QUANTIFICATION OF THE ECONOMIC IMPACTS OF SELECTED STRUCTURAL REFORMS IN IRELAND

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Abstract

The importance of structural reforms for medium term economic growth has been identified in the Government's Medium Term Economic Strategy ("the MTES"), the EU 2020 Strategy for Growth and Jobs and recent publications associated with the European Semester process. Economic reforms are necessary in "close-to-frontier" economies that are dependent on productivity gains in driving medium term growth. Broadly speaking, structural reforms include labour market reforms (for example training the long-term unemployed or changes to wage-setting mechanisms to promote flexibility) and product market reforms (e.g., to facilitate competition or ease regulatory burdens).

This staff working paper follows on from the MTES by outlining a range of possible reforms in the areas of tax policy, access to finance, competition policy, wage competitiveness, labour market activation and human capital. Using the ESRI HERMES model the authors estimate that that this suite of reforms could result in a permanent increase of 1.3 per cent in the level of GDP by 2020 relative to the baseline forecast set out in the SPU in April. The reforms would also add 26,000 jobs relative to baseline forecasts.

The authors also identify the macroeconomic impacts of certain policy choices or adverse developments which include weakened product market competition, losses in competitiveness or higher costs of credit to the domestic sector of the economy. It is estimated that these scenarios would reduce GDP by just over 1 per cent and lead to 23,000 fewer jobs relative to baseline by 2020.

It has to be acknowledged that the overall upsides are not in the nature of "game-changers" which reflects the already flexible nature of the Irish economy and the impact of previous reform efforts. However it should also be noted that the selected reforms complement modelling work conducted by the European Commission in the areas of benefit reform, female labour force participation and research and development. The combined impacts of this paper and research by others is to show the significant potential gains to output and employment from a wide-ranging package of structural reforms.

The authors, Niamh Callaghan, David Hegarty, Terence Hynes, Matt McGann, Brendan O'Connor[1] and Laura Weymes are economists in the Departments of Finance and Public Expenditure and Reform and are members of the Irish Government Economic and Evaluation Service ("IGEES"). The analysis and views set out in this paper are those of the authors only and do not necessarily reflect the views of the Ministers for Finance or the Minister for Public Expenditure and Reform or of their Departments.

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[1] Comments on this working paper may be submitted by email to Brendan O'Connor at brendan.oconnor@finance.gov.ie

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# 1.	Introduction, Background and Approach

## 1.1	Background and description

The Government's Medium-Term Economic Strategy (MTES) for the period 2014-2020, published in December 2013, highlighted the importance of structural reforms in improving the growth potential of the economy. The MTES referred to a number of areas where appropriate reforms could contribute to the achievement of higher rates of growth and employment over the medium term relative to the baseline projection set out in the MTES.

In the MTES, a 'high-growth' scenario was modelled for the purposes of capturing the macroeconomic impact of a range of structural reforms. The modelling work, which made use of the ESRI HERMES macroeconomic model,[2] suggested that if a suite of policy reforms in the areas of labour market activation, banking and finance, human capital and tax policy were successfully implemented, the level of output in the economy could be some 1 per cent higher by 2020 compared with a baseline projection. This technical paper provides more detail on the modelling work undertaken and the results for the various reforms considered. A hypothetical "harmful policy" scenario is also described in this paper. This has been included to illustrate the potential impacts of harmful policies or adverse developments in the areas of competition policy, wage competitiveness and the cost of capital that could, in certain circumstances, act as a drag on growth. While it is not expected that policy makers will adopt or countenance such policy approaches, their inclusion here serves to demonstrate the potential economic costs of policy choices.

This technical paper discusses the following:

- The role of structural reforms in boosting economic growth and living standards;

- The rationale for the selected reform areas;

- The channels through which the various reforms would impact on the economy;

- The macroeconomic results from a series of reform simulations in the selected areas; and,

- The aggregate impact of the various reforms.

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[2] Following a competitive tender, the Economic and Social Research Institute was appointed to work with the Department of Finance in modelling the supply side macroeconomic impacts of structural reforms.

The reform areas considered here are not exhaustive. For example, work undertaken by the European Commission has modelled other reforms, including in the areas of female labour force participation and benefit replacement rates. Whilst the Commission's work relies on a different model, the work suggests additional economic gains beyond those emanating from the areas considered in this paper.[3]

Approach

The authors are economists in the Departments of Finance and Public Expenditure and Reform ("the Departments") and are members of the Irish Government Economic and Evaluation Service ("IGEES"). The actual simulations were carried out using the HERMES model by researchers at the Economic and Social Research Institute (ESRI) under contract to the Department of Finance. The work in developing the structural reforms and modelling their impacts involved a number of stages.

- In the first instance, potential reform areas were identified by the authors based on a review of the international economic literature and a series of internal technical discussions;

- Next, the microeconomic evidence base for each of the identified reform areas was discussed with research experts from the ESRI;

- Where an empirical case appeared to exist based on micro analysis, the analysis moved towards an assessment of the likely macroeconomic impacts of the reforms and how these could be captured within the model;

- Where a material macroeconomic impact was considered likely, the impacts of the proposed reform were modelled by the ESRI; and

- Finally, the aggregate impact of a suite of reforms was imposed on the Department of Finance's baseline macroeconomic projections (as published in *Ireland's Stability Programme, April 2014 Update*).

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[3] The Growth Impact of Structural Reforms', European Commission, 2013, Quarterly Report on the Euro Area

2.   The Role of Structural Reforms in Enhancing Medium-Term Growth

2.1   Overview: The Medium-Term Economic Strategy

In the Medium-Term Economic Strategy published in December 2013, the Government committed to a strategy of "export-led growth", based on three pillars:

- Ensuring debt sustainability;

- Financing growth; and

- Supporting employment and living standards.

In respect of supporting employment and living standards, the MTES acknowledged the role of structural reforms in terms of enhancing growth. The MTES recognised that, in the medium to long term, growth in Ireland depends on improving productivity, which, in turn, depends on investment in people, and boosting competition and innovation. To this end, the MTES committed to the identification and removal of barriers to growth in key sectors of the economy; to opening up sheltered sectors of the economy to competition and investment; to enhancing the capacity of Ireland's workforce through investment in education and training; and to measures to support people to set up business or move between jobs and sectors as the economy grows.

The MTES set out a baseline macro-economic scenario based on Budget 2014 projections out to 2016. Output was subsequently profiled to grow by an average of 3.4 per cent per annum out to 2020. This projection was consistent with estimates of the supply-side potential of the economy and was informed by certain underlying assumptions regarding world demand and continued improvement in cost competitiveness to support Ireland's share of global export markets. It also assumed continued broad policy stability at both domestic and international levels.

In the MTES, a 'high growth' scenario was modelled to capture the economic impact of determined implementation of a range of appropriate domestic policies. The achievement of this outcome was dependent on the implementation of reforms in the areas of labour market activation, competition policy, banking and finance, human capital and tax policy. The modelling work suggested that if a suite of such policies was successfully implemented, output levels could be raised by 1 per cent by 2020 relative to baseline. This corresponds to a 1.1 percentage point increase in GDP per capita by 2020.

2.2 Importance of Structural Reforms in Raising Growth Potential

EU policy context

The pursuit of policies to foster economic growth and job creation is a key focus of the EU 2020 Strategy for Growth and Jobs (and, as discussed above, of the Medium-Term Economic Strategy). Both of these strategies recognise the role that structural reforms can play in raising the productive capacity of the economy or 'potential output'. As part of the EU 2020 process, each Member State must submit a National Reform Programme in April of each year, setting out the measures it is taking to increase the growth potential of its economy. While recognising the difficulties inherent in the process, the European Commission encourages Member States to estimate or quantify the potential impact of these reforms.

Growth framework

The supply side of the economy can be thought about in terms of a production function framework based on the foundational work of Solow (1956) and others. In this framework, potential output is a function of three factors: labour supply, the capital stock, and a third factor, generally referred to as "total factor productivity" (TFP) or "technical progress". Thus, increases in the level of the capital stock (e.g., through higher investment) or in the supply of labour can expand the supply potential of the economy. However, for mature or "close-to-frontier" economies, the potential contribution to growth from these sources is declining as additional capital investment is affected by diminishing returns and labour supply runs up against demographic constraints. For these reasons, most economists emphasise the importance of improvements in TFP or productivity levels to enhance long-term growth potential.

