The Economic and Social Review, Vol. 47, No. 1, Spring, 2016, pp. 155-184

POLICY PAPER

Searching for the Inclusive Growth Tax Grail: The Distributional Impact of Growth Enhancing Tax Reform in Ireland*

BRENDAN O'CONNOR
Department of Finance, Dublin

TERENCE HYNES
Department of Finance, Dublin

DAVID HAUGH
Organisation for Economic Co-operation and Development, Paris

PATRICK LENAIN
Organisation for Economic Co-operation and Development, Paris

* The authors would also like to thank David Hegarty, Department of Finance, Ireland, Bob Ford, Economics Department, OECD, Bert Brys, Centre for Tax Policy and Administration, OECD, Claire Keane, Directorate for Employment, Labour and Social Affairs, OECD, attendees at the Department of Finance's 2015 "Tax Policy Conference" and John McDonagh, NUI Galway, for useful comments on this paper. Any errors in the modelling or interpretation of results are solely the responsibility of the authors. This paper should not be reported as representing the official views of the Minister for Finance or the Department of Finance, or of the OECD or of its member countries. The opinions expressed and arguments employed are those of the authors.

Abstract: The economic literature suggests that a revenue-neutral shift of tax revenues from income taxes to property taxes would increase GDP per capita in the medium term. This paper analyses for Ireland the consequences of such a shift in the tax mix. In particular, it examines whether this can be carried out in a way that would neither undermine income distribution nor depress government revenue. Simulations using the ESRI tax-benefit model, *SWITCH*, suggest it is possible to achieve such a broadly revenue-neutral tax shift in a non-regressive way, while lowering marginal tax rates for most taxpayers. In particular, reductions in the Universal Social Charge would reduce marginal and average tax rates and have a positive impact for the income of most households. This could be funded by shifting the tax base toward residential properties, though this might have an adverse effect on income distribution, due to Ireland's high rates of home ownership throughout the income distribution. The analysis shows that low income groups could be protected through the careful introduction of income-related supports, with revenue losses recovered through a more progressive property tax rate structure. Overall, the simulations show that a shift from labour to property tax can be pro-growth and pro-employment, without equity losses. The paper therefore suggests that tax reform can be inclusive.

I INTRODUCTION

The overall tax structure matters for GDP growth. Broadly speaking, a shift from labour income to consumption or property taxation is found to promote growth (Johansson *et al*., 2008, Arnold *et al*., 2011, O'Connor, 2013). However, shifting the taxation burden in this way can have adverse implications for income distribution, and thus often prove controversial.

Taxation changes, even if they would promote growth, are unlikely to be implemented or could be reversed if they are perceived as regressive and undermine other government goals. Is a growth, equity trade-off unavoidable or do "win-win" reforms exist that can reduce the distortionary effects of the tax burden without leading to equity losses?

The paper first briefly discusses the fiscal composition literature on the tax mix and growth and identifies growth-promoting policies that are commonly advocated. Of these, the specific changes that would be the most growth enhancing in Ireland are a function of current features of the tax system compared with other OECD countries that are discussed below. The paper then simulates changes to policy calibrated to the Irish tax system in 2015.[1] The simulations examine the consequences of these policy changes for disposable income distribution, financial incentives to work as well as the fiscal costs.

[1] This paper is based on simulating policy reforms based on the tax system in 2015. In October 2015, the Irish Government announced as part of Budget 2016 that it would reduce the Universal Social Charge (USC) from 2016. These changes reduced the bottom three USC rates from 1.5 per cent to 1 per cent, 3.5 per cent to 3 per cent and 7 per cent to 5.5 per cent respectively. The threshold between the second and third bands was increased from €17,576 to €18,669. This policy change is similar to that proposed in simulation 7 of this paper. Even after the 2016 policy change, there remains further potential to reduce the USC.

The simulations suggest that a shift from labour taxation to property tax in Ireland can be achieved in a way that reduces marginal tax rates for most tax payers and does not lead to a regressive outcome. In addition, such a change would be expected to permanently increase output and employment in the economy. However, it should be acknowledged that there are trade-offs. Such a change requires a relatively complex tax design and some of the growth-enhancing effects of the shift are lowered by features required to maintain equity.

II WHY AND HOW DOES THE TAX STRUCTURE MATTER FOR GROWTH?

Taxes matter for economic growth because they affect incentives to work, save and invest. The literature is, however, not entirely consensual. OECD empirical research has suggested a ranking of taxes according to their effects on GDP per capita. Recurrent taxes on immovable property are found to be the least distortive in terms of reducing the long-run GDP per capita level, followed by consumption taxes (and other property taxes), personal income taxes and corporate income taxes (Arnold *et al*. 2011).

Other work has found less clear evidence. Acosta-Ormaechea and Yoo (2012) using a larger sample of countries find that shifting from property and consumption taxes to income taxes is negative for GDP per capita growth in middle and high income countries but there is not strong evidence of this for low income countries. Afonso and Tovar Jalles (2014) using a large sample of developed and developing countries conclude that income taxes are usually negative to growth.

The results in Arnold *et al*. (2011) appear to be sensitive to estimation technique and sample but the result that property taxes are less harmful to growth than other taxation types does appear robust, particularly for Ireland, the United Kingdom and Finland (Xing, 2011, 2012). Property taxes are less distortive because these taxes do not affect the decisions of households and firms to supply labour, invest in human and physical capital and innovate to the same extent as other taxes (Johansson *et al*., 2008). A property tax increase will not create a substitution effect to induce people to work less because it does not make labour less attractive relative to leisure as the property tax liability does not depend on labour market status. Only an income effect occurs: a higher property tax will make people poorer so it increases the incentive to work more.

A personal income tax cut will induce individuals to work more (substitution effect), which is often considered to be larger than the income

effect, which has the opposite sign (a tax rate decrease will make people richer so they work less). Empirical work confirms this: personal income taxes are found to have strong negative effects on labour supply, particularly of workers with high labour-supply elasticity, such as second earners in households, often women. Based on a sample of 21 OECD countries including Ireland for the period 1996-2003, a one percentage point increase in the marginal tax rate is estimated to reduce the hours worked by women by around 0.7 per cent (Causa, 2008). Labour taxation is also found to have an impact on investment in human capital. Empirical evidence suggests reducing marginal income tax rates tends to boost investment in human capital (Heckman *et al*., 1998; Oliveira Martins *et al*., 2007).

Previous work suggests that a revenue-neutral shift of 1 per cent of tax revenues from income taxes to consumption and property taxes would increase GDP per capita by between 0.25 per cent and 1 per cent in the long run, depending on the specification (Arnold *et al*., 2011). Research suggests that the effect is also sizeable in Ireland with a €1 billion (2.4 per cent of 2014 tax revenues) shift in tax revenues leading to a 0.32 per cent increase in the level of GDP and a 0.43 per cent increase in employment over a five year period (O'Connor, 2013).[2]

III MAIN FEATURES OF THE IRISH TAX SYSTEM IN AN INTERNATIONAL CONTEXT

3.1 *Ireland Has a Highly Progressive Income Tax System and a Highly Redistributive Tax and Transfer System by OECD Standards*

Ireland has average effective tax rates which are much lower than the OECD average until well above the average wage (Table 1).

Despite low average taxation, Ireland maintains a highly progressive tax system relative to other countries. One way of capturing this idea is to look at the ratio of the tax wedge at different points on the income distribution across countries.[3] Figure 1 below shows the ratios of tax wedges at 167 per cent and 67 per cent of the average wage across a range of OECD countries. Ireland's ratio is 1.8, compared with 1.3 times for the OECD average, and is the second highest in the OECD after Israel.

While this approach compares only two points on the income distribution, other research by the OECD has observed this relationship over multiple

[2] See also Table 4 below.

[3] The average tax wedge measures the total taxes paid by employees and employers, including social security contributions, minus family benefits received, as a percentage of the total labour costs of the employer.

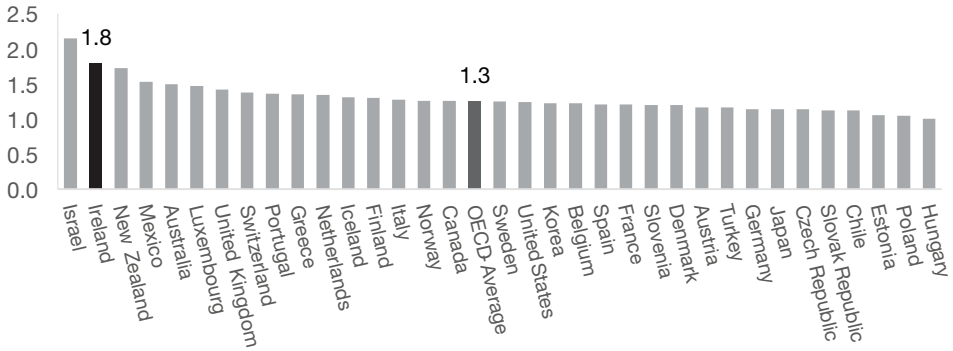
income ranges. Ireland's tax system is generally more progressive over multiple income ranges under this analysis compared to other OECD countries (Paturot *et al*., 2013).

