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Rory O'Farrell

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Nevin Economic Research Institute (NERI)

31/32 Parnell Square
Dublin 1
Phone + 353 1 8897722

Email: info@NERInstitute.net

Web: www.NERInstitute.net

Carlin House
4-6 Donegall Street Place
Belfast
BT1 2FN,
Northern Ireland
Phone +44 28 902 46214

THE EFFECTS OF VARIOUS FISCAL MEASURES

Rory O'Farrell, Nevin Economic Research Institute*

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ABSTRACT

At the beginning of the current recession a common narrative was that spending cuts were always better than tax increases and that fiscal austerity could actually cause the economy to grow. These claims were based more upon anecdotes and strongly held opinions than rigorous analysis. Five years on, much firmer evidence has emerged.

Using the HERMIN model, the effects of a consolidation of €1bn were simulated for eight fiscal measures. These are 1) an increase in direct tax (such as income tax), 2) an increase in indirect tax (such as VAT), 3) an increase in capital tax (such as capital acquisitions tax), 4) an increase in corporation tax 5) a cut to non-wage public consumption, 6) a cut to public sector wages, 7) a cut to social transfers, and 8) a cut to public investment. Consistent with other analyses, there is no evidence to support either that fiscal austerity can expand the economy, or that spending cuts are more effective at closing the deficit than tax increases.

The analysis suggests that the most effective methods of closing the deficit are through increases in capital taxes, the effective rate of corporation tax, and indirect tax. The least effective methods are cuts to public investment and to public sector wages.

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* I would like thank John Bradley and the European Commission for facilitating access to the HERMIN model. Any errors are the sole responsibility of the author. The views expressed are the author's alone. The analysis was conducted using data available during May 2013 and the paper summarises work mainly done up to the end of May 2013.

All correspondence to Rory.OFarrell@NERInstitute.net

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1. INTRODUCTION

A century ago one of the most prestigious careers for bright young men in France was to become an army officer. These intelligent people were trained in tactics that made sense given the experiences of the French army back to the days of Napoleon. The most effective way to win a war was to attack. However, by the time of the First World War defence had been mechanised while attack had not. Despite these changes in technology, for several years French army officers, who were intelligent people, continued with old tactics of attack despite huge casualties. It was not until spring of 1917 that a major rethink of strategy was undertaken. By the time of the Second World War the French army relied on a strategy of defence, building the Maginot Line. However by this time the development of tanks and aircraft made attack a more viable option. Though people can be intelligent, their patterns of thought and analysis are formed by their training and past experience.

A similar pattern can be seen in the development of economics. Prior to the Great Depression economists were schooled that the problems of economies were problems of supply. This led to destructive policies during the Great Depression, and in the US it was 1933, roughly four years after the Wall Street Crash, before New Deal policies were implemented. In the decades following the Great Depression most macroeconomic problems were usually viewed as problems of demand. However, following the Oil Crisis of the 1970s, a problem of supply of energy, demand side policies continued to be used although the problem was one of supply. This led to issues of stagflation (high inflation with a stagnant economy). However, over time supply side policies were pursued, such as investment in renewable energy in Denmark and nuclear power in France (increasing supply) while in the UK and US other policies were pursued. By the time of the 2008 financial crisis economists were generally trained to see economic problems as problems of supply with supply side solutions.

In some ways autumn 2012 marked a turning point for the economic analysis of the current recession, in what has been termed the 'Battle of the Boxes'. In October 2012 the IMF included an information 'box' in its World Economic Outlook (International Monetary Fund, 2012) suggesting that austerity was more harmful (to economic growth) than previously thought. In essence the argument was that 'fiscal multipliers', that is the spill-over effects of government spending and taxes on the wider economy, were larger than previously believed. However, what are the fiscal multipliers for the Irish economy and what are the policy implications of different fiscal multipliers?

The paper is presented as follows. Section two explains the relevance of fiscal multipliers, how they are estimated, and the recent debates regarding their size. Section three presents the methodology use to estimate fiscal multipliers based on the NERI's implementation of the HERMIN model, with the results presented in Section Four. Section Five concludes.

2. FISCAL MULTIPLIERS

Fiscal multipliers give the spill-over effects of governments' spending and taxation decisions. For example, if a government decides to build a school there are spill-over effects as building workers spend their incomes, giving a further boost to the economy. If government decisions had no spill-over effects then the multiplier would simply be one. If a measure has a positive effect the multiplier is above one. If an economy is over-heating the multiplier is likely to be less than one. This is as the economy does not have the capacity to absorb the extra spending, and private sector activity is 'crowded out'. Increasing spending has a positive multiplier (in all but the most extreme circumstances) and increasing taxes has a negative effect. From the 1930s to the 1970s the prevalent 'Keynesian' view was that governments could effectively manipulate demand in the economy and reduce the impact of the business cycle. It was commonly accepted that government spending stimulated the economy, and taxes dampened the economy. However, in the 1970s the hypothesis of 'Ricardian equivalence' emerged (Robert J Barro, 1974)¹. Under this hypothesis, if a government tries to stimulate the economy (and borrows the money to do so) then households will anticipate tax increases in the future to pay for the stimulus. Households would then save more money, so the increase in government spending is offset by household saving. However this hypothesis requires that households act as though they can live forever, and that households have perfect access to credit. An even more extreme view is the hypothesis of 'expansionary fiscal contraction' (Giavazzi & Pagano, 1990). This is the view that in a recession government cutbacks may actually cause the economy to expand as households feel the government is getting to grips with a crisis, inspiring confidence from the private sector to spend and to invest. The original proponents of this view gave the experience of Ireland and Denmark in the 1980s as examples, but their analysis has been controversial (and largely dismantled in the case of Ireland in a paper by Bradley and Whelan (1997)). Overall there have been various theoretical and ideological approaches the question and the matter became less one of theoretical development, but rather an issue of measurement.