Increasing productivity is about getting more from available resources of capital and labour. Productivity measures how efficiently these inputs are used to produce output. The key to improving productivity is through innovation - creating higher value products and finding better, more efficient ways of doing things. Innovation is therefore regarded as a key driver of growth, particularly in advanced economies such as Ireland.

The role of policy

The growth potential of any economy is not fixed. Public policy has a role to play in boosting the capacity of an economy. Whilst there is no single policy measure that can on its own improve economy-wide productivity, a range of policies can influence productivity on an incremental basis. It is important to note that whilst the impacts of individual reforms may be marginal, the aggregate impact of a suite of reforms, as illustrated later in this paper, can have a significant impact on growth potential.

Typical policy drivers that interact to underpin long-term productivity performance include investment, innovation, human capital and competition. Underpinning these are framework conditions that economists view as necessary for economic growth: low and stable inflation; developed financial markets; fiscal stability; a low tax burden; and a low share of distortionary taxes.[4] These conditions are the focus of the growth strategy set out in the MTES.

Structural reforms: definition and rationale

Broadly speaking, structural reforms include labour market reforms (for example training the long-term unemployed, changes to wage-setting mechanisms to promote flexibility and reforms to labour taxation to improve financial incentives to work) and product market reforms (e.g., to facilitate competition or ease regulatory burdens) as well as policies aimed at boosting investment in education, R&D and innovation.

Thus, in an Irish context, it is important to identify the scope for microeconomic reforms that could boost the growth potential of the economy. OECD work suggests that the potential gains from further structural reforms in Ireland are lower than for other OECD member countries, reflecting the success of previous reform efforts and the relative openness and flexibility of the Irish economy.[5] This does not, however, detract from the rationale for the implementation of such measures in Ireland. For an economy close to the technological frontier, productivity gains can raise living standards while maintaining competitiveness and can also play an important role in improving the economy's ability to withstand future shocks. In addition, stronger economic growth would accelerate the on-going repair of the fiscal position, in particular supporting a faster reduction in levels of public debt.

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[4] *"Lifting productivity: lessons from the OECD",* speech by Angel Gurría, OECD Secretary-General, to the Chamber of Commerce of New Zealand, 29 July 2008. See www.oecd.org/social/labour/liftingproductivitylessonsfromtheoecd.htm
[5] Bouis, R. and R. Duval (2011), "Raising Potential Growth after the Crisis: A Quantitative Assessment of the Potential Gains from Various Structural Reforms in the OECD Area and Beyond", OECD Economics Department Working Papers, No. 835, OECD Publishing.

Modelling structural reform

The structural reform areas considered here are:

- Tax policy reform;

- Labour activation;

- Human capital improvements;

- Financial sector reform;

- Competition policy;

- Competitiveness; and,

- Infrastructure investment.

To quantify the impacts of reforms, or policy shocks, a macro-simulation model is needed. The ESRI HERMES model is used for this purpose. This modelling exercise is not intended to set out the detail of proposed policy reforms, but rather to estimate the potential economic benefits of such policies, taking account of the impact across the economy as a whole through the use of the model.

Recent work by the European Commission using a version of its dynamic stochastic general equilibrium (DSGE) model QUEST,[6] has shown large potential gains for Ireland, and other Member States, from structural reforms. Some of the reform areas overlap with those examined in this paper including in areas such as human capital and tax policy reform. However, other reforms including a number relating to female labour force participation, benefits and pension reform and R&D incentives are not examined here. Of course, care should be exercised in comparing the results of different modelling exercises given variation in both the details of the reforms and the models used for the purpose. [7]

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[6] European Commission (2013)

[7] The 'size' of the reforms in the European Commission (2013) paper was based on a reduction of a half in the 'gap' between the member states concerned and the average of three best performing member states based on a structural indicator. For Ireland there is a large gap with the highest ranking members states in the area of female labour force participation and therefore a large reform was modelled in that regard. The larger the size of the reform, ceteris paribus, the greater the macroeconomic impact.

2.3   Key Features of HERMES Macroeconomic Model

HERMES is a large-scale supply-side 'structural' model of the Irish economy that was first developed in the 1980s. The specification of the HERMES model is built on the standard neo-classical assumptions that firms attempt to minimise their cost of production or maximise their profits and that households attempt to maximise their utility. This optimising behaviour is built into the basic specification of the model. Over the years the model has been expanded and adapted to reflect changes in the structure of the Irish economy.

The model distinguishes between the sectors of the economy that are exposed to the competitive world trading environment (the internationally traded sector) and those sectors that are sheltered from direct exposure to international competition (the non-traded sector). The traded sector consists of manufacturing, agriculture, and an element of market services (e.g., financial and business services, software, tourism, etc.). The non-traded sectors comprise the rest of the economy (i.e., utilities, building, most of market services and all public or non-market services). In all, there are three manufacturing sectors, three market services sectors and five other sectors, namely building and construction, utilities, agriculture, public administration and health and education. The workings of the model are discussed in detail in Bergin et al (2013).[8]

In HERMES, wages are modelled as the outcome of a bargaining process between workers and employers. Employees are assumed to "negotiate" in terms of their real after-tax wage; in other words workers look to be compensated for increases in prices or labour taxation. Labour supply is estimated to be highly elastic but labour demand relatively inelastic, based on empirical research on the Irish labour market. The implication of these elasticity parameters is that the long-run incidence of taxes on labour will fall predominantly on the employer rather than on the employees. In other words higher labour taxes eventually result in higher nominal wages than would otherwise be the case.[9]

To consider the impact on the economy of changes in policy, the shocks were introduced individually to the model, holding all other exogenous variables unchanged at their baseline

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[8] 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: Economic and Social Research Institute
[9] Whilst recent experience may not provide evidence at an aggregate level of higher nominal wages in response to higher marginal and average effective tax rates, it is very difficult to define a counterfactual wage level that would have arisen in the absence of higher taxation. A plausible theory is that higher income taxation may have contributed towards nominal rigidities, such that an appropriate counterfactual might be lower aggregate wage levels in the absence of higher taxation during the crisis period.

levels and letting endogenous variables respond appropriately.[10] The resulting simulation results are then compared to the baseline thereby isolating the effect of a change in a relevant variable (e.g. GDP, employment).

2.4 Limitations of Structural Reform Modelling

Before examining the individual reform proposals, it is important to acknowledge the inherent difficulties in the process of trying to quantify the impact of such measures. In particular, the model-based evaluation of structural reforms presents an input assessment problem. The mapping of specific policy interventions within the structure of the model may not always be obvious, requiring the use of microeconomic evidence and theory, but also a degree of judgement. In other words, the model may not always offer a direct 'lever' to simulate the effect of a proposed reform and, in such circumstances, it may be necessary to use a proxy to mimic the anticipated effect of the measure. This process involves assessing how the reform is assumed to impact upon exogenous variables (and possibly parameter values) in the model and determining a quantitative indicator of the impact, preferably through microeconomic or historical evidence. This at times involves applying a degree of judgement.

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[10] Exogenous variables are variables determined outside of the model, for example world demand or the euro-dollar exchange rate, whereas endogenous variables are those that are determined within the model such as GDP, employment or fiscal aggregates.

3.   Modelling Potential Structural Reforms

3.1   Introduction

The potential macroeconomic impact of the following reforms simulated using the HERMES macroeconomic model are discussed in this chapter:

- Revenue neutral shift from labour to property taxation;

- Alternative taxation approaches to meeting greenhouse gas emissions compliance costs;

- Reductions in the domestic cost of capital;

- Improvements in the employability of the long-term unemployed through labour market activation policies;

- Improvements in levels of human capital;

- The costs (benefits) of a reduction (improvement) in competition in a key non-traded sector of the economy;

- A loss in competitiveness resulting from increases in labour costs (and not offset through improvements in productivity); and,

- Increased investment in transport infrastructure to address capacity constraints that might emerge as a consequence of faster than expected economic growth; and,

The marginal macroeconomic impact of these various structural reform initiatives are shown in this paper relative to the Departments latest macroeconomic forecasts for 2014 to 2018 as published in the April 2014 Stability Programme Update.[11] Post-2018, real output is assumed to grow by 3 per cent per annum, alongside continued employment growth of 2 per cent per annum.

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[11] This is distinct from the growth scenarios shown in the MTES which were applied to the Budget 2014 forecasts.

