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# INCOME TAX REVENUE ELASTICITIES IN IRELAND: AN ANALYTICAL APPROACH

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Jean Acheson, Yota D. Deli, Derek Lambert  
and Edgar L.W. Morgenroth

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## Abbreviations

MIR	Mortgage interest relief
PAYE	Pay As You Earn
USC	Universal Social Charge

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# Chapter 1

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## Introduction

Over the last decade, Irish tax revenue has been subject to significant fluctuations, especially during the financial crisis, when total Exchequer tax receipts declined by over 30 per cent. As income tax is the largest individual source of tax revenue in Ireland, accounting for over 30 per cent of the total, fluctuations in this source of revenue have a significant bearing on the total tax revenue. The purpose of this paper is to analyse the responsiveness of income tax revenue to changes in income and how this is related to the structure of the tax system and the distribution of income. The lower the responsiveness of revenue to a change in income, the less volatile the tax revenue from this source becomes, but this also implies lower progressivity of the income tax system. This trade-off between responsiveness and progressivity is of particular importance in an Irish context as the income tax system is highly affected by the existence of tax credits, which by construction drive the size of the elasticity upwards.

Using readily available administrative data and parameters from the Irish income tax system, income tax revenue elasticities are calculated for the period 2003–13, and for different income levels and types of taxpayer.<sup>1</sup> An unusual feature of the Irish tax system, compared to other European ones, is the existence of the tax credits for the main income tax, while a more conventional system applies to the Universal Social Charge (USC). The tax credit structure provides a unique opportunity to assess whether a tax credit system is more or less progressive than the traditional multiple threshold ones. The estimates complement other current ESRI research on revenue elasticities (see Deli et al., 2016) but provide a more granular level of detail, which should prove useful for tax forecasting and policymaking.

Tax revenue elasticities are useful for the improved design of tax policy. They measure the percentage change in tax revenue in response to a percentage change in the tax base (i.e. the item or amount on which the tax rate is applied, in this case incomes). However, unlike tax buoyancy – which is similarly defined, but typically measured at an aggregate level with reference to GDP – tax elasticities are hypothetical constructs, as they are calculated as if there were no discretionary

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<sup>1</sup> We would like to thank Larry McCarthy in the Revenue Commissioners for assistance with data that were not publically available.



changes to tax policy, such as changes in tax rates. As such, the elasticity gives an indication of the automatic growth potential of the tax system.

The tax revenue elasticity of any type of tax measures the degree to which revenue responds to changes in the specific tax base. Any such elasticity can be expressed as the ratio of the marginal tax rate to the average tax rate, thus equating to measures of tax progressivity for a given income level (Creedy and Gemmell, 2011). It is important to remember that a tax policy change designed to improve progressivity can have consequences for the tax elasticity, and vice versa.

Our research provides some key points for understanding the Irish tax system and for implementing tax policy. Again, the fact that Ireland is a country that uses two structures of income taxation enables us to draw results on the differences between tax systems. In particular, we find the following.

- Tax credits comprise a structural parameter, which add to the progressivity of a tax system as they substantially reduce the average tax rate at low levels of income. However, they also act as a channel for strong revenue responsiveness, as the revenue of taxpayers who are near to exhausting their tax credits (or to the crossing of a threshold) are more responsive to marginal changes in their taxable income.
- Income tax elasticity estimates are higher than USC estimates, but are also more volatile. This makes income tax revenue more sensitive to the economic cycle than the revenue arising from USC.
- We are able to identify the taxpayers by income group and household type whose revenues are most responsive to income changes and who influence the overall elasticity result.
- Accounting for the different growth rates in income across the income distribution results in a considerably larger elasticity estimate, as higher earners typically experience faster income growth than growth in aggregate income. They also pay the most taxes.
- Any additional credit or relief increases the elasticity. For example, a policy like mortgage interest relief reduces average tax rates and makes those at either the entry point to paying tax or the standard rate threshold more responsive to income changes.
- The discretionary measures used in Ireland for the period examined were revenue-reducing compared to the automatic growth baseline that our estimates represent.

To compare our results with those of other countries, we follow the analysis of Creedy and Gemmell (2003b, 2004). Specifically, Creedy and Gemmell (2004) show

how budgetary changes in the UK, including income-related deductions such as pension contribution relief and mortgage interest relief, substantially affected (reduced) income tax revenue elasticities. We also see that the New Zealand tax system bears more resemblance to the Irish system, with both having fewer income-related allowances than in the UK, alongside no initial tax-free allowance (Creedy and Gemmell, 2003b). However, of the three countries, Ireland is the only one with income tax credits. Ireland's baseline revenue elasticity for income tax is 2.0 (based on the tax structure over 2003–13) and 1.2 for USC (based on 2011–13). By contrast, the baseline elasticity is 1.3 for New Zealand (based on the 2001 tax structure) and 1.4 for the UK (based on the 2000 tax structure).<sup>2</sup>

Other papers in the tax elasticity literature typically rely on time series analysis to compute elasticities. For example, Van den Noord (2000) obtains unbiased estimates of the elasticity using time series and tax revenue data cleaned of discretionary measures. Wolswijk (2007) also uses time series data to estimate both short- and long-run elasticities, with the former being important for understanding temporary volatility and the latter for estimating the long-term growth potential of revenues. However, the advantage of the analytical approach, compared to the time series one, is that the elasticities can be derived in terms of relatively few parameters and can provide an understanding of the determinants of revenue elasticities. Besides, they are straightforward to calculate as they are only determined by the tax structure itself and, when aggregated over individual taxpayers, the shape of the income distribution (Creedy and Gemmell, 2011).

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<sup>2</sup> Our methodology slightly differs from Creedy and Gemmell (2003b, 2004) in that we use mean averages of income instead of income drawn from parameterised populations.

# Chapter 2

## Structure and Recent History of the Irish Income Tax System

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### 2.1 INCOME TAX

Income tax is the largest source of tax revenue, accounting for over 30 per cent of all Exchequer tax revenue. Over 90 per cent of taxpayers pay income tax through the Pay-As-You-Earn (PAYE) system, which was introduced in Ireland in the early 1960s. Income tax is self-assessed for the self-employed and for those individuals who receive income from other sources that are not assessed under the PAYE system. Under this system, gross tax is reduced by tax credits. In general, tax credits have the same cash value benefit for all taxpayers regardless of income level, whereas tax-free allowances are worth more to higher earners than low earners, as they result in less of a high earner's gross income being subject to the highest rate of tax.

Income tax credits are non-refundable, meaning that if a taxpayer's gross tax liability is less than their allocation of tax credits the difference is not refunded. Both tax credits and the standard rate cut-off point are determined by an individual's circumstances (for example, whether they are single or married, or a PAYE or non-PAYE taxpayer). Currently, there are only two tax rates and therefore one cut-off point. Prior to the fiscal year 1992–93, the Irish tax system had a three-rate structure, and prior to 1985–86 it had a five-rate structure. Today, Ireland is unusual in an OECD context by only having a two-rate structure; although the trend has been towards fewer rates over the last 30 years, the OECD-average in 2010 was a five-rate structure (OECD, 2012).

Self-assessed taxpayers are allowed to deduct expenses from their trading income, which reduces their taxable income. This is one reason why, prior to Budget 2016, there was no equivalent PAYE credit for the self-assessed (another significant reason is the timing benefits that exist for the self-assessed). PAYE employees are also able to deduct expenses but the definition of expenses is more restrictive.

The income tax burden was reduced significantly in the years up to 2007. For example, the standard rate threshold for a single earner increased from €28,000 in 2002 to €35,400 in 2008 and the personal tax credit increased from €1,520 to €1,830. Other tax credits and bands relating to specific personal circumstances of individuals were also increased during the same period. These increases in tax credits resulted in a reduction in the number of people that were liable to pay income tax.

The main emphases of tax policy in the pre-crisis years were:

- keeping those on the minimum wage out of the tax net;
- keeping those on the average wage out of the liability to pay tax at the higher rate; and
- keeping the overall tax burden low to enhance the rewards for work.

Income taxation did not change immediately after the onset of the economic downturn. In fact, tax credits and bands were increased in 2008, as the full scale of the crisis had yet to be realised. An income levy was introduced in Budget 2009, and the standard threshold for income tax simultaneously increased by €1,000. It was only in Budget 2011 that credits and the standard rate threshold were reduced. Alongside this broadening of the tax base, the rise in unemployment also meant an increase in cases exempt from paying income tax and a decrease in those paying tax at the higher rate. But overall, income tax receipts have been rising since 2011, reflecting a combination of discretionary policy measures (such as lowering of bands and suspension of many income tax reliefs) and a stronger economic activity (i.e. automatic stabiliser effects).

There are a number of tax reliefs available to income taxpayers. Relief for pension contributions, like tax allowances, applies to gross income. This relief applies at the individual's marginal rate of tax, subject to limits that are determined by the age of the individual. Other reliefs are those for medical expenses, health insurance premiums and mortgage interest repayments. These operate like tax credits, with the last two deductible at source. In the past, mortgage interest relief (MIR) was one of the most politically popular tax policies. In particular, in Budget 2007 the ceiling for this relief was doubled for first time house-buyers (and was also increased for non-first time buyers for the first time since 2000). In the Supplementary Budget 2009, however, the relief was restricted to the first seven years of the mortgage. In Budget 2012, the relief was abolished for those who purchased houses from 1 January 2013 onward and the relief is to be fully abolished by end-2017.

The rationale for the abolition of MIR is that it is unlikely to improve affordability for buyers and rather may only result in higher prices. In addition, it raised questions of efficiency, as those in the highest-income deciles are unlikely to need the financial incentive for capital borrowing that MIR provides. However, the May 2016 Programme for Partnership Government contains a commitment to retain MIR beyond its current December 2017 end-date in the context of protecting home ownership. Table 2.1 presents the main parameters of the current income tax system in Ireland (as of Budget 2016). The taxpayer categories demonstrate the

hybrid nature of the Irish tax system where the taxable unit can be an individual or a married couple/civil partnership.

Table 2.1 Structure of the Irish Income Tax System as of Budget 2016

Personal circumstance	PAYE taxpayer				Self-assessed taxpayer
	Single - no children	Widow - no children	Married/CP 1 earner	Married/CP 2 earners	
Personal credit (€)	1, 650	2, 190	3, 300	3, 300	Same as PAYE
PAYE credit (€)	1, 650	1, 650	1, 650	3, 300	----
Earned income tax credit (€)	---	---	---	---	550
Standard rate cut-off point (€)	33, 800	33, 800	42, 800	67, 600	Same as PAYE
Standard rate (%)	20	20	20	20	20
Marginal rate (%)	40	40	40	40	40
Entry point for paying income tax, assuming no other credits apply (€)	16, 500	19,200	24, 750	33, 000	11, 000 or higher

## 2.2 UNIVERSAL SOCIAL CHARGE (USC)

The USC was introduced in Budget 2011, replacing the income and health levies. The measure was introduced in order to widen the tax base, raise revenue and remove poverty traps (by applying in a smoother progression to income than its predecessor levies). The USC operates on a wider income base than income tax by having a lower income-entry point and no associated tax credits. Although most social welfare income is taxed through the income tax system, such income is exempt from USC. Moreover, USC allows far fewer tax reliefs than income tax; examples of this include reduced rates for the elderly and for low-income taxpayers holding a full medical card. By applying a low rate to a broad base, the USC adheres to the tax principles of simplicity and efficiency. From the year of its introduction, the USC accounts for about 10 per cent of total annual Exchequer tax receipts. Table 2.2 summarises the current structure of USC.

Table 2.2: Summary of USC Rates as of Budget 2016

<b>PAYE taxpayers</b>	<b>Self-assessed taxpayers</b>
0% < €13,000	0% < €13,000
1% €0–€12,012	1% €0–€12,012
3% €12,012–€18,668	3% €12,012–€18,668
5.5% €18,668–€70,044	5.5% €18,668–€70,044
8% > €70,044	8% €70,044–€100,000
	11% > €100,000

# Chapter 3

## Methodology and Data

This section presents the methodology we use to estimate the income tax revenue elasticities, using analytical expressions both for individual elasticities and the aggregate level elasticity. The Irish income tax structure has two income tax rates and various tax credits. Taxable income, tax revenues and the number of cases within each income band for the different taxpayer categories are used in the analysis.<sup>3</sup> Combined with tax rates, thresholds and credits for the period 2003–13, we are able to compute individual tax revenue elasticities for each year, which are subsequently weighted into aggregate annual estimates. The data used are annual data on the distribution of taxpayers' incomes from the Irish Revenue Commissioners' statistical reports. These data cover the four main categories for taxpayers (single people, married couples with one earning (M1E), married couples with both earning (M2E), and widows/ers) sorted into 17 income groups.

In order to better understand the components that affect the revenue elasticity, we break down our analysis into several steps. First, following the Creedy and Gemmell (2004) approach, we calculate the baseline elasticity by assuming that an increase in the total income of the economy is equi-proportionally distributed across all categories of all income bands (equi-proportional income changes). Second, we take into account the effect of mortgage interest relief (MIR) that are imposed on gross tax liability and re-calculate the elasticities. Finally, we capture the change in income across the distribution and across time, and calculate the income elasticities with non-equi-proportional income changes.

### 3.1 THE BASELINE ELASTICITY

Consider an individual with a taxable income of  $y_i$  and facing a two-step income tax function, such that if  $0 < y_i < a_1$ , the tax paid is  $T_{y_i} = t_1 y_i - TC_i$ ; and if  $a_1 < y_i$  then  $T_{y_i} = (t_1 - t_2)a_1 + t_2 y_i - TC_i$ , where  $T_{y_i}$  is the tax revenue from the individual's income,  $t_1$  is the standard tax rate for the lower income,  $t_2$  is the marginal tax rate for the upper income,  $TC_i$  is the tax credit that refers to the

---

<sup>3</sup> All further references to income in the paper refer to taxable income, unless otherwise stated. Taxable income is that part of income on which tax is actually calculated, so is net of personal reliefs and other deductions, but prior to the application of tax credits. In the paper, total income refers to total *taxable* income, and not total income as per the Revenue Commissioners' classification.

specific individual<sup>4</sup> and  $a_i$  is the income threshold above which the specific individual starts paying taxes at a rate of  $t_2$ .

The definition of the individual income tax revenue elasticity  $\eta_{T_{y_i}, y_i}$  is:

$$\eta_{T_{y_i}, y_i} = \frac{dT_{y_i}}{dy_i} \frac{y_i}{T_{y_i}} = \frac{MTR_{y_i}}{ATR_{y_i}} \quad (1)$$

where  $MTR_{y_i}$  and  $ATR_{y_i}$  are the marginal and average income tax rates respectively. Differentiating the two income tax revenue expressions above with respect to  $y_i$ , we get that:

$$dT_{y_i} = t_1 dy_i \text{ for the case } 0 < y_i < a_1 \quad (2a)$$

$$dT_{y_i} = t_2 dy_i \text{ for the case } a_i < y_i \quad (2b)$$

Multiplying both equations with  $y_i/T_{y_i}$  and substituting the formula for  $T_{y_i}$  for each case, we get the formula for the individual elasticity for the two cases of incomes.

$$\eta_{T_{y_i}, y_i} = \frac{t_1 y_i}{t_1 y_i - TC_i} \text{ for the case } 0 < y_i < a_1 \quad (3a)$$

$$\eta_{T_{y_i}, y_i} = \frac{t_2 y_i}{(t_1 - t_2) a_i + t_2 y_i - TC_i} \text{ for the case } a_i < y_i \quad (3b)$$

To estimate the individual elasticities using the income distribution data available to us, we calculate the average income for every income band and for every taxpayer category and, using this, then compute the individual elasticity for every income band, for every tax category, and group separately in each year of the period 2003–13. The calculation of revenue elasticities takes income as exogenous; no behavioural response to the tax system is incorporated. When we have all the individual elasticities, we are able to compute the aggregate elasticity using the formula:

$$\eta_{T_{Y,Y}} = \sum_{T=1}^N \frac{T_{y_i}}{T_Y} \eta_{T_{y_i}, y_i} \eta_{y_i, Y} \quad (4)$$

---

<sup>4</sup> Taxpayers face two basic types of tax credits. The first one varies across the taxpayer categories; for example, the tax credit for single people is different to that received by married couples with both earning. The second tax credit is related to whether the taxpayer is enrolled as a PAYE or non-PAYE individual. If the individual is a PAYE taxpayer, then they receive an extra tax credit. In order to compute elasticities for this study, we first compute, separately, the individual elasticities for the PAYE and non-PAYE individuals, which we then weight and aggregate.



where  $\eta_{y_i, Y}$  is the elasticity of individual income with respect to total income and  $\frac{T_{y_i}}{T_Y}$  is an individual's share of total tax paid. The analytical expression for this income elasticity is given by:

$$\eta_{y_i, Y} = \frac{dy_i}{dY} \frac{Y}{y_i} = \frac{\Delta y_{i,t}}{\Delta Y_t} \frac{Y}{y_i} \quad (5)$$

An income elasticity of 1 implies that all individuals face the same increase in their income when total income increases. For the purposes of this study, we are going to follow two procedures. First, we are going to assume that this elasticity is 1. Second, we are going to estimate the size of this elasticity by calculating the income growth within each band.  $\Delta y_{i,t}$  is the change in the individual average income for a specific band between two succeeding years, and  $\Delta Y_t$  is the relative change in the total taxable income.

#### Box 1: Automatic Jump Effect

As we can see from equations (3a) and (3b), tax credits and the threshold directly affect only the denominator, which is the average tax rate or effective tax rate. Thus, changes in the threshold or in the tax credit can provoke notable changes in the individual elasticity. For example, an extra credit results in a movement, of the point on the income distribution where people start paying taxes, towards the right. Those with an income level around the point of the distribution at which the extra credit is exhausted display the highest marginal responsiveness in income tax revenues. As they are further to the right of the income distribution compared to equivalent persons in a scenario without an extra credit, they pay relatively more tax (as the income tax system is progressive). A high individual elasticity can thereby influence the tax-share weighted aggregate elasticity. This effect will be referred to as the **automatic jump effect**.

It may seem counterintuitive that an increase in a tax credit or a threshold, which reduces an individual's net tax liability, results in higher aggregate revenue elasticity. (In other words, a narrowing of the tax base through this channel would actually result in higher revenues being automatically obtained as income grows.) However, it is important to remember that it is the effect on the margin of the entry point to paying taxes that now dominates the elasticity.

Credits do not change the taxable income distribution per se (as they are applied after the individual's tax rate has been applied to their taxable income). But they do impact considerably on where the automatic jump effect will occur on the income distribution. Or in other words, they alter the tax revenue distribution rather than the income

### 3.2 MODEL WITH MORTGAGE INTEREST RELIEF

Given that the data used in this study comes from the Revenue Commissioners, the definition of taxable income is that part of income on which tax is actually calculated. It is thus the total income of taxpayers, less personal reliefs and other deductions but prior to the application of tax credits and reliefs. One of the most common reliefs is that paid on interest on home loans – MIR. The data that we have on the distribution of MIR allow us to examine the effect of this relief on the revenue elasticity.

To analytically compute the income tax revenue elasticity by including MIR, we follow a similar methodology as that set out in section 3.1. In particular, totally differentiating again the individual revenue functions, we have that:

$$\eta_{T_{y_i}, y_i} = \frac{t_1 y_i - \eta_{\beta(y_i), y_i} \beta(y_i)}{t_1 y_i - TC_i - \beta(y_i)} \text{ for the case } 0 < y_i < a_1 \quad (6a)$$

$$\eta_{T_{y_i}, y_i} = \frac{t_2 y_i - \eta_{\beta(y_i), y_i} \beta(y_i)}{(t_1 - t_2) a_i + t_2 y_i - TC_i - \beta(y_i)} \text{ for the case } a_i < y_i \quad (6b)$$

where  $\beta(y_i)$  is the MIR per se and  $\eta_{\beta(y_i), y_i}$  is its elasticity. Because of the way that MIR is calculated, both the above variables vary with income. Specifically,  $\beta(y_i)$  is a function of the mortgage the individual faces, which subsequently is a function of their level of income. In contrast with baseline elasticities, in the case of MIR we see that the inclusion of this relief affects both the numerator and the denominator of equations (6a) and (6b), namely the marginal and the average tax rate, respectively. Theoretically, therefore, we cannot predict the effect of MIR on the revenue elasticity. For example, it could be the case that the relative decrease in the marginal tax rate is greater than the decrease in the average tax rate, resulting in an overall decrease in the size of the elasticity.<sup>5</sup>

To estimate the revenue elasticity including MIR, we use the distributional data from the Revenue Commissioners' reports on tax deducted for MIR across each income band. We assume that the distribution of MIR is similar to that of overall incomes, which enables us to estimate the elasticity using regressions of the form:

$$\log \frac{\beta_j}{v_d} = \gamma \log \frac{y_j}{v_y} + \varepsilon_i \quad (7)$$

where there are  $j = 1, \dots, n$  income groups,  $\beta_j$  are the interest reliefs within the income group,  $v_d$  is the corresponding number of the taxpayers receiving these tax deductions,  $y_j$  is the total income of all the taxpayers that are within this income band, and  $v_y$  is the number of all the taxpayers in the band. The estimation of the

<sup>5</sup> This is the case of the effect on the elasticity in the UK (Creedy and Gemmell, 2004).

coefficient  $\gamma$  is the value of the elasticity  $\eta_{\beta(y_i), y_i}$ . We run this regression without a constant as this specification is more consistent with the analytical expression of the elasticity.

# Chapter 4

## Results: Income Tax

### 4.1 BASELINE ELASTICITY

The aggregate income tax revenue elasticities for each year were obtained by computing the individual values from equations (3a) and (3b), using the mean income for every taxpayer category and each income band. Table 4.1 displays the parameters of the Irish tax system over the period examined.

Table 4.1: Tax Rates, Credits and Thresholds in Ireland, 2003–13

Tax rates (%)			Tax credits (€)					Thresholds (€)			
			Married					Married			
Lower rate	Upper rate		Single	Two incomes	One income	Widow	PAYE	Single	Two incomes	One income	Widow
2003	20	42	1,520	3,040	3,040	1,820	800	28,000	56,000	37,000	28,000
2004	20	42	1,520	3,040	3,040	1,820	1,040	28,000	56,000	37,000	28,000
2005	20	42	1,580	3,160	3,160	1,980	1,270	29,400	58,800	38,400	29,400
2006	20	42	1,630	3,260	3,260	2,130	1,490	32,000	64,000	41,000	32,000
2007	20	41	1,760	3,520	3,520	2,310	1,760	34,000	68,000	43,000	34,000
2008	20	41	1,830	3,660	3,660	2,430	1,830	35,400	70,800	44,400	35,400
2009	20	41	1,830	3,660	3,660	2,430	1,830	36,400	72,800	45,400	36,400
2010	20	41	1,830	3,660	3,660	2,430	1,830	36,400	72,800	45,400	36,400
2011	20	41	1,650	3,300	3,300	2,190	1,650	32,800	65,600	41,800	32,800
2012	20	41	1,650	3,300	3,300	2,190	1,650	32,800	65,600	41,800	32,800
2013	20	41	1,650	3,300	3,300	2,190	1,650	32,800	65,600	41,800	32,800

Note: The 'widow' and 'married with one income' taxpayer parameters refer to the case where there are no children in the household.

The aggregate elasticities are computed by weighting the individual elasticities using the relative tax burdens and then summing them within a year. Table 4 shows the resulting income tax revenue elasticities over the period 2003–13. The elasticities for PAYE taxpayers are computed separately to those of non-PAYE taxpayers, as PAYE taxpayers receive an extra tax credit. Weighting and aggregating the two outcomes, we get the total value of the income tax revenue elasticity, which is presented in the last row of Table 4.2. The weighted average for

the whole period is 2.1 for the PAYE elasticity and 1.4 for the non-PAYE elasticity (further discussed in section 4.4).

We observe that the size of the elasticity has been fairly stable over the last ten years, varying from 1.7 to 2.4. In general, the size of this elasticity and its changes across time reflect changes in tax credits. For example, in Tables A2.1a–j of appendix 2, we primarily observe that the highest values of the elasticity are seen in the middle of the distribution, in particular when a taxpayer starts paying taxes or when they reach the threshold above which the tax rate increases. Moreover, we observe that changes across time are primarily driven by changes in tax credits and less by changes made to thresholds or tax rates (although tax rates were very stable over the period – see Table 4.1). This is due to the fact that tax credits alter the entry point to paying tax on the taxable income distribution, triggering the automatic jump effect described in Box 1.

Table 4.2: Aggregate Revenue Elasticities in the Baseline

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>E (PAYE)</b>	1.9	2.0	2.6	2.2	2.0	2.2	2.2	2.3	2.0	2.0	2.0
<b>E (non-PAYE)</b>	1.0	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4
<b>Elasticity (overall)</b>	1.7	1.9	2.4	2.0	1.9	2.1	2.1	2.2	1.9	1.9	1.9

The higher values reported for PAYE taxpayers are driven by the extra tax credit they receive, resulting in the automatic jump effect; see equations (3a) and (3b).<sup>6</sup> This extra credit increases non-taxable income, which results in a movement of the distribution of taxpayers that actually pay taxes towards the right. When we compare rows 1 and 2 of Table 4.2, it is also evident that the inclusion of the extra tax credit affects the variability of the elasticity over time.

To understand the importance of the interaction between tax system parameters and incomes, we can closely examine the case of 2005. The large value of the overall elasticity in 2005 was driven by the large value of PAYE elasticity for married couples where both are earning (M2E). For this taxpayer category and year, the

<sup>6</sup> The income liable for taxation is generated in a different way for non-PAYE and PAYE taxpayers, with the absolute difference between gross and taxable income found to be bigger for non-PAYE than PAYE taxpayers, due to the former's more generous expenses treatment. However, the tax system's parameters can be comparable as the initial gross income distribution is the same.

typical taxable income in the €27,000–€30,000 band is marginally higher than the entry point to paying tax in 2005. This results in a large automatic jump effect at this point in the income distribution for this individual elasticity, and further influences the aggregate elasticity result for that year.<sup>7</sup>

In general, our results suggest that the aggregate analytical elasticity captures the effects that occur on the margin of the starting point for each taxpayer category to pay taxes, and on the margin of the thresholds, capturing exactly the automatic jump effect already discussed. This makes the elasticity much more sensitive to changes in thresholds and tax credits than to changes in the tax rates. The negative values for lower-income bands are due to tax credits (see tables in appendix 2). These individual elasticities are calculated as if income tax credits were refundable: as income increases, revenues would decrease as the lowest income taxpayers would be due a refund.<sup>8</sup> But at the marginal point when the gross tax liability exceeds the size of the tax credit, the elasticity of each individual starts to become positive; see equations (3a) and (3b).

Table 4.3 reports total tax revenue, taxable income and mortgage interest relief (MIR) deductions across time. To compute the overall elasticity across time, we sum the total income tax revenue across years and weight each individual elasticity accordingly. The resulting value is 2.0, which suggests that the marginal tax rate is greater than the average tax rate; see equation (1). In Figure 4.1, we can see that for the year 2013 the marginal tax rate is always bigger than the average tax rate, for any income level. This pattern is the same throughout the whole period examined.