At the beginning of the 2008 financial crisis the notion that government cut backs and tax increases (a fiscal contraction) could be expansionary was in the public discourse. This is despite the credit crunch and banking crisis making the assumptions of perfectly efficient capital markets and access to credit highly implausible. Also, evidence from 'VAR models' (an approach that uses past data to analyse the effects of government spending) suggests that fiscal expansion (increases in government spending or tax cuts) does expand the economy. The use of VAR models for measuring the effects of government spending was first popularised by Blanchard and Perotti (2002). These studies mainly focused on the US, however the debate was largely, not whether government spending stimulated the economy, but by how much, with authors such as Robert J. Barro and Redlick (2011) saying that the multiplier is less than one (that is, that the economy expands, but by less than the increase in government spending, so there is some crowding out). A review of the literature is given by Ramey (2011) who suggests that for the US multipliers are between 0.8 to 1.5 (so for the US government spending is likely to stimulate the economy). The size of multipliers depend on the structure of the economy, and the state of the economy (such as if there is a recession). The debate reached its peak in the winter of 2012 with the 'Battle of the Boxes'. In an information box in a regular report the IMF suggested that various agencies had underestimated the negative effects of austerity

¹ This notion was promoted by the economist Robert Barro, but gets its name from a 19th Century economist David Ricardo who first came up with, but rejected, the notion.

(International Monetary Fund, 2012). The European Commission (European Commission. Directorate-General for Economic Financial Affairs, 2012) and European Central Bank (European Central Bank, 2012) rejected some of the IMF's criticisms. However, the consensus is that fiscal expansion is expansionary, with the notion of expansionary fiscal contraction being largely discredited.

At the beginning of the crisis it was also claimed that spending cuts were more effective than tax increases with Fine Gael (2010) stating in their pre-budget submission that "International experience shows clearly that cuts in spending are more effective at fixing deficits and are better for growth and jobs than tax increases." Within academia this notion was promoted by Alesina and Ardagna (2009). Their approach rested on an analysis of past data, which gives the average effect over a given period of time. Despite how this topic is often presented in the media, there is no consensus as to which is more effective, with models used by agencies such as central banks, the IMF, and European Commission showing that tax increases are generally less damaging to the economy than spending cuts (Coenen et al., 2012; Veld, 2013), with the effectiveness of spending cuts being particularly weak when interest rates are particularly low (Erceg & Lindé, 2013). (Despite this, other Commission staff (Castro, Salto, & Steiner, 2013) presume that growth-friendly consolidations are "expenditure based consolidation programmes, with contributions from the revenue side being less sizeable".) The use of such models differs from a relying on past data as the model can be adjusted to take account of the current state of the economy (such as high unemployment, and difficult access to credit).

Though consensus has not been achieved on the effects of government spending, it is generally accepted that in small open economies effects of government spending are smaller than in large closed economies (as some of the effects leak out due to imports), and it is also (now) generally accepted that in a recession fiscal policy has a greater effect than during a boom.

Though the literature for the US is quite rich, as is to be expected the current literature for Ireland is limited to a smaller number of researchers. Several studies (which make use of the VAR methodology that examines past performance), include Ireland in a sample of countries that are examined. However, what they imply for Ireland's situation today is somewhat contradictory. Corsetti, Meier, and Müller (2012) find that multipliers are 'unusually high during times of financial crisis', implying a large multiplier. However Beetsma and Giuliadori (2011) find that multipliers tend to be smaller for more open economies. This finding is shared by Ilzetzki, Mendoza, and Végh (2013) who also find that multipliers are smaller for countries with high debt. These both imply a smaller multiplier for Ireland. However, Ilzetzki et al. (2013) also find the multiplier to be larger for countries that are industrialised, and with a fixed exchange rate; both of which apply to Ireland. Given that Ireland is a country with a troubled financial system, is industrialised, open, has a high level of public debt, and has a fixed exchange rate (due to membership of the Euro), these findings are perhaps more likely to offer confusion than guidance as to what policy options are better for Ireland. Therefore it is necessary to look at studies that focus specifically on Ireland.

Continuing with the VAR approach, several studies have been conducted by Bénétrix and Lane (2009), Galstyan and Lane (2009), and Pereira and Pinho (2011). These studies focus on government spending rather than taxation. Pereira and Pinho (2011) only look at the topic of public investment, and find that it boosts the economy, and is self-financing over the long run. Galstyan and Lane (2009) find that government investment tends to boost competitiveness, and

government consumption spending tends to reduce competitiveness. The results of Bénétrix and Lane (2009) vary depending on the precise specification they use but find that increases in public investment tend to boost the economy, increases in the government pay bill hinder the economy, and the effects of spending on non-wage government consumption are more ambiguous. They also note that the approach uses historic data from 1970 to 2006 and that “the fiscal multiplier surely varies with the level of slack in the labour market and the perceived sustainability of the fiscal position”.