3.2 Tax Shifts: shift from income tax to property tax

Outline of measure

An important principle in taxation policy is to minimise the distortions that inevitably result from the effects of taxation on the economic decisions of individuals and firms. Building on this desideratum, the economics literature and empirical work by the OECD suggests a tax and economic growth hierarchy where the main forms of taxation are ranked on the basis of their economic growth impacts. On this basis, recurrent taxes on immovable property are ranked as the least distortive tax instrument in terms of reducing long-run GDP per capita, followed by consumption taxes, then other property taxes and environmentally-related taxes, with personal income taxes and corporate income taxes regarded as the most harmful.

Research by the OECD suggests that that there could be gains in terms of long-run GDP per capita from increasing the use of consumption and property taxes relative to income tax without changing the overall level of tax revenues.[12] For this reason, a revenue neutral shift from labour taxation towards consumption or property taxes has been advocated by the OECD and by the European Commission.[13] The measure considered here involves a €1 billion revenue neutral shift from income tax to property taxes such that there is no change in the general government deficit. This was described and modelled in detail in O'Connor (2013) along with a similar shift from income tax to VAT.[14] It has also been modelled for Ireland using the QUEST III model by the European Commission (2013).[15]

Channel through which the measure takes effect

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 are price-takers. As outlined earlier, in the long run the incidence of labour taxation falls mainly on employers rather than employees; in other words higher labour taxes are assumed to eventually lead to higher nominal wages.[16] As Irish exporters do not have the ability to pass on higher input costs the medium-term impact of

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[12] Organisation for Economic Cooperation and Development (OECD), 2010. Tax Policy Reform and Economic Growth, OECD Tax Policy Studies, OECD Publishing
[13] European Commission,2013. Tax Reforms in EU Member States, Tax Policy Challenges for Economic Growth and Fiscal Sustainability, 2013 Report.
[14] O'Connor B., 2013. "The Structure of Ireland's Tax System and Options for Growth Enhancing Reform", The Economic and Social Review, Vol. 44, No 4, Winter 2013, pp. 511-540.
[15] The results of the QUEST III simulations are reported in O'Connor (2013).
[16] See footnote 9.

higher labour taxes is a loss of competitiveness with a consequent fall in output and employment.

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 some of the incidence 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.

Summary of results

The results presented below simulate a €1 billion increase in revenue from property taxes offset by a cut in income tax sufficient to keep the general government deficit 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[17].

Because property tax has a less distortive impact than income tax on the labour market, the net effect of the change is to raise output and reduce the unemployment rate. The results indicate that real GDP would be 0.3 per cent higher than the no-policy change baseline after six years, with employment 0.4 per cent higher and unemployment 0.5 per cent lower.

Table 1: Output and employment impact of €1bn revenue neutral shift from labour taxation to property taxation

	2014	2015*	2016*	2017	2018	2019	2020
Real GDP levels (pp)	0.00	0.16	0.26	0.32	0.32	0.29	0.26
Unemployment rate (pp)	0.03	-0.05	-0.14	-0.34	-0.44	-0.46	-0.48
Employment levels (pp)	0.00	0.08	0.25	0.39	0.44	0.41	0.38
Nominal GDP levels (pp)	0.0	0.2	0.1	0.1	0.0	0.0	-0.1

Source: O'Connor (2013) from ESRI HERMES macroeconomic model

*Note: For modelling purposes and to ensure consistency in the timeframe over which are results are shown for the various reforms, the property tax shift is assumed to occur in 2014. However, it should be noted that the authors are fully cognisant of the commitment by the Minister for Finance, on behalf of the Government, that there will be no increase in the Local Property Tax (LPT) until 2016 at the earliest.

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[17] A €1 billion increase in property taxation would represent a substantial policy shock relative to existing estimates of a full year annual yield. As mentioned above, the results from HERMES can generally be scaled up or down by reference to the size of the shock such that, for example, a €500m shift to property taxes would have impacts of roughly half the size reported here.

3.3   Increasing the use of carbon tax to pay for emissions compliance costs[18]

Outline of measure

This illustrative simulation considers the relative costs in terms of output and employment of using two different instruments (carbon taxation or income taxation) to meet possible compliance costs in the event of Ireland not achieving greenhouse gas emissions targets in respect of the non-Emissions Trading Scheme (non-ETS). [19] It is important to note that this is a stylised example for the purposes of considering macroeconomic impacts; it does not purport to favour any particular approach to meeting possible costs.

Ireland is committed to a 20 per cent reduction in non-ETS greenhouse gas emissions by 2020 (relative to 2005 levels), and to keep emissions below annual limits over the period 2013 to 2020.[20] Projections by the Environmental Protection Agency (EPA) on non-ETS emissions levels are set out in Table 2 below;[21] and project that Ireland will exceed its non-ETS emissions reduction target by a cumulative total of 23.9 million tonnes over the 2013 to 2020 period.[22] This cumulative gap-over-target could be lower were additional policy measures to reduce carbon emissions introduced.

Table 2: Expected CO2 outcome relative to target

	2013	2014	2015	2016	2017	2018	2019	2020	Total
Annual non-compliance (millions of tonnes of CO2 equivalent)*	- 1.6	- 0.8	+0.5	+2.0	+3.6	+5.2	+6.7	+8.3	+23.9

Source: Environmental Protection agency [23]
*A positive sign indicates that emissions are above the annual allowed limit

Depending on a range of assumptions, principally relating to the price of carbon, the costs of non-compliance could lie in the range of €205m - €616m (see Table 3 below). As such, the choice of how to meet this has implications for the economy.

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[18] The authors would like to thank colleagues in the Climate Change Unit in the Department of Public Expenditure and Reform for helpful comments on earlier drafts of this paper.
[19] The majority of the non-ETS emissions come from agriculture, transport, residential and commercial activities.
[20] http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/misc/107136.pdf
[21] The projected greenhouse gas emissions used for this purpose were those published by the Environmental Protection Agency (EPA) in April 2013
[22] This is based on a "with measures scenario", i.e., one that takes into account all of the existing policies and measures from the National Climate Change Strategy.
[23](http://www.epa.ie/pubs/reports/air/airemissions/EPA_GHG_Emission_Proj_pub_2013_FINAL.pdf

Table 3: Cumulative "with measures" estimates of compliance costs

"With measures" scenario to 2020	Total
Using a cost of carbon of €16.5 per tonne	€205m
Using a cost of carbon of €39 per tonne	€616m

Source: NESC[24]

In principle, a range of options could be considered including offsetting reductions in other areas of public expenditure, increased government borrowing or additional taxation including in the areas of income or carbon. For the purposes of the simulation, the impacts of financing permit purchases in a budgetary neutral manner through additional income taxation or carbon taxation were examined based on an assumption that compliance purchases commence in 2018.

Channel through which the measure takes effect

The modelling was carried out under the assumption that the costs of permit purchases are fully passed through via additional taxation. Meeting the cost through increased income tax would have a damaging effect on the economy through the wage bargaining channels discussed in Section 3.2 above and result in an overall loss in competitiveness. In the alternative carbon tax scenario the rate of carbon tax is permanently increased by €25 per tonne in 2014. This approach is less damaging to the economy than raising income taxes as labour supply incentives are not affected. In addition, the increased price of carbon would act to curb its consumption, thus lowering emissions volumes as well as the associated compliance costs. Conefrey et al (2012) describe a 'double dividend' where the revenue from the carbon tax is recycled into reduced income tax.[25]

Summary of results

Table 4 and Table 5 show the modelling results as changes from the baseline projections.

Table 4 shows results from the income tax scenario with a negative impact on GDP observed by the end of the period fall due to the increase in income tax. This reflects the impacts that

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[24] *Towards a New National Climate Policy: Interim Report of the NESC Secretariat*, June 2012. We are aware that more up-to-date figures have been produced internally by the Department of Environment, Community and Local Government. However for the purposes of this exercise, and in order to maintain consistency with the assumptions in the MTES, it was decided to use the estimates in the NESC Secretariat Report.
[25] Conefrey, T., J. FitzGerald, L. Malaguzzi Valeri, R. S J. Tol, 2012. "The Impact of a Carbon Tax on Economic Growth and Carbon Dioxide Emissions in Ireland", Journal of Environmental Planning and Management, pp 1-19

increased income taxes have on the labour market discussed earlier and are reflected in the fall in employment and rise in unemployment compared with baseline levels shown below.