Table 1: *Average Income Tax, Including Universal Social Charge, Plus Employee Social Security Contributions at Different Wage Levels (Expressed as a Percentage of the Average Wage), 2014*

	Single No Children (67% AW) %	*Single No Children (100% AW)* %	*Single No children (167% AW)* %
Ireland	14	21	33
OECD-Average	21	26	31

Note: The OECD average does not take the "non-tax compulsory payments" (NTCPs) which employees or employers have to pay into account. NTCPs are compulsory payments paid to private (health, pension, etc.) funds. No such contributions are levied in Ireland. The average wage is the gross wage earnings that workers in the private sector earn on average in a particular year.
Source: OECD Taxing Wages database.

Figure 1: *OECD Progressivity Measure – Ratio of Average Tax Wedges at 167 Per Cent and 67 Per Cent of Average Wage For Single Taxpayers, 2014*

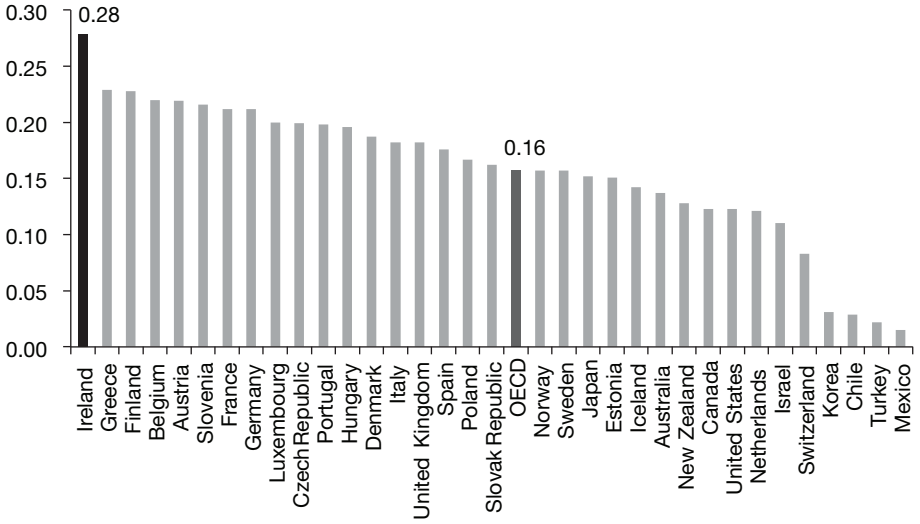


Source: OECD Taxing Wages.

The progressive nature of the tax system, along with social benefits, make the tax-transfer system highly redistributive by international standards. As a result, market income inequality in Ireland is reduced from the highest in the OECD to around the OECD median in terms of disposable income. Figure 2 illustrates this point by showing the reduction in the market income Gini Coefficient (i.e., before taxes and charges) achieved by a range of OECD

countries.[4] As can be seen, the Gini Coefficient falls by 0.28 for Ireland, compared with an OECD average reduction of 0.16, when moving from a market income to disposable income measure of inequality.

Figure 2: *Difference in Gini Coefficient Between Market and Disposable Incomes, 2012, or Nearest Year*



Source: OECD Income Distribution and Poverty database.

IV TAXATION OF PERSONAL INCOME IN IRELAND

Taxation of personal income in Ireland consists of two main component taxes – income tax, and the Universal Social Charge (USC), which was introduced in 2011. There also exists a social security system with employee and employer contributions.

Income tax operates using a two rate structure with different thresholds depending on family type (Table 2). A lower rate of 20 per cent applies on all income up to a band threshold, above which income is taxed at a higher rate of 40 per cent. This band threshold is €33,800 for a taxpayer who is assessed on an individual basis by the Revenue authorities. For a jointly assessed one-

[4] The Gini coefficient is a statistical measure of a country's inequality. The Gini coefficient ranges from a value of zero to one. A Gini coefficient of zero expresses perfect equality, i.e., where all households or individuals have the same income whereas a Gini coefficient of one expresses perfect inequality, i.e. where only one person has all the income and all others have none.

income couple this threshold is €42,800 and for a two-income couple this is €67,600. A one-parent family has a threshold of €37,800. Ireland has two main tax credits in the form of a personal tax credit and an employee tax credit. Both are set at €1,650. As such, a single taxpayer with combined credits of €3,300 does not begin paying the income tax until they have income of €16,500.

Table 2: *Income Tax Rate Schedule, 2015*

Family Type	*Rate*	
	20 Per Cent	*40 Per Cent*
Single person	€33,800	Balance
One parent family	€37,800	Balance
Married couple/civil partners, one income	€42,800	Balance
Married couple/civil partners, two incomes	Up to €67,600	Balance

How to read this table: A single person is taxed (before credits) at a rate of 20 per cent of their income between €0 and €33,800. The remaining income above €33,800 is taxed at a rate of 40 per cent.

The USC is operated on the basis of low rates with a wide base. The base is wider than the income tax in the sense that individuals become liable to pay it once their income reaches €12,012 rather than €16,500 in the income tax system (Table 3). It also has fewer exemptions available to reduce the tax liability for individuals relative to the income tax system. Once a person's income exceeds €12,012, their whole income is liable at 1.5 per cent up to this value. A 3.5 per cent rate applies between income from €12,012 to €17,576, a 7 per cent rate between €17,576 and €70,044 and an 8 per cent rate for those earning above €70,044. An additional rate is applied at 11 per cent for those earning income from self-employment above €100,000.

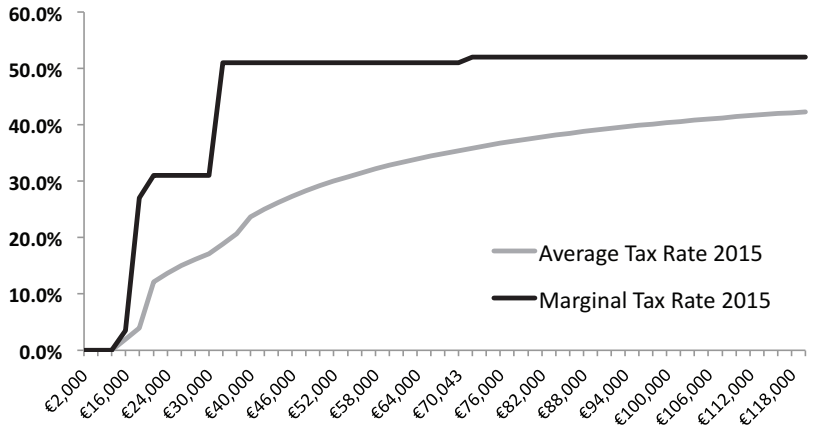
Table 3: *USC Rate Schedule, 2015*

Rate (Per Cent)	*Income Band*
1.50	Up to €12,012
3.50	From €12,012 to €17,576
7	From €17,576 to €70,044
8	From €70,044 to €100,000
8	Any PAYE income over €100,000
11	Self-employed income over €100,000

Social security (PRSI) contributions are a smaller component of labour taxation in Ireland. Most employees in Ireland pay PRSI at a rate of 4 per cent.[5] The combined top marginal tax rate for employees of 52 per cent is therefore made up of the 40 per cent income tax rate, the 8 per cent USC rate and the PRSI rate of 4 per cent.

Figure 3 shows the key points on an income range where marginal tax rates jump up in Ireland for an individually assessed taxpayer. USC becomes payable at €12,012, with income tax beginning at €16,500. At €18,304, the combined impact of USC, income tax and PRSI at rates of 7 per cent, 20 per cent and 4 per cent respectively, result in a marginal tax rate of 31 per cent up until €33,800, where the higher rate of income tax commences and the marginal tax rate becomes 51 per cent. At €70,044 the higher USC rate of 8 per cent kicks in and the top marginal tax rate of 52 per cent for employee income applies. However, for those with self-employment income over €100,000, there is an additional USC rate of 11 per cent, resulting in a top marginal tax rate of 55 per cent.

Figure 3: *Average and Marginal Effective Tax Rates in Ireland for an Individually Assessed Person, 2015*



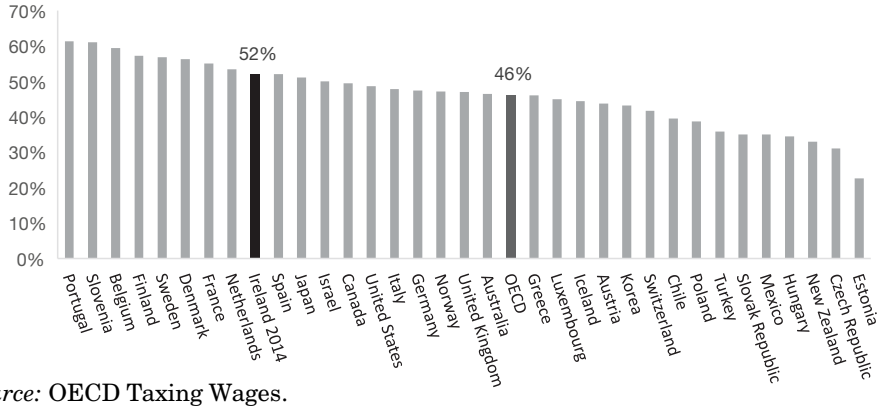
Source: Department of Finance calculations.