In the tax elasticity literature, an income tax elasticity greater than 1 indicates a progressive tax system. To better understand this, it is useful to take a step back, back to equation (1), and observe the elasticity as the resulting percentage change of income tax revenue, caused by a 1% change in taxable income (i.e.  $\eta_{T_{y_i} y_i} = \frac{\Delta T_{y_i}}{T_{y_i}} \% / \frac{\Delta y_i}{y_i} \%$ ). If this elasticity is greater than 1, a 1% increase in income causes a more than 1% increase in tax revenues. This means that taxpayers with higher incomes contribute more to the total revenue than lower-income taxpayers, making the system more progressive. Thus, our results suggest that although the

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<sup>7</sup> Creedy and Gemmell (2011) acknowledge that individual elasticity results can be very large, due to the reasons mentioned above. However, the inclusion or exclusion of such individual elasticities in the weighted aggregate baseline elasticity does not substantially change our 2003–13 average result of 2.0.

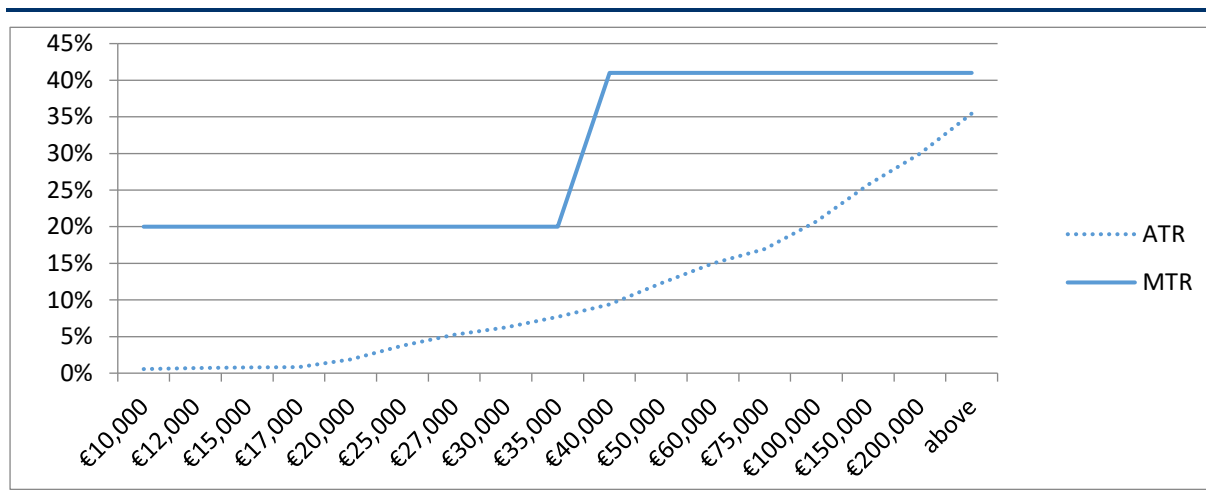
<sup>8</sup> Again, this does not impact on the aggregate elasticity as these taxpayers have a negligible share of total tax revenue paid.

Irish tax system has only one income threshold and two tax rates, the multiple tax credits make it more progressive than it may initially seem.<sup>9</sup>

Table 4.3: Total Tax Revenue, Taxable Income and Mortgage Interest Deductions, 2003–13

	<b>Total tax revenues (€million)</b>	<b>Total taxable income (€million)</b>	<b>Total cases</b>	<b>Total mortgage deductions (€million)</b>
<b>2003</b>	7,807	49,739	1,807,137	–
<b>2004</b>	8,839	53,893	1,897,388	197
<b>2005</b>	10,063	60,419	2,070,656	219
<b>2006</b>	11,093	68,352	2,208,100	263
<b>2007</b>	11,976	76,495	2,310,729	453
<b>2008</b>	12,286	83,556	2,288,616	570
<b>2009</b>	12,244	85,108	2,151,456	252
<b>2010</b>	10,616	77,108	2,088,443	279
<b>2011</b>	9,815	71,697	2,049,617	277
<b>2012</b>	10,831	71,258	2,107,208	304
<b>2013</b>	11,400	73,850	2,146,848	250

<sup>9</sup> In appendix 2, we present more detailed results for all cases examined, which capture differences between the different categories of the taxpayer (single people, married couples with one earner (M1E), married couples with two earners (M2E), and widowers).

**Figure 4.1: Comparison of Marginal and Average Tax Rates Across the 2013 Income Distribution**

#### 4.2 ELASTICITY WITH NON-EQUI-PROPORTIONAL INCOME CHANGES

The assumption that individual incomes grow at the same rate across income distribution is unlikely to reflect actual patterns of income growth. In this section, we relax this assumption by allowing  $\eta_{y_i, y} \neq 1$ ; see equations (4) and (5), meaning that income grows at different rates across income bands. The incorporation of this type of heterogeneity will alter the baseline estimate. For example, relatively higher-income growth at the top rather than the bottom of the income distribution would result in a higher aggregate revenue elasticity, as high-earning individuals pay more tax revenue and thus have a bigger weight in the aggregate elasticity.<sup>10</sup>

Figure 4.2 illustrates that income grows differently across the Irish taxable income distribution.<sup>11</sup> From equation (5), we can read the results of Figure 4.2 as follows: for a 1% increase in total taxable income, those earning above €150,000 per year experience a 1.8% increase in income, while those earning below €10,000 per year experience a 0.3% increase in income.

<sup>10</sup> Recall that the calculation of revenue elasticities takes income growth as exogenous, meaning that there is no modelling of behavioural change to changing tax system parameters. Such modelling would reflect the fact that as income grows, an individual's tax burden changes, which may induce them to work more or less in response. Incorporating the elasticity of taxable income in future work – how income responds to the (net of) tax rate – would allow for behavioural change to be included in the revenue elasticity estimate.

<sup>11</sup> Each elasticity on different points of the income distribution is a weighted sum of the individual income elasticities (for both PAYE and non-PAYE taxpayer categories), where weights are based on income shares within each income band. For illustrative purposes, 2011 data are excluded from Figure 4.2 as individual elasticities in this year explode (due to the very small change in aggregate income that year, a denominator effect). However, 2011 data are included in the aggregate adjusted revenue elasticity calculation shown in Figure 4.3.



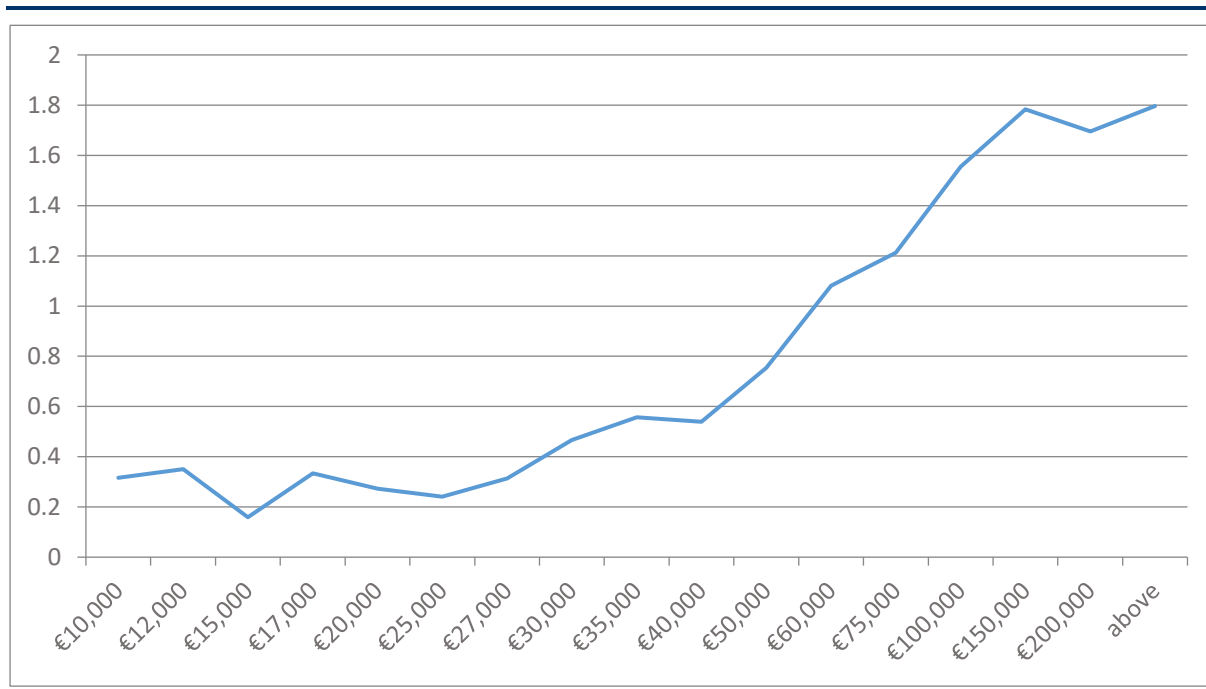
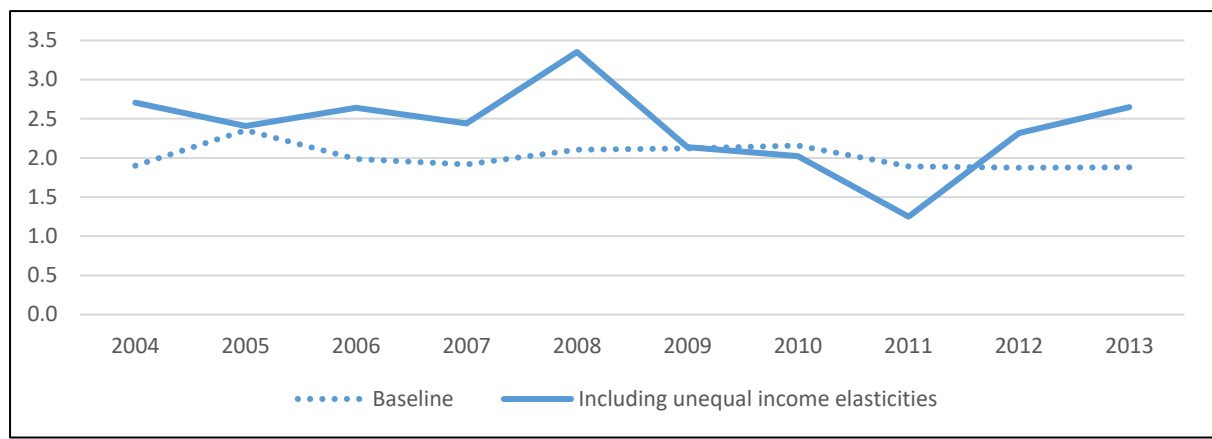
**Figure 4.2: Different Income Elasticities Across the Taxable Income Distribution**

Table 4.4 reports the values of the income tax elasticities with non-equi-proportional income changes. Over the period examined, we observe that this elasticity is higher, on average, than the baseline. This reflects the stronger income growth at the top of the Irish income distribution, as shown in Figure 4.2. Taking a tax share weighted average of the individual estimates across all years, we find that the baseline aggregate elasticity is 2.0, whereas the non-equi-proportional aggregate elasticity is 2.4. This adjusted elasticity is also less stable than the baseline, as income growth patterns change from year to year, and especially during the recession years (see Figure 4.1).

Table 4.4: Aggregate Revenue Elasticities with Non-Equi-Proportional Income Change

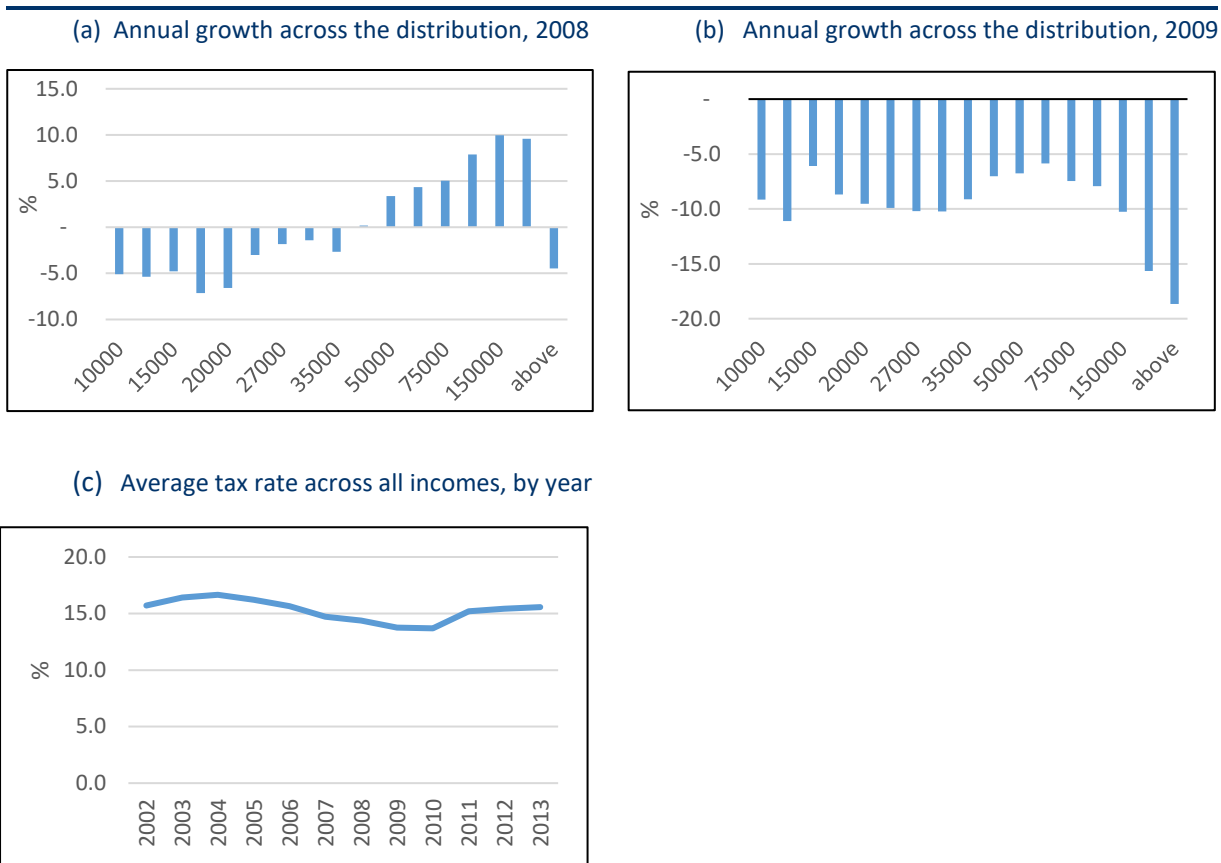
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>E (PAYE)</b>	–	2.9	2.6	2.8	2.9	3.6	2.2	2.2	1.2	2.3	2.8
<b>E (non-PAYE)</b>	–	1.9	1.8	2.0	0.3	1.7	1.5	1.1	1.6	2.4	1.9
<b>Elasticity (overall)</b>	–	2.7	2.4	2.6	2.4	3.4	2.1	2.0	1.3	2.3	2.7

Figure 4.3: Comparing the Non-Equi-Proportional Income Elasticity With The Baseline



In 2008, although the economic downturn began to have an impact on low incomes, the incomes in the top half of the distribution continued to grow strongly. This resulted in very high income elasticities, which augmented the weighted aggregate revenue elasticity. In 2009 and 2010, by contrast, all incomes contracted, with the deviation in growth rates across income bands less pronounced than previous years, causing the non-equi-proportional growth elasticity to be reasonably similar to the baseline (see Figure 4.4 (a) and (b)). Both of them fell in 2011, due to reductions in tax thresholds and credits, which in turn caused a sharp increase in the average tax rates (see Figure 4.4 (c)).<sup>12</sup>

<sup>12</sup> More extensive analysis, capturing differences across different taxpayers, is provided in appendix 2.

**Figure 4.4: Income Dynamics in Ireland**

### 4.3 THE ELASTICITY WITH MORTGAGE INTEREST RELIEF

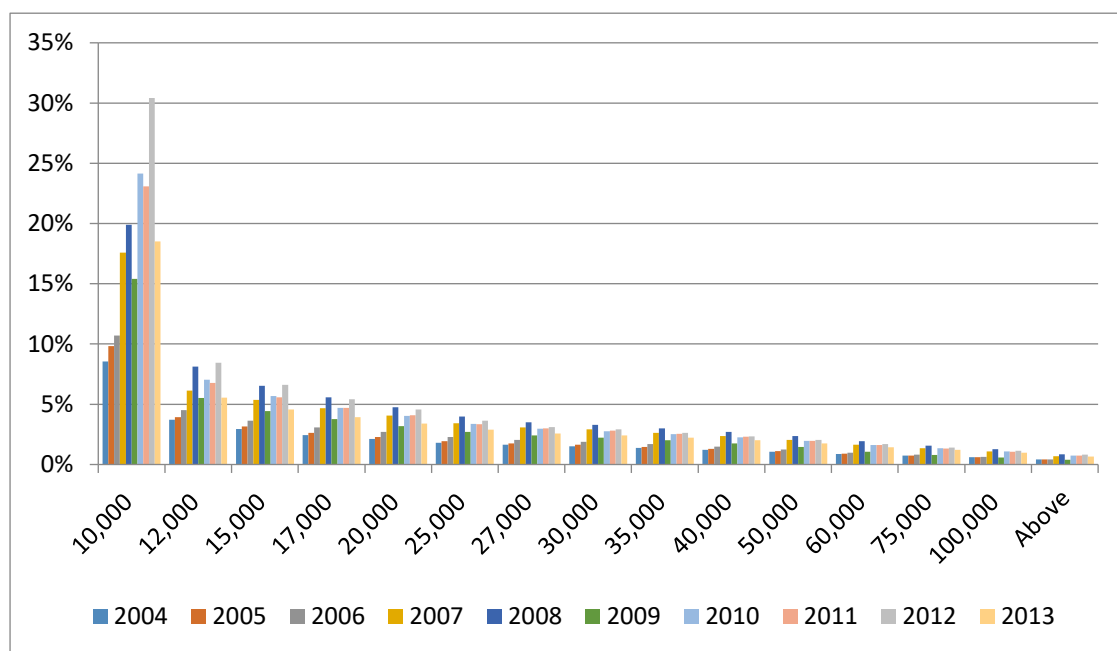
Section 3.2 described the methodology used to calculate the income tax revenue elasticities, including the effect of the MIR.<sup>13</sup> In order to analyse the effect of MIR, we use data, taken from the Revenue Commissioners' statistical reports, on interest deductions across the income distributions for the years 2004–13. To estimate the elasticity  $\gamma$  of equation (7), we estimate a regression with the log of the average tax deductions being the dependent variable and the log of the average income being the independent variable. For the individual elasticities, we use the predicted values of the fitted model across years, categories, and income bands.

The results show that the value of the elasticity of MIR does not vary significantly across the years and within a specific income band and taxpayer category. The values of these elasticities are presented in Table A2.6 in appendix 2. These values show that the effect of MIR is lower in higher-income bands. This means that the

<sup>13</sup> We include MIR in the paper as a case study on how tax reliefs can affect the revenue elasticity; there are many other reliefs on income tax in the Irish system, such as those relating to pension contributions and health expenditure, but distributional data on these are not available.

lower the income of a household, the relatively higher the effect of the relief, something that is explained by the size of the relief in terms of average income (see Figure 4.5). Figure 4.5 indicates that MIR is quite a progressive relief, as lower-income households derive more financial benefit from it than the highest-income households. It also indicates that the loan-to-income ratio is higher for the lowest income bands; therefore, these households are relatively more leveraged. The above suggests that the lower-income households/individuals should be more sensitive to changes made to MIR.

**Figure 4.5: Average MIR Tax Deduction as a Share of Average Income**



The overall effect suggests that a 1% increase in individual average taxable income results in a 0.62% increase in an individual's average tax reductions (see Table 4.5). The predicted variables of the fitted model of regressions for each category are used in the formulas described by equations (6a) and (6b) to find the revenue elasticity with MIR included. Table 4.6 presents the aggregate elasticities with MIR for every year. Tables A2.4a–j in appendix 2 present the individual elasticities across categories, income bands and years.

Table 4.5: Elasticity of Mortgage Interest Relief

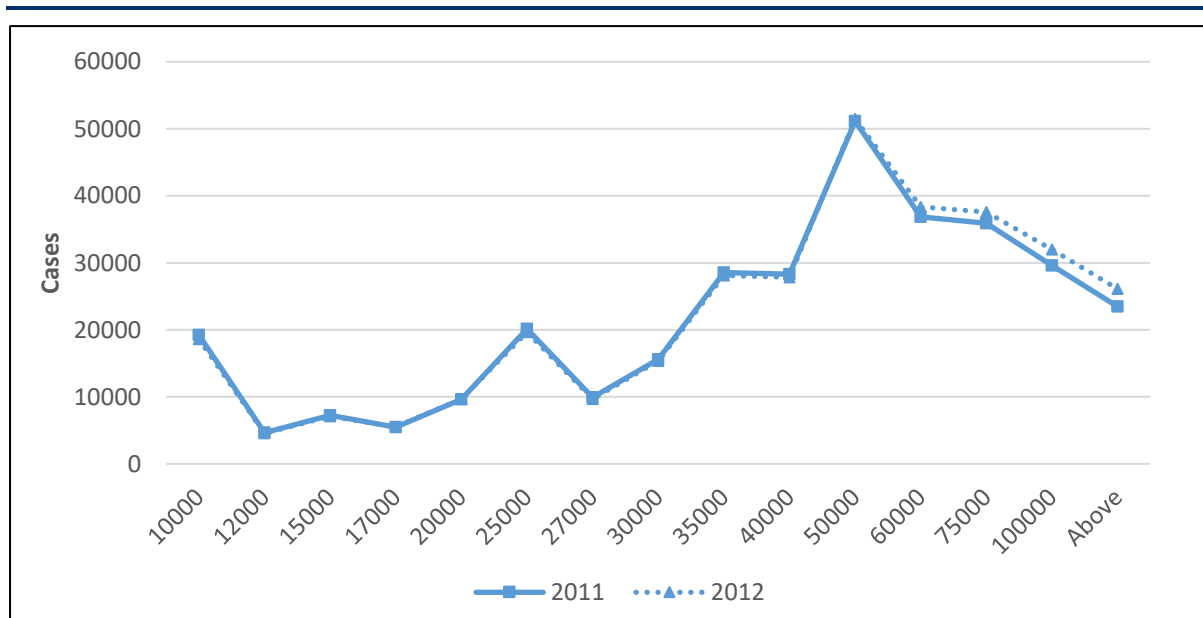
	Total singles	Married, both earning	Married, one earning	Total widowed	Overall
<b>Log_AvgInc</b>	0.637*** (143.519)	0.625*** (135.038)	0.619*** (133.238)	0.583*** (126.943)	0.616*** (253.087)
obs	150	150	150	150	600
p	1.30E-161	1.00E-157	7.60E-157	9.60E-154	0

Table 4.6: Aggregate Revenue Elasticities, Incorporating MIR, 2003–13

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Elasticity (PAYE)</b>	-	2.3	2.1	2.2	2.4	2.0	2.3	2.9	2.7	3.8	2.3
<b>Elasticity (non-PAYE)</b>	-	1.4	1.4	1.3	1.4	1.5	1.4	1.5	1.4	1.5	1.4
<b>Elasticity (overall)</b>	-	2.1	1.9	2.0	2.2	2.0	2.2	2.7	2.5	3.5	2.2

The high value of 3.5 for the year 2012 is mainly driven by the fact that the announcement to abolish MIR occurred in late 2011. This caused an increase in the number of people who bought a house during 2012 (see Figure 4.6).

Figure 4.6: Upsurge in Cases Following Announcement of Abolition of MIR

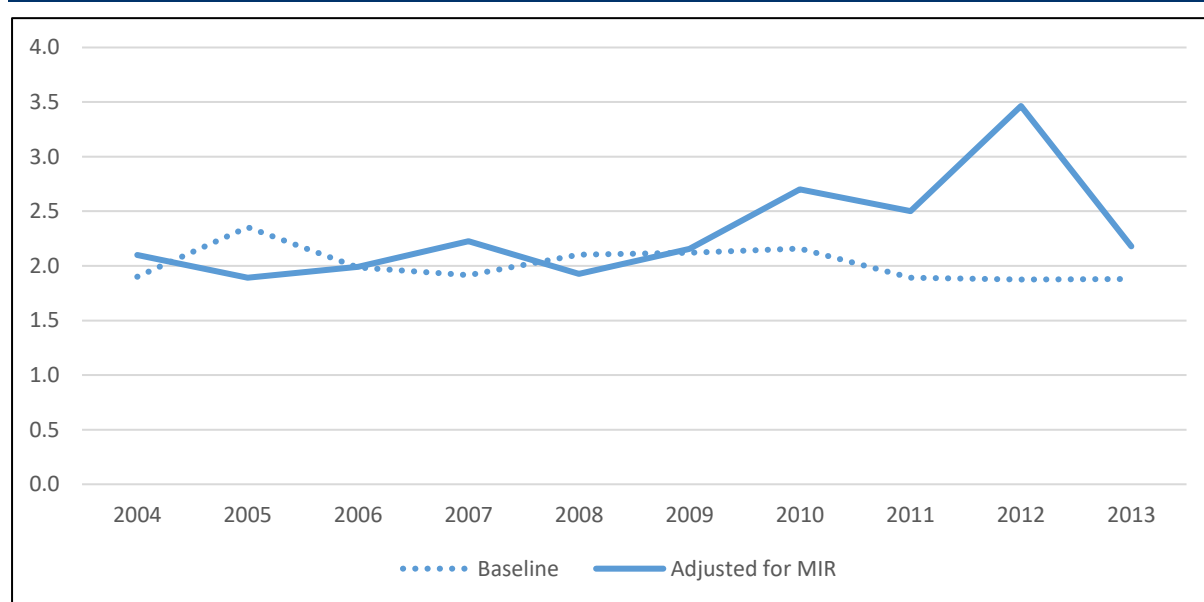


The overall value of the MIR income tax revenue elasticity across years is 2.3, which is higher than the baseline (2.0). MIR operates like an additional tax credit for those

with a tax liability, so the baseline elasticity is augmented via the automatic jump effect (see Box 1). MIR, however, is distinct from other tax credits in one notable respect: it is deductible at source, so an individual does not require a positive tax liability to benefit from it. There are individuals who avail of MIR but have no taxable income; they are not included in the elasticity calculation (although such cases would be rare).

Figure 4.7 presents the change across time in the baseline elasticity and the MIR elasticity. It shows that the baseline elasticity presents more stable behaviour than MIR elasticity, which is explained by changes made to MIR policy. It is also worth noticing, in Tables A2.4a–j in appendix 2, that the highest-income bands present the lowest and more stable values of the MIR elasticities, as opposed to the lowest incomes, which display negative values.