Given the limitations of the VAR approach, it is necessary to use theoretically founded models that take into account the characteristics of the Irish economy, and also the current state of recession in the Irish economy. Two models have been used, the HERMIN model and HERMES model. Both these models are similar in several ways, and have an ability to combine Keynesian demand elements with supply side elements. Both these models differ from “New Keynesian” models in that they do not assume people’s expectations are based on the past rather than what they can rationally expect about the future. A comparison of old and new Keynesian models is given by Cogan, Cwik, Taylor, and Wieland (2010). Although “New Keynesian” models have been commonly used in other countries, at present none have been developed specifically for the Irish economy.

The HERMES model (which was originally part of a cross-European project) was developed by the ESRI and Ireland’s Department of Finance to examine the impacts of different fiscal policies. Due to its origins other versions of HERMES were developed for other European countries. Today the model is maintained by the ESRI, and a description of the model and its multipliers is given in Bergin, Conefrey, FitzGerald, Kearney, and Žnuderl (2013). Though similar, the HERMIN model was developed for examining the effects of European Structural Funds and Cohesion Funds, and has been used by the European Commission’s Directorate General for Regional Policy across various European countries and regions. The latest application of the HERMIN model to the Irish economy appears in Bradley and Untiedt (2012b). A useful comparison between the HERMIN model and a New Keynesian model (the QUEST model used by the European Commission) appears in Bradley and Untiedt (2012a).

3. METHODOLOGY

The model that is used in this paper, and which has been used many times to measure the effects of cohesion funds in Europe, is the HERMIN model. Though the models examined in the paper of Coenen et al. (2012) also attempt to model the structure of an economy, there are important differences. As outlined by the European Commission (2009), the HERMIN model is used by the European Commission’s Directorate General for Regional Policy while the QUEST model (as mentioned in Coenen et al. (2012)) is used by the Directorate General for Economic and Financial Affairs. The HERMIN model combines Keynesian short term features with neoclassical longer term features and was originally designed for measuring the impact of EU Cohesion Policy in Ireland. It has since been extended to other countries and regions of the EU (Bradley, Gács, Kangur, and Lubenets, 2005). The HERMIN model does not have the same micro-foundations of the QUEST model because forward-looking expectations and complete optimising behaviour were considered to be overly strong assumptions (European Commission, 2009). Indeed, the micro foundations used in models such as the QUEST model are not without their critics. Differences in models can lead to large differences in estimates for the effects of fiscal policies.

Although the HERMIN model is based on theoretical foundations, historical data is used to calibrate the model to the Irish economy. The majority of the data were downloaded from the European Commission's AMECO database of the end of October, 2012. Data on spending on research and development and data on export shares are taken from the OECD online database. Data on sectoral branches are taken from the Eurostat database (November 2012) using NACE Rev. 2. This differentiates the NERI implementation of the HERMIN model from the standard version. Also in contrast to the standard version, the government wage bill is taken from government expenditure on wages and salaries, rather than the total wages of proxy NACE sectors. The public sector is represented by the NACE sectors O to Q (these are the sectors Public administration and defence/compulsory social insurance; Education; and, Human health and social work activities). Though multipliers vary depending on economic circumstances, any change is likely to be minor for changes in the Irish economy over the past year. Data for repatriated profits is taken from Eurostat from 1995 to 1998 and from the CSO afterwards. Migration data are taken from the CSO, and do not respond to the fiscal changes. The model was calibrated using data from 1996 to 2010.

The multipliers are not particularly sensitive to relatively minor changes in the baseline. Nevertheless, to ensure a realistic baseline, the April 2013 Stability Programme Update was used to project government spending and revenue decisions.

4. RESULTS

The effects of seven different fiscal measures were assessed. The measures refer to a discretionary fiscal consolidation of €1 billion. For spending cuts this is straightforward. For changes in tax rates it is slightly more involved. The starting point is to find what change in tax rate would raise €1bn in 2014 (assuming no change to behaviour). Then the model is run to see how much tax is actually raised. So for example, a €1bn consolidation based on an increase in income tax of €1 billion may raise income tax by less than €1 billion. This is as a fiscal consolidation will do some harm to the economy, so the actual yield will be less than the discretionary change. The fiscal measures examined are 1) an increase in direct tax (such as income tax), 2) an increase in indirect tax (such as VAT), 3) an increase in capital tax (such as capital acquisitions tax), 4) an increase in corporation tax 5) a cut to non-wage public consumption, 6) a cut to public sector wages, 7) a cut to social transfers, 8) a cut to public investment, 9) an increase in employer's PRSI, and, 10) a cut in public sector employment. The definitions used are those used by the European Commission (as part of its AMECO database). The tables are presented as fiscal contractions (spending cuts and tax increases) so as to make easy comparisons to previous work carried out by the ESRI (Bergin et al., 2013). The multipliers are presented in absolute terms to aid comparison with other studies, such as Coenen et al. (2012). The multipliers are reported as the change in GDP relative to the baseline for a given year, divided by the size of the discretionary change in policy (which for all cases is €1 billion).