Figure 4 shows the top marginal tax rates for all OECD countries in 2014. This includes income taxes (in Ireland's case, income tax and USC), as well as employee's social security contributions (i.e., PRSI in Ireland). At 52 per cent,

[5] Employees earning over €352 per week, equivalent to €18,304 per annum, pay 4 per cent PRSI on all of their earnings, while employees earning less than €352 gross per week (before tax) are exempt from employee contributions. Employers pay 8.5 per cent of an employee's earnings up to €356 per week and 10.75 per cent on earnings over €356.

Ireland's top marginal tax rate is joint 9th highest in the OECD, 9 percentage points below the highest in the OECD (Portugal), and 6 percentage points above the OECD average.

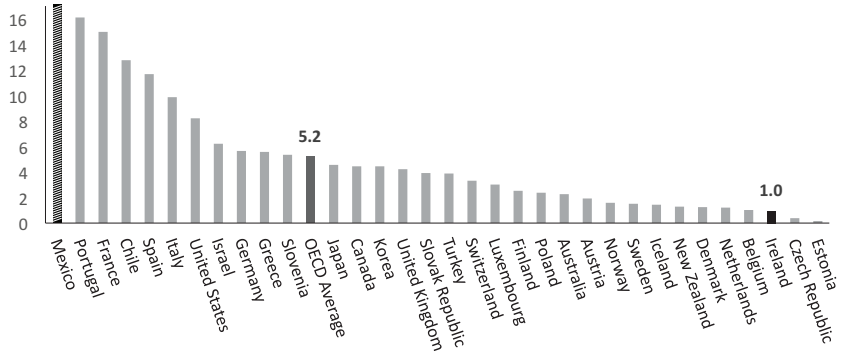
Figure 4: *Top Marginal Rates Across OECD Countries in 2014*



Source: OECD Taxing Wages.

Particularly striking in international comparison is that the relatively high top marginal tax rate in Ireland is reached at a low point in the income distribution by OECD standards. This can be established by comparing the relationship of the threshold at which one begins paying the top rate to the average wage for each country. In 2014, the point at which Irish tax payers begin paying the top marginal tax rate of 52 per cent was at the average wage (Figure 5) which was the 3rd lowest in the OECD compared to just over 5 times the average wage for the OECD as a whole.

Figure 5: *Threshold Where Taxpayer Becomes Liable to the Top Marginal Tax Rate as a Multiple of the Average Wage in 2014*



Note: The threshold multiple for Mexico is 29.5.
Source: OECD Taxing Wages.

This appears to be partly a function of the way gross earnings are distributed in Ireland and a desire to achieve strong progressivity. By OECD standards the distribution of gross earnings is skewed in Ireland. The OECD's Labour Force Survey database shows the ratios of the 9th to 1st deciles and median to 1st decile gross earnings are respectively 7th and 6th highest in the OECD. It also shows the incidence of low pay (i.e., the percentage of households earning less than two-thirds of median earnings) is the 3rd highest in the OECD at 23 per cent. This combined with sizable income tax credits means that a large share of households pay no income tax at all. For a given revenue need, this narrower tax base correspondingly requires a high marginal rate to be applied relatively low in the income distribution.

Budget 2015 increased the point at which people began paying the top rate of 52 per cent to €70,044. However, a significant proportion of the population still begin paying the slightly lower marginal tax rate of 51 per cent from an income of €33,800. This marginal tax rate would still be the joint 11th highest of all OECD countries in 2014.

This section identified that in comparison to other OECD countries, marginal tax rates in Ireland are high and more importantly the point at which people begin to pay them on the income distribution is quite low. High marginal tax rates penalise economic growth especially in the medium term as they reduce the incentive to work and can induce tax avoidance behaviour.

V SIMULATING TAXES AND WELFARE CHANGES

The preceding sections illustrated the empirical and theoretical research on growth enhancing tax reforms as well as particular aspects of the Irish tax system that may act as a drag on growth. This section seeks to identify a win-win reform that would lead to growth enhancing macroeconomic outcomes, consistent with economic theory, in a manner that does not lead to losses for low income groups, or significant gains for high income groups.

OECD (2010) presented empirical and theoretical evidence that there could be gains in terms of long-run GDP per capita from increasing the use of property taxes relative to income taxes without changing overall tax revenues. This shift would likely have larger effects on GDP per capita if it was in the form of cuts in marginal personal income tax rates rather than increases in thresholds (although the latter would be more effective at reducing inequality). A shift to increased use of recurrent taxation of immovable property would also give rise to a more stable tax revenue base.[6] Blöchliger *et al*. (2015) find in cross-country

[6] The sensitivity of other non-recurrent tax types to the business cycle is illustrated by the evolution of capital gains taxes and stamps which in 2006 accounted for 15 per cent of tax revenues, but accounted for only 5 per cent in 2012.
Source: Department of Finance databank (databank.finance.gov.ie).

regressions that recurrent property taxes are a stable source of revenue being only mildly affected by the business cycle. The reform explored herein therefore considers marginal tax rates. In particular, the low entry point to the top marginal rate in Ireland, relative to other OECD countries, warrants examination.

O'Connor (2013) presented the results from the Economic and Social Research Institute (ESRI) *HERMES* macroeconomic model of a €1 billion (2.4 per cent of 2015 total tax revenues) revenue neutral shift from income tax to property tax (Box 2). The results, set out in Table 4 below, indicated that such a reform would result in a permanent increase in the levels of GDP and employment of 0.32 per cent and 0.43 per cent in the medium term. Whilst the reforms in this paper are calibrated to a shift of €500 million, results from the *HERMES* model are linear and as such can be proportionately scaled to a smaller reform.

Table 4: *Output and Employment Impact of €1 Billion Revenue Neutral Shift from Labour Taxation to Property Taxation*

*Year**	*1*	*2*	*3*	*4*	*5*
Real GDP levels (pp)	0.00	0.16	0.26	0.32	0.32
Employment levels (pp)	0.00	0.11	0.26	0.41	0.43

Source: O'Connor (2013) from ESRI *HERMES* macroeconomic model.
* Year T represents the year in which the reform is introduced.

The distributional impacts of the reforms are simulated using the ESRI tax-benefit model, *SWITCH*. The *SWITCH* model is a micro-simulation model that estimates the distributional impact on household incomes, as well as impacts on financial incentives to work, in terms of changes in replacement rates and marginal effective tax rates, from changes in fiscal policy.

Results are presented which show the estimated exchequer cost and distributional impacts of a range of simulations of labour tax and property tax reforms. The distributional impacts on household incomes are presented on a decile basis.

VI *SWITCH* MODEL DESCRIPTION

The ESRI *SWITCH* model is a micro-simulation tax-benefit model based on data from the *Survey of Income and Living Conditions* (*SILC*), a large-scale nationally representative sample of households. The modelling processes

include the construction of new weights for the survey households, based on statistical information from Revenue's Income Distribution Statistics, and forecasts of employment, unemployment and whether the person is receipt of social welfare for the next budgetary year. In this way the model seeks to represent the great diversity of household circumstances relevant to tax and social welfare. Administrative tax data discussed in Kennedy *et al*. (2015) tends to have less coverage of poor and non-tax paying households, but has more accurate and reliable information on the highest income households.

At present the capabilities of the model include:

- Estimation of the net budgetary cost of packages of tax and/or welfare changes;
- Estimation of the distribution of gains and losses from certain tax and welfare policy changes; and,
- The impact of policy changes on financial incentives to work, and to work more, as measured by replacement rates and changes in marginal effective tax rates.[7]

Results from the model can be expressed for three basic units of analysis – a household, a tax unit and an income sharing unit. The household is the widest unit of analysis. A tax unit represents a married couple or single person, together with all children aged less than 15 and children aged less than 18 in full-time education. An income sharing unit is a wider definition than a tax unit and includes third level students living with their parent, a cohort that would be regarded as tax separate units to their parents under the tax unit definition. For the purposes of this paper the unit of analysis is at the household level, on an equivalised basis (Box 1).

VII REFORM SIMULATIONS AND RESULTS

As outlined above, the highly progressive nature of Ireland's income tax system results in around 18 per cent of tax-payer units facing high marginal tax rates of at least 51 per cent from incomes just above the average wage. This negatively affects labour supply decisions, and through this channel, economic growth. Reducing the labour supply disincentives caused by the current income tax structure provides an opportunity for a growth enhancing reform.