**Figure 4.7: Aggregate Elasticity for Baseline and Baseline Adjusted for MIR Effects**



Last but not least, an interesting difference emerges when comparing MIR elasticity in the UK with that in Ireland. Creedy and Gemmell (2004) suggest that the introduction of the income-related allowances elasticity in their formula, which also includes MIR for the UK, results in a decrease in the overall size of the aggregate revenue elasticity. Our results suggest that this is not the case for Ireland, where accounting for the MIR elasticity results in an increase in the overall responsiveness of tax revenues. This means that the relative decrease of the average tax rate is bigger than the decrease of the marginal tax rate; see equation (1). This might be explained by the fact that the Irish tax system uses tax credits,

whereas the UK system only has progressive tax rates for a number of income thresholds.

In general, our analysis suggests that the high value of the elasticity, or responsiveness, in Ireland mainly arises from the tax credits. This means that an additional relief, such as MIR, increases this responsiveness even further, as it reduces gross tax liabilities in a similar way to tax credits (affecting disposable income through a banking channel rather than a labour-income channel). Moreover, in the UK the average claim for mortgage relief declined over time (as the policy became less generous). The opposite is true in Ireland, where the value of average deductions has increased over time. Overall, MIR adds to the progressivity of the Irish tax system and positively affects relatively more taxpayers in the lower-income bands.<sup>14</sup>

#### 4.4 COMPARING THE THREE SPECIFICATIONS

Table 4.7 summarises the average of all annual aggregate estimates for the three specifications discussed in this paper. First, we observe that for all specifications the non-PAYE results are lower than the PAYE results, due to the additional tax credit that PAYE workers receive, which results in lower average tax rates for this group. Second, incorporating non-equi-proportional income growth has a higher impact on the baseline than incorporating the existence of MIR. Currently, for tax forecasting purposes, the Department of Finance uses an estimate of 2.15 for its PAYE revenue elasticity, which is in line with the baseline specification. The Revenue Commissioners forecast non-PAYE revenue using an elasticity of 1.7. This is slightly higher than the one calculated here.

As mentioned in the introduction, elasticities correspond to a local measure of progressivity in the tax system. All elasticities calculated in the paper are above 1, highlighting the progressive nature of the Irish income tax system. Although it appears that non-PAYE workers face a less progressive system than PAYE workers, it must be borne in mind that the taxable income of the two worker types are not subject to the same adjustments; typically, non-PAYE workers have more allowances and expenses that they can deduct from their gross income before arriving at taxable income.

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<sup>14</sup> As an extra experiment, in appendix 2 we compute the elasticity, which incorporates both non-equi-proportional income growth and MIR.

Table 4.7: Average Estimates for the Three Specifications

	1. Baseline	2. Including MIR	3. Including income effects
<b>All income tax payers</b>			
Average	2.0	2.3	2.4
<b>PAYE tax payers</b>			
Average	2.1	2.5	2.6
<b>Non-PAYE tax payers</b>			
Average	1.4	1.4	1.6

#### 4.5 COMPARING ANALYTICAL AND EMPIRICAL RESULTS FOR INCOME TAX

In this section, we discuss the differences between the analytical results explained in the previous sections and the elasticity computed when estimated using a regression of the total taxable income on the income tax revenues. The value of the elasticity arising from the econometric model is the coefficient of the equation:

$$\log T_t = \beta_t \log I_t + \varepsilon_t \quad (8)$$

where  $T_t$  is the total income tax revenue and  $I_t$  is the total taxable income. The size of the elasticity is given by the value of the coefficient  $\beta_t$ . Again, to capture the notion of the elasticity as the ratio of the logarithms, we do not use a constant term in the regression.

Column 1 of Table 4.8 presents the results of the estimation of equation (8). The results suggest that, across years, the value of the elasticity is 0.83, a value much smaller than the 2.0 obtained by the analytical results. Choudhry (1979) suggests that the estimation of this elasticity captures the level of tax buoyancy, as it does not take into account income growth, the income distribution, the automatic changes in the tax system, or the discretionary measures.

The fact that, in Ireland, this value is lower than the elasticity arising from the analytical expressions indicates that the regression result does not account for the different relative tax burdens across the income distribution. Moreover, this result does not capture the jump in responsiveness of tax revenues for those who are near the margins of starting to pay taxes, or near the standard rate threshold. Finally, the regression expressed in equation (8) treats all individuals as if they display similar responsiveness, thus underestimating the increased responsiveness of individuals near the margins, and thereby underestimating the overall size of the elasticity.



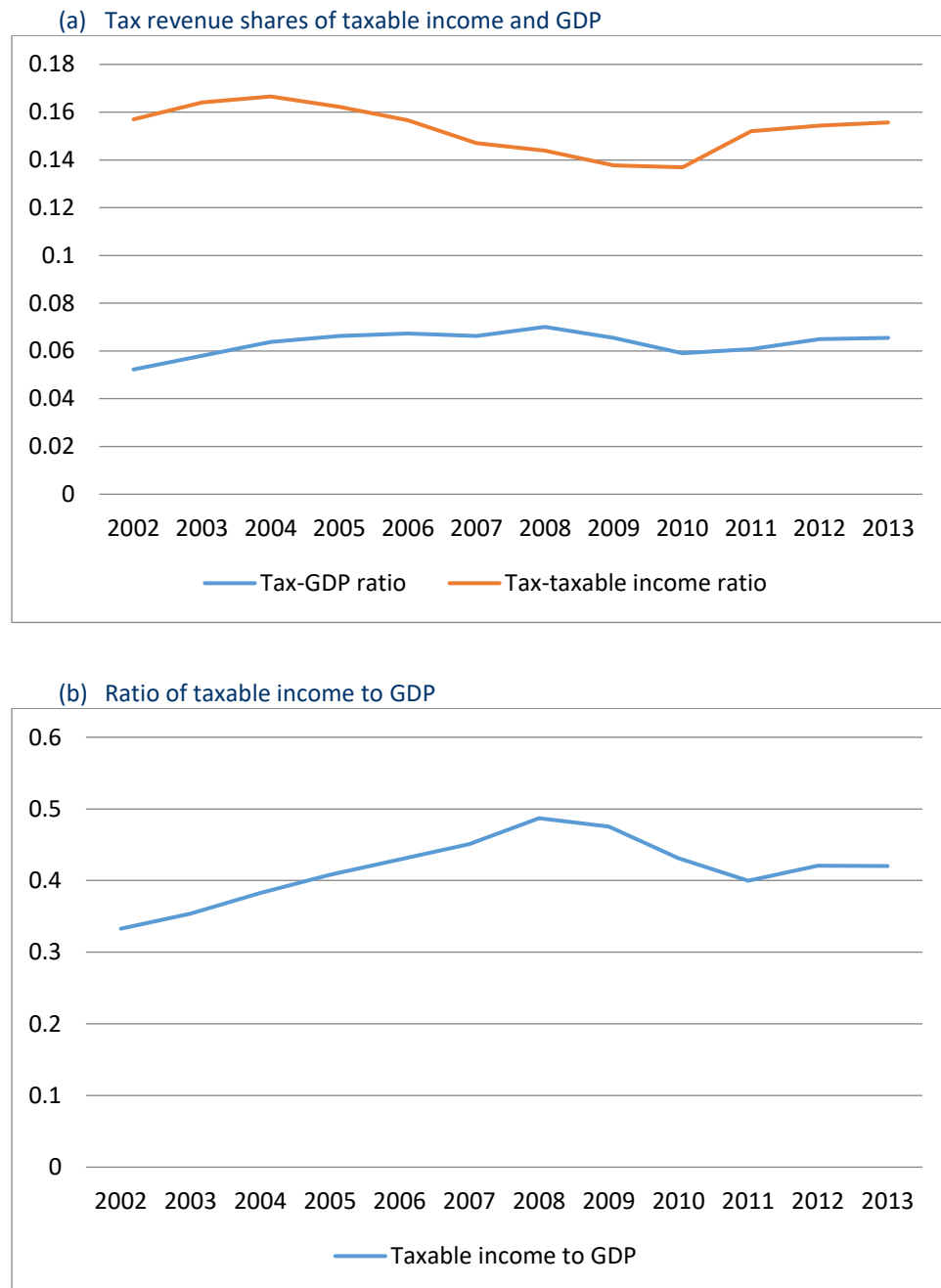
Table 4.8: Regression Results for Tax Elasticity/Buoyancy

	1	2	3	4	5	6
	Total tax (2003–13)	Average tax (2003–13)	Total tax (1983–13)	Average tax (1983–13)	Total tax (1983–13)	Average tax (1983–13)
Total taxable income	0.831*** (-602.714)		0.856*** (161.84)		0.864*** (-139.285)	
Average taxable income		1.554*** (-183.16)		1.341*** (49.98)		1.304*** (-52.7)
Crisis Dummy					-0.381*** (-5.233)	-0.892*** (-10.487)
Obs	12	12	30	30	30	30
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: This table reports coefficients and t-statistics (in parentheses) from OLS regressions with the total tax as the dependent variable in column I, III, and V and the average tax as dependent variable in column II, IV, and VI. \*, \*\*, \*\*\* marks denote statistical significance at the 10, 5, and 1% level, respectively.

If the overall effect of the discretionary measures is revenue-enhancing, compared to a no-change policy scenario, then the size of the elasticity is less than the size of the tax buoyancy and vice versa (Chouldry, 1979). In our case, a no-change policy scenario is one in which the tax credits, tax rates and any other reliefs do not change. The fact that the value of tax buoyancy is much smaller than the analytical expression provides evidence that Irish discretionary income tax policy over the period 2003–13 was relatively revenue-reducing, if we compare it with a no-change policy scenario. The difference between the income tax revenue elasticity and the resulting tax buoyancy indicates that the time series analysis is also affected by the macroeconomic cycle capturing the economic growth effects on revenues. However, many of the discretionary policies that created this result, such as various generous income tax reliefs, have subsequently been restricted or removed following recommendations in the 2009 report of the Commission on Taxation.

Figure 4.8 (a) shows that the share of income tax revenues in taxable income was falling over time during the years preceding the crisis, whereas the share of tax revenues in GDP was slightly rising. Figure 4.8 (b) shows that, in the years before the crisis, the ratio of taxable income to GDP sharply increased, suggesting that the taxable income increased more than GDP. This can be explained by a big increase in wages compared to other components of GDP that remained relatively stable or even declined (such as corporate income).

**Figure 4.8: Comparison of Tax Revenue, Taxable Income and GDP**

To address the fact that equation (8) does not capture income growth or income distribution, we estimate the regression with the average tax revenue and average

taxable income – the total income tax revenue and taxable income divided by the number of total cases. We expect this result to be closer to our analytical estimation, which involved computing the individual elasticities using the mean income of the individual within an income band. The estimated regression is given by the equation:

$$\log \frac{\beta_j}{v_a} = \gamma \log \frac{y_j}{v_y} + \varepsilon_i \quad (9)$$

The second column of Table 4.8 presents results from the regression of average values of taxable income and income tax revenue. These results suggests that a 1% increase in the mean income of the average or representative individual causes a 1.55% increase in the average tax that this individual pays.

Now the elasticity, or buoyancy, takes the value of 1.55, which is also smaller than the analytical result but larger than the 0.83 value of the regression expressed by equation (8). This suggests that the regression with the average variables better captures the automatic jump effect that emerged from the analytical analysis. (Recall that the stated tax policy in the pre-crisis years was to remove earners on the average wage from the higher rate of income by ensuring that the standard threshold was above this income level). Overall though, we still find that the discretionary measures in the Irish tax system are revenue-reducing, compared to the no-policy change scenario given by the analytical elasticity.

In order to examine whether the size of the elasticity changes when more years are taken into account, we estimate the same regression analysis for a 30-year period: 1983–2013. This time-frame is likely to yield more indicative results, as it is longer and therefore a smaller proportion of it relates to the financial crisis. The results in columns 3 and 4 of Table 4.8 suggest that, during this period, the elasticity of the total income tax revenue is 0.856, a value higher than the 0.831 that we find when we examine the period 2003–13. Moreover, for the period 1983–13, the elasticity for the average income tax revenue takes the value of 1.341, which is less than the 1.554 we found before.

This second result is harder to explain. One interpretation might be that during the later years of this period (which were affected by the financial crisis) the responsiveness of the income tax revenue decreased but not in the same way across the income distribution. The fact that the average income tax revenue elasticity during the longer time period has a smaller value compared to that for the period 2003–13 reflects the distributional changes that occurred during the later years. Various factors may explain this, such as changes in the taxation system that make it more progressive, suggesting that these changes focus less on the mean income. It may also highlight distributional changes that were provoked by

the financial crisis. This observation suggests that further investigation on the distributional aspects of the collection of taxes might provide interesting insights.<sup>15</sup> Note also that for the longer time period, we incorporate the change from a tax allowance to a tax credit system, which may have a notable impact on the results (as already observed, credits explain a large part of the sensitivity of our aggregate revenue elasticity).

As a final test to examine whether the years of the last financial crisis affected the difference between tax elasticity and tax buoyancy, we estimate equations (8) and (9) by adding a dummy that captures the years of the crisis. From the last two columns of Table 4.8 (columns 5 and 6) we observe that the value of the tax buoyancy remains relatively the same, with the dummy of the crisis being negative and statistically significant. This suggests that during the crisis there was a significant decrease in income tax revenues.<sup>16</sup>

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<sup>15</sup> The income distribution and its effects on the income tax revenues is a subject that we plan to investigate in future research.

<sup>16</sup> Given the short lifetime of the Universal Social Charge (USC) it was not possible to compare an empirical estimate with its analytical estimate. In any case, there were very few discretionary policy changes associated with USC over 2011–13.

# Chapter 5

## Results: Universal Social Charge

In this chapter, we apply the analytical methodology described above to the Universal Social Charge (USC). Table 5.1 highlights the parameters used in the construction of USC revenue elasticities. As is the case for the income tax revenue elasticities, USC elasticities are constructed using equation (4), and income is assumed to grow equi-proportionally in the baseline (i.e. the income elasticity is equal to 1).

Table 5.1: Summary of USC Tax Parameters, 2011–13

	2%	4%	7%	Exempt income threshold
<b>2011</b>	€0–10,036	€10,037–16,016	On the balance	€4,004
<b>2012</b>	€0–10,036	€10,037–16,016	On the balance	€10,036
<b>2013</b>	€0–10,036	€10,037–16,016	On the balance	€10,036

Table 5.2 shows the baseline elasticity estimates for USC. PAYE and non-PAYE estimates are computed separately and then weighted into an aggregate using the respective tax shares. The estimates for the USC revenue elasticity present a stable behaviour across time. For both PAYE and non-PAYE workers, the estimate for the elasticity is 1.2. This stability is explained by the fact that this tax treats the vast majority of workers equally (although non-PAYE workers earning above €100,000 do face an additional rate, and medical card holders and those aged over 70 years have certain concessions; see Table 2.2). Unlike income tax, there are no credits associated with USC, and credits typically have an important impact on the change in responsiveness of taxpayers for the period under review. In addition, the only USC policy change over the period in question was an increase in the income threshold exempt from payment between 2011 and 2012.

Table 5.2: Baseline USC Elasticity

	2011	2012	2013
<b>E (PAYE)</b>	1.2	1.2	1.2
<b>E (non-PAYE)</b>	1.2	1.2	1.2
<b>Elasticity (overall)</b>	1.2	1.2	1.2

Official Budget forecasts by the Department of Finance for PAYE workers currently rely on the same elasticity for both income tax and USC. While the Department's estimate and the analytical baseline estimate were in line for the income tax revenue elasticity, the baseline result obtained here for USC of 1.2 is considerably lower than the current official elasticity of 2.15. Similarly, the Revenue Commissioners currently use the same elasticity for both income tax and USC for non-PAYE workers. Again, the analytical estimate of 1.2 is lower than the Revenue Commissioners' estimate of 1.7.

When we relax the assumption of equi-proportional income growth the USC revenue elasticity increases (see Table 5.3). This is expected as higher-income individuals typically experience faster income growth than the rest of the economy and have the highest share of tax paid. However, the jump in 2012 is particularly large, due to the more rapid increase in incomes relative to the whole economy of high earners in the M2E category in particular.<sup>17</sup>

Table 5.3: USC Elasticity with Non-equi-proportional Income Growth

	2011	2012	2013
<b>Elasticity (baseline)</b>	1.2	1.2	1.2
<b>Elasticity (income adjusted)</b>	-	2.9	1.3

*Note: 2011 estimates are unavailable as the calculation of income elasticities requires income data from the previous year, and USC was introduced in 2011.*

## 5.1 COMPARING INCOME TAX AND USC RESULTS

Now that we have estimated both the elasticities of income tax and USC, it is possible to analyse how they differ. The main question to be asked is: Why do these two elasticities, both of which are estimated from the income distributions of the same taxpayers, broadly speaking, produce such different results?

<sup>17</sup> Appendix 2 includes a more detailed explanation of USC elasticity, regarding the different types of taxpayer categories.

First, we have to state that the tax base for USC and income tax are not identical. In particular, USC is applied to income prior to most tax reliefs such as pension contributions, while income tax is applied to income following these deductions. In addition, most social welfare benefits are chargeable to income tax, but not to USC. These definitional differences may alter the income distribution slightly, but not in a way to cause the two elasticities to have such different magnitudes. In particular, the shape of the income distribution for high incomes is barely altered. Second, we observe that the USC elasticity is substantially lower than the income tax elasticity. This comes as no surprise as the USC was designed to raise revenue from a broader base than income tax, but most importantly it does not have tax credits. As a result, it is a less progressive tax than income tax, while still being progressive overall as its elasticity is greater than 1.

The USC and income tax revenue elasticities for non-PAYE workers are more similar than the aggregate for all workers (see Table 5.4). As the magnitude of marginal tax rates is substantially different under either tax for a non-PAYE worker (for example a maximum of 10% under USC and 41% under income tax in 2013), this suggests that it is the absence of the additional PAYE credit that contributes to the similarities between the two values (although non-PAYE workers do have a personal tax credit under income tax).

Table 5.4: Comparing the Analytical Elasticities with Officially Used Estimates

	Income tax		USC	
	Analytical result	Official forecast	Analytical result	Official forecast
<b>Elasticity (PAYE)</b>	2.1	2.15	1.2	2.15
<b>Elasticity (non-PAYE)</b>	1.4	1.7	1.2	1.7
<b>Elasticity (overall)</b>	2.0	–	1.2	–

*Note: Income tax results are the weighted average of 2004–13, whereas USC results are the weighted average of 2011–13.*

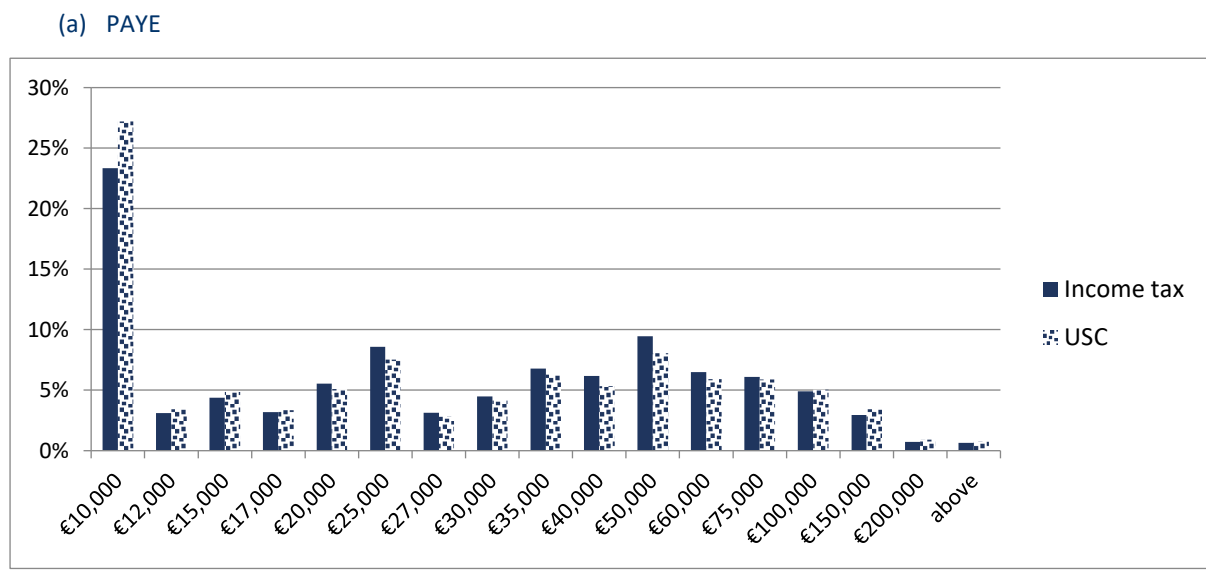
If we wish to compare the two taxes by PAYE status across the income distribution, the first thing to note is that there are more PAYE cases for USC in the lower end of the income distribution than is the case for income tax (see Figure 5.1 (a)). This could be due to the definition of their respective income bases and differences in the way income tax and USC data are collected. As mentioned previously, most social welfare receipts are not liable for USC but are liable for income tax and this affects the income distribution. For example, an individual could earn €9,000 from employment income and €9,000 from welfare income annually. For USC, they would appear in the first income band but for income tax they would appear in the fifth income band. However, this would have little impact on the aggregate

elasticity, as individuals on the lowest income groups pay a negligible share of total tax. Additionally, pension contributions are exempt from income tax but are within the charge for USC. This means there are more USC cases than income tax cases at the top end of the income distribution, but the effect is very small.

The lowest income band is quite similar when we plot the two distributions for non-PAYE workers (Figure 5.1 (b)). This is primarily because non-PAYE workers are not entitled to certain benefits like Jobseekers Benefit or Illness Benefit, meaning their taxable income is likely to be at a similar level under both the income tax and USC regimes. Again, the shape of the non-PAYE distribution at high incomes remains similar for both taxes, although there are slightly more USC cases here than income tax cases.

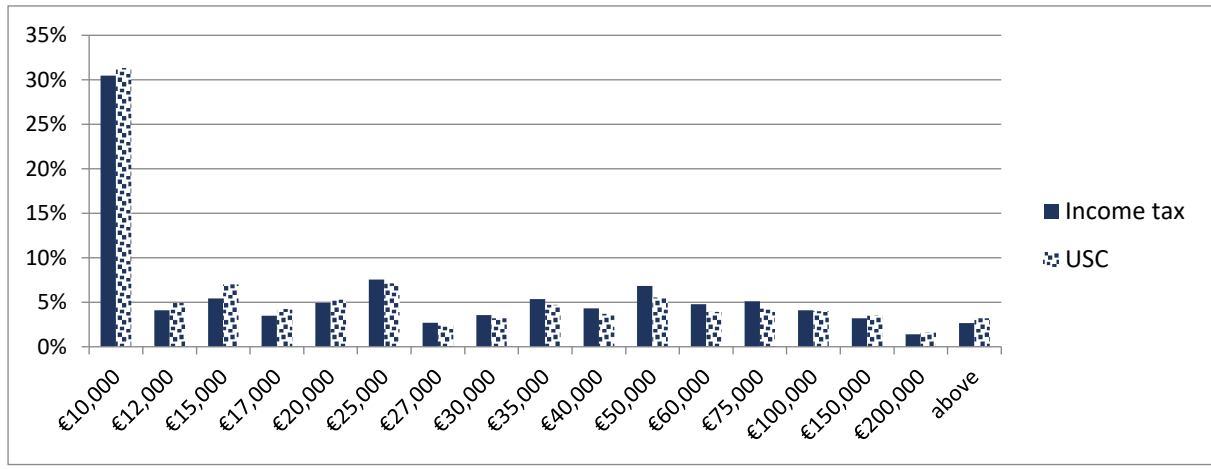
Overall, though, it is reasonable to say that the income distribution is similar for both taxes. This leads us to conclude that it is the parameters of each tax (and in particular tax credits), rather than their base or underlying income distribution, that results in such different revenue elasticities.

**Figure 5.1: Distribution of taxpayer cases by PAYE status**





(b) Non-PAYE



# Chapter 6

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## Discussion and Policy

In this study, we analytically estimate the income tax revenue elasticities for Ireland over the period 2003–13. To do so, we base our analysis on the study of Creedy and Gemmell (2003) and use data from the statistical reports of the Office of the Revenue Commissioners on the distributions of taxable income. Our results suggest that, on average, the value of the Irish income tax revenue elasticity is 2.0, indicating a progressive tax system, and that a 1% increase in taxable income results in a 2.0% automatic increase in income tax revenues.

In the first step of our analysis, we estimated the baseline elasticities, without taking into account changes in income growth or the effect of other types of tax deductions. Our findings highlight the importance of the thresholds and tax credits in the increase of the responsiveness of revenues. In particular, revenues increase for taxpayers near thresholds, or near the limit of the starting point to pay taxes, thereby substantially increasing the value of the elasticity within those income bands.

In the second step of our analysis, we took into account the different rates of growth of taxable income across income bands. In doing so, we showed that this increases the elasticity from its baseline values, as income growth is higher as we move towards higher incomes. When we take into account the effect of mortgage interest relief (MIR), once again the elasticity increases because the extra credit reduces average tax rates relatively more than marginal tax rates.<sup>18</sup>

In the third step of our analysis, we estimated the average aggregate estimate for the USC revenue elasticity. The size of this elasticity is 1.2, a value lower than that for the income tax elasticity. This indicates that it is both less volatile and also less progressive than income tax (while still being overall progressive, with an elasticity greater than 1). In contrast findings regarding income tax elasticities, the USC estimates for PAYE and non-PAYE earners are similar; this arises from the fact that USC treats all taxpayers similarly. Besides, the non-PAYE income tax revenue elasticity of 1.4, is reasonably similar to the USC result, indicating that tax credits

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<sup>18</sup> An interesting fact about mortgage interest relief is that it alters the incentives for buying houses, by giving an extra incentive for lower income people to buy a house. Also, we observe that from lower to higher income bands people are more leveraged (not least because the MIR is tax deductible at source) and thus the effect of the relief is greater for the lowest earners. This suggests that MIR has a strong distributional implication.

also play a role in the differences. This pinpoints the role of tax credits in the automatic responsiveness of the Irish income tax system.

One of the most interesting policy implications of this paper relates to the results arising from the difference between the analytical and empirical values computed for the income tax revenue elasticity. The fact that the result arising from the regression analysis is much smaller than the analytical one provides evidence that Irish discretionary income tax policy was revenue-reducing over 2003–13. However, a lot of the discretionary policies that created this result, such as various income tax reliefs, have subsequently been restricted or removed following recommendations from the 2009 report of the Commission on Taxation. Moreover, the difference suggests that the analytical expression provides more detail in terms of the distributional and marginal effects affecting the responsiveness of tax revenues across the income distribution, an outcome that leads us to the next step in our future research: empirically examine the differences arising when we take into account the different income distributions across taxpayer categories.