It should be noted that in the HERMIN model total social welfare spending is not linked to unemployment. A loss of 10,000 jobs could be expected to cost the state somewhere between €86 million and €200 million. The Department of Finance estimates that in 2012 the average annual cost per person on the Live Register was €8,670 (Department of Finance, 2013), but this does not include other benefits (such as medical cards). These should be added to the numbers presented below.

The previous work which is most comparable to this paper is the work of Bergin, Conefrey, FitzGerald, and Kearney (2010) and Bergin et al. (2013). Though a direct comparison can be made for spending cut between the studies, this approach takes a slightly different approach to taxation. In this study a €1 billion fiscal consolidation is considered to be without regard to the negative effects it produces. So for example a €1 billion fiscal effort of raising €1 billion in direct tax will not achieve this (as the negative effects on the economy of a tax increase will mitigate some of the increase in revenue). In contrast, the other two studies look at the necessary tax change that leads to a fiscal outcome of €1 billion extra revenue in a particular tax. The fiscal effort needed to achieve this is most likely higher.

4.1 An increase in direct tax or worker's PRSI

Table 1: €1bn increase in direct taxes or worker's PRSI in 2014

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.07	1.11	1.15	1.17	1.19	1.19	1.19
	Percentage Change Relative to Baseline						
GDP	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
Consumption	-1.5%	-1.5%	-1.6%	-1.6%	-1.6%	-1.5%	-1.5%
Non-Agricultural wages	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%
Consumption deflator	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%
Total Employment	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%
Output manufacturing	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Output services	-0.9%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%
	Absolute changes						
Employment	-8,900	-9,100	-9,300	-9,400	-9,500	-9,500	-9,600
Unemployment rate	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%
Balance of payments (% GDP)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Borrowing requirement (%GDP)	-0.3%	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.3%
Borrowing requirement (€million)	-526.9	-467.8	-485.9	-509.1	-537.8	-568.1	-599.6
Direct Tax revenue	888	881	907	931	957	984	1,012

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

Direct taxes are taxes paid by private citizens on income or taxes paid regularly on wealth (such as the Local Property Tax). The most important direct tax is income tax, and property tax is a common example. Though other taxes such as capital acquisitions tax (a tax on gifts and inheritances) can be viewed as a tax on wealth, as they are levied on an irregular basis they fall under the category of capital tax. In the HERMIN model a change in the rate of worker's PRSI has the same effect as a change in direct taxation. As can be seen (Table 1) the initial effect is smaller and it takes some time before it takes full effect. The percentage change of GDP relative to the baseline is stable, but as the rate is a percentage of a growing economy, the overall effect is increasing. An increase in direct tax has a depressing effect on the domestic economy, leading to falls in employment. There is a slight improvement in the balance of payments as less is being imported (due to lower domestic demand) and a slight improvement in competitiveness (as the

fall in domestic demand leads to a ‘crowding in’ of the export industries as wages fall). As can be seen, despite a discretionary change in policy with the aim to raise €1 billion in direct taxes, less than €1 billion is raised for the first six years. This is as increasing the rate of direct tax has two main effects. One is to shrink the size of the economic pie from which the state cuts its share; the other is to increase the size of the share taken. However, as the economy is naturally growing by 2020 the amount taken in revenue is greater than the discretionary change. Overall however, the effect on the borrowing requirement remains considerably below €1 billion. This is as an increase in direct tax also has a negative effect on other taxes (such as VAT).

The figures presented are broadly similar (though somewhat larger in magnitude) to those of the ESRI (for an income tax increase) (Bergin et al., 2013). The drop in consumption is larger under this analysis. This may be as in this analysis the direct tax increase leads to fall in wages (due to a depressed labour market), but in the ESRI analysis wages increase mitigates the fall in income (in the HERMES model workers bargaining over take-home pay rather than gross pay). Similar effects are found on employment and the balance of payments.

4.2 An increase in indirect tax

Indirect taxes include taxes such as VAT, import duties, car registration taxes and levies on insurance premiums. Indirect taxes are generally considered to be regressive, and it should be noted that the HERMIN model (and also the vast majority of macroeconomic models used to calculate fiscal multipliers) does not account for inequality, or that people on different incomes consume different proportions of their income.

Table 2: €1bn increase in indirect taxes in 2014

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	0.94	0.82	0.92	1.01	1.10	1.10	1.10
	Percentage Change Relative to Baseline						
GDP	-0.5%	-0.5%	-0.5%	-0.5%	-0.6%	-0.6%	-0.6%
Consumption	-1.2%	-1.0%	-1.1%	-1.2%	-1.3%	-1.4%	-1.4%
Non-Agricultural wages	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Consumption deflator	1.5%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Total Employment	-0.4%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%
Output manufacturing	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
Output services	-0.7%	-0.6%	-0.6%	-0.7%	-0.7%	-0.8%	-0.8%
	Absolute changes						
Employment	-7200	-6000	-6600	-7200	-7700	-8300	-8800
Unemployment rate	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Balance of payments (% GDP)	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%
Borrowing requirement (%GDP)	-0.6%	-0.6%	-0.6%	-0.6%	-0.7%	-0.7%	-0.7%
Borrowing requirement (€million)	-902	-1037	-1157	-1233	-1309	-1387	-1469
Indirect Tax revenue	1066	1183	1225	1256	1285	1314	1344