[7] The ESRI carry out comparisons of the revenue/cost projections of changing different tax measures with the Revenue Commissioner's forecasting model. While the *SWITCH* model projections are close to those of the Revenue Commissioners they are not perfectly consistent. As such, revenue/cost projections included in this paper are only approximate.

Box 1: *Equivalisation in the SWITCH Model*

Household incomes are equivalised within *SWITCH*. Equivalisation takes into account the fact that larger households usually need a higher income than smaller households to achieve a comparable standard of living. Equivalence scales are used to calculate the *equivalised household size* in a household. The national scale for Ireland uses a scale of 1 for the first adult, 0.66 for each subsequent adult (aged 14+ living in the household) and 0.33 for each child aged less than 14.

Under the above scales a household of 1 adult, a household of 2 adults, and a household of 2 adults and one child under the age of 14 – are considered to have equivalent resources available to them if they have actual total household incomes of €1,000, €1,666 and €1,999 per week respectively.

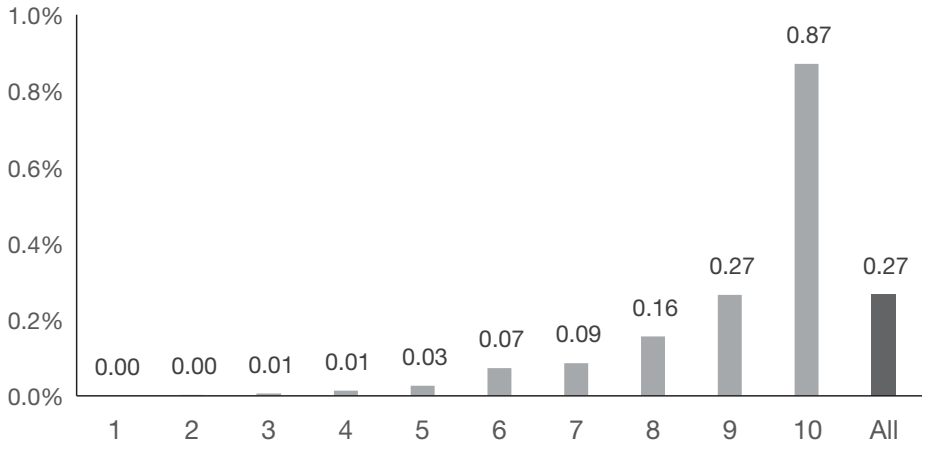
7.1 *Reductions in Income Tax and Increases in the Standard Rate Band Benefit a Relatively Small Cohort of Taxpayers*

The first reforms analysed relate to income tax, in particular the top rate of income tax and the threshold for this rate. In Simulation 1 the top income tax rate is reduced by 1 per cent, from 40 per cent to 39 per cent, and then, in Simulation 2, the standard rate band is increased by €2,000, from €33,800 to €35,800.

The net exchequer cost for Simulation 1 is €200 million and results in an average gain of 0.27 per cent in equivalised disposable weekly income for all deciles. As the benefit of the tax change increases with income it is intuitive that the 10th decile shows the biggest gain of 0.87 per cent. Smaller gains of 0.27 per cent and 0.16 per cent occur for the 9th and 8th deciles respectively. Gains below the 8th decile are negligible at less than 0.1 per cent of weekly equivalised disposable income. Thus, the gains are largely concentrated in the top deciles.

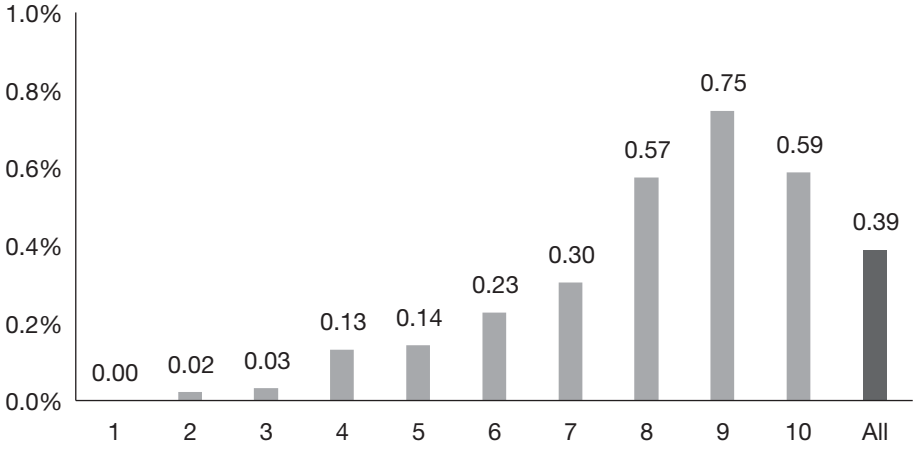
Turning to an increase in the standard rate band, the *SWITCH* model estimates a net exchequer cost of €292 million, with an average gain of 0.39 per cent in equivalised disposable weekly income. Gains are more evenly distributed across the top 5 to 7 deciles than the reduction in the top rate as, for example, an individually assessed tax unit gains the same absolute amount of income if their income is above €35,800 i.e., the new higher rate threshold. The 9th decile shows the biggest gains of 0.75 per cent, with gains falling off in the 10th decile. As the gain from the reform is constant in cash terms this fall in the 10th decile is due to a denominator effect caused by larger disposable

Figure 6: *Simulation 1, Reduction in the 40 Per Cent Income Tax Rate by 1 Per Cent to 39 Per Cent, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

Figure 7: *Simulation 2, Increase in the Standard Rate Band of €33,800 by €2,000 to €35,800 for an Individually Assessed Tax Unit and Correspondingly for Other Tax Unit Types, Percentage Change in Equivalised Disposable Income*



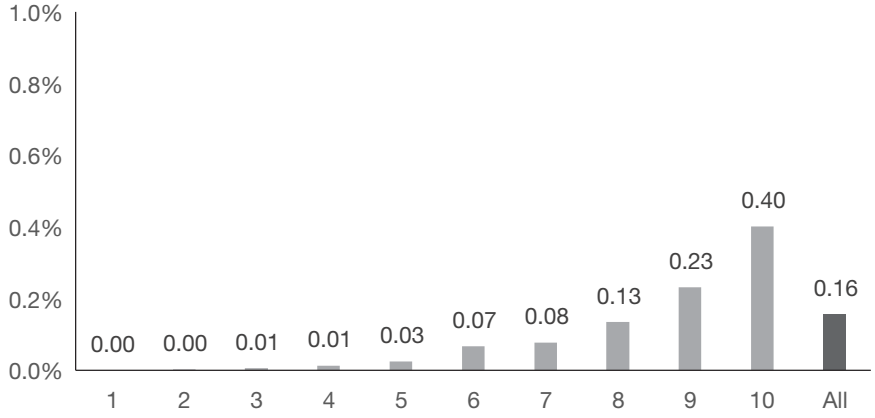
Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

income in the 10th decile relative to the 9th. Negligible gains occur in the first three deciles and may be explained by equivalisation wherein some households that benefit from the change in the standard rate band, and who would appear in the middle deciles on a pre-equivalisation basis, actually appear in the lower deciles on a post-equivalisation basis due to their household composition.

Budget 2015 introduced a new 8 per cent rate of USC for those earning €70,044 and above. This was introduced to cap the benefit of reductions in the top income tax rate. It is possible to replicate the approach to limit the gains to the upper deciles by increasing the top rate of USC from 8 per cent to 9 per cent, alongside a 1 per cent reduction in the top income tax rate. Simulation 3 below illustrates the distributional impact.

SWITCH estimates the net exchequer cost of this reform as €117 million so, comparing with Simulation 1, increasing the top USC rate in tandem with decreases in the top income tax rate saves approximately €73 million. The gains in the 10th decile are substantially reduced, with gains of 0.4 per cent as against 0.87 per cent in the reform without the USC increase, with small reductions in gains for the 8th and 9th deciles also.

Figure 8: *Simulation 3, Reduction in the 40 Per Cent Income Tax Rate by 1 Per Cent to 39 Per Cent and Increase the 8 Per Cent Rate of USC to 9 Per Cent, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

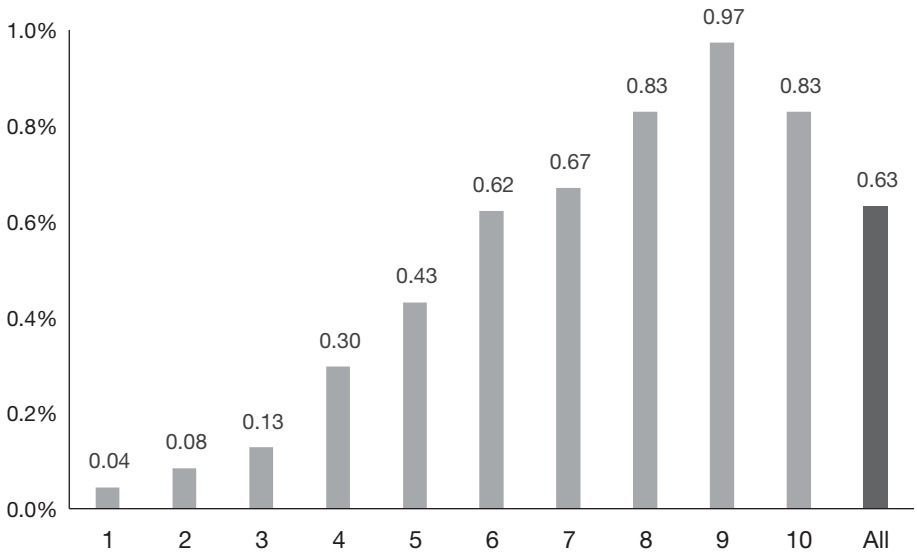
In terms of why core income tax changes are mainly impacting on the higher deciles, work by Collins (2015) using 2013 *SILC* data, indicates that 82 per cent of employed persons can be found in deciles 5 to 10 (on an equivalised basis); hence changes to the core income tax system tend to impact at the higher end of the income distribution.