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# Appendix 1

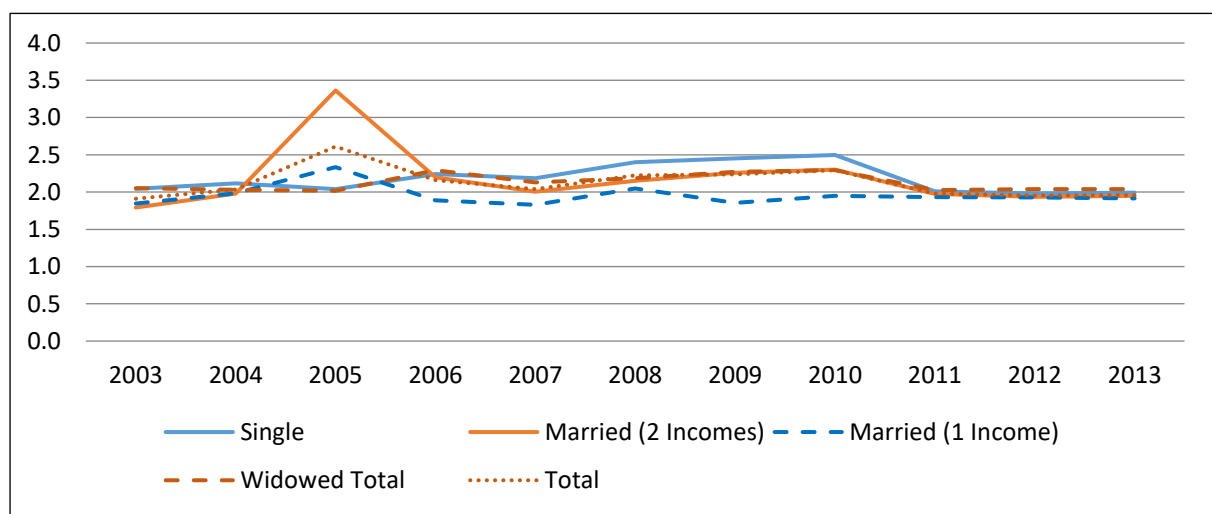
## More Detailed Results

### A1.1 ANALYSIS EXAMINING THE DIFFERENT CATEGORIES OF THE TAX PAYERS

#### Baseline Elasticity

Figure A1 shows the differences across categories of taxpayers – single people, married people with one income (M1E), married people with two incomes (M2E) and widowed. It shows that the category of M1E has the lowest elasticity, compared to the other categories, but that the elasticity does not vary much across categories. This may indicate that the income tax revenue responsiveness of M1E is lower when their income changes. By contrast, the tax elasticity of single people is the highest in most of the years shown. Tables A2.1a–j of appendix 2 present the individual elasticities across categories, income bands, and for the years 2003–13.

**Figure A1.1: PAYE Baseline Elasticity Across Years, Total and by Category**



#### Non-equi-proportional Income Growth Elasticity

When we assume there is no equi-proportional income growth across the income distribution, and focus our analysis on taxpayer categories, we find negative income elasticities (i.e. income growth) for single-earning couples (M1E) and for widowed people, and positive income elasticities (i.e. income contraction) for single people and dual-earning couples (M2E) in 2011 (see Figure a(2)). The non-

equi-proportional growth elasticity rose in the last two years considered here – 2012 and 2013 – because relatively stronger income growth at the top of the income distribution allowed the share of top earners in total income to expand again.

**Figure A1.2: Income Elasticities by PAYE Category, 2001**



Generally, the baseline elasticity is stable across time and across all years (see Figure A3). An exception occurs in 2005 for the M2E category, when the average income in that year results in the automatic jump effect, as mentioned previously in the baseline results. However, the non-equi-proportional growth elasticities for all categories are more volatile due to income dynamics during the downturn. The spike in 2008, for both single and widowed taxpayers, is due to extremely high income elasticities (growth in total income for these categories was of a small magnitude relative to growth of income for certain income bands – a denominator effect prevails).

The weighted average of the non-equi-proportional growth elasticity is 2.8 for single people, while it is 2.4 for M2E and 2.2 for M1E (Table A1). One reason the elasticity is smaller for both M2E and M1E than it is for single people is the greater share of high-earning taxpaying units in these categories compared to the single category, resulting in a higher average tax rate for couples. This relatively higher share is partly due to the way in which Irish tax revenues are collected. Couples can have their income jointly assessed as one taxpaying unit, and so the average tax rate on their combined income may be higher than that of two single individuals separately earning the two components of the sum, as the combined income is more likely to be subject to the higher rate of tax.

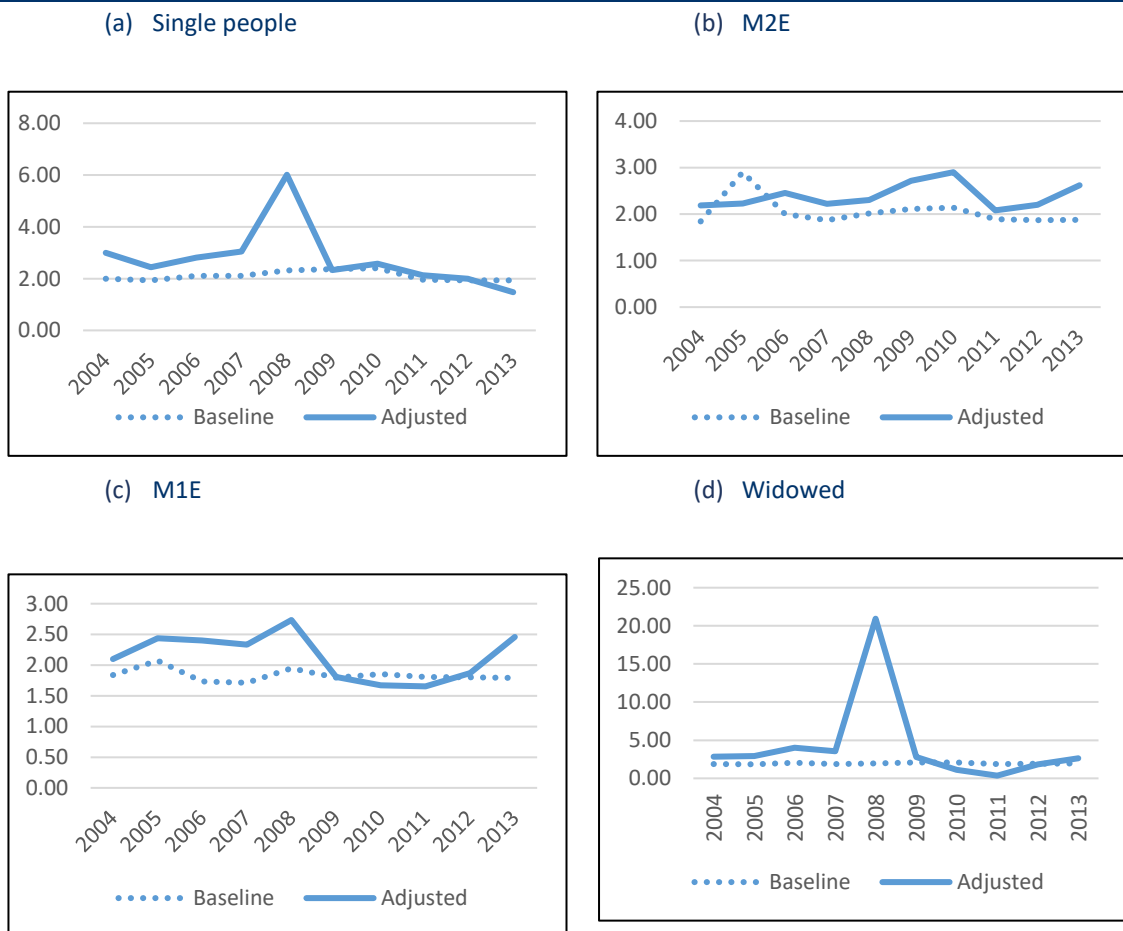
However, the tax system assists M1E households by allowing a higher minimum income before tax must be paid than that which applies to single people, in recognition of the role of partners in the home or the presence of dependents in the household. This lowers their average tax rate compared to singles in the lower half of the income distribution. The dispersion between singles and couples is less notable for the baseline taxpayer elasticities.

Table A1.1: Weighted Average Elasticities by Taxpayer Category

	Singles	M2E	M1E	Widowed
Baseline elasticity	2.1	2.1	1.8	1.9
Adjusted elasticity	2.8	2.4	2.2	4.6

Note: Annual estimates are weighted by their tax share within a category

Figure A1.3: Annual Estimates of Adjusted Elasticities by Taxpayer Category



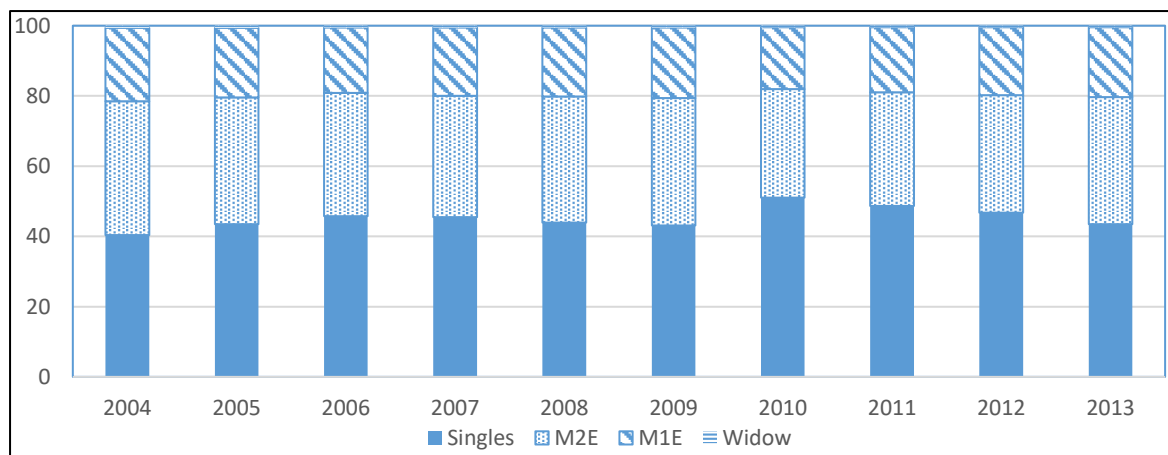


### A1.2 THE ELASTICITY WITH MORTGAGE INTEREST RELIEF (MIR)

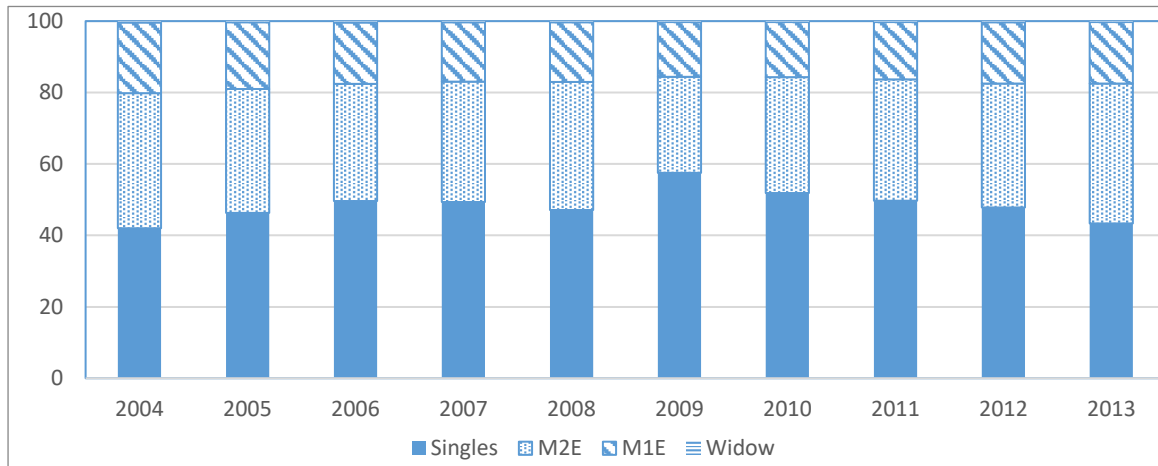
In order to understand the magnitude of the MIR effect and its quantitative implications, Table 7 (in the main body of this paper) reports the size of the coefficient or elasticity of MIR, both for the different taxpayer categories and the aggregate one. There, we observe that the effect of the relief is bigger for single people, and has the smallest effect on people who are widowed. This might be explained by the fact that single people and M2E display the highest share of the overall number of cases that have a mortgage. Figure A4 shows the share of the four categories that use MIR and the relative share of the deductions each category faces across years.

**Figure A1.4: MIR Policy by Taxpayer Category**

(a) Each category's share in total MIR cases (%)



(b) Each category's share in total MIR deductions (%)



### A1.3 ELASTICITIES WITH MORTGAGE INTEREST RELIEF (MIR) AND NON-EQUI-PROPORTIONAL INCOME GROWTH

Table A2 and Figure A5 show the results for including both MIR and non-equi-proportional income changes in the aggregate revenue elasticity, combining equations (5), (6a) and (6b) into equation (4).

Table A1.2: Aggregate Revenue Elasticities With MIR And Non-equi-proportional Income Change

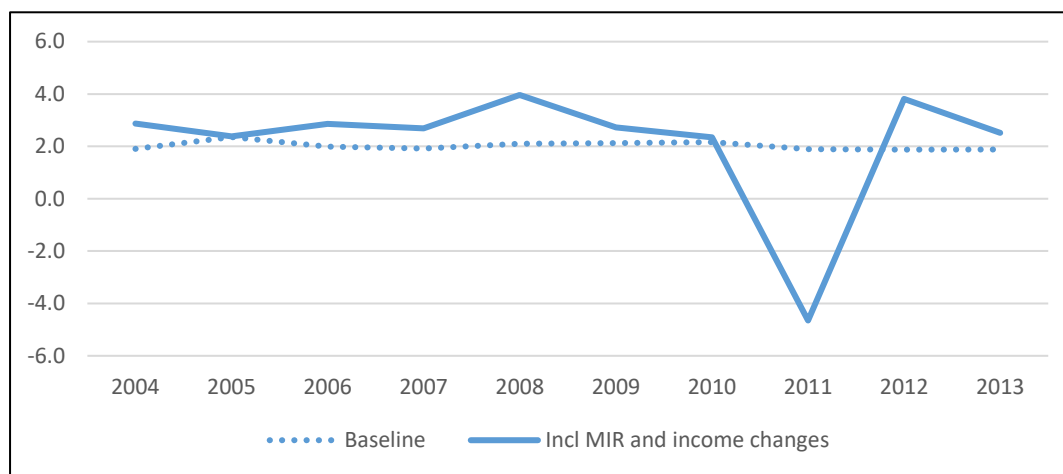
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Elasticity (PAYE)</b>	3.1	2.5	3.0		3.1	4.4	2.9	2.5	-5.6	4.1	2.6
<b>Elasticity (non-PAYE)</b>	1.8	1.8	2.1		0.6	1.7	1.6	1.4	1.5	1.9	1.9
<b>Elasticity (overall)</b>	2.9	2.4	2.9		2.7	4.0	2.7	2.3	-4.7	3.8	2.5

As expected, it is higher in almost all years. The stark exception is 2011, where the elasticity is found to be negative. In that year, incomes fell compared to the previous year, and taxes rose compared to the previous year, as Budget 2011 reduced credits and thresholds by approximately 10 per cent across all taxpayers. The marginal tax rate was thus negative between 2010 and 2011. This is not captured in the baseline, however, as, by construction, it only uses within-year information.<sup>19</sup> Introducing data from the previous year, in order to calculate

<sup>19</sup> Ideally the income elasticity would also be calculated based on within-year information from the income distribution. However, this is not easily operationalised without case-level data.

individual income elasticities as changes occur across time, causes the 2011 weighted aggregate estimate to reduce relative to the baseline.

**Figure A1.5: Aggregate Elasticity for Baseline and Baseline Adjusted for MIR and Income Effects**



This can be explained by low-but-dual-earning PAYE married couples, specifically those whose combined income is between €35,000 and €40,000. Their baseline elasticity is large and positive because their income is just high enough to result in a net tax liability, making them extremely responsive to income changes. Their marginal income tax rate is 20 per cent and their average income tax rate is relatively small, as their tax credits almost cover their gross tax liability. When the baseline is adjusted to include MIR effects, the result is to increase their revenue elasticity further as this taxpayer category had large tax deductions associated with large mortgages in this period. This deduction worked like a tax credit (on the assumption that these taxpayers typically have a positive gross tax liability) and substantially reduced their net tax liability and average tax rate accordingly. However, unlike other couples in the M2E category and indeed the wider economy, their incomes grew strongly in 2011, rising by 11 per cent. Given the economy-wide contraction in income of 0.6 per cent, their individual income elasticity was thus large and negative. The combination of the two effects results in a negative individual elasticity that has a large enough magnitude to influence the aggregate elasticity result for 2011 (see Table A3).

Table A1.3: Illustration of Individual Elasticity Effects Dominating Aggregate Result for 2011

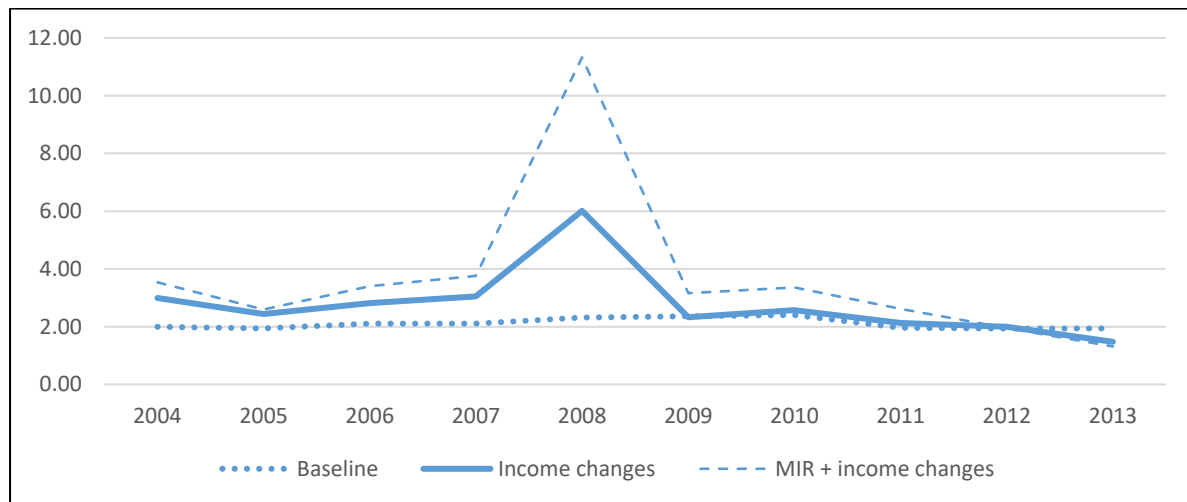
	PAYE M2E (€35–40,000)	PAYE M2E category	Total
$\eta_{T_{y_i}y_i}$ : Baseline revenue elasticity	8.2	2.0	1.9
$\eta_{T_{y_i}y_i}$ : Baseline adjusted for MIR	88.9	3.0	2.5
$\eta_{y_i,Y}$ : Income elasticity	-33.2	2.3	1.0
$\eta_{T_{y_i}y_i}$ : Baseline adjusted for MIR and income effects	-2,951.8	-13.6	-4.7

Note: Weights for PAYE M2E revenue elasticities in Column 2 are based on within-category revenue shares, while weights for total revenue elasticity are based on individual shares in total, as per results presented in appendix 2.

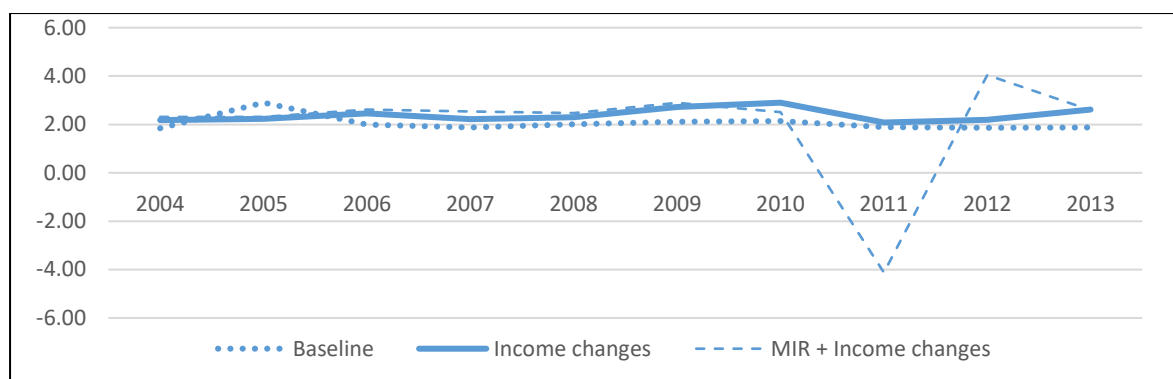
For illustration purposes, Figure A6 compares the single people category with the M2E category. The expected reinforcing effect of both non-equi-proportional income growth and MIR is seen in the former, but not the latter category.

Figure A1.6: Comparing Elasticities by Category

(a) A6.1 Single people



(b) A6.2 M2E

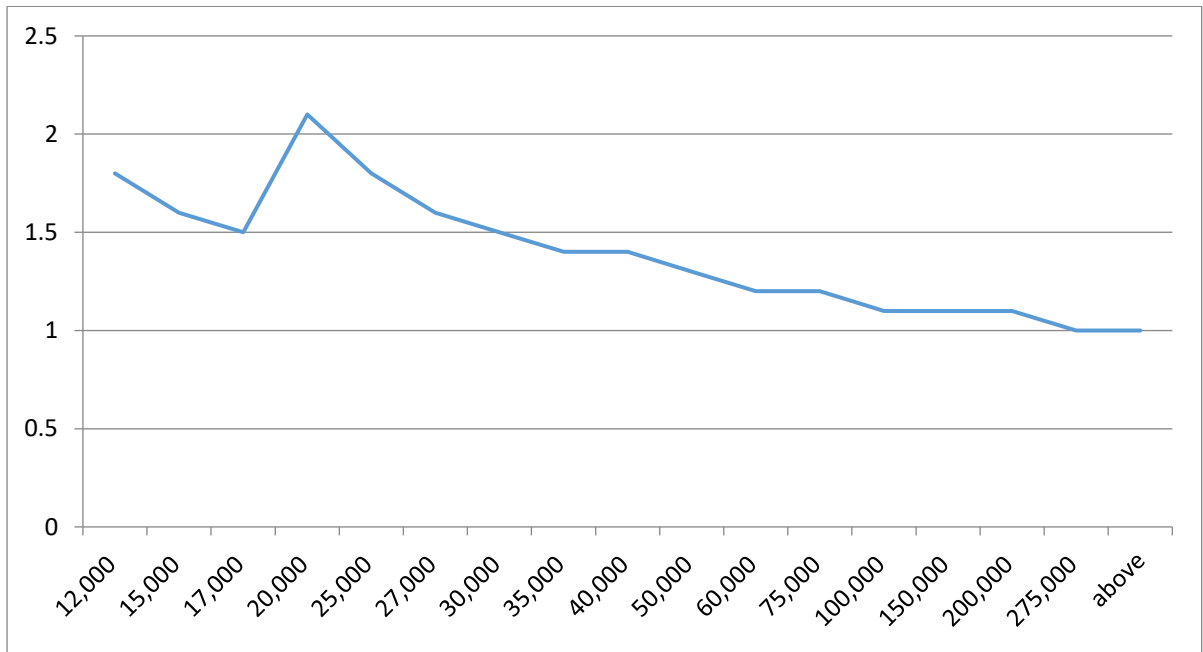


#### A1.4 USC ELASTICITY

When weighted by category, the results are stable (see Table A4). Both the single and the widowed categories have a slightly higher elasticity because incomes in these categories are typically lower than they are for a couple. Lower incomes imply a higher elasticity, as the average tax rate is relatively lower for low incomes under a progressive system. Figure A7 shows the aggregate elasticity for the single PAYE category over income ranges (rather than across time). It is observed that the elasticity is always highest whenever an income threshold is crossed, as the marginal tax rate takes a discrete jump upward, and then declines as the average tax rate rises with income.