Table 4: Buy Carbon Permits financed entirely by income tax

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.03	0.00	-0.03	-0.03	-0.01	-0.03	-0.08
Unemployment rate (pp)	-0.16	-0.01	0.17	0.19	0.10	0.15	0.30
Employment levels (pp)	0.05	0.02	-0.01	-0.02	-0.02	-0.02	-0.07
Nominal GDP levels (pp)	0.01	-0.02	-0.04	-0.04	-0.01	-0.03	-0.05

Source: HERMES macroeconomic model

Table 5 shows that the level of real GDP over the period to 2019 is higher than would otherwise be the case as a result of lower income taxation (funded by an increase in carbon tax). Income taxes rise again in 2020 as carbon tax revenue begins to be used for the purchase of permits but the decline in the level of GDP in 2020 is marginally lower than under the income tax scenario shown above. In addition, carbon emissions fall significantly during the period as a result of the behavioural effect of increasing the price of carbon.

Table 5: Carbon Tax €25 a tonne plus expenditure to buy Permits abroad

|	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.00	0.03	0.06	0.10	0.07	0.02	-0.05
Unemployment rate (pp)	0.03	-0.16	-0.23	-0.50	-0.85	-1.25	-1.34
Employment levels (pp)	0.00	0.08	0.25	0.39	0.44	0.41	0.38
Nominal GDP levels (pp)	0.00	0.27	0.23	0.23	0.17	0.08	0.01

Source: HERMES macroeconomic model

3.4 Financial Sector Reform and the Cost of Capital

Outline of measure

The euro area crisis has been marked by fragmentation in financial markets resulting in tighter credit conditions and higher interest rates for non-financial corporates in peripheral economies (including Ireland), compared with core economies.[26]

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[26] See discussion "Financial fragmentation in the euro area", OECD Economic Outlook, May 2014

Figure 1: Average Short Term Interest Rates on Short Term Loans (< €1 million)[27]

Legend: Austria, Belgium, Germany, Spain, Finland, France
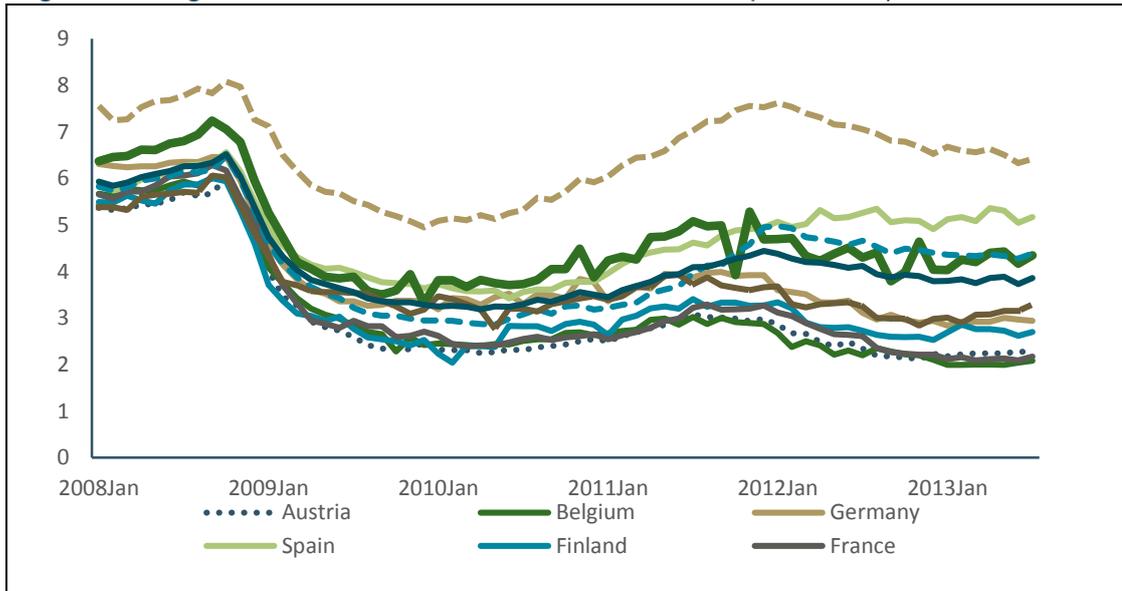
Source: European Central Bank

While this divergence in credit conditions may not be an issue for larger multi-national corporates (MNCs) that can borrow in liquid corporate bond and international bank finance markets, the cost of capital for SMEs is typically domestically-determined, based on the government bond rate plus a margin influenced, inter alia, by domestic factors including credit risk perceptions, funding costs and competition (reflected in margins).

Figure 2: SME vs. Corporate Loan Rates in Ireland

Legend: Rates for Loans up to €1 million (%), Rates for Loans over €1 million (%)
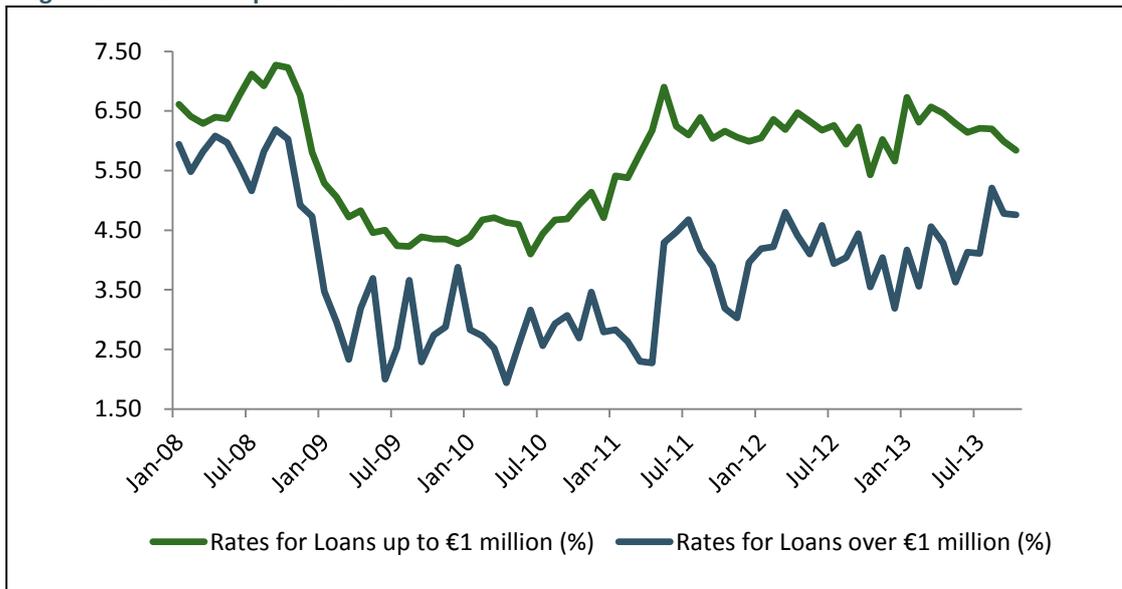
Source: Central Bank of Ireland

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[27] Loans of up to €1m are used as a proxy for SME lending

The impacts of the level of bank competition on SME lending were recently considered by Ryan et al (2014), using pan-European firm level data.[28] The authors find that bank market power is associated with lower levels of SME investment. They also note that the effect of bank market power on financing constraints is stronger in financial systems that are more dependent on banking as a source of finance, implying that developing alternative liquid financing sources for SMEs would help develop a more stable financing environment.

Thus policy actions that improve competition, for example in terms of retail entry, or financial market innovation resulting in improved availability of a greater range of non-bank lending options, would be expected to put downward pressure on the domestically determined cost of capital.

Channel through which the measure takes effect

This reform estimates the impact of a set of measures that has the effect of lowering the domestic cost of credit by 1 per cent (as distinct from a general reduction in eurozone interest rates on foot of ECB monetary policy decisions). This mimics the effects of a reduction in credit risk and/or the effects of increased competition and financial innovation that would be expected to put downward pressure on interest rate margins.

The HERMES model specification is such that the effects are initially observed in the manufacturing sector and, through this sector, the rest of the economy.

Summary of results

The simulations show higher output in the manufacturing and industrial sectors over the period with economy-wide GDP over half of a percentage point higher by 2020. Employment increases by one third of a percentage point with a reduction also observed in the unemployment rate.

The results shown can be interpreted symmetrically such that an increase in the domestic cost of credit by 1 per cent would have a negative impact of a similar magnitude on the variables shown.