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

The increase in consumption taxes is less harmful to employment and GDP (Table 2), according to this analysis, than an increase in income taxes. Indirect taxes are assumed to be levied entirely on personal consumption, and so some of the negative effects leak abroad. Also, as wage bargaining accounts for inflation, the inflation caused by an increase in indirect taxes leads to higher nominal wages, which helps to mitigate some of the negative effects on private consumption. Inflation also harms international competitiveness due to higher costs, leading to falls in output in the manufacturing sector. However, overall the balance of payments improves as imports fall more than exports. By the second year, an increase in indirect tax aimed at raising €1 billion raises more than €1 billion. This is as an increase in indirect tax has three effects. The first is to reduce the overall level of personal consumption (which serves to reduce the tax yield. The second is to increase price inflation, which acts to increase the nominal level of personal consumption. The third is the higher rate increases the size of the share taken by the state. The latter two effects are greater, so overall revenue from indirect tax increases. As taxes are levied on nominal amounts, inflation raises the nominal yield on other taxes (such as direct taxes).

4.3 An increase in capital tax

Capital taxes are taxes on capital transfers such as gifts or occasional and exceptional levies such as a levy on the increase in value of agricultural land following rezoning. According to Table 3 this is among the least harmful (to GDP) of tax increases. It is assumed in the HERMIN model that the negative effect is due to the reduced borrowing requirement of government. This leads to a lower interest bill for the government. As such interest payments are someone's income, it leads to a slight negative effect on the economy.

Table 3: €1bn increase in capital taxes in 2014

Period	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	0.04	0.09	0.14	0.18	0.23	0.23	0.23
	Percentage Change Relative to Baseline						
GDP	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Consumption	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.4%
Non-Agricultural wages	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%
Consumption deflator	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Employment	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Output manufacturing	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Output services	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%
	Absolute changes						
Employment	-400	-800	-1,100	-1,500	-1,800	-2,100	-2,400
Unemployment rate	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
Balance of payments (% GDP)	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
Borrowing requirement (%GDP)	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%	-0.5%	-0.5%
Borrowing requirement (€million)	-1022	-1,043	-1,064	-1,085	-1,106	-1,128	-1,150
Direct Tax revenue	-4.4	-10.2	-16.4	-22.7	-29.0	-35.5	-42.1

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.4 An increase in corporation tax

An increase in effective corporation tax would also have a small effect. The increase need not be in the headline rate of 12.5%, but could be due to an adjustment of various allowances. The effect may appear surprisingly small (Table 4), though it should be noted in the study of Coenen et al. (2012), the multiplier for corporation tax for the US is reported as 0.24 and 0.15 for the EU. In the HERMIN model the tax base for the current year's corporation tax is the previous year's profits.

One reason the multiplier is so low is that retained profits are determined as a ratio of total profits rather than after tax profits. Also in the private sector investment is assumed to be determined by cost minimisation by firms rather profit maximisation (whether before or after tax). The analysis does not account for any potential reduction in foreign investment which may occur due to a loss of the "12.5% brand" or uncertainty regarding future corporation tax increases. For these reasons the estimates for a change in corporation tax should be treated with caution.

Table 4: €1bn increase in corporation taxes in 2014

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	0.05	0.10	0.15	0.21	0.26	0.26	0.26
Percentage Change Relative to Baseline							
GDP	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%
Consumption	-0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.5%
Non-Agricultural wages	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%
Consumption deflator	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Employment	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%
Output manufacturing	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Output services	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%
Absolute changes							
Employment	-400	-800	-1200	-1700	-2100	-2500	-2900
Unemployment rate	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
Balance of payments (% GDP)	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
General Government Balance (%GDP)	-0.6%	-0.6%	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%
Borrowing requirement (€million)	-1058	-1133	-1217	-1308	-1400	-1496	-1598
Corporation Tax revenue	1035	1086	1143	1207	1269	1334	1402

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.5 A cut to non-wage public consumption

Non-wage public consumption includes most of the day to day spending of government not included in wages. This study assumes that 60% of non-wage public consumption comes from the private sector services, 10% from private sector manufacturing, and 30% imported. As can be seen (Table 5), there is a strong negative effect on output from private sector services. As services are labour intensive it leads to a large fall in employment. The depressive effect leads to wage falls, which combined with the drop in employment leads to falls in private consumption. Although non-wage expenditure is cut successfully, cuts do not equal savings. The weaker

economy mean less taxes are collected, so the change in the government's borrowing requirement is less than €1billion.

Over time the multiplier is less than that for an increase in direct taxes. This is as a €1bn cut is a cut in nominal terms. Due to inflation, over time the real effect of such a cut diminishes. In contrast, for an increase in a tax rate, it remains a fixed percentage of an increasing nominal amount. The impact on GDP is broadly in line with Bénétrix and Lane (2009). In the majority of their specifications an increase in non-wage government consumption increases GDP, which is consistent with the findings presented in Table 5.