Table A1.4: Baseline USC Elasticity by Taxpayer Categor

	2011	2012	2013
Single people	1.3	1.3	1.3
M2E	1.2	1.2	1.2
M1E	1.2	1.2	1.2
Widowed	1.3	1.4	1.3

**Figure A1.7: USC Elasticity for Single Category PAYE Taxpayers, Over the Income Distribution, 2013**

# Appendix 2

## Tabulated Data of Elasticities by Year

### A2.1 ELASTICITIES ACROSS INCOME DISTRIBUTIONS

Tables A2.1a–1e: Baseline Elasticity, PAYE

Table A2.1a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-0.7	-18.1	7.0	3.6	2.7	2.1	1.8	3.4	2.7	2.2	1.8	1.6	1.4	1.3	1.2	1.1	1.0	2.0
<b>2004</b>	-0.6	-6.1	18.7	5.0	3.3	2.3	2.0	3.7	2.8	2.3	1.9	1.6	1.5	1.3	1.2	1.1	1.1	2.1
<b>2005</b>	-0.5	-3.4	-18.3	9.1	4.4	2.7	2.2	2.0	3.2	2.5	2.0	1.7	1.5	1.4	1.2	1.1	1.1	2.0
<b>2006</b>	-0.4	-2.4	-6.5	40.3	6.4	3.3	2.5	2.2	4.0	2.8	2.2	1.8	1.6	1.4	1.3	1.2	1.1	2.2
<b>2007</b>	-0.4	-1.7	-3.3	-10.1	20.9	4.6	3.1	2.6	2.2	3.3	2.4	1.9	1.6	1.4	1.3	1.2	1.1	2.2
<b>2008</b>	-0.3	-1.5	-2.8	-7.0	90.9	5.4	3.4	2.8	2.3	3.6	2.6	2.0	1.7	1.5	1.3	1.2	1.1	2.4
<b>2009</b>	-0.3	-1.5	-2.8	-7.0	91.5	5.4	3.4	2.8	2.3	3.8	2.6	2.0	1.7	1.5	1.3	1.2	1.1	2.5
<b>2010</b>	-0.3	-1.5	-2.8	-7.0	90.4	5.4	3.4	2.8	2.3	3.8	2.6	2.0	1.7	1.5	1.3	1.2	1.1	2.5
<b>2011</b>	-0.3	-2.0	-4.5	-33.5	9.2	3.8	2.7	2.4	2.0	3.0	2.3	1.8	1.6	1.4	1.3	1.2	1.1	2.0
<b>2012</b>	-0.3	-2.0	-4.5	-33.3	9.2	3.8	2.7	2.4	2.0	3.0	2.3	1.8	1.6	1.4	1.3	1.2	1.1	2.0
<b>2013</b>	-0.3	-2.0	-4.5	-33.5	9.3	3.8	2.7	2.4	2.0	3.0	2.3	1.8	1.6	1.4	1.3	1.2	1.1	2.0

Table A2.1b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-0.3	-0.9	-1.4	-2.2	-4.0	-38.9	9.2	5.3	3.5	2.6	2.1	1.7	2.5	1.9	1.5	1.3	1.1	1.8
2004	-0.3	-0.8	-1.1	-1.7	-2.7	-7.6	61.0	9.7	4.7	3.1	2.3	1.9	2.6	1.9	1.5	1.3	1.2	2.0
2005	-0.2	-0.6	-0.9	-1.3	-1.9	-3.8	-10.6	866.2	8.0	4.2	2.7	2.1	3.0	2.1	1.6	1.4	1.2	3.4
2006	-0.2	-0.5	-0.8	-1.1	-1.5	-2.6	-5.0	-10.8	23.1	5.9	3.2	2.3	3.6	2.3	1.7	1.4	1.2	2.2
2007	-0.2	-0.5	-0.6	-0.8	-1.1	-1.8	-2.8	-4.3	-12.6	15.9	4.6	2.8	2.1	2.5	1.8	1.4	1.2	2.0
2008	-0.2	-0.4	-0.6	-0.8	-1.0	-1.6	-2.5	-3.5	-8.1	38.4	5.3	3.0	2.2	2.7	1.8	1.5	1.2	2.1
2009	-0.1	-0.4	-0.6	-0.8	-1.0	-1.6	-2.5	-3.5	-8.0	39.8	5.4	3.0	2.2	2.8	1.9	1.5	1.2	2.3
2010	-0.1	-0.4	-0.6	-0.8	-1.0	-1.6	-2.5	-3.5	-8.0	40.2	5.4	3.0	2.2	2.8	1.9	1.5	1.2	2.3
2011	-0.1	-0.5	-0.7	-0.9	-1.3	-2.2	-3.7	-6.4	-69.8	8.2	3.8	2.5	3.9	2.4	1.7	1.4	1.2	2.0
2012	-0.1	-0.5	-0.7	-0.9	-1.3	-2.2	-3.7	-6.4	-73.0	8.2	3.8	2.5	3.9	2.4	1.7	1.4	1.2	1.9
2013	-0.1	-0.5	-0.7	-0.9	-1.3	-2.2	-3.7	-6.4	-73.4	8.2	3.8	2.5	3.8	2.4	1.7	1.4	1.2	2.0

Table A2.1c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-0.3	-1.4	-2.4	-5.0	-25.5	6.9	3.8	3.1	2.4	4.2	2.8	2.1	1.8	1.5	1.3	1.2	1.1	1.8
2004	-0.3	-1.2	-2.0	-3.7	-9.6	10.7	4.6	3.5	2.7	4.5	2.9	2.1	1.8	1.5	1.3	1.2	1.1	2.0
2005	-0.3	-1.0	-1.6	-2.6	-5.0	73.0	6.8	4.5	3.1	2.4	3.2	2.3	1.9	1.6	1.3	1.2	1.1	2.3
2006	-0.3	-0.9	-1.3	-2.1	-3.6	-17.3	11.6	6.0	3.7	2.7	3.8	2.5	2.0	1.6	1.4	1.2	1.1	1.9
2007	-0.2	-0.7	-1.1	-1.5	-2.4	-5.7	-65.0	13.6	5.4	3.4	4.6	2.8	2.1	1.7	1.4	1.3	1.1	1.8
2008	-0.2	-0.7	-1.0	-1.4	-2.1	-4.6	-17.9	26.7	6.5	3.7	5.2	3.0	2.2	1.7	1.4	1.3	1.1	2.0
2009	-0.1	-0.7	-1.0	-1.4	-2.1	-4.6	-17.7	26.9	6.5	3.7	2.6	3.0	2.2	1.8	1.4	1.3	1.1	1.9
2010	-0.1	-0.7	-1.0	-1.4	-2.1	-4.6	-17.9	27.0	6.5	3.7	2.6	3.0	2.2	1.8	1.4	1.3	1.1	1.9
2011	-0.1	-0.8	-1.2	-1.8	-3.0	-10.1	20.9	7.6	4.2	2.9	4.0	2.6	2.0	1.6	1.4	1.2	1.1	1.9
2012	-0.1	-0.8	-1.2	-1.8	-3.0	-10.0	20.9	7.6	4.2	2.9	4.0	2.6	2.0	1.6	1.4	1.2	1.1	1.9
2013	-0.1	-0.8	-1.2	-1.8	-3.0	-10.0	21.0	7.6	4.2	2.9	4.0	2.6	2.0	1.6	1.4	1.2	1.1	1.9

Table A2.1d: Total widowed (up to)



	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-1.4	-5.2	83.6	5.6	3.5	2.4	2.0	3.8	2.8	2.3	1.9	1.6	1.5	1.3	1.2	1.1	1.1	2.1
<b>2004</b>	-1.2	-3.3	-15.5	9.5	4.4	2.8	2.2	4.1	3.0	2.4	1.9	1.7	1.5	1.3	1.2	1.1	1.1	2.0
<b>2005</b>	-0.9	-2.1	-4.8	-64.4	8.5	3.7	2.7	2.3	3.5	2.6	2.1	1.7	1.5	1.4	1.2	1.2	1.1	2.0
<b>2006</b>	-0.7	-1.5	-2.9	-7.6	55.0	5.3	3.3	2.8	4.6	3.1	2.3	1.9	1.6	1.4	1.3	1.2	1.1	2.3
<b>2007</b>	-0.4	-1.2	-1.9	-3.7	-9.9	11.4	4.6	3.5	2.7	3.7	2.6	2.0	1.7	1.5	1.3	1.2	1.1	2.1
<b>2008</b>	-0.3	-1.1	-1.7	-3.0	-6.6	21.4	5.6	4.0	2.9	4.2	2.8	2.1	1.7	1.5	1.3	1.2	1.1	2.2
<b>2009</b>	-0.1	-1.1	-1.7	-3.0	-6.5	20.9	5.5	4.0	2.9	4.5	2.9	2.1	1.8	1.5	1.3	1.2	1.1	2.3
<b>2010</b>	0.0	-1.1	-1.7	-3.0	-6.4	21.2	5.6	4.0	2.9	4.5	2.9	2.1	1.8	1.5	1.3	1.2	1.1	2.3
<b>2011</b>	0.0	-1.3	-2.4	-5.0	-50.2	7.2	3.8	3.1	2.5	3.3	2.4	1.9	1.7	1.4	1.3	1.2	1.1	2.0
<b>2012</b>	0.0	-1.3	-2.4	-5.0	-49.3	7.2	3.8	3.1	2.5	3.3	2.4	1.9	1.7	1.4	1.3	1.2	1.1	2.0
<b>2013</b>	0.0	-1.3	-2.4	-4.9	-50.7	7.1	3.8	3.1	2.5	3.3	2.4	1.9	1.7	1.4	1.3	1.2	1.1	2.0

Table A2.1e: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-0.7	-17.0	7.9	3.5	2.0	1.9	2.2	3.5	2.7	2.5	2.1	1.8	2.0	1.7	1.4	1.3	1.1	1.9
<b>2004</b>	-0.6	-4.9	16.1	4.6	2.7	2.6	4.0	3.9	2.9	2.7	2.2	1.8	2.1	1.7	1.5	1.3	1.1	2.0
<b>2005</b>	-0.5	-3.0	-15.3	8.0	4.0	6.1	2.3	24.1	3.4	2.6	2.3	1.9	2.2	1.8	1.5	1.3	1.1	2.6
<b>2006</b>	-0.4	-2.2	-5.5	36.8	6.3	2.4	3.0	2.3	4.6	3.0	2.6	2.1	2.5	1.9	1.6	1.3	1.1	2.2
<b>2007</b>	-0.3	-1.6	-3.1	-9.0	19.3	4.1	-0.7	3.4	2.2	3.8	3.0	2.3	1.9	2.1	1.6	1.4	1.1	2.0
<b>2008</b>	-0.2	-1.4	-2.3	-6.4	83.3	5.0	2.1	4.4	2.5	4.9	3.2	2.4	2.0	2.2	1.7	1.4	1.1	2.2
<b>2009</b>	-0.2	-1.4	-2.6	-6.3	83.2	4.9	2.0	4.5	2.5	5.4	2.9	2.4	2.0	2.2	1.7	1.4	1.1	2.2
<b>2010</b>	-0.2	-1.4	-2.6	-6.2	79.5	4.8	1.9	4.6	2.5	5.5	3.0	2.5	2.0	2.3	1.7	1.4	1.2	2.3
<b>2011</b>	-0.3	-1.8	-4.0	-28.8	8.0	2.9	4.1	2.7	-0.5	3.3	2.8	2.2	2.6	2.0	1.6	1.3	1.1	2.0
<b>2012</b>	-0.3	-1.8	-4.1	-29.3	7.9	2.9	4.2	2.7	-0.6	3.4	2.8	2.2	2.6	2.0	1.6	1.3	1.1	2.0
<b>2013</b>	-0.3	-1.8	-4.0	-29.6	8.0	2.9	4.1	2.7	-0.5	3.3	2.8	2.2	2.6	2.0	1.6	1.3	1.1	2.0

## Tables A2.1f–1j: Baseline Elasticity, Non-PAYE

Table A2.1f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-51.3	3.2	2.3	1.9	1.7	1.5	1.4	2.8	2.3	2.0	1.7	1.5	1.4	1.3	1.2	1.1	1.0	-0.2
2004	-45.8	3.2	2.3	1.9	1.7	1.5	1.4	2.8	2.3	2.0	1.7	1.5	1.4	1.3	1.2	1.1	1.0	1.2
2005	-18.4	3.6	2.4	2.0	1.7	1.5	1.4	1.4	2.5	2.1	1.8	1.5	1.4	1.3	1.2	1.1	1.0	1.3
2006	-9.2	3.9	2.5	2.0	1.8	1.6	1.5	1.4	2.8	2.2	1.9	1.6	1.4	1.3	1.2	1.1	1.0	1.3
2007	-5.1	5.0	2.9	2.2	1.9	1.6	1.5	1.4	1.4	2.4	2.0	1.7	1.5	1.3	1.2	1.1	1.0	1.4
2008	-1.8	6.0	3.1	2.3	2.0	1.7	1.5	1.5	1.4	2.5	2.0	1.7	1.5	1.4	1.2	1.2	1.1	1.4
2009	-1.0	6.0	3.1	2.3	2.0	1.7	1.5	1.5	1.4	2.6	2.1	1.7	1.5	1.4	1.2	1.2	1.1	1.4
2010	-1.0	6.1	3.1	2.3	2.0	1.7	1.5	1.5	1.4	2.6	2.1	1.7	1.5	1.4	1.2	1.2	1.1	1.4
2011	-1.2	4.0	2.6	2.1	1.8	1.6	1.5	1.4	1.3	2.3	1.9	1.6	1.5	1.3	1.2	1.1	1.0	1.4
2012	-1.3	4.0	2.6	2.1	1.8	1.6	1.5	1.4	1.3	2.3	1.9	1.6	1.5	1.3	1.2	1.1	1.1	1.4
2013	-1.3	4.0	2.6	2.1	1.8	1.6	1.5	1.4	1.3	2.3	1.9	1.6	1.5	1.3	1.2	1.1	1.0	1.3

Table A2.1g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-0.7	-2.8	-9.0	19.8	5.5	3.1	2.4	2.1	1.9	1.7	1.5	1.4	2.2	1.7	1.4	1.3	1.1	1.4
2004	-0.6	-2.8	-9.1	20.0	5.5	3.1	2.4	2.1	1.9	1.7	1.5	1.4	2.2	1.7	1.4	1.3	1.1	1.4
2005	-0.6	-2.4	-6.3	67.3	6.7	3.3	2.6	2.2	1.9	1.7	1.5	1.4	2.4	1.8	1.5	1.3	1.1	1.4
2006	-0.7	-2.2	-5.1	-65.9	8.2	3.5	2.7	2.3	2.0	1.8	1.6	1.4	2.6	1.9	1.5	1.3	1.1	1.4
2007	-0.6	-1.7	-3.5	-10.2	19.9	4.5	3.1	2.6	2.2	1.9	1.6	1.5	1.4	2.0	1.6	1.3	1.1	1.3
2008	-0.5	-1.5	-2.9	-7.2	66.8	5.2	3.4	2.8	2.3	2.0	1.7	1.5	1.4	2.1	1.6	1.4	1.1	1.4
2009	-0.1	-1.5	-2.9	-7.1	82.0	5.3	3.4	2.8	2.3	2.0	1.7	1.5	1.4	2.2	1.6	1.4	1.1	1.4
2010	-0.1	-1.5	-2.9	-7.0	64.2	5.4	3.4	2.8	2.3	2.0	1.7	1.5	1.4	2.2	1.6	1.4	1.1	1.4
2011	-0.2	-2.0	-4.6	-36.8	9.3	3.7	2.7	2.4	2.0	1.8	1.6	1.4	2.7	1.9	1.5	1.3	1.1	1.4
2012	-0.2	-2.0	-4.7	-37.2	9.2	3.7	2.7	2.4	2.0	1.8	1.6	1.4	2.7	1.9	1.5	1.3	1.1	1.4
2013	-0.2	-2.0	-4.5	-36.8	9.1	3.7	2.7	2.4	2.0	1.8	1.6	1.4	2.7	1.9	1.5	1.3	1.1	1.4

Table A2.1h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-0.5	-2.8	-8.6	20.9	5.7	3.1	2.4	2.1	1.9	3.5	2.5	2.0	1.7	1.4	1.3	1.2	1.1	1.4
<b>2004</b>	-0.5	-2.9	-8.5	21.1	5.7	3.1	2.4	2.1	1.9	3.5	2.5	2.0	1.7	1.4	1.3	1.2	1.1	1.4
<b>2005</b>	-0.4	-2.5	-6.3	84.8	6.8	3.4	2.5	2.2	1.9	1.7	2.7	2.0	1.7	1.5	1.3	1.2	1.0	1.3
<b>2006</b>	-0.4	-2.2	-5.0	-57.9	8.4	3.7	2.7	2.3	2.0	1.8	3.0	2.2	1.8	1.5	1.3	1.2	1.0	1.3
<b>2007</b>	-0.5	-1.7	-3.3	-10.2	21.5	4.7	3.1	2.6	2.2	1.9	3.2	2.3	1.8	1.6	1.3	1.2	1.1	1.3
<b>2008</b>	-0.4	-1.5	-2.8	-7.0	98.8	5.4	3.4	2.8	2.3	2.0	3.5	2.4	1.9	1.6	1.4	1.2	1.1	1.5
<b>2009</b>	-0.2	-1.5	-2.8	-7.0	100.3	5.4	3.4	2.8	2.3	2.0	1.7	2.4	1.9	1.6	1.4	1.2	1.1	1.5
<b>2010</b>	-0.2	-1.5	-2.8	-7.0	102.8	5.5	3.4	2.8	2.3	2.0	1.7	2.4	1.9	1.6	1.4	1.2	1.1	1.5
<b>2011</b>	-0.3	-2.0	-4.5	-34.2	9.4	3.8	2.7	2.4	2.0	1.8	3.0	2.2	1.8	1.5	1.3	1.2	1.1	1.3
<b>2012</b>	-0.3	-2.0	-4.5	-31.7	9.4	3.8	2.7	2.4	2.0	1.8	2.9	2.2	1.8	1.5	1.3	1.2	1.1	1.3
<b>2013</b>	-0.3	-2.0	-4.5	-33.2	9.4	3.8	2.7	2.4	2.0	1.8	2.9	2.2	1.8	1.5	1.3	1.2	1.1	1.3

Table A2.1i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-3.6	6.0	3.0	2.3	2.0	1.7	1.5	3.0	2.4	2.0	1.7	1.5	1.4	1.3	1.2	1.1	1.1	0.8
<b>2004</b>	-3.3	6.0	3.0	2.3	2.0	1.7	1.5	3.0	2.4	2.0	1.7	1.5	1.4	1.3	1.2	1.1	1.1	1.4
<b>2005</b>	-2.8	9.7	3.7	2.6	2.1	1.8	1.6	1.5	2.6	2.2	1.8	1.6	1.4	1.3	1.2	1.1	1.1	1.4
<b>2006</b>	-1.7	29.4	4.8	2.9	2.3	1.9	1.7	1.6	3.1	2.4	2.0	1.7	1.5	1.3	1.2	1.1	1.1	1.4
<b>2007</b>	-1.3	-18.6	7.2	3.6	2.6	2.0	1.8	1.7	1.6	2.6	2.1	1.7	1.5	1.4	1.2	1.2	1.1	1.3
<b>2008</b>	-0.8	-8.7	10.3	4.1	2.9	2.2	1.9	1.7	1.6	2.8	2.2	1.8	1.6	1.4	1.2	1.2	1.1	1.3
<b>2009</b>	-0.1	-8.5	10.7	4.1	2.9	2.2	1.9	1.7	1.6	2.9	2.2	1.8	1.6	1.4	1.3	1.2	1.1	1.4
<b>2010</b>	-0.1	-9.4	10.7	4.1	2.9	2.2	1.9	1.7	1.6	2.9	2.2	1.8	1.6	1.4	1.3	1.2	1.1	1.4
<b>2011</b>	-0.1	-91.2	5.3	3.2	2.4	1.9	1.7	1.6	1.5	2.5	2.0	1.7	1.5	1.3	1.2	1.1	1.1	1.4
<b>2012</b>	-0.1	577.7	5.4	3.2	2.4	1.9	1.7	1.6	1.5	2.5	2.0	1.7	1.5	1.3	1.2	1.1	1.1	1.5
<b>2013</b>	-0.1	1237.5	5.2	3.2	2.4	1.9	1.7	1.6	1.5	2.4	2.0	1.7	1.5	1.3	1.2	1.1	1.1	1.7

Table A2.1j: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	-17.8	2.8	1.5	3.4	2.3	2.0	1.8	2.6	2.1	2.3	1.8	1.5	1.9	1.6	1.3	1.2	1.1	1.0
<b>2004</b>	-38.4	2.9	1.8	3.2	2.3	2.0	1.8	2.6	2.1	2.3	1.8	1.5	1.9	1.6	1.3	1.2	1.1	1.3
<b>2005</b>	-9.8	3.2	1.8	7.7	2.4	2.0	1.8	1.7	2.3	1.9	1.9	1.6	1.9	1.6	1.4	1.2	1.1	1.3
<b>2006</b>	-7.7	3.7	2.2	-0.9	2.4	2.0	1.8	1.7	2.5	2.0	2.0	1.6	2.1	1.7	1.4	1.3	1.1	1.3
<b>2007</b>	-2.0	4.1	1.8	1.0	4.5	2.3	1.9	1.8	1.7	2.2	2.2	1.7	1.5	1.8	1.4	1.3	1.1	1.3
<b>2008</b>	-0.8	4.2	2.4	1.1	16.6	2.6	2.0	1.9	1.8	2.3	2.3	1.8	1.5	1.8	1.5	1.3	1.1	1.4
<b>2009</b>	-0.4	4.4	2.2	1.1	18.7	2.5	2.2	1.9	1.8	2.3	1.9	1.8	1.5	1.8	1.5	1.3	1.1	1.4
<b>2010</b>	-0.6	4.1	1.9	0.7	20.8	2.6	2.1	2.0	1.8	2.3	1.9	1.8	1.5	1.8	1.5	1.3	1.1	1.4
<b>2011</b>	-0.8	2.1	1.2	-4.4	3.4	2.2	1.9	1.8	1.6	2.0	2.1	1.7	2.2	1.7	1.4	1.3	1.1	1.4
<b>2012</b>	-0.8	4.7	1.2	-4.2	3.5	2.2	1.9	1.8	1.6	2.0	2.1	1.7	2.1	1.7	1.4	1.3	1.1	1.4
<b>2013</b>	-0.9	10.5	1.1	-5.2	3.5	2.2	1.9	1.8	1.6	2.1	2.1	1.7	2.2	1.7	1.4	1.3	1.1	1.4

## Tables A2.2a–2e: Income Elasticity, PAYE

Table A2.2a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
2003	-0.4	0.1	-0.6	-0.2	-0.4	0.3	0.7	1.0	1.8	1.8	2.4	3.1	3.6	3.3	2.6	2.4	3.0	1.2
2004	-0.1	-0.1	-0.1	-0.1	-0.5	-0.2	0.1	0.4	0.8	1.3	1.6	2.7	2.9	3.3	3.2	2.2	-0.8	0.8
2005	0.6	0.5	0.4	0.7	0.7	0.5	0.6	0.8	0.8	1.2	1.3	1.7	2.4	2.4	2.1	2.1	4.1	1.1
2006	0.3	0.5	0.4	0.5	0.6	0.5	0.9	0.4	1.1	1.3	1.5	1.7	2.1	2.8	2.7	3.4	2.2	1.2
2007	-0.3	0.2	-0.1	-0.3	0.5	0.5	0.4	0.6	0.5	0.9	1.1	1.2	1.5	2.4	2.0	1.1	1.8	0.8
2008	-2.3	-1.7	-1.8	-2.2	-1.6	-0.9	-0.6	-0.3	-0.6	0.7	1.6	2.3	2.9	3.2	3.6	3.3	2.3	0.5
2009	1.7	1.9	1.4	1.6	1.6	1.8	1.9	1.8	1.6	1.2	1.3	1.2	1.5	2.2	2.6	3.3	1.8	1.6
2010	0.9	0.7	1.4	1.3	0.9	0.6	0.6	1.0	0.6	0.4	1.1	1.7	2.0	2.2	1.5	0.6	2.1	1.1
2011	11.3	12.8	7.1	-7.9	0.3	4.3	11.4	13.7	13.4	22.5	12.3	3.9	5.8	-0.2	-11.8	-25.1	-13.1	8.0
2012	1.2	1.0	0.8	1.0	0.8	0.1	-0.1	0.0	0.4	-0.6	0.2	0.7	0.7	1.1	1.8	2.5	8.5	0.6
2013	2.2	2.5	1.4	2.2	0.9	-1.4	-0.8	0.4	0.2	-0.4	0.6	2.8	1.9	2.2	0.6	1.6	-12.3	0.6

Table A2.2b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
2003	-0.6	-1.1	-1.4	-1.3	-1.6	-1.0	-1.7	-1.5	-0.6	-0.4	-0.1	0.8	1.6	2.1	3.8	3.1	3.3	1.5
2004	8.2	1.7	0.4	0.2	-0.6	-0.5	0.1	-0.1	-0.3	-0.1	0.1	1.0	1.6	2.2	3.7	2.7	-0.8	1.5
2005	1.1	0.9	0.4	-0.1	0.2	0.1	-0.1	0.0	0.0	0.1	0.3	0.5	1.1	1.5	2.0	2.4	2.4	1.2
2006	0.0	0.0	-0.2	0.0	-0.1	0.0	-0.1	-0.2	-0.3	-0.1	0.1	0.0	1.0	1.3	1.8	2.2	2.4	1.0
2007	-0.4	0.3	0.0	-0.6	0.2	0.2	0.4	0.3	0.0	0.1	0.3	0.4	0.7	1.2	1.8	2.3	3.1	1.2
2008	2.5	2.6	2.2	1.1	0.5	0.1	0.5	0.8	0.3	-0.2	0.5	0.3	1.0	2.2	3.0	4.0	2.1	1.8
2009	-2.9	-3.5	-3.9	-3.7	-3.8	-3.2	-2.8	-2.1	-1.4	-0.6	-0.1	0.4	0.6	0.5	1.0	1.8	3.2	0.6
2010	-0.7	-1.3	-0.8	-1.4	-1.0	-0.1	0.4	0.2	0.1	0.3	-0.5	-0.3	0.0	0.6	1.4	0.9	0.7	0.4
2011	30.2	14.9	23.7	9.9	23.1	1.2	-7.0	6.9	0.6	-33.2	5.3	4.8	5.6	9.7	-0.3	4.5	-13.8	2.3
2012	-1.0	-1.2	0.4	-0.5	0.0	-0.1	0.2	-0.1	0.5	1.1	0.9	0.9	0.9	1.1	1.2	2.1	4.9	1.4
2013	-2.3	-2.4	-2.5	-3.2	-2.1	-1.3	-1.3	-1.3	-0.5	-0.6	0.1	1.1	1.9	2.7	3.4	3.8	0.2	1.8

Table A2.2c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-1.1	-2.7	-2.6	0.7	0.1	-0.1	-1.2	-1.8	0.3	0.2	0.4	1.3	1.6	1.6	1.5	1.2	1.0	0.5
2004	1.0	0.1	-1.2	-0.2	0.8	1.5	2.5	2.6	0.8	1.2	1.1	1.5	2.1	1.7	1.7	1.9	-0.6	1.3
2005	1.0	0.3	-0.6	0.0	0.8	0.6	0.6	0.5	0.5	0.7	0.6	0.5	1.0	1.1	1.0	0.9	1.1	0.7
2006	0.3	0.3	-0.4	-0.8	0.2	0.7	0.3	0.4	0.3	0.5	0.9	0.7	1.0	1.2	1.2	1.4	2.4	0.9
2007	-0.6	-0.1	-0.6	-1.7	-0.5	0.7	0.5	0.6	0.5	0.7	1.0	1.1	1.4	2.0	2.1	2.4	4.9	1.5
2008	-0.9	-0.8	-0.9	-1.4	-2.7	-0.3	0.2	-0.7	-0.2	-0.5	0.8	2.1	1.8	2.5	2.7	3.1	2.1	1.2
2009	-0.5	-0.5	-1.0	-0.5	0.4	0.4	0.4	0.7	0.7	0.6	0.3	-0.1	0.2	0.2	0.1	1.0	0.4	0.3
2010	2.9	2.0	2.8	2.4	2.6	3.4	3.1	2.6	2.3	2.2	-0.1	0.5	0.9	1.8	1.6	1.2	3.8	1.6
2011	25.1	17.2	-0.5	-9.1	-5.9	3.6	3.2	1.9	5.8	-89.0	-13.1	-5.7	-7.8	-9.1	-10.8	-31.6	-28.7	-16.1
2012	0.5	1.6	0.5	1.7	1.8	1.8	2.0	1.1	1.2	1.0	1.2	1.2	0.6	1.3	1.4	0.5	2.0	1.2
2013	2.2	2.6	0.6	-0.2	-1.0	-0.8	-2.3	-0.6	-0.8	-0.2	0.4	1.3	0.7	0.1	0.8	2.1	3.1	0.7