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[28] Ryan, Robert M. & O'Toole, Conor & McCann, Fergal, 2013. "Does Bank Market Power Affect SME Financing Constraints?,"Papers WP472, Economic and Social Research Institute (ESRI).

Table 6: Lowering domestic interest rates by 1%

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.00	0.00	0.02	0.20	0.38	0.54	0.57
Unemployment rate (pp)	0.03	-0.08	-0.12	-0.45	-0.88	-1.37	-1.48
Employment levels (pp)	0.00	0.00	0.01	0.11	0.23	0.32	0.33
Nominal GDP levels (pp)	0.00	0.00	0.02	0.24	0.46	0.66	0.72

Source: HERMES macroeconomic model

3.5 Improved Labour Market Activation

Outline of measure

Long-term unemployment is generally defined as a continuous spell of more than one year in unemployment. As of end April 2014, 46 per cent of Live Register claimants were designated as long-term unemployed. On an ILO basis, 61 per cent of unemployed persons in the fourth quarter of 2013 were unemployed for a year or more as per the Quarterly National Household Survey.

Active labour market policy (ALMP) measures such as job search assistance, training and education (as set out for example in *Pathways to Work*), allied to effective job-seeker incentives, can help reduce the number of long-term unemployed through improving their employability. The measures modelled assume a further improvement in the effectiveness of activation policies and incentives relative to the baseline scenario such that a greater proportion of newly-created jobs are filled by the unemployed.

Channel through which the measure takes effect

ALMPs affect labour market outcomes by improving the matching process between employers and job-seekers. Improvements in ALMPs would be reflected in a sharper reduction in unemployment for a given change (increase) in employment. In turn, lower levels of unemployment would result in a reduction in social welfare expenditure which, for modelling purposes, is assumed to be applied in one of two ways:

- The Exchequer borrowing requirement is reduced (scenario 1); or,

- The borrowing requirement is left unchanged with the expenditure decrease used to offset the costs of income tax reductions (scenario 2).

In order to proxy a reduction in long-term unemployment (as a result of more effective labour activation programmes) via the HERMES model, the highly elastic response between employment increases and migration was altered. The assumption is, that while total employment numbers are unchanged relative to baseline forecasts, more of the additional jobs are filled by unemployed individuals from the Live Register (rather than migrants as would normally be the case given Ireland's elastic labour supply). A cumulative reduction in migration of 80,000 people is implemented on a staggered basis as illustrated in the table below.

Table 7: Assumed reduction in migration for modelling impact of active labour market reforms

Year	2014	2015	2016	2017	2018	2019	2020
Reduction in migration	5,000	10,000	20,000	20,000	20,000	5,000	0

Summary of results

The assumption of a reduction in inward migration has the effect of reducing the population compared with baseline assumptions. As a result, total consumption and GDP are lower (compared with baseline levels) in both scenarios (although GDP per capita increases). The reduction in consumption is less pronounced in the second scenario as the reduction in income tax has a positive offsetting effect. However, under both scenarios, the measure is welfare-enhancing in that *GDP per capita* is higher. Where social welfare savings are recycled into lower income tax, the unemployment rate falls by over 3 per cent below the baseline.

Table 8: Output and employment impact of active labour market reforms

Scenario 1 - Reduced Exchequer Borrowing Requirement	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.00	-0.01	-0.04	-0.10	-0.18	-0.25	-0.28
GDP per head (pp)	0.00	0.10	0.29	0.66	1.01	1.36	1.43
Unemployment rate (pp)	0.00	-0.11	-0.33	-0.76	-1.18	-1.62	-1.71
Employment levels (pp)	0.00	0.00	-0.02	-0.05	-0.10	-0.16	-0.20
Nominal GDP levels (pp)	0.00	-0.01	-0.04	-0.09	-0.17	-0.25	-0.30
Scenario 2 - Income Tax Reduction	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Real GDP levels (pp)	-0.03	0.00	0.04	0.07	0.09	0.09	0.10
GDP per head (pp)	-0.05	0.10	0.36	0.82	1.27	1.71	1.81
Unemployment rate (pp)	0.02	-0.19	-0.42	-1.10	-1.90	-2.80	-3.05
Employment levels (pp)	0.05	0.03	0.00	-0.02	-0.02	-0.01	0.00
Nominal GDP levels (pp)	0.01	-0.02	-0.05	-0.08	-0.11	-0.15	-0.20

Source: HERMES macroeconomic model

3.6   Human Capital Improvements

Outline of measure

This proposal models the impact of an improvement in the level of human capital in the population and labour force by simulating a one percentage point increase in the proportion of the relevant age cohorts completing the Leaving Certificate and third level education.

Channel through which the measure takes effect

Improvements in human capital can raise overall output through a number of channels. Firstly, higher education attainment has been shown to be positively associated with labour force participation, particularly in the case of females (Bergin and Kearney, 2007).[29] Secondly, the probability of unemployment is lower at higher qualifications levels thereby positively impacting on the proportion of the labour force in employment. These two impacts increase the level of labour utilisation. The third impact is a longer-run improvement in labour productivity resulting from the higher average level of human capital of the labour force.

This reform was not modelled using HERMES and instead relied on the ESRI's human capital model. The simulation assumes a one percentage point increase in the proportion of the population completing the Leaving Certificate and third level education. The level of educational attainment is then held constant at its higher 2016 level across future cohorts. There is a considerable time lag with regard to the visibility of results as the cohorts affected replace earlier cohorts with lower education levels, with more pronounced effects evident beyond the 2020 horizon shown here. Furthermore, the education base is already quite high in Ireland and thus additional effects are likely to be limited. As a result of the time lag in transmission of the higher education levels throughout the economy, the full impact of the policy change would not be realised until the 2060s when it would contribute just over one per cent to the level of GDP in what would be a permanent effect. However, there are likely to be significant spillover effects with regard to the absorption of knowledge in the interim. While such effects are difficult to capture in a model, they can reasonably be expected to have a positive impact on labour productivity.

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[29] Bergin, Adele, Kearney, Ide, 2013. "Human Capital Accumulation in an Open Labour Market: Ireland in the 1990s", Economic Modelling, 2007

Summary of results

The impact on the labour force and GDP in the medium term (i.e. in the period to 2020) is limited, as would be expected with a measure that inherently involves such a significant time lag. However, the labour force expands in the long run, at a higher skill level, and unemployment is reduced by just over one quarter of a percentage point (by 2061). As noted above, the effect by 2061 would be a permanent increase of one per cent in the level of GDP.

Table 9: Output and employment impact of human capital improvements

	2014	2015	2016	2017	2018	2019	2020
Labour Force levels (pp)	0.00	0.01	0.01	0.01	0.02	0.02	0.03
Unemployment rate	-0.02	0.00	0.02	0.02	0.01	0.02	0.03
Real GDP levels (pp)	0.02	0.03	0.04	0.06	0.07	0.08	0.09

Source: ESRI Human Capital Model

3.7 Competition Policy

Outline of measure

This measure simulates the impacts of policy choices or other adverse market developments that could have the effect of reducing competition in product markets. Specifically the results shown here estimate the costs of reduced competition manifested through an increase in consumer prices.[30] Dynamic or second-round costs that might arise over a longer-term horizon owing to, for example, lower incentives to innovate or increased inefficiency, are not factored into this simulation.

Policy choices with adverse economic macroeconomic outcomes could include the granting of competition law exemptions, the creation or facilitation of barriers to entry (regulatory and otherwise), or regulatory actions that act to limit retail price competition. The macroeconomic effect of individual policy choices could be quite small but multiple policies of this kind could potentially have a significant economic impact.

While the traded sector of the economy is assumed to operate in an internationally competitive environment, its competitive position would be affected by reduced competition and cost pressures in the non-traded sector. Lower competition in the domestic non-traded sector feeds through to the traded sector through a reduction in cost competitiveness which

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[30] In Ireland the OECD (2013) have identified an increase in product market regulations during the period 2008-2013 that have restricted competition.

adversely affects export performance. Whilst not explicitly modelled here, economic evidence also suggests additional longer-term negative TFP impacts.[31] In the simulations presented below the retail sector is used as a proxy for a general weakening in competition in the non-traded sectors of the economy.

