2	0.6
2	23.1	26.7	14.6	12.1	9.1	6.7	4.3	2.0	1.0	0.4
3	11.9	24.0	24.9	13.7	9.6	6.7	4.3	2.7	1.5	0.8
4	8.1	11.4	25.2	24.2	13.3	7.9	5.0	2.9	1.5	0.6
5	5.9	6.7	9.6	21.7	24.6	14.1	8.5	5.4	2.5	1.1
6	4.0	4.7	5.3	8.9	21.1	25.9	15.2	8.7	4.7	1.6
7	2.9	2.8	3.6	4.5	8.3	20.1	30.0	16.6	8.2	3.0
8	2.2	1.9	2.5	3.0	4.4	7.9	20.1	34.1	18.0	6.0
9	1.2	1.0	1.3	1.7	2.3	3.6	7.5	20.3	43.9	17.0
10	1.2	0.7	0.5	0.7	1.2	1.5	2.3	5.4	17.7	68.9

Source: Analysis of tax administration data by the Revenue Commissioners.

Table A12: *Income Mobility of Tax Units by Decile, 2008–2012*

	Deciles 2012									
Deciles 2008	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	38.8	22.6	14.4	8.8	6.3	4.1	2.4	1.2	0.9	0.6
2	20.9	28.9	18.1	11.8	7.7	6.0	3.9	1.7	0.7	0.4
3	12.3	17.7	29.4	18.4	9.4	5.7	4.1	1.8	0.9	0.5
4	7.5	10.8	14.6	28.7	19.5	9.2	5.3	2.8	1.1	0.4
5	6.4	7.1	9.1	13.5	28.5	19.2	8.6	4.7	2.3	0.7
6	4.6	4.9	5.7	7.7	12.7	28.9	21.2	8.9	4.1	1.4
7	3.5	3.4	3.8	5.1	7.3	13.3	30.2	22.3	8.3	2.7
8	2.4	2.5	2.6	3.3	4.9	7.7	14.3	35.0	21.4	5.9
9	1.9	1.4	1.5	1.8	2.7	4.5	7.6	16.3	43.2	19.2
10	1.7	0.8	0.7	1.0	1.0	1.6	2.5	5.4	17.1	68.2

Source: Analysis of tax administration data by the Revenue Commissioners.