Table A2.2d: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
2003	-1.9	-0.1	-2.2	0.1	1.4	0.8	0.5	1.0	1.8	3.0	2.5	1.8	4.1	3.3	2.4	1.1	5.8	1.0
2004	-1.8	-0.2	1.9	0.5	0.1	0.8	0.9	0.9	1.0	1.9	1.5	1.9	3.1	2.5	3.1	-1.0	0.6	1.0
2005	-1.7	0.3	0.0	0.5	0.7	0.8	1.0	0.7	0.9	1.0	1.6	1.5	1.0	2.3	1.4	2.9	-0.7	0.8
2006	-2.7	0.0	-0.1	-0.2	0.8	0.7	0.2	0.9	0.7	0.8	1.7	1.3	1.4	2.4	2.3	1.3	1.8	0.8
2007	-3.6	-0.8	0.1	-0.2	-0.1	0.8	1.0	0.9	0.8	1.0	1.5	1.5	1.6	2.5	2.9	3.1	2.5	1.0
2008	-9.0	-5.8	0.5	-0.3	-1.0	2.5	2.3	1.8	1.9	2.7	3.0	3.5	4.6	4.4	5.2	3.5	7.9	2.2
2009	1.2	1.7	-0.1	0.1	0.3	-0.4	-0.8	-0.3	-0.7	-0.5	-0.7	-1.0	-0.9	0.7	0.5	1.7	3.0	-0.2
2010	7.8	9.4	10.1	9.4	8.8	-0.2	-0.2	-0.5	-0.1	-0.3	-0.1	-0.5	-0.1	0.3	1.7	-4.1	1.4	0.5
2011	112.5	50.2	-5.6	4.7	-526	-14.8	-36.5	-17.2	-34.1	-4.3	-25.1	-2.4	-7.3	22.5	-25.9	43.5	-124	-48.8
2012	2.1	2.7	0.8	1.4	1.9	2.4	1.3	1.9	1.4	1.5	2.0	1.4	1.1	1.0	0.7	5.1	-0.1	1.7
2013	5.9	0.2	0.1	-0.7	0.4	0.7	-0.2	1.1	1.4	2.0	2.1	1.9	1.3	3.6	4.6	1.8	-2.7	1.4

Table A2.2e: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-1.0	-0.2	-1.0	-0.1	-0.3	0.2	0.3	0.3	1.2	1.0	1.1	1.6	2.0	2.2	3.2	2.4	2.5	1.0
<b>2004</b>	0.1	-0.1	-0.1	0.0	-0.3	0.1	0.5	0.7	0.6	1.0	1.0	1.6	2.0	2.3	3.2	2.4	-0.8	1.0
<b>2005</b>	0.6	0.5	0.3	0.5	0.7	0.5	0.6	0.7	0.7	0.9	0.9	0.9	1.4	1.6	1.8	2.0	2.2	1.0
<b>2006</b>	0.2	0.4	0.2	0.3	0.5	0.5	0.7	0.4	0.8	0.9	1.0	0.8	1.3	1.5	1.8	2.2	2.4	1.0
<b>2007</b>	-0.3	0.1	-0.1	-0.4	0.4	0.6	0.4	0.6	0.5	0.7	0.9	0.9	1.1	1.6	1.9	2.2	3.6	1.0
<b>2008</b>	-2.1	-1.7	-1.4	-1.9	-1.6	-0.6	-0.3	-0.2	-0.3	0.4	1.2	1.6	1.7	2.5	3.1	3.7	2.2	1.0
<b>2009</b>	1.3	1.4	0.7	0.9	1.0	1.1	1.1	1.1	0.9	0.7	0.6	0.5	0.7	0.8	1.0	1.8	1.8	1.0
<b>2010</b>	1.0	0.9	1.6	1.4	1.2	0.9	0.9	1.1	0.8	0.6	0.3	0.6	0.6	1.0	1.5	0.9	2.0	1.0
<b>2011</b>	13.4	14.0	6.9	-6.6	-29.2	2.8	5.7	9.5	8.2	-13.2	3.2	2.0	2.8	5.1	-3.8	-7.6	-20.5	1.0
<b>2012</b>	1.1	1.0	0.7	1.0	1.0	0.5	0.3	0.3	0.6	0.1	0.7	0.9	0.8	1.1	1.3	1.8	4.4	1.0
<b>2013</b>	2.0	2.2	1.1	1.6	0.5	-1.2	-1.0	0.1	0.0	-0.3	0.5	1.8	1.6	2.2	2.6	3.2	-0.2	1.0

## Tables A2.2f–2j: Income Elasticity, Non-PAYE

Table A2.2f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	0.1	0.1	-0.1	1.2	1.3	1.1	1.3	1.8	2.9	2.6	1.9	3.5	1.9	2.0	2.2	1.6	4.7	2.1
<b>2004</b>	0.2	0.1	0.4	0.5	0.6	0.7	0.8	0.9	0.7	1.0	1.1	1.0	1.0	0.9	0.9	0.6	2.7	1.1
<b>2005</b>	-0.6	-0.2	-0.1	-0.1	0.4	0.6	0.7	0.8	1.5	1.1	1.2	0.9	1.0	0.9	1.1	2.3	2.3	1.2
<b>2006</b>	-0.9	-0.6	-0.8	-0.7	-0.1	0.2	0.0	-1.3	2.3	0.9	0.8	1.0	1.3	1.2	1.4	1.2	3.9	1.6
<b>2007</b>	1.3	1.0	1.1	2.2	1.3	0.7	0.9	1.7	1.9	-0.2	0.4	0.9	1.5	2.9	3.4	4.4	10.6	3.2
<b>2008</b>	-2.7	-0.5	0.1	0.6	1.1	1.0	0.7	1.3	2.3	0.7	1.1	1.4	1.1	1.0	0.4	0.5	1.4	0.8
<b>2009</b>	-0.6	0.0	0.2	0.7	1.0	0.9	1.1	1.1	1.4	1.3	1.7	1.5	1.6	1.1	1.4	1.3	1.3	1.0
<b>2010</b>	0.0	1.0	2.1	3.2	2.8	2.6	1.3	3.3	2.8	4.0	2.8	4.9	3.6	2.2	4.1	0.2	-1.2	1.8
<b>2011</b>	-3.4	2.1	1.2	-1.7	-2.7	0.9	2.1	-2.7	-6.0	3.2	-0.4	-0.8	-0.5	4.8	0.5	0.1	3.6	0.2
<b>2012</b>	5.5	3.0	-2.0	4.0	-2.0	-0.1	20.6	-3.4	4.5	7.9	4.0	17.9	10.2	21.0	-2.5	-10.9	-7.2	2.8
<b>2013</b>	0.9	-0.1	0.5	1.2	0.3	0.9	-1.1	1.9	2.1	0.6	1.2	1.4	0.9	0.3	1.5	0.9	5.5	1.8

Table A2.2g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	-1.2	-0.3	-1.5	-0.4	-0.3	0.2	-0.2	-1.0	0.8	1.2	1.0	2.0	1.8	1.4	1.7	1.0	2.5	1.5
<b>2004</b>	0.6	-0.2	-0.2	-0.2	-0.3	0.2	0.3	0.6	0.2	0.4	0.5	0.7	0.6	0.8	0.7	0.8	3.2	1.5
<b>2005</b>	-0.1	-1.0	-1.4	-1.1	-1.1	-0.4	0.3	0.2	0.1	0.2	0.5	1.0	1.2	0.9	0.7	0.6	2.2	1.2
<b>2006</b>	-0.6	-1.7	-1.3	-1.6	-1.7	-1.1	-0.7	-0.7	-0.1	-0.1	0.1	-0.3	2.5	1.1	1.0	1.3	2.1	1.3
<b>2007</b>	18.5	7.2	5.8	4.6	2.9	3.2	-2.2	-0.9	1.0	0.7	0.4	0.0	-1.7	-3.0	-1.7	-1.3	4.2	0.8
<b>2008</b>	-121	-9.4	-2.1	-0.5	-1.4	-0.1	0.9	-0.9	0.3	1.2	0.7	1.1	1.0	0.6	0.4	0.7	1.4	0.7
<b>2009</b>	-2.4	-1.9	-1.7	-1.3	-0.9	-0.6	-0.2	0.5	0.4	0.4	0.8	0.9	1.1	1.1	1.3	1.2	1.0	0.9
<b>2010</b>	-5.7	-3.7	-2.5	-2.6	-2.8	0.0	2.5	1.7	-0.1	1.3	0.5	1.4	2.0	1.8	2.4	1.5	-0.2	0.8
<b>2011</b>	1.3	2.4	3.1	2.3	6.3	5.3	4.8	7.3	6.0	1.2	3.3	2.3	0.8	2.4	1.2	1.8	3.8	2.8
<b>2012</b>	3.9	-12.1	0.2	2.1	-5.4	-6.8	-11.4	-1.9	0.0	-2.8	-6.0	1.4	1.1	11.7	7.7	3.4	-14.0	-2.5
<b>2013</b>	-3.0	-1.7	-2.4	-0.2	-2.3	-0.2	-0.9	-1.4	-0.6	-0.9	1.1	0.3	2.2	2.0	1.7	1.2	1.2	1.2



Table A2.2h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	1.7	-0.5	-0.3	0.5	0.2	0.3	-0.7	-1.3	0.5	0.3	-0.6	0.3	-0.2	0.1	-0.4	-1.6	-0.1	-0.2
<b>2004</b>	0.0	-0.3	-0.3	-0.3	0.0	0.1	0.1	0.0	0.1	0.3	0.3	0.0	0.4	0.1	0.1	0.3	2.2	0.9
<b>2005</b>	0.0	-1.5	-1.2	-0.6	-0.6	-0.2	-0.5	0.0	-0.8	0.3	0.5	0.5	0.3	0.4	0.2	0.7	2.0	0.9
<b>2006</b>	-1.3	-1.5	-1.8	-1.3	-1.8	-0.6	-1.0	-1.0	-0.7	-1.2	1.1	0.3	0.2	0.6	-0.4	0.2	1.3	0.5
<b>2007</b>	-90.9	-10.6	-2.9	1.9	-1.7	-1.2	-1.4	-1.7	0.1	1.9	-3.4	-4.9	-5.9	-4.8	-7.2	-7.5	-1.0	-2.8
<b>2008</b>	-18.6	-3.5	-0.7	-0.1	0.4	0.8	0.8	1.3	1.4	2.1	1.3	0.8	0.5	0.7	0.3	0.9	2.0	1.0
<b>2009</b>	-1.3	-0.8	-0.5	0.4	0.3	0.6	0.7	1.0	1.2	1.1	1.3	1.1	1.2	0.7	0.6	0.5	1.3	0.9
<b>2010</b>	-2.2	-0.3	0.7	2.7	3.7	3.9	0.8	4.2	3.4	4.7	2.9	3.8	3.6	5.0	3.9	2.6	-3.5	0.2
<b>2011</b>	-4.1	-2.2	-0.7	-5.6	-0.1	-3.3	-2.7	-5.9	-4.1	-14.6	-7.4	-10.0	-6.8	-5.1	-3.1	0.6	3.0	-2.1
<b>2012</b>	16.0	-2.3	-11.3	-8.1	-1.9	-7.4	-17.6	-3.1	3.0	2.4	2.4	7.2	16.4	15.5	3.2	-2.2	5.7	4.5
<b>2013</b>	0.3	-1.2	0.3	-0.5	-0.7	-0.6	0.0	-0.8	-0.2	0.0	0.6	1.1	0.0	1.0	1.7	1.5	0.2	0.4

Table A2.2i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-0.1	-1.4	-5.5	-0.4	1.2	1.5	0.6	0.6	0.9	0.3	0.2	-0.3	0.3	2.0	0.3	0.8	-0.3	0.4
<b>2004</b>	-0.3	-0.6	-0.5	-0.3	-0.2	0.4	0.7	0.4	0.3	0.1	0.6	0.5	0.8	-0.3	1.1	-0.3	1.8	0.5
<b>2005</b>	-1.1	-0.6	-1.9	-3.1	-0.5	0.2	0.3	0.7	0.6	0.7	0.8	0.6	0.2	1.9	0.6	1.5	2.7	0.9
<b>2006</b>	-2.1	-1.4	-2.2	-4.0	-1.0	-0.3	-0.3	-0.1	1.5	2.0	1.4	1.1	1.7	1.1	2.6	2.9	2.0	1.3
<b>2007</b>	-5.0	-0.1	-2.3	2.6	9.0	0.6	-0.5	1.0	-1.5	-3.1	-4.6	-6.5	-5.3	-7.0	-5.5	-5.8	-9.9	-5.1
<b>2008</b>	1.2	2.7	2.2	1.8	4.6	0.9	-0.5	-0.8	0.4	-0.9	-0.2	-0.1	-0.9	-1.1	-0.3	-0.6	0.5	-0.1
<b>2009</b>	-0.1	-1.7	-0.5	1.1	0.9	0.7	-0.1	0.3	0.2	1.1	1.1	1.0	1.6	1.4	1.5	1.7	2.0	1.2
<b>2010</b>	-2.7	6.7	2.9	-0.7	0.5	-1.0	0.7	-1.3	2.1	-0.8	-0.2	-0.1	0.5	1.1	5.1	-5.3	-2.1	-0.2
<b>2011</b>	2.6	-1.4	4.6	4.7	-63.2	-1.2	-1.5	-4.1	-4.0	-2.5	-1.7	0.2	-1.0	2.0	-5.6	0.0	2.5	-2.5
<b>2012</b>	21.5	0.2	-8.6	-14.9	-8.4	5.1	5.9	0.4	11.2	3.1	7.5	21.4	17.5	17.2	20.9	-19.8	24.1	12.1
<b>2013</b>	-1.8	4.5	5.6	-2.2	-0.1	-1.3	-0.1	-0.4	0.5	0.6	1.4	1.1	-1.4	4.0	-0.9	4.9	3.1	1.3

Table A2.2j: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	0.1	-0.1	-0.4	0.7	0.6	0.6	0.3	0.1	1.3	1.2	0.8	1.8	1.4	1.2	1.2	0.5	1.9	1.0
<b>2004</b>	0.2	0.0	0.2	0.2	0.2	0.4	0.5	0.6	0.3	0.5	0.6	0.6	0.7	0.6	0.6	0.6	2.8	1.0
<b>2005</b>	-0.6	-0.4	-0.5	-0.5	-0.2	0.1	0.3	0.5	0.4	0.5	0.7	0.9	1.0	0.9	0.7	0.9	2.1	1.0
<b>2006</b>	-0.9	-0.8	-1.1	-1.1	-0.8	-0.3	-0.4	-1.0	0.9	0.0	0.6	0.1	1.9	1.1	0.9	1.1	2.2	1.0
<b>2007</b>	-10.1	-1.1	0.3	2.4	0.8	0.6	-0.6	0.0	1.0	0.5	-0.9	-1.1	-2.0	-2.6	-2.2	-2.2	2.6	1.0
<b>2008</b>	-10.6	-1.7	-0.3	0.3	0.5	0.7	0.7	0.4	1.3	1.1	0.9	1.0	0.8	0.6	0.3	0.7	1.6	1.0
<b>2009</b>	-0.9	-0.3	-0.2	0.3	0.4	0.4	0.5	0.8	0.9	0.9	1.1	1.0	1.2	1.1	1.2	1.0	1.2	1.0
<b>2010</b>	-0.9	0.3	1.2	2.0	1.8	2.0	1.5	2.5	1.8	2.7	1.5	2.3	2.4	2.4	3.1	1.3	-1.6	1.0
<b>2011</b>	-3.3	0.8	0.8	-2.4	-3.2	0.5	1.1	-0.8	-1.8	-3.1	-1.0	-1.5	-1.0	1.0	-0.4	1.2	3.4	1.0
<b>2012</b>	8.7	0.3	-4.6	-0.4	-2.8	-3.3	1.8	-2.5	3.5	2.1	-0.5	6.8	6.4	14.1	5.8	-1.0	-4.2	1.0
<b>2013</b>	0.5	-0.5	0.2	0.4	-0.4	0.1	-0.7	0.1	0.7	-0.1	1.0	0.7	1.4	1.7	1.6	1.4	1.5	1.0

## Tables A2.3a–3e: Baseline Elasticity with Income Changes, PAYE

Table A2.3a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	0.3	-1.9	-4.0	-0.6	-1.2	0.7	1.3	3.5	4.8	3.9	4.5	4.9	5.2	4.3	3.2	2.7	3.2	3.6
<b>2004</b>	0.0	0.7	-2.2	-0.3	-1.7	-0.4	0.2	1.4	2.2	3.0	3.0	4.3	4.2	4.4	3.9	2.5	-0.9	2.6
<b>2005</b>	-0.3	-1.6	-7.3	6.2	3.1	1.5	1.4	1.7	2.6	2.9	2.6	2.8	3.6	3.3	2.6	2.4	4.4	2.8
<b>2006</b>	-0.1	-1.2	-2.3	19.3	4.1	1.6	2.2	1.0	4.4	3.7	3.2	3.1	3.3	3.9	3.4	4.0	2.4	3.3
<b>2007</b>	0.1	-0.3	0.2	2.9	11.4	2.4	1.3	1.6	1.2	2.9	2.8	2.3	2.5	3.4	2.5	1.4	1.9	2.5
<b>2008</b>	0.8	2.5	5.0	15.5	-145	-5.1	-2.1	-0.9	-1.4	2.5	4.1	4.7	4.9	4.7	4.7	3.9	2.5	2.9
<b>2009</b>	-0.5	-2.9	-3.9	-11.2	148	9.7	6.4	5.0	3.7	4.5	3.4	2.4	2.6	3.3	3.4	3.9	2.0	3.8
<b>2010</b>	-0.2	-1.1	-3.9	-8.9	83.0	3.0	2.1	2.9	1.5	1.4	2.9	3.4	3.5	3.2	2.0	0.7	2.3	2.9
<b>2011</b>	-3.7	-25.5	-32.1	266	3.0	16.3	31.4	32.5	27.3	67.0	27.9	7.3	9.2	-0.2	-15.0	-29.4	-14.1	16.7
<b>2012</b>	-0.4	-2.0	-3.6	-34.7	7.7	0.2	-0.3	0.1	0.8	-1.9	0.6	1.3	1.2	1.6	2.2	2.9	9.0	1.3
<b>2013</b>	-0.7	-5.0	-6.5	-75.4	8.8	-5.3	-2.1	0.9	0.5	-1.2	1.4	5.2	3.0	3.1	0.8	1.9	-13.3	1.0

Table A2.3b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	0.2	1.0	2.0	3.0	6.6	38.3	-16.2	-8.2	-1.9	-1.1	-0.2	1.5	4.0	4.0	5.9	4.0	3.7	3.5
<b>2004</b>	-2.1	-1.3	-0.5	-0.4	1.6	3.7	5.3	-1.3	-1.5	-0.3	0.3	1.8	4.3	4.3	5.7	3.6	-1.0	3.3
<b>2005</b>	-0.2	-0.6	-0.4	0.1	-0.5	-0.2	1.2	18.3	-0.1	0.5	0.9	1.1	3.2	3.1	3.1	3.2	2.7	2.8
<b>2006</b>	0.0	0.0	0.2	0.0	0.2	0.0	0.3	2.1	-7.3	-0.8	0.2	-0.1	3.7	2.9	3.1	3.0	2.8	2.7
<b>2007</b>	0.1	-0.2	0.0	0.5	-0.2	-0.4	-1.0	-1.4	0.1	2.2	1.2	1.1	1.4	3.1	3.3	3.3	3.6	2.9
<b>2008</b>	-0.4	-1.1	-1.3	-0.9	-0.5	-0.2	-1.1	-3.0	-2.7	-8.3	2.8	1.0	2.1	5.8	5.6	5.8	2.6	4.3
<b>2009</b>	0.3	1.5	2.3	2.9	3.9	5.2	6.8	7.6	11.2	-25.4	-0.8	1.0	1.2	1.5	1.9	2.6	3.8	1.9
<b>2010</b>	0.0	0.6	0.5	1.1	1.0	0.2	-1.0	-0.7	-0.9	10.1	-2.9	-0.9	-0.1	1.6	2.7	1.3	0.8	1.3
<b>2011</b>	-2.3	-7.5	-16.5	-9.3	-29.7	-2.6	26.1	-43.9	-43.9	-271	20.0	12.1	21.7	23.0	-0.5	6.3	-16.5	5.4
<b>2012</b>	0.1	0.6	-0.3	0.5	0.0	0.2	-0.6	0.8	-39.9	9.3	3.5	2.3	3.4	2.5	2.1	2.9	5.7	3.1
<b>2013</b>	0.2	1.2	1.7	3.1	2.7	2.8	5.0	8.6	38.0	-5.1	0.4	2.9	7.2	6.3	5.8	5.4	0.2	4.8

Table A2.3c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	0.4	3.7	6.3	-3.4	-1.6	-0.7	-4.4	-5.4	0.8	0.7	1.0	2.6	2.8	2.4	1.9	1.4	1.1	1.6
<b>2004</b>	-0.3	-0.1	2.4	0.7	-7.3	16.2	11.5	9.1	2.1	5.5	3.1	3.2	3.7	2.5	2.3	2.3	-0.7	2.7
<b>2005</b>	-0.3	-0.3	0.9	0.0	-4.1	45.9	4.4	2.3	1.7	1.6	1.9	1.1	1.8	1.8	1.3	1.1	1.2	1.8
<b>2006</b>	-0.1	-0.2	0.5	1.7	-0.7	-12.1	3.0	2.6	1.2	1.3	3.5	1.7	2.0	1.9	1.7	1.7	1.7	2.1
<b>2007</b>	0.1	0.1	0.6	2.6	1.1	-4.1	-32.3	8.4	2.8	2.3	4.7	3.0	3.0	3.3	3.0	3.0	5.4	3.7
<b>2008</b>	0.2	0.6	0.9	2.0	5.8	1.4	-3.3	-19.9	-1.4	-1.7	4.1	6.2	4.0	4.3	3.8	3.9	2.3	3.4
<b>2009</b>	0.1	0.3	0.9	0.7	-0.8	-1.7	-7.5	17.7	4.7	2.4	0.7	-0.3	0.4	0.4	0.1	1.3	0.4	0.5
<b>2010</b>	-0.2	-1.3	-2.8	-3.3	-5.4	-15.4	-55.7	71.5	15.2	8.2	-0.3	1.5	1.9	3.1	2.3	1.5	4.2	3.0
<b>2011</b>	-1.5	-13.7	0.6	16.6	17.5	-36.8	67.3	14.5	24.3	-261	-52.5	-14.9	-15.7	-15.0	-15.0	-39.3	-31.6	-30.1
<b>2012</b>	0.0	-1.3	-0.6	-3.0	-5.5	-18.0	42.6	8.7	5.2	2.8	4.6	3.2	1.1	2.2	2.0	0.6	2.1	2.3
<b>2013</b>	-0.1	-2.1	-0.7	0.4	2.9	8.4	-47.6	-4.2	-3.2	-0.5	1.6	3.4	1.3	0.2	1.1	2.7	3.4	1.7

Table A2.3d: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
<b>2003</b>	2.7	0.4	-183	0.6	4.9	2.0	1.0	4.0	5.2	6.9	4.7	2.9	6.0	4.4	2.9	1.2	6.1	3.7
<b>2004</b>	2.1	0.8	-28.8	4.8	0.5	2.1	2.1	3.6	3.0	4.5	2.8	3.1	4.6	3.4	3.7	-1.2	0.6	3.0
<b>2005</b>	1.4	-0.6	0.0	-31.8	5.6	2.9	2.8	1.7	3.0	2.7	3.3	2.6	1.6	3.2	1.7	3.4	-0.7	2.4
<b>2006</b>	1.8	0.0	0.4	1.5	42.2	3.6	0.7	2.6	3.0	2.4	4.0	2.4	2.3	3.5	2.9	1.5	2.0	2.9
<b>2007</b>	1.6	0.9	-0.2	0.8	0.9	9.1	4.8	3.1	2.3	3.8	4.0	3.0	2.8	3.7	3.8	3.7	2.7	3.4
<b>2008</b>	3.1	6.3	-0.9	0.9	6.3	52.6	12.9	7.2	5.4	11.3	8.3	7.3	8.1	6.6	6.8	4.2	8.5	7.9
<b>2009</b>	-0.1	-1.9	0.2	-0.4	-2.1	-7.4	-4.2	-1.3	-2.2	-2.4	-2.1	-2.2	-1.5	1.1	0.6	2.1	3.3	-0.8
<b>2010</b>	-0.1	-10.2	-17.5	-28.5	-56.9	-3.7	-1.2	-1.9	-0.4	-1.4	-0.2	-1.1	-0.1	0.5	2.3	-4.9	1.5	-0.3
<b>2011</b>	-1.4	-67.3	13.5	-23.5	26403	-106	-140	-53.0	-83.9	-14.2	-60.7	-4.7	-12.0	32.5	-33.2	51.4	-133	-14
<b>2012</b>	0.0	-3.6	-2.0	-7.0	-91.8	17.5	4.8	5.8	3.3	5.0	4.9	2.7	1.8	1.5	1.0	6.1	-0.1	3.2
<b>2013</b>	-0.1	-0.3	-0.3	3.3	-18.2	4.7	-0.8	3.3	3.4	6.7	5.0	3.6	2.2	5.3	5.9	2.2	-2.9	3.7

Table A2.3e: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	0.7	3.3	-7.7	-0.2	-0.7	0.4	0.5	1.2	3.2	2.5	2.4	2.8	4.2	3.7	4.6	3.0	2.7	3.1
<b>2004</b>	-0.1	0.3	-1.3	-0.1	-0.7	0.3	2.0	2.9	1.9	2.8	2.2	2.9	4.2	4.0	4.7	3.0	-0.8	2.9
<b>2005</b>	-0.3	-1.4	-4.0	4.3	2.8	3.3	1.4	17.2	2.2	2.3	2.0	1.8	3.1	2.9	2.7	2.6	2.4	2.6
<b>2006</b>	-0.1	-0.9	-1.3	9.4	3.4	1.2	2.1	0.9	3.7	2.7	2.5	1.7	3.3	3.0	2.9	2.9	2.9	2.8
<b>2007</b>	0.1	-0.1	0.3	4.0	6.9	2.3	-0.3	2.0	1.1	2.8	2.7	2.0	2.0	3.3	3.1	3.0	4.0	2.9
<b>2008</b>	0.5	2.4	3.1	12.0	-135.4	-3.1	-0.6	-1.0	-0.9	1.9	3.9	3.7	3.4	5.3	5.1	5.1	2.5	3.6
<b>2009</b>	-0.2	-2.0	-1.8	-5.9	86.9	5.3	2.2	4.9	2.3	3.9	1.9	1.3	1.4	1.8	1.7	2.4	2.1	2.2
<b>2010</b>	-0.2	-1.3	-4.2	-8.8	93.1	4.1	1.8	5.2	2.0	3.6	1.0	1.4	1.3	2.3	2.5	1.2	2.3	2.2
<b>2011</b>	-3.4	-25.1	-27.8	190.1	-233.2	8.2	22.9	25.5	-3.7	-43.9	9.0	4.2	7.2	10.2	-6.0	-10.2	-23.4	1.2
<b>2012</b>	-0.3	-1.8	-3.0	-30.3	7.7	1.3	1.4	0.8	-0.4	0.5	2.0	2.0	2.0	2.2	2.1	2.4	4.9	2.3
<b>2013</b>	-0.5	-4.1	-4.5	-46.6	3.9	-3.4	-4.3	0.1	0.0	-1.0	1.3	3.9	4.2	4.4	4.2	4.2	-0.2	2.8