There are a number of non-traded sectors in the domestic economy where the Competition Authority and various international agencies have argued that competition could be further enhanced including in legal services, some public services, the grocery sector, and retail banking. For instance, increased competition in the retail sector could result from market entry of a large international multiple on a scale that would facilitate significant efficiencies to be realised in distribution costs resulting in lower consumer prices.

Channel through which the measure takes effect

The effect of reduced product market competition is simulated through an increase in consumer prices that reduces consumption and increases firm margins. Nominal wages rise in response to the increase in consumer prices but, in overall terms, the effect is to reduce real personal disposable income.

On the external side, manufacturing sector exporters, who are price-takers, are unable to "pass on" the increase in wage costs to international customers and thus reduce their output and demand for labour in Ireland.

The higher price level is such that there would be a small increase in nominal GDP levels. However, in real terms, GDP would fall and unemployment would rise. The higher rate of domestic inflation has no effect on the interest rate because it is set by the ECD based on euro area conditions.

The results are symmetric so a fall of 1 per cent in consumer prices due to increased product market competition or for any other reason would have the opposite effect on the variables shown in the Table below.

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[31] Buccirossi, Paolo, Ciari, Lorenzo, Duso, Tomaso, Spagnolo Giancarlo and Vitale, Cristiana, Competition Policy and Productivity Growth: An Empirical Assessment, May 2011. Published in: The Review of Economics and Statistics, 95 (2013), pp. 1324-1336

Summary of results

This overall effect of this policy choice would be to reduce GDP in the long run by 0.3 percent. Total employment falls by one third of a percentage point percent in the long run along with an increase in unemployment. As mentioned above, the results shown can be interpreted symmetrically such that an increase in product market competition of the same size would have a positive impact of a similar magnitude on the variables shown.

Table 10: Output and employment impact of weakening in product market competition

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.00	0.00	-0.06	-0.14	-0.20	-0.26	-0.31
Unemployment rate (pp)	-0.03	0.08	0.11	0.35	0.67	1.05	1.12
Employment levels (pp)	0.00	0.00	0.00	-0.12	-0.20	-0.27	-0.33
Nominal GDP levels (pp)	0.00	0.00	-0.40	-0.39	-0.38	-0.32	-0.26

Source: HERMES macroeconomic model

3.8   Competitiveness and Labour Costs

Outline of measure

This simulation considers the effect of a loss in competitiveness caused by higher labour costs across the economy (i.e., in both the public and private sectors) that is not accompanied by a commensurate improvement in productivity. For the purposes of this exercise, the technical assumption was made that the total government wage bill is not fixed; in other words higher public service wage rates are not offset through a reduction in employment numbers. However to ensure budget neutrality it is assumed that the increase in the public service wage bill is financed through an increase in income tax.

Channel through which the measure takes effect

Wage rates in both the public and private sector are assumed to increase by 1 per cent compared to baseline assumptions thereby leading to a deterioration in competitiveness. As in the previous competition policy simulation, exporters in the manufacturing sector, who are price-takers, are unable to "pass-on" the increase in costs to international customers and respond by reducing output and their demand for labour.

Employment falls in manufacturing in response to price (wages) rises and a reduction in demand for output. Higher wages in the public and private sectors initially impact positively

on consumption although the impacts are offset by lower numbers employed in the private sector.

The general government balance is held constant such that initial gains from higher personal income taxes and VAT are offset by higher payroll and unemployment benefit costs. As explained in the earlier tax shift simulation (Section 3.2), higher income taxation ultimately increases employment costs and results in a loss in competitiveness.

Summary of results

The results show a long-run reduction in real GDP of one quarter of a percentage point and a reduction in employment of 0.4 per cent. The unemployment rate increases by 1 per cent.

Table 11: Output and employment impact of higher domestic wage rates

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	-0.03	-0.04	-0.02	-0.02	-0.07	-0.16	-0.25
Unemployment rate (pp)	-0.10	-0.12	-0.03	0.26	0.60	0.97	1.01
Employment levels (pp)	-0.05	-0.23	-0.24	-0.24	-0.28	-0.35	-0.43
Nominal GDP levels (pp)	0.01	-0.31	-0.34	-0.37	-0.32	-0.22	-0.14

Source: HERMES macroeconomic model

3.9 Infrastructure Investments and Constraints

Outline of measure

In this hypothetical scenario, the effects of additional investment of €1 billion annually in productive public infrastructure are considered. This could be in response to infrastructure constraints or bottlenecks that might emerge in response to faster economic growth over the medium term than currently projected. For the purposes of the simulation – which should be seen as illustrative in nature - the additional investment was assumed to be allocated to public transport projects but the investment variable in question in the model also includes roads and water investment. The additional investment of €1 billion is assumed to occur each year out to 2020, commencing from 2015. Whilst this would represent a very substantial increase in investment over current levels (total transport investment allocation of €824 million in 2014), it still represents less than one percent of GDP per annum. In principle, the additional investment could be paid for directly through an increase in public capital expenditure or

through some type of PPP arrangement financed for example by the Irish Strategic Investment Fund (ISIF).

A 10% rate of return is imposed based on an assumption that the investment is allocated to high-priority projects focused on addressing critical bottlenecks in high population density areas. This assumption captures the supply-side effects of the investments discussed below.

Channel through which the measure takes effect

The additional investment would have both demand- and supply-side effects. Demand effects, including both direct and indirect effects of the additional expenditure, are immediate, resulting in increased demand for goods and services and additional employment during the planning and construction phases of the various projects. The supply-side effects are realised over the medium to longer term once the projects have been completed. Given the assumption that the additional investment is allocated to public transport projects, the benefits would include reduced commuting times for workers (which could in turn feed through to lower wage demands), lower congestion, and, depending on the projects, reduced freight transport costs.

As the cut-off point for the modelling exercise was 2020, the impacts of the additional investment are not shown for later periods. It is important to bear in mind that the supply-side effects represent increases in the productive capacity of the economy and would be essentially permanent in nature. A full quantification of the supply impacts would involve discounting the future benefits beyond 2020 through a net present value (NPV) type analysis. As this was not undertaken as part of the modelling work, the results shown here understate the longer-term benefits.

Various assumptions underpin the results. A crucial assumption implicit in the rate of return is that of prioritisation on projects that address critical economic bottlenecks or growth constraints.

Summary of results

As can be seen from the results tables, the demand side effects are observed from 2016 in response to the stimulus of additional capital expenditure. These include a reduction in unemployment in response to the creation of jobs during the construction phase.

In the long-run, the supply-side effects dominate. By 2020 the supply- side effect is estimated to add 0.04 per cent to GDP which can be understood as a permanent impact.

Table 12: Transport -Supply side only (a)

(a)	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.0	0.0	0.01	0.02	0.03	0.03	0.04
Unemployment rate (pp)	0.0	0.0	0.00	-0.01	-0.04	-0.10	-0.17
Employment levels (pp)	0.0	0.0	0.00	0.01	0.03	0.03	0.04

Source: HERMES macroeconomic model

Table 13: Transport - Demand side only

(b)	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.0	0.0	0.3	0.31	0.3	0.26	0.22
Unemployment rate (pp)	0.0	0.0	-0.45	-0.4	-0.35	-0.3	-0.25
Employment levels (pp)	0.0	0.0	0.53	0.49	0.45	0.4	0.36

Source: HERMES macroeconomic model

Table 14: Transport – Demand and supply side

(a + b)	2014	2015	2016	2017	2018	2019	2020
Real GDP (change)	0.0	0.0	0.3	0.32	0.32	0.29	0.25
Unemployment rate	0.0	0.0	-0.45	-0.4	-0.36	-0.34	-0.35
Employment	0.0	0.0	0.53	0.5	0.48	0.43	0.4

**Source**: HERMES macroeconomic model

4.   Estimation and Results

4.1   Aggregation of Results

On the basis of the individual simulations described in the previous chapter, a "beneficial policy" scenario is constructed for the purpose of this paper. This scenario is similar to the high-growth scenario included in the MTES with the addition of the estimated gains from competition-enhancing reforms.[32] Given the binding fiscal rules Ireland faces over the medium term, the public finance implications merited particular attention in this phase. For this reason, the illustrative €1 billion in additional infrastructure investment was not considered, as without offsetting spending reductions or revenue increases, it could threaten compliance with fiscal rules.