7.2 *Reductions in the Universal Social Charge Can Reduce Marginal and Average Tax Rates and Achieve a Broader Impact on Household Incomes*

Changes introduced in Budget 2015 resulted in the 7 per cent USC rate applying to income between €17,542, approximately equivalent to income for a full-time equivalent employee at the national minimum wage, and €70,044. The broad nature of the income range that the 7 per cent rate applies to would suggest, a priori, that USC changes should have a wider distributional impact than the income tax reforms that were discussed above.

The distributional impact of a 1.5 per cent reduction in the 7 per cent rate, and 0.25 per cent reduction in the 3.5 per cent rate, which applied to income between €12,012 and €17,542, is shown below. The inclusion of a reduction in the 3.5 per cent rate is designed to spread the gains to lower income groups.

Figure 9: *Simulation 4, Reduce 7 Per Cent USC Rate by 1.5 Per Cent and the 3.5 Per Cent Rate by 0.25 Per Cent, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

SWITCH estimates this USC reform to result in a net exchequer cost of €475 million, with an average gain of 0.63 per cent in weekly equivalised disposable income across all income deciles. The gains from this reform reach further down the income distribution, reflecting the low threshold to the 3.5 per cent rate. Gains steadily rise between each decile until the 9th where they peak at just under 1 per cent of disposable income.

Such a reform would result in a top marginal rate of 49.5 per cent for all tax payers with income less than €70,000 and a lower average effective rate for tax payers with an income above €12,012 per annum. While the top marginal rate would remain at 52 per cent for tax payers with income above €70,000, the reduction in the average effective tax rate could improve Ireland's attractiveness as a location for high skilled labour, as it is the average effective rate that determines participation (i.e., the extensive margin), as opposed to the marginal rate which determines the amount of labour supplied (i.e., the intensive margin) after the participation decision has been made.

Table 5 shows the percentage of those in employment by whether or not they experience a change in their Marginal Effective Tax Rate (METR). *SWITCH* models METRs by showing the amount of an additional €100 in earnings that is taxed away. This shows that 68 per cent of the population of employed persons (i.e., employees and self-employed) have a reduction in their METR as a result of Simulation 4.

Table 5: *Percentage of Employed Persons by Change in Marginal Effective Tax Rates*

	%
Increase	0
No Change	32
Decrease	68
Total	100

Note: Numbers subject to rounding.

7.3 *Shifting the Burden to Property Tax is Challenging Due To High Home Ownership Shares Throughout the Income Distribution*

A recent survey of OECD countries finds the amount of revenue raised and type of recurrent property tax varies significantly and that property tax can be efficient and progressive but that depends on design (Blöchliger, 2015a). Ireland introduced a recurrent tax on residential property, the Local Property Tax (LPT), in 2013. In 2014, the LPT yielded revenue of approximately €480 million (roughly 0.3 per cent of 2014 nominal GDP), which is low by international comparison (OECD, 2015).[8] The tax is based on self-assessed market values with a rate of 0.18 per cent applied to the mid-point of an applicable valuation band. The first valuation band applies to properties valued below €100,000 with

[8] The 2014 LPT yield estimate is net of the impact of deferrals and exemptions but does not account for the local adjustment factor that was introduced in 2015 and which allows local authorities to vary rates by up to 15 per cent above or below the central rate.

nineteen further bands of €50,000 each up to €1 million (Table 6). The incremental value of a property above €1 million is taxed at a rate of 0.25 per cent. As property ownership is widespread and property values do not rise quickly with income the tax structure is only mildly progressive.

Table 6: *LPT Liabilities for Different Bands*

	Property Band (€)	*Mid-point (€)*	*LPT Liability (€)*
	100,000	50,000	90
100,000	150,000	125,000	225
150,000	200,000	175,000	315
200,000	250,000	225,000	405
250,000	300,000	275,000	495
300,000	350,000	325,000	585
350,000	400,000	375,000	675
400,000	450,000	425,000	765
450,000	500,000	475,000	855
500,000	550,000	525,000	945
550,000	600,000	575,000	1,035
600,000	650,000	625,000	1,125
650,000	700,000	675,000	1,215
700,000	750,000	725,000	1,305
750,000	800,000	775,000	1,395
800,000	850,000	825,000	1,485
850,000	900,000	875,000	1,575
900,000	950,000	925,000	1,665
950,000	1,000,000	975,000	1,755

The share of home ownership across income deciles has important implications for how property taxes can be structured to ensure they are equitable. Overall a high share of Irish households own their own home. According to the *Household Finance and Consumption Survey* (*HFCS*) 70.5 per cent of households own their homes, compared with a euro area average of 60 per cent. Approximately 10 per cent of households own other residential properties (e.g., buy-to-let, holiday homes, etc.).

The share of home ownership is not particularly concentrated amongst higher income groups with a 60 per cent share attributed to the first quintile according to the *HFCS*,[9] dipping slightly in the second quintile and rising in quintiles 3 to 5, (Table 7). While data from the *HFCS* is presented on a gross income basis and is not equivalised, a cross-check of these statistics against the *SILC* data used in the *SWITCH* model which is based on equivalised disposable income, show a similar reported pattern of home ownership (Table 8).

[9] Data from the *HFCS* is reported on a gross income basis and is not equivalised. This contrasts with data from *SILC* and ESRI *SWITCH*, which is reported on an equivalised disposable income basis.

In addition, *HFCS* data shows the median value of the household's main residence does not increase that steeply with income (Table 9). This high home ownership share and relatively flat value distribution throughout the income distribution may pose challenges for structuring a reform that shifts the labour tax burden towards property taxes in a non-regressive manner.[10] Against this, the local property tax is also imposed on rental and holiday homes in Ireland and the *HFCS* data shows that the incidence of ownership of "other real estate property" rises sharply with income.

Table 7: *Household Main Residence (HMR) Ownership Rates and HMR Value as a Percentage of Real and Financial Assets*

Income Quintile	*Percentage Who Own Household Main Residence*	*HMR Per Cent of Real and Financial Assets*
0%-20%	60	62
20%-40%	57	55
40%-60%	68	54
60%-80%	79	48
80%-100%	89	40

Source: Lawless *et al.* (2015).
Note: Data based on the *HFCS* presented on a gross income basis and not equivalised.

Table 8: *Proportion of Households that Own Property (With or Without Mortgage), by Decile*

Bottom	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*Top*
	%	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
63%	51	59	67	68	76	74	87	89	91

Source: Survey on Income and Living Conditions, Central Statistics Office, 2010.[11]
Note: Data presented on a disposable income basis and equivalised.

Table 9: *Median Value of Household Main Residence*

Income Quintile	*0-20%*	*20-39%*	*40-59%*	*60-79%*	*80-100%*
Euros 000s	120	130	150	150	220

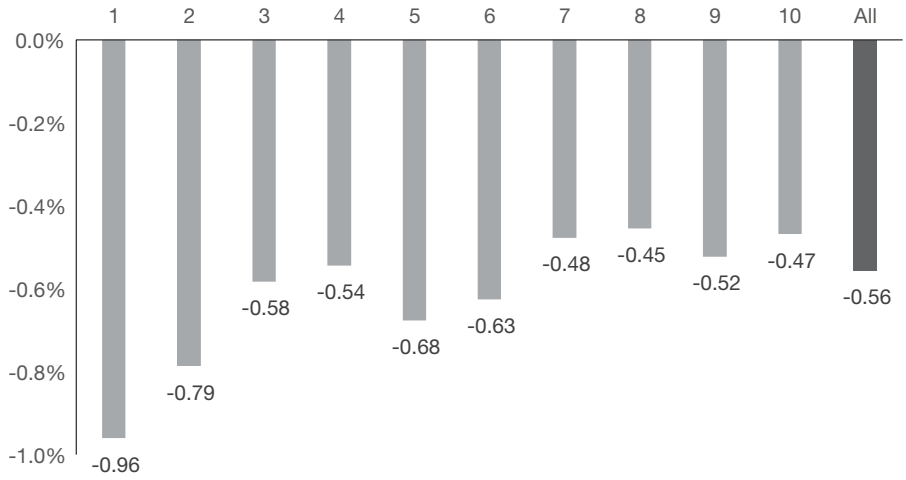
Source: Household Finance and Consumption Survey (2013).
Note: Data presented on a gross income basis and not equivalised.