Table 5: €1bn cut in non-wage public consumption in 2014

Period	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.05	1.09	1.11	1.11	1.12	1.12	1.12
Percentage Change Relative to Baseline							
GDP	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%
Consumption	-0.7%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
Non-Agricultural wages	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
Consumption deflator	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Total Employment	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
Output manufacturing	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Output services	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
Absolute changes							
Employment	-10500	-10800	-10800	-10800	-10700	-10600	-10500
Unemployment rate	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Balance of payments (% GDP)	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%
Borrowing requirement (%GDP)	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
Borrowing requirement (€million)	-732	-650	-646	-653	-665	-678	-691
Non-wage expenditure	-1000	-1000	-1000	-1000	-1000	-1000	-1000

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.6 A cut to public sector wages

A cut in public sector wage rates has a large multiplier (Table 6). This is partially due to the value added in the public sector being measure in part as linked to the value of wages in the public sector. For this reason the multiplier should be treated with some caution.

The removal of €1 billion in pay rate reductions has the effect of reducing consumption, with private sector services being particularly badly hit. The effect on the borrowing requirement is relatively small. This is as a large amount of public sector pay is returned directly to the government in the form of tax. The reduced consumer spending and fall in employment reduces both direct and indirect taxes collected by the government, resulting in public sector pay cuts having a relatively small impact on the deficit. The results contrast somewhat with those of Bénétrix and Lane (2009). In all their specifications, an increase in the government wage bill (whether due to pay rates or head count) reduces GDP. However, the results are qualitatively

the same as those of Bergin et al. (2013). Although the effect on GDP is smaller in their paper, the effect on private consumption is very similar.

Table 6: €1bn cut in public sector wages in 2014

Period	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.35	1.37	1.38	1.37	1.37	1.37	1.37
	Percentage Change Relative to Baseline						
GDP	-0.8%	-0.8%	-0.7%	-0.7%	-0.7%	-0.7%	-0.6%
Consumption	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%	-0.8%	-0.8%
Non-Agricultural wages	-1.7%	-1.7%	-1.7%	-1.6%	-1.6%	-1.6%	-1.5%
Consumption deflator	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Total Employment	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
Output manufacturing	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Output services	-0.6%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%	-0.5%
	Absolute changes						
Employment	-5,200	-5,400	-5,400	-5,300	-5,200	-5,100	-5,000
Unemployment rate	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
Balance of payments (% GDP)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Borrowing requirement (%GDP)	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Borrowing requirement (€million)	-346	-300	-295	-299	-307	-315	-323
Public Sector Wages	-1000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.7 A cut to social transfers

A shortfall of the HERMIN model is that rather than being linked to factors such as the numbers of unemployed, numbers of pensioners and so on, social transfers are simply a rate set per person, and linked to inflation. Therefore, as seen in Table 7 the effect on a change in rate amplifies over time as the base (size of population and price inflation) change over time. Nevertheless, the negative effects on private consumption are clearly seen, leading to job losses. Less VAT is paid on consumption, and less direct tax is being paid due to lower employment, resulting in the government deficit being improved by only approximately half the actual adjustment.

The effects on private sector consumption and GDP reported in Table 7 are somewhat larger than those reported by Bergin et al. (2013). This may be due to different assumptions regarding the savings rate. Qualitatively the results are similar.

Table 7: €1bn cut in social transfers in 2014

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.06	1.10	1.12	1.12	1.12	1.12	1.12
	Percentage Change Relative to Baseline						
GDP	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%
Consumption	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.4%	-1.4%
Non-Agricultural wages	-0.1%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
Consumption deflator	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Total Employment	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%
Output manufacturing	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Output services	-0.9%	-1.0%	-0.9%	-0.9%	-0.9%	-0.9%	-0.9%
	Absolute changes						
Employment	-8,800	-9,000	-9,100	-9,000	-8,900	-8,800	-8,700
Unemployment rate	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Balance of payments (% GDP)	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%
Borrowing requirement (%GDP)	-0.3%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Borrowing requirement (€million)	-523	-462	-470	-484	-503	-523	-543
Social Transfers	-1000	-1028	-1052	-1066	-1079	-1093	-1107

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.8 A cut to public investment

The HERMIN model was originally developed with analysing the effects of European Structural and Cohesion funds specifically in mind, and is therefore well suited to measuring the effect of a €1 billion cut to public investment. Public investment has the largest multiplier and this is consistent with other studies (Coenen et al., 2012; European Central Bank, 2012). The effect increases over time as the lack of investment reduces Ireland's capacity as an export platform. The job losses are also large. It should be noted that these results are somewhat sensitive to differences in the price index for building and construction. This sector has yet to return to any sort of equilibrium, and reported price indices are somewhat unreliable. Nevertheless, the large multiplier is consistent with other studies.

The effects shown are considerably larger than those reported in Bergin et al. (2013). This may partially be due to different assumptions regarding the price of construction. Also, the HERMES model assumes that public investment has no role in enhancing productivity (effectively assuming that public investment involves building roads to nowhere). In contrast the HERMIN model accounts for these positive spill-overs. Due to these productivity enhancing effects, cuts to investment have a relatively small effect on the deficit (and if the effects on social welfare spending of changes in employment were properly accounted for, it is likely to be self-financing).