The beneficial policy scenario illustrates the combined macroeconomic impact of a subset of simulations described in Section 3 above. It reflects the overall benefits of a rebalanced tax system (sections 3.2 and 3.3), a lower interest rate environment (section 3.4), improvements in product market competition (Section 3.7), greater dividend from labour market activation policies (section 3.5) and improvements in human capital (section 3.6). From an output perspective, in the early part of the projection period (2014-2020) the greatest benefits derive from the lower cost of capital and the rebalancing of the tax system away from labour taxation, with competition reforms making a significant contribution towards the latter half of the period.

**Figure 3: Contributions to output gain under beneficial policy scenario**

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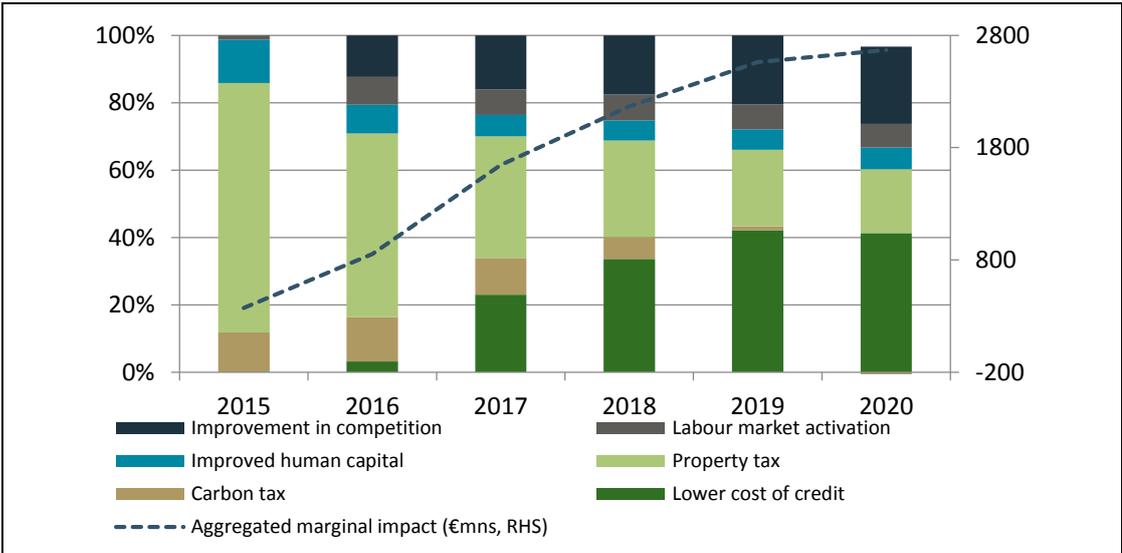
[32] As discussed in Section 3.7 the impacts of a positive competition reform are the inverse of the results presented there.

The HERMES model is broadly symmetric (i.e. it can be used to estimate the effect of a percentage point increase or decrease in wage rates, price levels etc.)[33]. As a result, it was also used to run a range of adverse simulations. A hypothetical "harmful policy" scenario was calibrated to illustrate the impact of a range of indicative policy errors or adverse developments.

This scenario does not represent a projection, but rather was modelled to attach an order of magnitude around the baseline were certain adverse domestically-driven events to materialise. As the purpose of this paper is to focus on available domestic policy levers to support growth, shocks to the external environment were not considered. Adverse events considered include: an increase in the cost of capital in the economy; a deterioration in economy-wide competitiveness (proxied by increases in labour costs); and, lower levels of product market competition (captured within the model as an increase in the price level in the retail sector).

The combined effect of these three harmful policies/adverse developments is presented below. This is included here for illustrative purposes and in order to highlight the potential economic impacts of growth-damaging policy measures or other adverse domestic developments.

Figure 4: Contributions to output loss under harmful policy scenario

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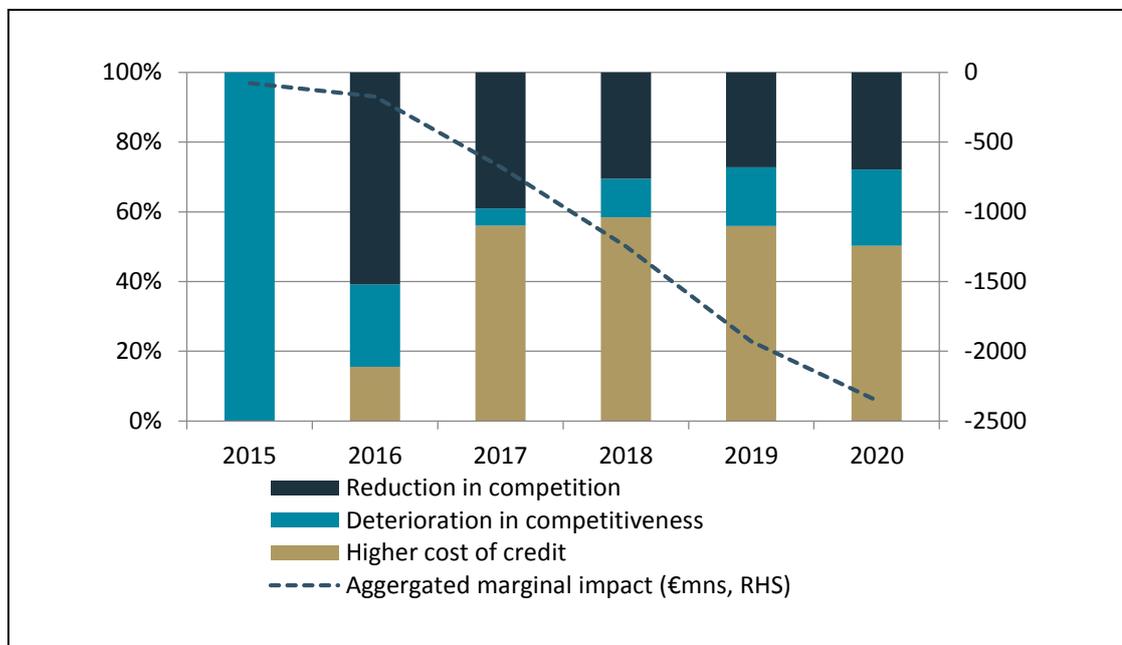
[33] Whilst results are broadly symmetric they are not necessarily additive due to non-linearities. For example the effects of a 1pp reduction in interest rates could not necessarily be scaled by a factor of 5 to capture the impact of a 5pp fall in rates.

4.2 Integration of Results with Baseline Growth Forecast

The baseline macroeconomic scenario is based on the Stability Programme Update (SPU) April 2014 projections out to 2018. Thereafter, real output volumes are assumed to grow at 3 percentage points per annum out to 2020. This assumption is contingent on a supportive global economic environment, alongside the continued improvements in cost competitiveness necessary to support Ireland's share of global export markets. Provided labour productivity growth is sustained and wage growth does not outstrip improvements in productivity, average employment growth of 2 per cent per annum can be supported out to 2020. Given the scope for divergent net migration, population growth and labour force participation rates trends, medium-term labour force estimates are difficult to project with certainty. Were the labour force to grow at a conservative rate of 1 per cent per annum, this would be consistent with an unemployment rate of 6.5 per cent at the end of the decade.

Table 15: SPU macroeconomic assumptions

	2013	2014	2015	2016	2017	2018	2019	2020
Real GDP growth	-0.3	2.1	2.7	3.0	3.5	3.5	3.0	3.0
Unemployment rate	13.0	11.5	10.5	9.7	8.9	8.0	7.2	6.4
Employment growth	2.4	2.2	2.0	2.0	1.9	1.9	2.0	2.0
Nominal GDP growth	0.1	2.6	3.6	4.3	4.7	4.7	4.9	5.0

Source: Stability Programme Update, April 2014 Update Department of Finance

The HERMES model is calibrated specifically to the ESRI's own baseline projections. Rather than recalibrating the entire model to reflect the Department's baseline, to derive beneficial and harmful policy scenario paths consistent with the SPU baseline, marginal aggregated impacts estimated via HERMES were applied proportionately to the SPU baseline. The resulting real and nominal output volumes and labour market variables (employment and labour force levels, and unemployment rates) are shown below.

Figure 5 illustrates the marginal impact of the aggregated beneficial policy and harmful policy scenarios relative to baseline GDP levels. Under the beneficial policy scenario the level of output in 2020 is some 1.3 per cent higher than baseline. In contrast, under the harmful policy scenario, output is some 1.1 per cent lower than baseline by 2020 (see Table 16 and 17 below for numerical results).