[10] Consultations with the ESRI *SWITCH* team has suggested a stronger gradient in main residence values in *SILC* than that reported in the *HFCS*.
[11] The authors thank Michael Savage and Tim Callan of the ESRI for providing these statistics from *SILC* 2010.

7.4 *Low Income Groups Could Be Protected Through the Careful Introduction of Income Related Supports, with Revenue Losses Recovered Through a More Progressive Rate Structure*

The proposed USC reforms outlined above were estimated to cost in the range of €450-500 million, which approximately equates to the 2014 LPT yield of €470 million.[12] The simulations are designed to be broadly revenue neutral reforms as the focus of the paper is the fiscal composition holding the fiscal stance roughly constant. In the first instance a "straw-man" reform that doubles the current LPT rate of 0.18 per cent to 0.36 per cent, and which should, a priori, finance the USC reduction, is simulated (Figure 10).

Figure 10: *Simulation 5, Doubling of the Rate of the Local Property Tax, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

The results show that a straight increase (doubling) in the local property tax rate would have a regressive impact, with the largest losses expected to occur in the first decile with losses generally declining as income rises. Overall, an average loss of 0.56 per cent is estimated across the full distribution, which

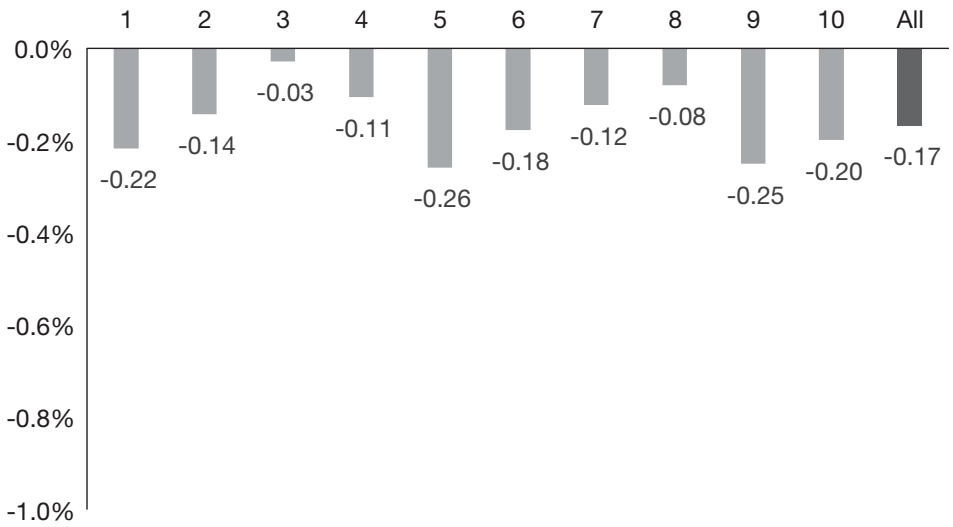
[12] The *SWITCH* model reflects the sensitivity of the LPT system to a number of macroeconomic variables including the stock of property valuations and employment and wage growth. However, as LPT liabilities are currently based on house price valuations in May 2013, house price sensitivities are only with respect to estimates of the 2013 stock rather than changes in house prices since then. Differences between the outturn and assumptions for wage and employment growth would impact on income related waivers/thresholds in the property tax simulations, as well as estimations of the earlier income tax and USC simulations.

is less than the average gains from the USC reforms. It is noteworthy that losses of just under 1 per cent are estimated in the first decile, which would not be compensated for by the USC reform. The results show the distributional effect assuming property owners are paying the taxes. However, some of the LPT may eventually be passed on to renters in higher rents. This is likely to make the taxation change more regressive as higher income households are more likely to own second properties to rent (see Lawless *et al.*, 2015).

An interesting outcome from the simulation is that the lowest losses are observed in decile 8. Deeper analysis shows that while home ownership is high in this decile, property values are relatively low in relation to income. This may partly be explained by equivalisation, which would, *ceteris paribus*, increase the decile position of a young household without children, a household that would be expected to have comparatively lower value properties.

To illustrate the difficulty in shifting the burden to property tax in a manner that protects low income groups, the simulation below shows the distributional impact of doubling the LPT only for properties valued above €300,000 (Figure 11). The results, which are driven by high home ownership rates throughout the income distribution as well as the weak correlation between property values and income, indicates that the impact of this approach does not fit either a regressive or progressive pattern.

Figure 11: *Simulation 6, Doubling LPT on Properties Above €300,000, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

Increasing the rate of LPT on higher value properties does not, on its own, protect low income groups as one might a priori assume. An income related offset would be needed to avoid losses for low income groups but this would be at the expense of complicating the administration of the property tax system as well as having some negative effect on labour supply incentives.

As with all income related supports, poverty traps may arise when an individual's income rises above the threshold for the support in question. A system known as "marginal relief" that tapers the liability to LPT as income progresses above the threshold, could be introduced to avoid these traps.[13] However, such a system has the drawback of introducing a marginal effective tax rate for the beneficiary that, depending on the property value, could have a very long "tail" up the income distribution.

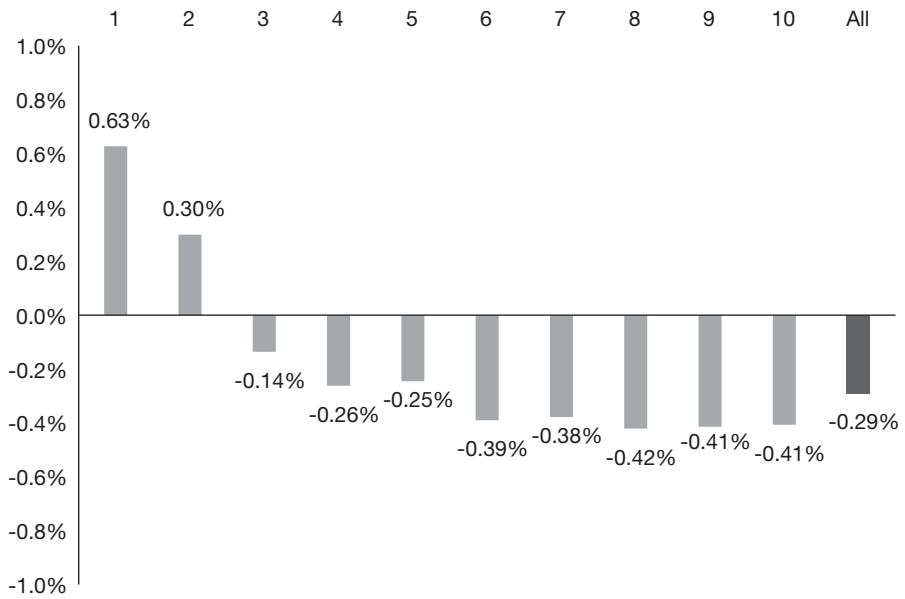
Simulation 7 builds on Simulation 5 by adding an income related support such that those households with equivalised incomes below a threshold of €10,000 pay a capped amount equal to the current minimum charge of €90 (Figure 12). The threshold is itself equivalised and is defined such that for a single adult household a threshold of €10,000 is applied with an increase of €6,660 for each additional person over the age of 14 and an additional €3,330 for each person below 14 years. In this simulation marginal relief is offered at a rate of 5 per cent of the difference between a household's threshold and their income (i.e., the taxpayer is liable for the lower of 0.05*([income – threshold]) or the actual amount of LPT due). It should be noted that such an arrangement would introduce a degree of complexity into the administration of the local property tax.

Simulation 7 shows a progressive shape to the LPT reform (Figure 12). However, the revenue gain is almost halved compared to the reform without income supports. The cost would be in the region of €200-€250 million. This implies that a progressive change in LPT will have to generate the bulk of revenue needed for the reform from higher deciles and would require significantly higher rates.

Table 10 below shows the change in Marginal Effective Tax Rate (METR) for the population from Simulation 7. As can be seen, over 100,000 people experience an increase in their METR (the sum of the totals of "from 0.5 per

[13] The approach to marginal relief in *SWITCH* is to apply a payment equal to the lower amount of either (a) the actual amount of property tax due or (b) a rate of marginal relief times the difference between the person's income and the income threshold for the income related support (i.e., MR rate*[income – threshold]). For example consider a person with income of €12,000 that owns a property valued in the €150,000 to €200,000 band, with an associated LPT liability of €315 as per Table 4 above. With a marginal relief rate of 5 per cent this person's LPT liability would be the lower amount of either (a) the actual LPT liability of €315, or (b) 0.05 * (12,000 – 10,000) which equals €100.