The impact on GDP is broadly in line with Bénétrix and Lane (2009). In the majority of their specifications an increase in public investment increases GDP (at least over the short run, for which their methodology is more appropriate), which is consistent with the findings presented

in Table 8. Positive effects are also found in an analysis by Pereira and Pinho (2011). A recent analysis conducted by Bradley and Untiedt (2012b) focusing on Ireland and also using the HERMIN model shows results that are broadly similar (though slightly smaller in magnitude, again possibly due to different assumptions regarding the price index for building and construction). Recent work by Kelly and McQuinn (2013) suggests that models such as HERMIN and HERMES may overstate the effects an investment cut has on the public finances. This is due to the linkages between the cost of a bank bailout, and the rate of unemployment (the unemployed are more likely to default on their mortgage). Therefore public sector investment is likely to be self-financing. A more detailed discussion of an investment stimulus is given in O'Farrell (2012).

Table 8: €1bn cut in public investment in 2014

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.76	1.88	1.98	2.06	2.15	2.15	2.15
	Percentage Change Relative to Baseline						
GDP	-1.0%	-1.0%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%
Consumption	-1.1%	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%
Non-Agricultural wages	-0.3%	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%
Consumption deflator	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Total Employment	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%
Output manufacturing	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.6%
Output services	-1.5%	-1.6%	-1.6%	-1.6%	-1.5%	-1.5%	-1.5%
	Absolute changes						
Employment	-18500	-18800	-18800	-18600	-18400	-18200	-18100
Unemployment rate	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Balance of payments (% GDP)	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.3%
Borrowing requirement (%GDP)	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Borrowing requirement (€million)	-420	-255	-216	-194	-177	-157	-134
Public Investment	-1000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.9 An increase in employer's PRSI

The effect of a change in employer's PRSI (Table 9) is almost identical to the effect of a change in corporation tax. Both impact on firm's after-tax profits in the same way (in the model), but they have a different tax base (employer's PRSI is based on worker's pay, but corporation tax is based on last year's profits). The impact operates through the same channels as a change in corporation tax.

Table 9: €1bn increase in employer's PRSI

	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	0.04	0.09	0.14	0.19	0.24	0.24	0.24
Percentage Change Relative to Baseline							
GDP	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%
Consumptoin	-0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.4%
Non-Agricultural wages	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%
Consumption deflator	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Employment	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Output manufacturing	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Output services	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.3%
Absolute changes							
Employment	-400	-800	-1200	-1500	-1900	-2300	-2600
Unemployment rate	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
Balance of payments (% GDP)	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
Borrowing requirement (%GDP)	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
Borrowing requirement (€million)	-1022	-1065	-1124	-1178	-1235	-1294	-1356
Employer PRSI revenue	998	1017	1052	1081	1111	1143	1175

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

Table 10: €1bn cut in public sector employment

Period	2014	2015	2016	2017	2018	2019	2020
GDP Multiplier	1.38	1.42	1.48	1.45	1.42	1.42	1.42
Percentage Change Relative to Baseline							
GDP	-0.8%	-0.8%	-0.8%	-0.8%	-0.7%	-0.7%	-0.6%
Consumptoin	-1.0%	-1.1%	-1.1%	-1.1%	-1.0%	-1.0%	-0.9%
Non-Agricultural wages	-0.3%	-0.6%	-0.7%	-0.7%	-0.7%	-0.6%	-0.6%
Consumption deflator	-0.3%	-0.4%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%
Total Employment	-1.7%	-1.8%	-1.8%	-1.7%	-1.7%	-1.7%	-1.7%
Output manufacturing	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%
Output services	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.6%
Absolute changes							
Employment	-31300	-32100	-32500	-32200	-32000	-31700	-31500
Unemployment rate	1.5%	1.5%	1.6%	1.5%	1.5%	1.5%	1.5%
Balance of payments (% GDP)	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Borrowing requirement (%GDP)	-0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Borrowing requirement (€million)	-241	-28	43	73	88	101	114
Public Sector Pay bill	-1000	-964	-971	-971	-971	-971	-971

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

4.10 A cut to public sector employment

As satisfactory data is not available, the public sector is proxied by sectors Public administration and defence/compulsory social insurance; Education; and, Human health and social work activities (O,P, and Q in the NACE Rev.2 framework). These sector's employ over 470,000 people, while actual public sector employment (excluding semi-states) is considerably smaller (at roughly 330,000 workers). Using the proxy data, it is necessary to fire roughly 25,700 workers to cut €1 billion from the public sector pay bill, though in reality the figure is closer to 18,000. Therefore the employment losses shown in Table 10 are exaggerated by about 8,000 workers. Interestingly, the measure is ineffective at closing the deficit.

A cut to public sector employment has a large direct negative effect on GDP. This is as output in the public sector is reduced as a result of the job losses. In contrast Bergin et al. (2013) assume that there is no loss in public services, meaning efficiency in the public sector increases to an extent that there is no loss in services. The reality is most likely between these two extremes.