Figure 5: Real GDP Volumes (€m,2011), SPU baseline with policy success and policy error impacts
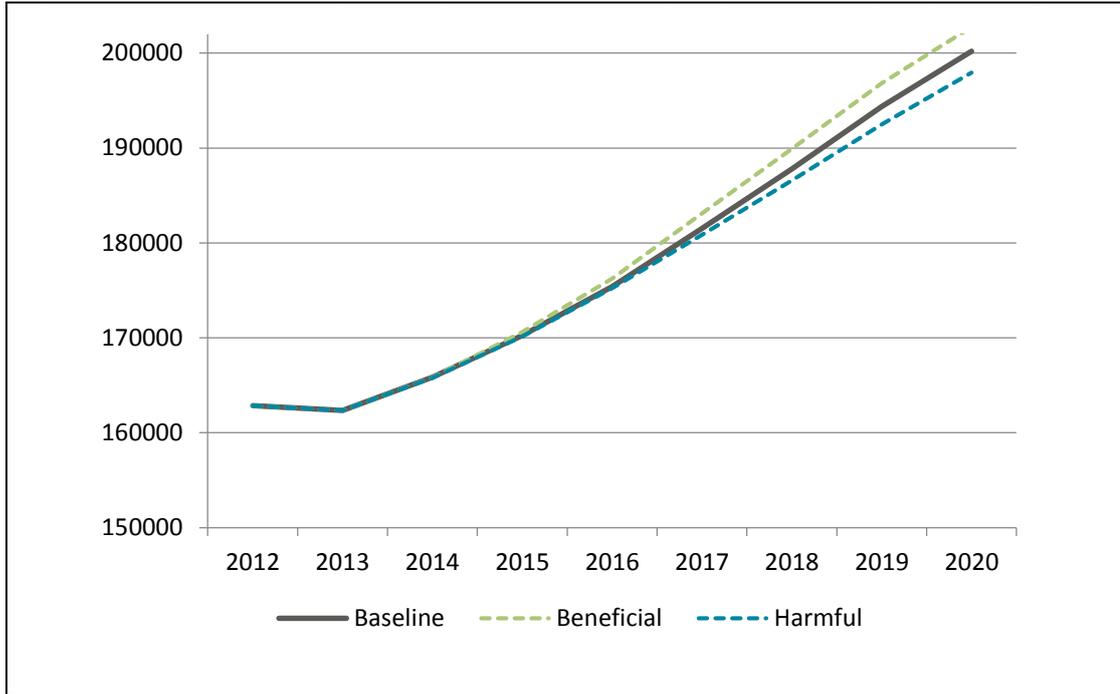
Turning to labour market impacts, by 2020 there are some 26,000 more jobs relative to baseline. Employment gains result from the lower interest rate and re-balanced tax system components of the simulation in broadly equal measure. Under the harmful policy scenario, there are some 23,000 fewer jobs by 2020.

In terms of the impact on unemployment, the effect on the unemployment rate under the policy success scenario is more pronounced than the gains in employment might suggest. This is the result of modelling assumptions whereby the effect of improved effectivenees of labour market activation policies under the high growth scenario is reflected in a reduction of the labour force. As explained earlier, this reflects the assumption that increases in employment are filled by those already unemployed, rather than through migration (see Tables 16 and 17 below for numerical results).

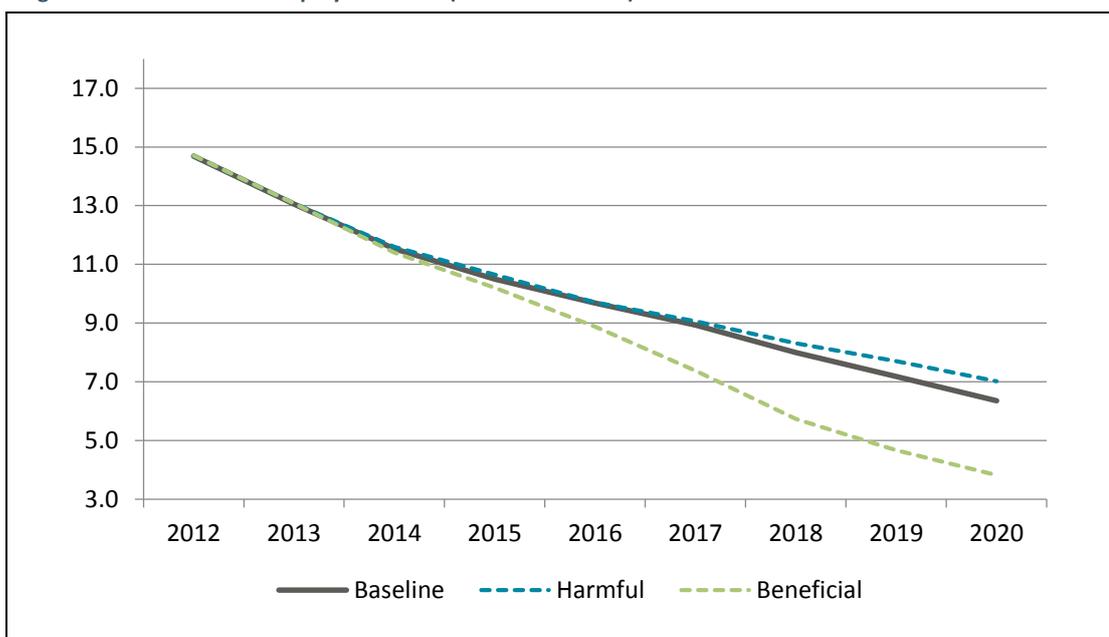**Figure 6: Evolution of Unemployment rate (as % labour force)**

Table 16: Beneficial policy aggregates

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.0%	0.2%	0.5%	0.9%	1.1%	1.3%	1.3%
Unemployment rate (pp)	0.0%	-0.1%	-0.3%	-0.8%	-1.6%	-2.3%	-2.5%
Employment levels (pp)	0.1%	0.2%	0.5%	0.9%	1.2%	1.3%	1.3%
Nominal GDP levels (pp)	0.1%	0.4%	0.8%	0.9%	1.0%	1.0%	0.8%

Source: HERMES macroeconomic model

Table 17: Harmful policy aggregates

	2014	2015	2016	2017	2018	2019	2020
Real GDP levels (pp)	0.0%	0.0%	-0.1%	-0.4%	-0.6%	-1.0%	-1.1%
Unemployment rate (pp)	0.0%	0.1%	0.1%	0.0%	0.1%	0.3%	0.5%
Employment levels (pp)	-0.1%	-0.2%	-0.2%	-0.5%	-0.7%	-0.9%	-1.1%
Nominal GDP levels (pp)	0.0%	-0.3%	-0.8%	-1.0%	-1.2%	-1.2%	-1.1%

Source: HERMES macroeconomic model

5.   Concluding Comments

This paper presents estimates of the likely magnitude of the economic benefits of a set of potential reform options that could be considered by Government out to 2020. As discussed in Section 4, the aggregate impact of the reforms is estimated as an increase in output levels of 1.3 percent by 2020 and an increase in total employment of 26,000. The consequences of possible policies choices or outcomes that could havea negative economic impact were also considered.

The paper focuses on policy areas that are endogenous or within the control of domestic policy makers. Of course, economic performance over the medium term will also be affected by a wide range of exogenous factors, including growth in export markets, exchange rate developments and wider EU and international policy developments.

The areas considered here include product and labour market reforms, tax policy, education and financial sector reforms. It is important to bear in mind that, in most cases, the "reforms" are described in general terms and the results presented are best understood as being approximate orders of magnitude rather than precise estimates of the economic benefits or costs of specific policy proposals or initiatives. As such, they should be seen as illustrative in nature. In some cases, a fuller evaluation would be required especially where additional public expenditure or investment would be necessary to give effect to the reforms.

The range of possible reform shocks simulated for the purposes of this exercise were somewhat limited by the characteristics and specification of the model used. Other exercises, conducted using different models, have considered other wider reforms and have shown significant benefits to Ireland from policy actions in areas such as female labour force participation, benefit and pension reform as well as R&D incentives.[34] Whilst there are obvious pitfalls in aggregating the results from different models, the various exercises demonstarte that there are a range of reform areas open to policy makers where policy actions can be taken to improve the economy's medium-term growth potential.

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[34] European Commission (2013).