## Tables A2.3f–3j: Baseline Elasticity with Income Changes, Non-PAYE

Table A2.3f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
2003	-6.5	0.4	-0.2	2.4	2.2	1.7	1.9	5.1	6.8	5.2	3.3	5.2	2.7	2.5	2.6	1.8	4.9	3.3
2004	-7.2	0.4	1.0	1.0	1.0	1.0	1.1	2.7	1.7	1.9	1.8	1.5	1.4	1.1	1.1	0.6	2.7	1.8
2005	11.3	-0.6	-0.3	-0.2	0.7	1.0	1.0	1.2	3.6	2.4	2.1	1.4	1.4	1.2	1.3	2.6	2.4	1.9
2006	8.5	-2.2	-2.0	-1.5	-0.3	0.4	0.0	-1.8	6.4	2.0	1.4	1.6	1.8	1.6	1.7	1.3	4.0	2.7
2007	-6.7	5.1	3.3	5.0	2.4	1.1	1.3	2.4	2.6	-0.4	0.9	1.6	2.2	3.8	4.1	5.0	11.1	5.2
2008	4.8	-2.9	0.3	1.3	2.1	1.7	1.2	1.9	3.2	1.8	2.2	2.4	1.7	1.4	0.5	0.6	1.4	1.5
2009	0.6	0.3	0.7	1.7	2.0	1.4	1.7	1.6	1.9	3.5	3.5	2.6	2.5	1.5	1.7	1.4	1.4	1.8
2010	0.0	6.1	6.4	7.4	5.6	4.3	2.1	4.8	3.9	10.6	5.9	8.5	5.5	3.0	5.1	0.2	-1.3	2.6
2011	4.2	8.5	3.1	-3.5	-4.9	1.4	3.1	-3.8	-8.0	7.3	-0.8	-1.3	-0.7	6.4	0.6	0.1	3.7	1.5
2012	-7.1	12.1	-5.2	8.2	-3.6	-0.2	30.2	-4.8	6.1	17.8	7.6	29.0	14.8	27.7	-3.0	-12.4	-7.5	3.4
2013	-1.2	-0.6	1.4	2.4	0.6	1.4	-1.6	2.6	2.9	1.3	2.2	2.2	1.3	0.4	1.8	1.0	5.7	3.0

Table A2.3g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	above	Total
2003	0.8	0.9	13.9	-6.9	-1.7	0.7	-0.4	-2.1	1.6	2.0	1.6	2.8	4.0	2.4	2.4	1.3	2.8	2.5
2004	-0.4	0.6	1.7	-3.4	-1.4	0.7	0.7	1.3	0.4	0.6	0.8	1.0	1.4	1.4	1.0	1.0	3.5	2.2
2005	0.1	2.3	8.9	-75.6	-7.6	-1.4	0.8	0.4	0.1	0.3	0.8	1.5	2.9	1.7	1.1	0.7	2.3	1.8
2006	0.4	3.7	6.6	108	-13.9	-3.9	-1.9	-1.5	-0.2	-0.1	0.1	-0.5	6.6	2.2	1.6	1.8	2.3	2.2
2007	-12.0	-12.5	-20.1	-46.9	57.3	14.4	-6.9	-2.3	2.2	1.4	0.7	0.0	-2.3	-6.0	-2.7	-1.7	4.6	1.2
2008	61.1	14.2	6.3	3.3	-94.4	-0.7	2.9	-2.5	0.8	2.4	1.2	1.6	1.4	1.4	0.6	1.0	1.6	1.7
2009	0.3	2.9	4.8	9.2	-72.2	-3.2	-0.7	1.3	1.0	0.7	1.4	1.3	1.5	2.5	2.1	1.6	1.1	1.4
2010	0.8	5.6	7.1	17.9	-183	0.3	8.6	4.9	-0.2	2.5	0.8	2.0	2.8	3.9	3.8	2.0	-0.3	1.1
2011	-0.3	-4.8	-14.3	-84.4	57.9	19.7	13.1	17.4	12.3	2.1	5.2	3.3	2.0	4.7	1.8	2.4	4.3	3.8
2012	-0.9	24.2	-1.1	-76.3	-49.8	-25.1	-31.1	-4.6	-0.1	-5.0	-9.5	2.1	3.1	22.7	11.8	4.5	-15.6	-3.6
2013	0.7	3.5	11.1	6.6	-21.1	-0.7	-2.4	-3.4	-1.2	-1.6	1.8	0.5	6.0	3.9	2.6	1.6	1.3	2.1

Table A2.3h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-0.9	1.5	2.6	9.9	1.0	0.8	-1.6	-2.9	0.9	1.1	-1.6	0.5	-0.3	0.1	-0.4	-1.8	-0.1	-0.3
<b>2004</b>	0.0	0.8	2.3	-5.6	0.2	0.3	0.3	0.1	0.1	1.1	0.7	0.0	0.6	0.1	0.2	0.4	2.3	1.5
<b>2005</b>	0.0	3.7	7.7	-54.8	-4.3	-0.7	-1.2	0.1	-1.5	0.5	1.3	1.0	0.6	0.7	0.2	0.8	2.1	1.5
<b>2006</b>	0.6	3.3	9.3	74.7	-14.8	-2.2	-2.7	-2.3	-1.3	-2.1	3.4	0.7	0.3	0.9	-0.5	0.3	1.3	1.0
<b>2007</b>	43.2	18.2	9.6	-19.2	-35.7	-5.7	-4.3	-4.5	0.2	3.6	-11.0	-11.2	-10.9	-7.5	-9.6	-9.1	-1.0	-3.4
<b>2008</b>	7.9	5.3	1.9	0.6	39.5	4.3	2.6	3.7	3.2	4.2	4.7	2.0	0.9	1.1	0.4	1.1	2.2	2.1
<b>2009</b>	0.3	1.2	1.4	-2.5	31.9	3.1	2.4	2.7	2.7	2.2	2.2	2.7	2.2	1.1	0.9	0.6	1.4	1.5
<b>2010</b>	0.5	0.5	-2.0	-18.8	380	21.1	2.6	11.9	7.9	9.1	4.9	9.3	7.0	8.0	5.3	3.2	-3.7	0.4
<b>2011</b>	1.0	4.4	3.2	191	-0.6	-12.5	-7.5	-14.1	-8.3	-26.1	-22.0	-21.8	-12.2	-7.7	-4.1	0.7	3.2	-1.2
<b>2012</b>	-4.3	4.5	50.6	257	-17.7	-28.0	-48.0	-7.4	6.2	4.3	7.0	15.6	29.4	23.6	4.2	-2.6	6.1	7.6
<b>2013</b>	-0.1	2.3	-1.2	17.5	-6.6	-2.2	0.0	-1.9	-0.5	0.0	1.7	2.3	0.0	1.5	2.2	1.8	0.2	0.6

Table A2.3i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	0.4	-8.3	-16.5	-0.8	2.3	2.5	1.0	1.8	2.2	0.6	0.3	-0.4	0.4	2.6	0.4	0.9	-0.3	0.6
<b>2004</b>	1.1	-3.9	-1.4	-0.7	-0.3	0.6	1.1	1.1	0.8	0.2	1.1	0.8	1.1	-0.4	1.3	-0.4	1.9	1.0
<b>2005</b>	3.0	-5.8	-7.2	-7.9	-1.1	0.4	0.5	1.1	1.5	1.5	1.5	1.0	0.3	2.5	0.7	1.7	2.8	1.7
<b>2006</b>	3.5	-40.2	-10.4	-11.8	-2.4	-0.6	-0.4	-0.2	4.6	4.9	2.7	1.9	2.6	1.5	3.1	3.3	2.1	2.4
<b>2007</b>	6.8	1.1	-16.6	9.2	23.2	1.3	-1.0	1.7	-2.4	-8.2	-9.5	-11.3	-8.1	-9.5	-6.8	-6.6	-10.4	-8.6
<b>2008</b>	-1.0	-23.8	22.6	7.5	13.3	1.9	-0.9	-1.3	0.6	-2.4	-0.4	-0.2	-1.4	-1.5	-0.4	-0.7	0.6	-0.3
<b>2009</b>	0.0	14.2	-4.9	4.4	2.7	1.5	-0.2	0.6	0.3	3.2	2.5	1.8	2.6	1.9	1.9	2.0	2.1	2.0
<b>2010</b>	0.2	-63.0	31.5	-2.8	1.5	-2.2	1.4	-2.3	3.3	-2.5	-0.4	-0.3	0.7	1.6	6.3	-6.2	-2.2	-0.5
<b>2011</b>	-0.2	132	24.4	14.9	-150	-2.3	-2.7	-6.6	-6.1	-6.2	-3.5	0.3	-1.5	2.8	-6.9	0.0	2.6	-1.0
<b>2012</b>	-2.3	135	-47.0	-47.4	-19.9	10.0	10.2	0.6	16.9	7.6	15.0	36.0	26.1	23.0	25.4	-22.8	25.6	19.6
<b>2013</b>	0.2	5620	28.8	-7.1	-0.1	-2.5	-0.1	-0.7	0.8	1.5	2.8	1.8	-2.1	5.3	-1.1	5.7	3.3	3.9

Table A2.3j: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	above	Total
<b>2003</b>	-2.4	-0.2	-0.7	2.3	1.4	1.3	0.5	0.3	2.8	2.8	1.4	2.8	2.5	1.9	1.7	0.6	2.0	1.8
<b>2004</b>	-5.9	0.0	0.3	0.5	0.5	0.7	0.8	1.5	0.7	1.2	1.1	1.0	1.2	1.0	0.8	0.7	2.9	1.9
<b>2005</b>	5.8	-1.3	-1.0	-3.7	-0.5	0.3	0.5	0.8	0.9	1.0	1.3	1.4	2.0	1.4	0.9	1.2	2.3	1.8
<b>2006</b>	7.3	-2.8	-2.4	0.9	-2.0	-0.6	-0.8	-1.7	2.3	0.0	1.2	0.2	4.1	1.8	1.3	1.4	2.3	2.0
<b>2007</b>	20.1	-4.6	0.6	2.3	3.8	1.3	-1.2	0.1	1.7	1.2	-2.0	-1.9	-3.0	-4.6	-3.2	-2.8	2.8	0.3
<b>2008</b>	8.0	-6.9	-0.6	0.3	9.1	1.9	1.4	0.8	2.3	2.6	2.1	1.8	1.3	1.1	0.5	0.9	1.8	1.7
<b>2009</b>	0.4	-1.5	-0.4	0.4	7.6	1.0	1.1	1.5	1.6	2.1	2.1	1.8	1.8	2.0	1.7	1.3	1.3	1.5
<b>2010</b>	0.6	1.3	2.3	1.3	37.1	5.3	3.2	4.9	3.2	6.3	2.9	4.1	3.7	4.5	4.6	1.7	-1.8	1.1
<b>2011</b>	2.7	1.7	1.0	10.4	-11.0	1.1	2.2	-1.4	-2.9	-6.4	-2.1	-2.5	-2.3	1.7	-0.5	1.5	3.7	1.6
<b>2012</b>	-7.2	1.6	-5.3	1.6	-9.9	-7.2	3.3	-4.5	5.7	4.4	-1.0	11.4	13.8	23.9	8.2	-1.2	-4.5	2.4
<b>2013</b>	-0.5	-5.0	0.3	-2.2	-1.5	0.2	-1.3	0.2	1.1	-0.2	2.1	1.3	3.1	2.8	2.2	1.8	1.6	1.9



## Tables A2.4a–4e: Baseline Elasticity with MIR, PAYE

Table A2.4a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
<b>2004</b>	-0.3	-2.4	-9.0	12.5	4.7	2.8	2.2	4.2	3.0	2.4	1.9	1.7	1.5	1.3	1.2	2.3
<b>2005</b>	-0.2	-1.7	-4.1	-33.9	8.3	3.5	2.6	2.3	3.5	2.6	2.1	1.7	1.5	1.4	1.2	2.1
<b>2006</b>	-0.2	-1.3	-2.5	-6.5	66.2	5.0	3.2	2.7	4.6	3.1	2.3	1.9	1.6	1.4	1.2	3.1
<b>2007</b>	-0.1	-0.9	-1.4	-2.4	-5.0	26.8	5.7	4.0	2.9	4.0	2.7	2.0	1.7	1.5	1.2	3.1
<b>2008</b>	-0.05	-0.6	-1.1	-1.8	-3.5	-33.7	8.1	4.9	3.3	4.7	2.9	2.2	1.8	1.5	1.2	1.5
<b>2009</b>	-0.1	-0.8	-1.4	-2.3	-5.0	37.0	6.0	4.1	2.9	4.6	2.9	2.1	1.8	1.5	1.2	3.3
<b>2010</b>	-0.1	-0.7	-1.3	-2.2	-4.4	64.7	6.3	4.2	3.0	4.7	3.0	2.2	1.8	1.5	1.2	4.2
<b>2011</b>	-0.1	-0.9	-1.6	-3.1	-8.6	9.6	4.3	3.3	2.6	3.5	2.5	1.9	1.7	1.4	1.2	2.3
<b>2012</b>	0.01	-0.7	-1.3	-2.6	-6.6	11.1	4.3	3.3	2.6	3.5	2.5	2.0	1.7	1.5	1.2	2.4
<b>2013</b>	-0.1	-1.0	-1.9	-3.8	-13.7	7.7	3.9	3.1	2.5	3.4	2.5	1.9	1.6	1.4	1.2	2.2

Table A2.4b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
<b>2004</b>	-0.2	-0.6	-0.9	-1.3	-2.0	-4.3	-15.9	28.0	6.3	3.7	2.5	2.0	2.7	2.0	1.4	2.0
<b>2005</b>	-0.1	-0.5	-0.7	-1.0	-1.5	-2.7	-5.6	-13.7	15.0	5.2	3.0	2.2	3.1	2.1	1.4	2.1
<b>2006</b>	-0.1	-0.4	-0.6	-0.9	-1.1	-2.0	-3.3	-5.6	-38.0	8.8	3.8	2.5	3.8	2.4	1.5	2.1
<b>2007</b>	-0.04	-0.3	-0.5	-0.6	-0.8	-1.3	-1.9	-2.6	-5.0	-27.9	7.2	3.3	2.3	2.7	1.5	2.0
<b>2008</b>	-0.04	-0.3	-0.4	-0.5	-0.7	-1.1	-1.6	-2.1	-3.6	-10.2	10.9	3.9	2.5	2.9	1.6	2.2
<b>2009</b>	-0.03	-0.4	-0.5	-0.6	-0.9	-1.3	-2.0	-2.7	-5.0	-30.1	6.9	3.3	2.3	2.9	1.6	2.1
<b>2010</b>	0.04	-0.3	-0.4	-0.6	-0.7	-1.1	-1.6	-2.2	-3.6	-11.0	10.2	3.8	2.5	3.0	1.6	2.3
<b>2011</b>	0.03	-0.3	-0.5	-0.6	-0.9	-1.4	-2.1	-3.1	-6.5	88.9	5.5	3.0	4.3	2.5	1.5	3.0
<b>2012</b>	0.03	-0.3	-0.5	-0.6	-0.8	-1.3	-2.0	-2.9	-6.1	273	5.7	3.0	4.4	2.5	1.5	4.3
<b>2013</b>	0.02	-0.3	-0.5	-0.7	-0.9	-1.5	-2.3	-3.3	-7.5	42.5	5.3	2.9	4.3	2.5	1.5	2.6

Table A2.4c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	-0.2	-0.9	-1.5	-2.4	-4.6	100.1	6.7	4.4	3.1	5.0	3.0	2.2	1.8	1.5	1.2	2.9
<b>2005</b>	-0.1	-0.7	-1.2	-1.8	-3.1	-12.5	13.8	6.3	3.8	2.8	3.4	2.4	1.9	1.6	1.2	1.9
<b>2006</b>	-0.1	-0.6	-1.0	-1.5	-2.3	-5.9	-413.2	11.2	4.9	3.2	4.1	2.6	2.0	1.7	1.2	0.5
<b>2007</b>	-0.1	-0.5	-0.7	-1.0	-1.5	-2.9	-6.2	-19.1	12.0	4.7	5.5	3.0	2.2	1.7	1.2	2.1
<b>2008</b>	-0.05	-0.4	-0.6	-0.9	-1.3	-2.3	-4.4	-8.8	32.2	6.0	6.8	3.3	2.3	1.8	1.2	2.5
<b>2009</b>	-0.1	-0.5	-0.7	-1.1	-1.5	-2.9	-6.5	-22.4	11.4	4.7	2.9	3.2	2.3	1.8	1.2	1.8
<b>2010</b>	0.1	-0.4	-0.6	-0.9	-1.3	-2.4	-4.8	-10.7	21.2	5.5	3.2	3.3	2.3	1.8	1.3	2.1
<b>2011</b>	0.1	-0.5	-0.8	-1.1	-1.7	-3.6	-10.9	125	7.2	3.8	4.7	2.8	2.1	1.7	1.2	2.8
<b>2012</b>	0.1	-0.4	-0.7	-1.0	-1.6	-3.3	-9.6	471	7.5	3.9	4.7	2.8	2.1	1.7	1.2	5.2
<b>2013</b>	0.05	-0.5	-0.8	-1.2	-1.8	-3.9	-13.5	36.9	6.6	3.7	4.6	2.8	2.1	1.7	1.2	2.2

Table A2.4d: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	-0.8	-2.6	-6.3	34.8	6.3	3.2	2.5	4.4	3.1	2.4	2.0	1.7	1.5	1.4	1.1	2.3
<b>2005</b>	-0.6	-1.4	-3.3	-8.8	24.8	4.6	3.1	2.6	3.8	2.7	2.1	1.8	1.6	1.4	1.2	2.4
<b>2006</b>	-0.4	-1.0	-1.9	-3.7	-12.4	8.5	4.1	3.2	5.2	3.3	2.4	1.9	1.6	1.4	1.2	2.3
<b>2007</b>	-0.2	-0.8	-1.4	-2.3	-4.3	-81.2	7.4	4.7	3.2	4.1	2.8	2.1	1.7	1.5	1.2	1.2
<b>2008</b>	-0.2	-0.7	-1.1	-1.8	-3.5	-13.6	12.5	6.0	3.6	4.9	3.0	2.2	1.8	1.5	1.2	2.2
<b>2009</b>	-0.04	-1.0	-1.4	-2.2	-3.9	-1240	7.3	4.7	3.4	4.8	3.0	2.2	1.8	1.5	1.2	-5.4
<b>2010</b>	0.1	-0.6	-1.4	-1.9	-3.3	-20.0	9.7	5.4	3.5	5.0	3.1	2.2	1.8	1.5	1.2	2.2
<b>2011</b>	0.1	-0.8	-1.7	-3.6	-5.6	14.9	5.3	3.8	2.8	3.6	2.5	2.0	1.7	1.5	1.2	2.3
<b>2012</b>	0.2	-0.6	-1.2	-2.3	-5.3	31.9	5.6	3.9	3.0	3.6	2.6	2.0	1.7	1.5	1.2	2.7
<b>2013</b>	0.1	-0.8	-1.5	-3.5	-10.6	16.1	4.9	3.8	2.8	3.6	2.5	2.0	1.7	1.5	1.2	2.4

Table A2.4e: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
<b>2004</b>	-0.3	-2.1	-8.0	12.0	4.2	8.0	2.1	5.2	3.2	2.9	2.3	1.9	2.1	1.8	1.3	2.3
<b>2005</b>	-0.2	-1.6	-3.5	-31.8	8.2	2.7	3.3	2.3	4.1	2.9	2.5	2.0	2.3	1.9	1.3	2.1
<b>2006</b>	-0.2	-1.2	-2.2	-6.1	62.2	4.5	-22.4	3.2	3.3	3.5	2.8	2.2	2.6	2.0	1.4	2.2
<b>2007</b>	-0.1	-0.8	-1.3	-2.2	-4.8	23.6	5.0	2.3	3.7	2.8	3.6	2.5	2.0	2.2	1.4	2.4
<b>2008</b>	-0.04	-0.6	-1.0	-1.7	-3.3	-31.6	7.3	3.9	5.9	4.3	4.3	2.7	2.1	2.3	1.4	2.0
<b>2009</b>	-0.1	-0.8	-1.3	-2.2	-4.7	19.6	5.1	2.1	3.6	3.1	3.3	2.6	2.1	2.3	1.4	2.3
<b>2010</b>	-0.02	-0.7	-1.2	-2.0	-4.1	58.5	5.5	3.0	4.7	4.1	3.8	2.8	2.2	2.4	1.5	2.9
<b>2011</b>	-0.03	-0.8	-1.5	-2.8	-8.0	8.8	3.1	14.4	2.7	9.1	3.3	2.4	2.8	2.1	1.4	2.7
<b>2012</b>	0.03	-0.7	-1.3	-2.4	-6.2	10.7	3.2	48.1	2.8	22.4	3.3	2.4	2.8	2.1	1.4	3.8
<b>2013</b>	-0.1	-1.0	-1.7	-3.5	-12.7	7.1	2.5	6.2	2.6	6.2	3.2	2.3	2.8	2.1	1.4	2.3

## Tables A2.4f–4j: Baseline Elasticity with MIR, Non-PAYE

Table A2.4f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
2004	-2.5	7.6	3.2	2.3	1.9	1.7	1.5	3.1	2.5	2.0	1.8	1.5	1.4	1.3	1.1	1.5
2005	-2.0	10.4	3.5	2.5	2.0	1.7	1.6	1.5	2.6	2.2	1.8	1.6	1.4	1.3	1.1	1.5
2006	-1.5	35.8	4.2	2.7	2.2	1.8	1.6	1.5	3.1	2.4	1.9	1.7	1.5	1.3	1.1	1.5
2007	-0.7	-7.0	14.3	4.2	2.8	2.1	1.8	1.7	1.5	2.7	2.1	1.7	1.5	1.4	1.1	1.6
2008	-0.3	-2.7	-38.0	6.1	3.3	2.3	1.9	1.8	1.6	3.0	2.2	1.8	1.6	1.4	1.1	1.1
2009	-0.2	-5.0	12.7	4.1	2.8	2.1	1.8	1.7	1.5	3.0	2.2	1.8	1.6	1.4	1.1	1.6
2010	-0.2	-3.9	26.1	4.5	2.9	2.1	1.8	1.7	1.6	3.0	2.3	1.8	1.6	1.4	1.1	1.8
2011	-0.2	-8.3	7.8	3.5	2.5	1.9	1.7	1.6	1.5	2.5	2.0	1.7	1.5	1.3	1.1	1.5
2012	-0.05	-3.6	18.8	4.1	2.7	2.0	1.7	1.6	1.5	2.5	2.0	1.7	1.5	1.3	1.1	1.7
2013	-0.3	-31.0	5.4	3.0	2.3	1.9	1.7	1.6	1.5	2.5	2.0	1.7	1.5	1.3	1.1	1.2

Table A2.4g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
2004	-0.4	-1.7	-3.6	-13.2	11.6	4.0	2.8	2.4	2.0	1.8	1.6	1.4	2.3	1.8	1.2	1.4
2005	-0.3	-1.4	-2.9	-8.3	19.7	4.5	3.0	2.5	2.1	1.8	1.6	1.4	2.4	1.8	1.2	1.4
2006	-0.4	-1.3	-2.5	-6.3	45.5	5.1	3.3	2.7	2.2	1.9	1.7	1.5	2.7	2.0	1.2	1.5
2007	-0.2	-0.9	-1.7	-3.2	-7.5	11.5	4.7	3.5	2.7	2.2	1.8	1.6	1.4	2.1	1.2	1.4
2008	-0.1	-0.7	-1.2	-2.1	-4.0	18.8	6.4	4.4	3.0	2.3	1.9	1.6	1.5	2.2	1.2	1.5
2009	-0.01	-1.1	-1.8	-3.4	-9.5	9.3	4.4	3.3	2.6	2.1	1.8	1.6	1.4	2.2	1.2	1.4
2010	0.1	-0.7	-1.2	-2.2	-4.7	67.3	6.3	4.1	3.0	2.3	1.9	1.6	1.5	2.3	1.2	1.5
2011	0.01	-0.9	-1.5	-3.1	-8.7	9.1	4.3	3.2	2.5	2.1	1.8	1.5	2.9	2.0	1.2	1.5
2012	0.01	-0.8	-1.5	-3.0	-7.3	11.6	4.6	3.4	2.6	2.1	1.8	1.5	2.9	2.0	1.2	1.5
2013	-0.02	-0.9	-1.8	-3.5	-12.5	7.7	3.9	3.1	2.4	2.0	1.7	1.5	2.8	2.0	1.2	1.5

Table A2.4h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	above	Total
<b>2004</b>	-0.3	-1.7	-3.6	-13.8	12.2	4.0	2.8	2.4	2.0	3.8	2.6	2.0	1.7	1.5	1.1	1.4
<b>2005</b>	-0.2	-1.5	-3.0	-8.6	22.3	4.6	3.0	2.6	2.1	1.9	2.8	2.1	1.7	1.5	1.1	1.3
<b>2006</b>	-0.2	-1.3	-2.5	-5.9	-591	5.5	3.3	2.7	2.2	1.9	3.2	2.2	1.8	1.5	1.1	0.7
<b>2007</b>	-0.2	-0.9	-1.7	-3.0	-7.0	13.2	4.8	3.6	2.7	2.2	3.6	2.4	1.9	1.6	1.1	1.4
<b>2008</b>	-0.1	-0.7	-1.2	-2.2	-4.3	68.2	6.2	4.2	3.0	2.3	4.0	2.6	2.0	1.6	1.1	1.8
<b>2009</b>	-0.1	-1.0	-1.7	-3.1	-8.4	11.0	4.6	3.4	2.6	2.1	1.8	2.5	2.0	1.6	1.1	1.3
<b>2010</b>	-0.01	-0.8	-1.3	-2.4	-4.8	33.0	5.8	4.0	2.9	2.3	1.9	2.6	2.0	1.6	1.1	1.4
<b>2011</b>	-0.02	-0.9	-1.7	-3.5	-10.5	8.1	4.0	3.1	2.4	2.0	3.3	2.3	1.9	1.6	1.1	1.3
<b>2012</b>	0.03	-0.8	-1.5	-2.9	-8.1	9.4	4.1	3.2	2.5	2.0	3.3	2.3	1.9	1.6	1.1	1.3
<b>2013</b>	-0.1	-1.1	-1.9	-4.0	-16.6	7.1	3.7	3.0	2.4	2.0	3.2	2.3	1.8	1.5	1.1	1.3

Table A2.4i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	above	Total
<b>2004</b>	-1.7	9.3	3.8	2.7	2.2	1.8	1.6	3.2	2.5	2.1	1.8	1.6	1.4	1.3	1.1	1.5
<b>2005</b>	-1.4	-15.4	5.2	3.2	2.5	1.9	1.7	1.6	2.8	2.2	1.9	1.6	1.4	1.3	1.1	1.4
<b>2006</b>	-0.9	-4.9	12.0	4.1	2.8	2.1	1.8	1.7	3.3	2.5	2.0	1.7	1.5	1.4	1.1	1.4
<b>2007</b>	-0.4	-2.8	-66.8	5.9	3.4	2.4	2.0	1.9	1.7	2.8	2.2	1.8	1.6	1.4	1.1	1.3
<b>2008</b>	-0.3	-2.4	-9.8	13.2	4.0	2.7	2.2	2.0	1.7	3.1	2.3	1.8	1.6	1.4	1.1	1.4
<b>2009</b>	0.1	-4.6	-79.7	6.3	3.6	2.3	2.0	1.8	1.7	3.1	2.3	1.9	1.6	1.4	1.1	1.3
<b>2010</b>	0.1	-1.8	-130	10.5	4.2	2.6	2.1	1.9	1.7	3.1	2.3	1.9	1.6	1.4	1.1	1.4
<b>2011</b>	0.1	-2.8	16.0	3.9	3.3	2.2	1.9	1.8	1.6	2.6	2.1	1.7	1.5	1.4	1.1	1.4
<b>2012</b>	0.2	-1.8	-9.2	6.8	3.4	2.3	1.9	1.8	1.7	2.6	2.1	1.7	1.5	1.4	1.1	1.4
<b>2013</b>	0.05	-3.2	32.4	3.8	2.7	2.2	1.9	1.8	1.6	2.6	2.1	1.7	1.5	1.4	1.1	1.4