Figure 12: *Simulation 7, Double LPT Rate with Income Related Supports, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

cent to 2 per cent" and "from 2 per cent to 5 per cent"), while 1.48 million experience no change in their METR.

The increases in the METR in Table 10 relate to the introduction of the system of marginal relief. While a system of marginal relief does avoid a step-effect poverty trap by phasing in a household's full LPT liability, the benefit of marginal relief is, by definition, withdrawn as income rises thus giving rise to a METR equal to the rate of marginal relief. Indeed, the higher the rate of marginal relief is, the more rapidly a household becomes liable to pay their full LPT liability, thus illustrating the trade-off between labour supply incentives and low income supports inherent in a system of marginal relief.

The number experiencing an increase in their METR can be lowered by increasing the rate of marginal relief from 5 per cent.[14] In the final property tax simulation, specified below, a marginal relief rate of 20 per cent is used.

Given the foregoing analysis, the final property tax simulation, which targets a revenue yield close to the estimated €450 million-€500 million cost associated with the simulated USC changes, introduces a non-linear rate structure, with higher rates on higher value properties, so as to offset losses

[14] For an explanation of marginal relief, see second paragraph page 172.

Table 10: *Number of Persons Experiencing a Change in Marginal Effective Tax Rate as a Result of Simulation 7 by Original Marginal Effective Tax Rate*

Change in METR	*From –2% to –0.5%*	*From –0.5% to 0.5%*	*From 0.5% to 2%*	*From 2% to 5%*	*From 5% to 10%*	*Total*
Original METR						
Less than 20%	**	194,793	**	16,565	**	219,976
From 20 to 30%	**	198,614	**	26,487	**	230,416
From 30% to 40%	**	439,523	12,970	25,282	**	477,775
From 40% to 50%	**	209,554	**	20,368	**	234,938
From 50% to 60%	**	536,400	**	18,644	**	557,756
From 60% to 70%	**	30,882	13,396	**	**	50,234
From 70% to 80%	**	13,985	**	**	**	16,634
From 80% to 90%	**	20,353	**	**	**	27,185
From 90% to 100%	**	19,319	**	**	**	20,420
Greater than 100%	**	42,943	**	**	**	48,104
Total	3,590	1,706,366	54,432	115,825	3,224	1,883,438

Note: Data for cells with low entries have been removed for data confidentiality reasons.

from the income related reliefs from higher value properties (Table 10). The overall revenue yield is estimated at €400-€450 million which would generate a broadly revenue neutral tax shift if introduced with the USC changes. The rate structure modelled is as follows:

- A capped payment of €100 up to an equivalised income related threshold of €10,000 and marginal relief at 20 per cent thereafter;
- 0.2 per cent LPT rate for properties with valuation less than 200,000;
- 0.4 per cent for properties valued between 200,00 and 400,000;
- 0.65 per cent from 400,000 to 600,000;
- 0.85 per cent from 600,000 to 800,000;
- 1 per cent from 800,000 to 1 million; and,
- 1.25 per cent on the incremental property value above 1 million.

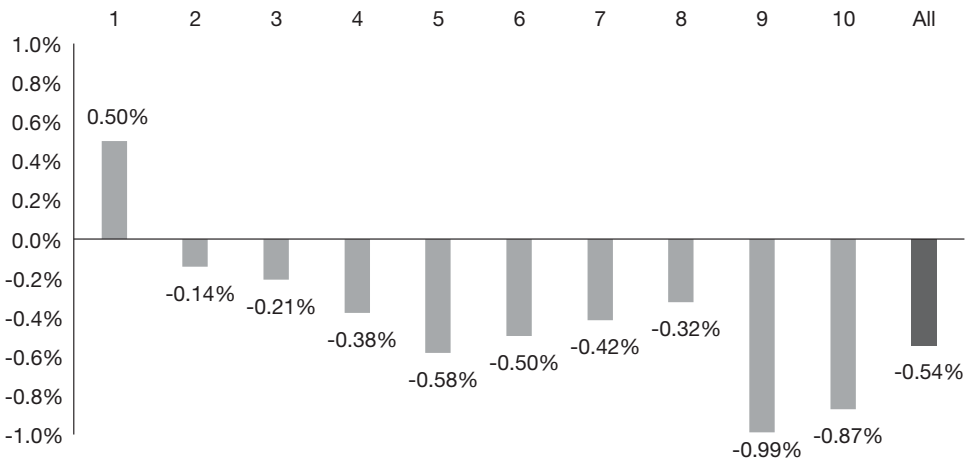
The distributional impact is broadly progressive, with the largest losses incurred for the highest income groups (deciles 9 and 10), and a pattern of losses that increase with income in deciles 2 to 5, declining losses in deciles 6 to 8, and gains in decile 1 (Figure 13).

Looking closer at the pattern of losses, the decline in losses in deciles 6 to 8 is consistent with the pattern in Simulation 5, which doubled the LPT rate for all properties and is driven by the breakdown in correlation between income and property value in these deciles. The gains in decile 1 relate to the

Table 11: *Proposed LPT Liabilities*

	Property Band (€)	*Mid-point* (€)	*Rate* %	*LPT Liability* (€)
	100,000	50,000	0.20	100
100,000	150,000	125,000	0.20	250
150,000	200,000	175,000	0.20	350
200,000	250,000	225,000	0.40	900
250,000	300,000	275,000	0.40	1,100
300,000	350,000	325,000	0.40	1,300
350,000	400,000	375,000	0.40	1,500
400,000	450,000	425,000	0.65	2,763
450,000	500,000	475,000	0.65	3,088
500,000	550,000	525,000	0.65	3,413
550,000	600,000	575,000	0.65	3,738
600,000	650,000	625,000	0.85	5,313
650,000	700,000	675,000	0.85	5,738
700,000	750,000	725,000	0.85	6,163
750,000	800,000	775,000	0.85	6,588
800,000	850,000	825,000	1.00	8,250
850,000	900,000	875,000	1.00	8,750
900,000	950,000	925,000	1.00	9,250
950,000	1,000,000	975,000	1.00	9,750

Figure 13: *Simulation 8, Proposed Non-linear LPT Rate Structure, Percentage Change in Equivalised Disposable Income*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

introduction of the capped payment of €100, with some of these benefits as well as the marginal relief minimising losses for neighbouring deciles.

7.4 *A Carefully Designed Shift from USC to Property Tax Can Reduce Marginal and Average Effective Rates, Boost Economic Output and Employment, and Do So in a Manner that is Not Regressive*

The overall macroeconomic and distributional impacts of an approximate €500 million revenue neutral shift from USC to property taxes are described below. This shift results in a top marginal rate of less than 50 per cent for all taxpayers with income below €70,000, with a lower average effective tax rate for all payers regardless of income.

The macroeconomic gains are based on the results from the *HERMES* model described in O'Connor (2013), and summarised in Box 2 below, which were based on a €1 billion shift. The *HERMES* model results are linear and so results can be scaled to a lower reform. The results are based on the medium-term impact and so relate to the year 5 impact of the reform with year 1 representing the year that reform is introduced. When scaled to a €500 million reform, the results suggest a permanent increase in employment in year 5 of 0.22 per cent, representing an additional 4,600 jobs relative to the Department of Finance (2015) baseline forecast (Table 12).[15]

Table 12: *Macroeconomic Impacts of €500 Million Shift from USC to Property Tax*

Amount	*Employment Change (%)*	*Employment (000s)*	*Jobs Impact*
€1bn	0.43	2,131	9,200
€0.5bn	0.22	2,131	4,600

Source: O'Connor (2013) based on ESRI *HERMES* model, and Budget 2016.

The distributional impact, which combines the USC reform in Simulation 4 and the LPT reform in Simulation 8, is shown in Simulation 9 below on a decile. Overall, the reform is estimated to give rise to an average increase of 0.1 per cent in weekly equivalised household disposable income.

The impacts in deciles 2 to 6 and deciles 9 and 10 are very slightly negative, with gains of 0.5 per cent of disposable income estimated in deciles 1 and 8. The gain in the first decile is due to the introduction of an income related LPT payment, while the gains in decile 8 are slightly more complex and are due to the low asset values, relative to income, which result in a relatively low increase in LPT compared with the USC gain.

[15] Budget 2016, Department of Finance, October 2015.

Box 2: *Description of HERMES Model and "Tax-Shift' Simulations*

The *HERMES* model was first estimated in the 1980s and is described in Bergin *et al*. (2013). The model is based on a detailed empirical literature on the behaviour of the Irish economy. In respect of a "tax shift' the key features of the Irish economy relate to why the incidence of taxation differs between direct, indirect and property taxes.

As described in Bergin *et al*. (2013), *HERMES* models the wage setting mechanism as a bargaining process between firms and workers over the real after tax wage. Irish manufacturing output prices are assumed to be determined primarily in the world market place and as such cannot easily be altered to respond to Irish cost conditions. In other words, Irish firms trading internationally tend to be price takers. Labour supply is assumed to be elastic and labour demand relatively inelastic such that in the medium term the incidence of labour taxation falls mainly on employers rather than employees. Thus, as Irish exporters are assumed to not have the ability to pass on higher input costs on the world market, the medium term impact of higher labour taxes is a loss of competitiveness for Irish firms with a consequent fall in output and employment. The opposite effect occurs in the medium term from a reduction in labour taxes.

While economic theory suggests that in the medium term the impact of an increase in indirect taxes for workers is equivalent to an increase in direct taxes, indirect taxes affect a wider population, such that in the *HERMES* model some of the incidence of indirect taxation falls on the household sector with a lower consequent impact on employment and competitiveness. As regards property taxes, the incidence is assumed to fall entirely on the household sector and does not affect competitiveness.

The results presented in O'Connor (2013) were based on a €1 billion increase in revenue from property taxes offset by a cut in income tax sufficient to keep the general government balance unchanged relative to baseline. The *HERMES* results are broadly symmetric and linear and, within plausible bounds, can be scaled up or down to reflect a greater or lesser shift than that modelled. The results herein are scaled to represent a €500 million "shift" in the tax burden.

Source: Description of results from O'Connor (2013).

However, while the reform is distributionally neutral across the decile and quintile distribution, it is important to note that within these deciles there would be winners and losers depending on individual household circumstances.

The revenue projections within the *SWITCH* model indicate that the USC costs €60-70 million (0.03 per cent-0.04 per cent of 2014 nominal GDP) more

than the LPT reforms gains. Although not perfectly revenue neutral, the reform is, in practical terms, close to neutrality relative to the government's overall spending and the economy. In addition, although finely calibrated and based on the best available micro data on Irish households, the simulations do not account for possible positive behavioural effects that could result in revenue gains. The simulations also do not account for any costs of providing income support to low-income renting households should LPT increases be partially passed on in rents. Both of these factors would affect the exact calibration of the LPT rates required to ensure a revenue neutral tax shift for a given cut in USC but not the fundamental policy design.

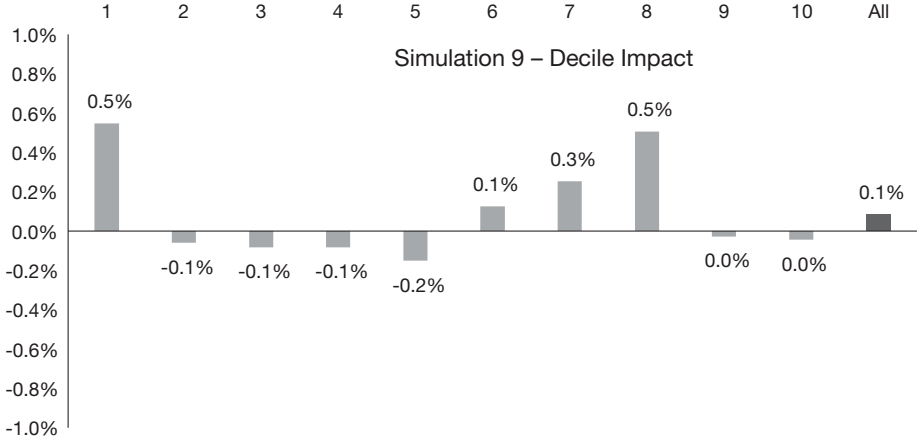
As a result of the simulation, 67 per cent of persons (employees and self-employed) experience a decrease in their METR with no change in METR for a further 31 per cent (Table 13). Only 2 per cent face an increased METR from the simulation which arises due to the system of marginal relief.

Table 13: *Change in METR*

	%
Increase	2
No Change	31
Decrease	67
Total	100

Source: ESRI *SWITCH* model.

Figure 14: *Simulation 9, Overall Impact of USC-LPT Reform, Percentage Change in Equivalised Disposable Income, Decile and Quintile Impact*



Source: Authors' analysis using *SWITCH*, the ESRI tax-benefit model.

VIII CONCLUSIONS

Overall, the illustrated shift from labour to property tax is pro-growth and pro-employment, without the equity losses that often arise with some growth enhancing tax reforms. It therefore suggests that growth enhancing tax reforms can be inclusive. There are some trade-offs though. The introduction of the property tax with a capped payment and marginal relief for low income property owning households does mean that some (but importantly not all) of the benefits of higher incentives to work from lower labour taxation are lost. In practice, some compensation may also need to be provided to low-income renting households as well if the increase in the LPT was partially passed on to them. It is also a relatively complex change, which would complicate the relatively simple nature of the existing property tax system and possibly increase administrative and compliance costs moderately. Survey evidence suggests that, on average, property taxes are somewhat more expensive to collect than taxes on average (1.35 per cent of tax revenues versus around 1 per cent) but that the collection costs can be as low as 0.13 per cent (Slack and Bird, 2014; OECD, 2015a).

BIBLIOGRAPHY

ACOSTA-ORMAECHEA, S. and J. YOO, 2012. "Tax Composition and Growth: A Broad Cross-Country Perspective", IMF Working Paper, WP/12/257.

AFONSO, A. and J. TOVAR JALLES, 2014. "Fiscal Composition and Long-term Growth", *Applied Economics*, Vol. 46, pp. 349-358.

ARNOLD, J. M., B. BRYS, C. HEADY, A. JOHANSSON, C. SCHWELLNUS and L. VARTIA, 2011. "Tax Policy for Economic Growth", *The Economic Journal*, Vol. 121, pp. F59-80.

BERGIN A., T. CONEFREY, J. FITZGERALD, I. KEARNEY and N. ŽNUDERL, 2013. "The *HERMES*-13 Macroeconomic Model of the Irish Economy", ESRI Working Paper No. 460, July, Dublin: The Economic and Social Research Institute.

BLÖCHLIGER, H. et al., 2015. "The Stabilisation Properties of Immovable Property Taxation: Evidence from OECD Countries", OECD Economics Department Working Papers, No. 1237, Paris: OECD Publishing.

BLÖCHLIGER, H., B. ÉGERT, B. ALVAREZ and A. PACIOREK 2015a. "Reforming the Tax on Immovable Property: Taking Care of the Unloved", OECD Economics Department Working Papers, No. 1205, Paris: OECD Publishing.

CAUSA, O., 2008. "Explaining Differences in Hours Worked Among OECD Countries: An Empirical Analysis", OECD Economics Department Working Papers, No. 596.

COLLINS, M, 2015. *Earnings and Low Pay in Ireland: A Profile and Some Policy Issues*, Nevin Economic Research Institute

HECKMAN, J. T., L. LOCHNER and C. TABER, 1998. "Tax Policy and Human Capital Formation", *American Economic Review*, Vol. 88, No. 2, Papers and Proceedings, pp. 293-297.

HOUSEHOLD FINANCE AND CONSUMPTION SURVEY, 2013. January 2015, Central Statistics Office, Ireland.

JOHANSSON A., C. HEADY, J. ARNOLD, B. BRYS and L. VARTIA, 2008. "Taxation and Economic Growth", OECD Economics Department Working Papers, No. 620, Paris: OECD Publishing.

KENNEDY, S., Y. JIN and D. HAUGH, 2015. "Taxes, Income and Economic Mobility in Ireland: New Evidence from Tax Records Data", OECD Economics Department Working Papers, No. 1269, Paris: OECD Publishing.

LAWLESS, M., R. LYDON, T. MCINDOE-CALDER, 2015. *The Financial Position of Irish Households*, Dublin: Central Bank of Ireland.

O'CONNOR, B., 2013. "The Structure of Ireland's Tax System and Options for Growth Enhancing Reform", *The Economic and Social Review*, Vol. 44, pp. 511-540.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, 2010. "Tax Policy Reform and Economic Growth", *OECD Tax Policy Studies*, Paris: OECD Publishing.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, 2015. *OECD Economic Survey of Ireland*, Paris: OECD Publishing.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, 2015a. *Tax Administration 2015*, Paris: OECD Publishing.

OLIVEIRA MARTINS, J., R. BOARINI, H. STRAUSS, C. DE LA MAISONNEUVE and C. SAADI, 2007. "The Policy Determinants of Investment in Tertiary Education", OECD Economics Department Working Papers, No. 576, Paris: OECD Publishing.

PATUROT, D., K. MELLBYE and B. BRYS, 2013. "Average Personal Income Tax Rate and Tax Wedge Progression in OECD Countries", OECD Taxation Working Papers, No. 15.

SLACK, E. and R. BIRD, 2014. "The Political Economy of Property Tax Reform", OECD Working Papers on Fiscal Federalism, No. 18, Paris: OECD Publishing.

XING, J., 2011. "Does Tax Structure Affect Economic Growth? Empirical Evidence from OECD Countries", Working Paper 11/20,Centre for Business Taxation, Saïd Business School, University of Oxford.

XING. J.,2012. "Tax structure and Growth: How Robust is the Empirical Evidence?", *Economics Letters*, Vol. 117, pp. 379-382.