Table A2.4j: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
<b>2004</b>	-2.1	7.1	2.8	1.2	3.4	2.3	2.0	2.8	2.3	2.5	1.9	1.6	1.9	1.6	1.1	1.4
<b>2005</b>	-1.2	9.3	3.1	1.6	4.7	2.4	2.0	1.8	2.4	2.0	2.0	1.6	2.0	1.6	1.1	1.4
<b>2006</b>	-1.3	33.7	4.0	2.3	-14.8	2.5	2.1	1.9	2.8	2.2	2.1	1.7	2.2	1.7	1.1	1.3
<b>2007</b>	-0.4	-6.2	11.1	3.5	1.5	4.4	2.6	2.3	1.9	2.5	2.4	1.8	1.6	1.8	1.2	1.4
<b>2008</b>	-0.2	-2.2	-33.0	5.0	2.1	21.5	3.0	2.6	2.2	2.7	2.6	1.9	1.6	1.9	1.2	1.5
<b>2009</b>	-0.1	-4.2	8.9	3.2	0.9	3.9	2.7	2.3	2.0	2.6	2.0	1.8	1.6	1.9	1.2	1.4
<b>2010</b>	-0.1	-3.1	19.3	3.3	1.4	11.7	3.1	2.5	2.2	2.7	2.0	1.9	1.6	1.9	1.2	1.5
<b>2011</b>	-0.1	-6.5	6.0	2.2	-0.1	3.7	2.5	2.2	1.9	2.3	2.3	1.8	2.3	1.8	1.2	1.4
<b>2012</b>	-0.01	-2.9	14.5	2.8	0.3	4.2	2.5	2.3	1.9	2.3	2.3	1.8	2.3	1.8	1.2	1.5
<b>2013</b>	-0.2	-22.8	4.0	1.6	-1.7	3.3	2.4	2.1	1.8	2.3	2.2	1.8	2.3	1.7	1.2	1.4

## Tables A2.5a–5e: Baseline Elasticity with MIR and Income Changes, PAYE

Table A2.5a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	0.02	0.3	1.0	-0.7	-2.4	-0.4	0.2	1.6	2.4	3.1	3.1	4.4	4.2	4.4	1.8	2.7
<b>2005</b>	-0.2	-0.8	-1.6	-23.0	5.9	1.9	1.6	1.9	2.8	3.1	2.7	2.9	3.7	3.3	3.1	2.8
<b>2006</b>	-0.1	-0.6	-0.9	-3.1	42.2	2.5	2.9	1.1	5.2	4.0	3.4	3.2	3.4	4.0	3.2	3.9
<b>2007</b>	0.02	-0.2	0.1	0.7	-2.7	14.1	2.3	2.5	1.6	3.5	3.1	2.5	2.6	3.5	2.1	3.1
<b>2008</b>	0.1	1.1	1.9	4.0	5.6	31.7	-5.1	-1.6	-2.0	3.2	4.8	5.0	5.1	4.9	3.8	4.4
<b>2009</b>	-0.1	-1.5	-1.9	-3.8	-8.1	67.1	11.4	7.4	4.7	5.5	3.7	2.6	2.6	3.4	3.0	5.3
<b>2010</b>	-0.05	-0.5	-1.7	-2.8	-4.1	36.0	4.0	4.4	1.9	1.7	3.2	3.6	3.6	3.3	1.9	3.8
<b>2011</b>	-0.7	-11.6	-11.4	24.5	-2.8	41.6	49.2	45.1	34.3	78.3	30.5	7.7	9.5	-0.3	-17.3	20.5
<b>2012</b>	0.01	-0.7	-1.1	-2.7	-5.5	0.7	-0.5	0.1	1.0	-2.3	0.6	1.4	1.2	1.6	4.7	1.2

Table A2.5b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2013</b>	-0.2	-2.6	-2.7	-8.5	-13.0	-10.9	-3.1	1.1	0.6	-1.4	1.5	5.5	3.1	3.1	-4.7	0.6
<b>2004</b>	-1.3	-1.0	-0.4	-0.3	1.2	2.1	-1.4	-3.8	-2.1	-0.3	0.3	1.9	4.5	4.4	3.0	3.1
<b>2005</b>	-0.1	-0.5	-0.3	0.1	-0.4	-0.1	0.6	-0.3	-0.1	0.7	1.0	1.1	3.3	3.2	3.0	2.8
<b>2006</b>	0.005	-0.02	0.1	0.02	0.1	0.03	0.2	1.1	12.0	-1.2	0.2	-0.1	3.9	3.0	3.0	2.8
<b>2007</b>	0.02	-0.1	-0.01	0.4	-0.2	-0.3	-0.7	-0.8	0.1	-3.8	1.9	1.3	1.6	3.3	3.4	3.0
<b>2008</b>	-0.1	-0.7	-0.9	-0.6	-0.4	-0.2	-0.7	-1.8	-1.2	2.2	5.8	1.3	2.4	6.3	4.7	4.6
<b>2009</b>	0.1	1.2	1.9	2.4	3.3	4.3	5.4	5.8	7.0	19.2	-1.0	1.2	1.3	1.6	2.8	2.2
<b>2010</b>	-0.02	0.4	0.3	0.7	0.7	0.1	-0.7	-0.4	-0.4	-2.8	-5.5	-1.1	-0.1	1.7	1.9	1.2
<b>2011</b>	0.8	-4.8	-10.9	-6.4	-20.3	-1.7	15.1	-21.4	-4.1	-2952	29.2	14.4	24.4	24.1	-3.9	-13.6
<b>2012</b>	-0.03	0.4	-0.2	0.3	0.0	0.2	-0.3	0.4	-3.3	311	5.3	2.7	3.8	2.7	3.4	5.6
<b>2013</b>	-0.05	0.8	1.2	2.2	1.9	1.9	3.1	4.5	3.9	-26.5	0.6	3.4	8.0	6.6	4.0	4.7

Table A2.5c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	above	Total
<b>2004</b>	-0.2	-0.1	1.8	0.4	-3.5	151.1	16.6	11.4	2.4	6.1	3.3	3.3	3.8	2.6	0.8	4.0
<b>2005</b>	-0.2	-0.2	0.7	0.0	-2.5	-7.8	9.0	3.2	2.0	1.8	2.1	1.1	1.9	1.8	1.2	1.5
<b>2006</b>	-0.04	-0.2	0.4	1.2	-0.5	-4.1	-109.0	4.8	1.5	1.5	3.8	1.8	2.1	1.9	2.1	1.7
<b>2007</b>	0.04	0.1	0.4	1.7	0.7	-2.0	-3.1	-11.9	6.3	3.1	5.6	3.3	3.1	3.4	4.1	3.8
<b>2008</b>	0.04	0.3	0.6	1.3	3.4	0.7	-0.8	6.6	-6.8	-2.7	5.2	6.8	4.3	4.5	3.1	3.7
<b>2009</b>	0.03	0.2	0.7	0.5	-0.6	-1.1	-2.8	-14.7	8.2	3.0	0.8	-0.4	0.4	0.4	0.5	0.5
<b>2010</b>	0.2	-0.9	-1.8	-2.2	-3.4	-8.1	-14.9	-28.4	49.8	12.1	-0.4	1.7	2.0	3.2	3.3	3.3
<b>2011</b>	1.6	-8.5	0.4	10.2	9.8	-13.3	-34.9	239	41.7	-342	-61.2	-15.9	-16.3	-15.4	-27.3	-31.9
<b>2012</b>	0.05	-0.7	-0.3	-1.7	-2.9	-6.0	-19.6	536	9.3	3.8	5.4	3.5	1.2	2.3	1.8	6.0
<b>2013</b>	0.1	-1.4	-0.5	0.2	1.8	3.3	30.6	-20.5	-5.1	-0.6	1.8	3.6	1.4	0.2	2.5	1.8

Table A2.5d: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	above	Total
<b>2004</b>	1.5	0.6	-11.6	17.8	0.7	2.5	2.3	3.9	3.2	4.7	2.9	3.2	4.7	3.4	1.4	3.2
<b>2005</b>	1.0	-0.4	-0.02	-4.3	16.3	3.6	3.3	1.9	3.2	2.8	3.4	2.6	1.6	3.2	0.9	2.6
<b>2006</b>	1.2	0.0	0.2	0.7	-9.5	5.7	0.8	3.1	3.4	2.6	4.1	2.5	2.4	3.5	2.3	3.0
<b>2007</b>	0.6	0.6	-0.1	0.5	0.4	-64.5	7.7	4.2	2.7	4.2	4.2	3.1	2.8	3.8	3.4	2.7
<b>2008</b>	1.6	4.3	-0.6	0.5	3.3	-33.3	29.0	10.9	6.8	13.2	9.0	7.6	8.3	6.7	7.0	7.9
<b>2009</b>	-0.1	-1.7	0.2	-0.3	-1.3	441.1	-5.5	-1.5	-2.5	-2.5	-2.2	-2.3	-1.5	1.1	1.9	2.0
<b>2010</b>	0.6	-5.9	-14.0	-17.5	-28.9	3.5	-2.1	-2.5	-0.5	-1.6	-0.2	-1.1	-0.1	0.5	0.9	-0.2
<b>2011</b>	12.5	-40.3	9.4	-16.8	2939	-221	-192	-64.9	-95.5	-15.4	-63.7	-4.8	-12.4	33.0	-43.8	-32.9
<b>2012</b>	0.4	-1.7	-1.0	-3.2	-9.8	77.9	7.1	7.4	4.0	5.4	5.2	2.8	1.8	1.5	1.5	4.7
<b>2013</b>	0.4	-0.2	-0.2	2.4	-3.8	10.7	-1.1	4.0	3.8	7.2	5.3	3.7	2.2	5.3	2.1	4.0



Table A2.5e: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000 above	Total	
<b>2004</b>	-0.03	0.1	0.6	-0.3	-1.2	0.9	1.0	3.8	2.1	3.0	2.3	3.1	4.3	4.0	2.2	3.1
<b>2005</b>	-0.1	-0.7	-0.9	-17.1	5.7	1.4	1.9	1.6	2.7	2.5	2.1	1.8	3.2	3.0	2.5	2.5
<b>2006</b>	-0.05	-0.5	-0.5	-1.5	34.1	2.3	-15.8	1.3	2.6	3.1	2.8	1.7	3.4	3.1	2.8	3.1
<b>2007</b>	0.02	-0.1	0.1	1.0	-1.7	13.0	2.2	1.4	1.8	2.0	3.3	2.2	2.2	3.4	3.4	3.2
<b>2008</b>	0.1	1.1	1.3	3.2	5.4	19.6	-2.3	-0.9	-2.1	1.6	5.2	4.3	3.7	5.6	4.1	4.4
<b>2009</b>	-0.1	-1.1	-0.9	-2.0	-4.9	21.1	5.6	2.3	3.4	2.3	2.1	1.4	1.5	1.8	2.1	2.9
<b>2010</b>	-0.02	-0.6	-1.9	-2.9	-4.8	50.0	5.2	3.4	3.8	2.6	1.3	1.6	1.4	2.5	2.3	2.6
<b>2011</b>	-0.4	-11.7	-10.2	18.5	235	24.8	17.6	137	22.6	-120	10.6	4.7	7.8	10.6	-12.5	-5.9
<b>2012</b>	0.03	-0.7	-0.9	-2.5	-6.0	4.9	1.1	14.1	1.7	3.1	2.4	2.2	2.2	2.3	3.1	4.1
<b>2013</b>	-0.1	-2.2	-1.9	-5.5	-6.2	-8.3	-2.6	0.3	0.0	-1.9	1.5	4.2	4.6	4.5	2.3	2.6

Tables A2.5f–5j: Baseline Elasticity with MIR and Income Changes, Non-PAYE

Table A2.5f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	-0.4	0.8	1.4	1.2	1.1	1.1	1.2	2.9	1.8	2.0	1.9	1.5	1.4	1.1	2.1	1.8
<b>2005</b>	1.2	-1.7	-0.4	-0.3	0.8	1.1	1.1	1.2	3.9	2.5	2.2	1.4	1.4	1.2	2.2	1.9
<b>2006</b>	1.4	-20.6	-3.4	-2.0	-0.3	0.4	0.0	-2.0	7.0	2.1	1.5	1.6	1.9	1.7	3.3	2.6
<b>2007</b>	-0.9	-7.1	16.2	9.5	3.5	1.4	1.5	2.8	3.0	-0.5	0.9	1.7	2.3	3.9	9.8	5.9
<b>2008</b>	0.7	1.3	-3.3	3.4	3.5	2.3	1.4	2.3	3.7	2.1	2.4	2.6	1.8	1.4	1.2	1.7
<b>2009</b>	0.1	-0.2	2.7	2.9	2.7	1.8	2.0	1.9	2.1	3.9	3.8	2.7	2.5	1.5	1.5	1.9
<b>2010</b>	0.01	-4.0	53.8	14.4	8.2	5.4	2.4	5.5	4.4	12.1	6.4	9.0	5.7	3.1	0.2	3.6
<b>2011</b>	0.7	-17.5	9.2	-5.9	-6.8	1.8	3.6	-4.4	-8.9	8.1	-0.9	-1.4	-0.7	6.5	2.7	1.3
<b>2012</b>	-0.2	-10.7	-37.8	16.0	-5.3	-0.3	35.3	-5.5	6.8	19.9	8.1	30.3	15.3	28.3	-7.3	3.2
<b>2013</b>	-0.3	4.4	2.9	3.5	0.7	1.7	-1.8	2.9	3.1	1.4	2.3	2.3	1.3	0.4	4.3	3.0

Table A2.5g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	-0.2	0.3	0.7	2.2	-2.9	0.9	0.8	1.5	0.5	0.7	0.9	1.0	1.4	1.4	2.5	2.1
<b>2005</b>	0.04	1.3	4.1	9.3	-22.5	-1.9	0.9	0.5	0.1	0.4	0.8	1.5	3.0	1.7	1.9	1.8
<b>2006</b>	0.2	2.2	3.3	10.3	-777	-5.6	-2.4	-1.8	-0.2	-0.2	0.1	-0.5	6.9	2.2	2.1	1.9
<b>2007</b>	-4.2	-6.3	-9.8	-14.9	-21.5	36.8	-10.4	-3.1	2.7	1.6	0.7	0.0	-2.4	-6.3	3.1	1.6
<b>2008</b>	17.5	6.6	2.5	1.0	5.7	-23.4	5.5	-3.9	1.0	2.9	1.3	1.7	1.4	1.4	1.4	1.5
<b>2009</b>	0.03	2.0	2.9	4.4	8.3	-5.7	-0.9	1.6	1.1	0.8	1.4	1.4	1.5	2.5	1.4	1.5
<b>2010</b>	-0.3	2.7	3.1	5.6	13.3	3.3	16.0	7.2	-0.2	3.0	0.9	2.2	3.0	4.1	0.7	1.2
<b>2011</b>	0.01	-2.1	-4.8	-7.1	-54.5	48.4	20.3	23.6	15.3	2.5	5.8	3.5	2.2	4.9	3.7	3.9
<b>2012</b>	0.03	10.0	-0.4	-6.1	39.7	-78.9	-52.0	-6.6	-0.1	-5.9	-10.6	2.2	3.3	23.6	-8.5	-4.1
<b>2013</b>	0.1	1.6	4.4	0.6	29.0	-1.5	-3.5	-4.4	-1.4	-1.9	2.0	0.5	6.4	4.1	1.6	2.1

Table A2.5h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	0.01	0.5	1.0	3.6	0.5	0.3	0.4	0.1	0.2	1.2	0.8	0.0	0.6	0.1	1.8	1.4
<b>2005</b>	-0.01	2.2	3.6	5.6	-14.1	-1.0	-1.4	0.1	-1.6	0.5	1.3	1.0	0.6	0.7	1.7	1.5
<b>2006</b>	0.3	2.0	4.6	7.6	1047	-3.4	-3.3	-2.7	-1.5	-2.3	3.7	0.7	0.3	0.9	1.1	2.0
<b>2007</b>	15.2	9.8	4.8	-5.6	11.6	-16.1	-6.6	-6.1	0.2	4.1	-12.4	-11.9	-11.3	-7.6	-2.2	-3.4
<b>2008</b>	2.1	2.5	0.8	0.2	-1.7	53.6	4.8	5.5	4.2	5.0	5.4	2.2	1.0	1.1	2.0	2.4
<b>2009</b>	0.1	0.8	0.8	-1.1	-2.7	6.3	3.3	3.3	3.0	2.4	2.3	2.8	2.3	1.1	1.3	1.4
<b>2010</b>	0.03	0.3	-0.9	-6.4	-17.9	127	4.4	16.7	9.8	10.6	5.5	9.9	7.3	8.2	-1.9	0.5
<b>2011</b>	0.1	2.1	1.2	19.5	0.6	-26.3	-10.9	-18.5	-10.0	-29.7	-24.4	-23.0	-12.7	-7.9	2.2	-1.8
<b>2012</b>	0.5	1.8	16.8	23.8	15.4	-69.3	-71.7	-9.9	7.5	4.9	7.8	16.5	30.5	24.2	5.0	7.0
<b>2013</b>	-0.01	1.2	-0.5	2.1	11.8	-4.1	0.0	-2.4	-0.6	0.0	1.8	2.4	0.0	1.5	0.6	0.7

Table A2.5i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	0.6	-6.0	-1.7	-0.9	-0.3	0.7	1.1	1.2	0.8	0.2	1.1	0.8	1.1	-0.4	1.2	0.9
<b>2005</b>	1.5	9.3	-9.9	-9.7	-1.3	0.5	0.5	1.2	1.6	1.6	1.5	1.0	0.3	2.5	2.1	1.7
<b>2006</b>	1.8	6.7	-26.2	-16.5	-2.8	-0.7	-0.5	-0.2	5.0	5.1	2.8	2.0	2.6	1.5	2.5	2.4
<b>2007</b>	2.0	0.2	153	15.3	30.4	1.5	-1.1	1.9	-2.6	-8.8	-10.0	-11.6	-8.2	-9.7	-9.0	-8.6
<b>2008</b>	-0.4	-6.6	-21.7	24.0	18.5	2.4	-1.1	-1.5	0.6	-2.7	-0.4	-0.2	-1.4	-1.5	0.2	-0.3
<b>2009</b>	0.00	7.7	36.6	6.7	3.4	1.7	-0.2	0.6	0.3	3.3	2.6	1.8	2.6	1.9	2.1	2.1
<b>2010</b>	-0.2	-11.7	-382	-7.2	2.2	-2.6	1.5	-2.6	3.6	-2.6	-0.4	-0.3	0.8	1.6	-0.6	-0.4
<b>2011</b>	0.4	4.1	73.1	18.2	-208	-2.6	-3.0	-7.2	-6.5	-6.6	-3.6	0.3	-1.5	2.8	0.1	-1.0
<b>2012</b>	4.7	-0.4	79.4	-101	-28.2	11.9	11.5	0.7	18.5	8.1	15.7	37.2	26.7	23.6	17.1	19.2
<b>2013</b>	-0.1	-14.5	180	-8.7	-0.1	-2.8	-0.1	-0.8	0.8	1.6	2.9	1.9	-2.2	5.4	2.5	2.3

Table A2.5j: Total

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above	Total
<b>2004</b>	-0.3	0.1	0.5	0.2	0.7	0.8	0.9	1.7	0.8	1.2	1.1	1.0	1.2	1.0	2.2	1.8
<b>2005</b>	0.7	-3.8	-1.7	-0.8	-0.9	0.3	0.5	0.9	0.9	1.0	1.3	1.5	2.0	1.4	1.9	1.8
<b>2006</b>	1.2	-25.6	-4.4	-2.5	12.2	-0.7	-0.9	-1.9	2.6	0.0	1.2	0.2	4.2	1.8	2.0	2.1
<b>2007</b>	3.5	6.9	3.5	8.3	1.3	2.5	-1.6	0.1	2.0	1.3	-2.2	-2.0	-3.2	-4.7	2.7	0.6
<b>2008</b>	1.7	3.7	8.7	1.4	1.1	15.5	2.1	1.1	2.8	3.0	2.3	2.0	1.3	1.2	1.5	1.7
<b>2009</b>	0.1	1.4	-1.6	1.0	0.3	1.6	1.4	1.8	1.8	2.3	2.3	1.9	1.9	2.0	1.4	1.6
<b>2010</b>	0.1	-1.0	22.7	6.8	2.5	23.5	4.6	6.4	3.9	7.2	3.1	4.4	3.9	4.7	-0.3	1.4
<b>2011</b>	0.4	-5.3	4.9	-5.3	0.5	1.8	2.8	-1.8	-3.3	-7.1	-2.3	-2.7	-2.4	1.7	2.9	1.5
<b>2012</b>	-0.1	-1.0	-67.3	-1.0	-0.9	-13.7	4.4	-5.7	6.6	4.9	-1.1	12.1	14.6	24.7	-2.6	1.9
<b>2013</b>	-0.1	10.9	1.0	0.7	0.7	0.3	-1.6	0.2	1.2	-0.3	2.2	1.3	3.3	2.9	1.6	1.9

MIR Elasticity (Equation (7))

Table A2.6: MIR elasticity (equation (7))

	Total singles (up to)														
	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above
<b>Log_AvgInc</b>	0.779*** (60.644)	0.697*** (70.935)	0.683*** (71.132)	0.672*** (69.363)	0.661*** (72.229)	0.650*** (75.4)	0.644*** (80.284)	0.642*** (80.014)	0.637*** (79.963)	0.633*** (80.487)	0.627*** (77.231)	0.615*** (76.414)	0.603*** (80.63)	0.592*** (78.762)	0.569*** (68.68)
obs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
p	4.54E-13	1.11E-13	1.08E-13	1.36E-13	9.45E-14	6.42E-14	3.65E-14	3.77E-14	3.79E-14	3.57E-14	5.18E-14	5.70E-14	3.52E-14	4.34E-14	1.49E-13
	*p<0.10 **p<0.05 ***p<0.01														
	Married couples both earning (up to)														
	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above
<b>Log_AvgInc</b>	0.794*** (38.244)	0.689*** (60.819)	0.671*** (60.677)	0.657*** (61.32)	0.648*** (60.494)	0.637*** (59.347)	0.629*** (61.381)	0.624*** (59.529)	0.618*** (58.253)	0.612*** (59.426)	0.604*** (58.096)	0.597*** (57.875)	0.590*** (58.285)	0.580*** (58.99)	0.567*** (65.606)
obs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
p	2.84E-11	4.43E-13	4.52E-13	4.11E-13	4.65E-13	5.52E-13	4.08E-13	5.37E-13	6.52E-13	5.45E-13	6.68E-13	6.91E-13	6.49E-13	5.82E-13	2.24E-13
	*p<0.10 **p<0.05 ***p<0.01														
	Married couples one earning (up to)														
	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above
<b>Log_AvgInc</b>	0.800*** (33.836)	0.684*** (68.124)	0.667*** (66.451)	0.654*** (68.19)	0.645*** (69.129)	0.632*** (73.782)	0.625*** (74.636)	0.620*** (73.283)	0.614*** (75.232)	0.607*** (75.533)	0.600*** (73.974)	0.590*** (73.145)	0.581*** (74.218)	0.573*** (80.6)	0.554*** (81.625)
obs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
p	8.48E-11	1.60E-13	2.00E-13	1.58E-13	1.40E-13	7.81E-14	7.04E-14	8.30E-14	6.55E-14	6.32E-14	7.62E-14	8.44E-14	7.40E-14	3.53E-14	3.15E-14
	*p<0.10 **p<0.05 ***p<0.01														

	Total widowed (up to)														
	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above
<b>Log_AvgInc</b>	0.796***	0.655***	0.618***	0.604***	0.604***	0.586***	0.586***	0.578***	0.577***	0.567***	0.568***	0.562***	0.553***	0.553***	0.525***
	(14.31)	(32.991)	(50.406)	(49.795)	(66.866)	(64.404)	(82.087)	(77.01)	(82.834)	(82.443)	(74.421)	(70.371)	(80.43)	(58.737)	(67.498)
obs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
p	1.70E-07	1.06E-10	2.39E-12	2.67E-12	1.89E-13	2.65E-13	2.99E-14	5.31E-14	2.76E-14	2.88E-14	7.22E-14	1.19E-13	3.59E-14	6.05E-13	1.74E-13
*p<0.10 **p<0.05 ***p<0.01															

	Total														
	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	above
<b>Log_AvgInc</b>	0.783***	0.693***	0.678***	0.666***	0.656***	0.645***	0.638***	0.635***	0.630***	0.624***	0.616***	0.603***	0.592***	0.582***	0.564***
	(52.887)	(71.351)	(70.064)	(69.505)	(71.571)	(74.872)	(78.258)	(77.451)	(76.248)	(75.559)	(72.212)	(69.178)	(67.729)	(65.517)	(69.408)
obs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
p	1.55E-12	1.05E-13	1.24E-13	1.33E-13	1.03E-13	6.84E-14	4.60E-14	5.05E-14	5.81E-14	6.30E-14	9.47E-14	1.39E-13	1.68E-13	2.27E-13	1.35E-13
*p<0.10 **p<0.05 ***p<0.01															

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**A2.2 INDIVIDUAL USC REVENUE ELASTICITIES ACROSS THE INCOME DISTRIBUTION**

Tables A2.7a–7e: Baseline Elasticity, PAYE

Table A2.7a: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	1.0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.3
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.3
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.3

Table A2.7b: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	0	1.8	1.6	2.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.1

Table A2.7c: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2

Table A2.7d: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.3
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.4
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.4

Table A2.7e: Total (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	0.8	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.2

## Tables A2.7f–7j: Baseline Elasticity, Non-PAYE

Table A2.7f: Total singles (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	1.0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3

Table A2.7g: Married couples both earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	1.0	1.8	1.6	2.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2

Table A2.7h: Married couples one earning (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,000	150,000	20,000	275,000	above	Total
<b>2011</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2



Table A2.7i: Total widowed (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	275,000	above	Total
<b>2011</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.3

Table A2.7j: Total (up to)

	10,000	12,000	15,000	17,000	20,000	25,000	27,000	30,000	35,000	40,000	50,000	60,000	75,000	10,0000	150,000	20,0000	275,000	above	Total
<b>2011</b>	0.7	1.8	1.6	1.6	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2012</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2
<b>2013</b>	0	1.8	1.6	1.5	2.1	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.4	1.3	1.2	1.1	1.2



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