4.11 An overview of results

Table 11: Effect of €1bn consolidation on GDP multiplier in 2014

	2014	2015	2016	2017	2018	2019	2020
Direct taxes	1.07	1.11	1.15	1.17	1.19	1.19	1.19
Indirect taxes	0.94	0.82	0.92	1.01	1.10	1.10	1.10
Capital Tax	0.04	0.09	0.14	0.18	0.23	0.23	0.23
Corporation Tax	0.04	0.09	0.14	0.19	0.24	0.24	0.24
Non-Wage Public Consumption	1.05	1.09	1.11	1.11	1.12	1.12	1.12
Public Sector Wages	1.35	1.37	1.38	1.37	1.37	1.37	1.37
Social Transfers	1.06	1.10	1.12	1.12	1.12	1.12	1.12
Public Investment	1.76	1.88	1.98	2.06	2.15	2.15	2.15
Employer's PRSI	0.04	0.09	0.14	0.19	0.24	0.24	0.24
Public Sector Employment	1.38	1.42	1.48	1.45	1.42	1.42	1.42

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

Tables 11 to 13 allow for a more easy comparison between the various measures. Despite the mantra that cuts are better than savings, this is not the case. Short run multipliers from the European Central Bank (2012) show that the most damaging (to GDP) cut is to public investment, followed by government consumption, a consumption tax, and finally a labour tax, with cuts to general transfers (transfers not targeted at poor households or households with difficulty accessing credit) having a negligible or positive effect. Over the long run a cut to public investment is the worst option, with changes to government consumption, labour taxes and consumption taxes having similar effects. Veld (2013) finds that Ireland has a multiplier on impact of 0.5 for a consolidation balanced between spending and revenue measures, and that cuts have bigger impact multipliers than revenue increases (though the impact dissipates over

time). The work of Coenen et al. (2012) show for the EU cuts to government consumption and investment are both very negative, while changes to corporate taxes and labour taxes are less so. The work of Bergin et al. (2013) is somewhat of an outlier in that cuts to public investment does not have the most damaging effect, but this is due to the HERMES model excluding the productivity boosting effects of public investment. Multipliers are compared in Table 11.

Table 12: Effect of €1bn consolidation on employment in 2014

	2014	2015	2016	2017	2018	2019	2020
Direct taxes	-8900	-9100	-9300	-9400	-9500	-9500	-9600
Indirect taxes	-7200	-6000	-6600	-7200	-7700	-8300	-8800
Capital Tax	-400	-800	-1100	-1500	-1800	-2100	-2400
Corporation Tax	-300	-700	-1100	-1500	-1900	-2300	-2700
Non-Wage Public Consumption	-10500	-10800	-10800	-10800	-10700	-10600	-10500
Public Sector Wages	-5200	-5400	-5400	-5300	-5200	-5100	-5000
Social Transfers	-8800	-9000	-9100	-9000	-8900	-8800	-8700
Public Investment	-18500	-18800	-18800	-18600	-18400	-18200	-18100
Employer's PRSI	-400	-800	-1200	-1500	-1900	-2300	-2600
Public Sector Employment	-31300	-32100	-32500	-32200	-32000	-31700	-31500

Table 13: Effect of €1bn consolidation on government borrowing requirement in 2014

	2014	2015	2016	2017	2018	2019	2020
Direct taxes	-527	-468	-486	-509	-538	-568	-600
Indirect taxes	-902	-1037	-1157	-1233	-1309	-1387	-1469
Capital Tax	-1022	-1,043	-1,064	-1,085	-1,106	-1,128	-1,151
Corporation Tax	-973	-1042	-1119	-1203	-1287	-1375	-1469
Non-Wage Public Consumption	-732	-650	-646	-653	-665	-678	-691
Public Sector Wages	-346	-300	-295	-299	-307	-315	-323
Social Transfers	-523	-462	-470	-484	-503	-523	-543
Public Investment	-420	-255	-216	-194	-177	-157	-134
Employer's PRSI	-1022	-1065	-1124	-1178	-1235	-1294	-1356
Public Sector Employment	-241	-28	43	73	88	101	114

Table 12 shows the effects on employment. Cuts to public investment have by far the worst effect on employment. Only changes to capital tax and corporation tax have relatively small

negative effects on employment. Of the spending cuts, cuts to public wages have the smallest effect on employment. However, this is as much of public wages returns directly to the public purse in terms of income tax, so the actual amount of money taken from the economy is less than €1 billion. The effectiveness of closing the public deficit is shown in Table 13.

Table 14: Comparison to Bergin et al. (2013) impact multipliers

	Bergin et al. (2013)	This study
Income Tax	0.4	1.07
Public Sector Wage Rates	0.3	1.35
Public Sector Employment	1.2	1.38
Social Transfers	0.4	1.06
Investment	0.6	1.76

Note: The GDP multiplier is reported in absolute terms to aid comparisons with other studies

As can be seen from Table 14 the multipliers presented in this study are greater in magnitude than those of Bergin et al. (2013). This seems largely to be due to private consumption being less sensitive in the HERMES model. In the HERMES model private consumption is a function of both household wealth and current income, while in this implementation of the HERMIN model it is determined by current income. The Bergin et al. (2013) results are consistent in magnitude with European Commission estimates (Veld, 2013). However, it should be noted that it is a subject of debate as to whether the effects of austerity have been underestimated (International Monetary Fund, 2012). Overall it is an empirical question as to which are more accurate. This will require more data to become available, and though the result will be useful to help improve the models used, by the time such empirical results are available the Irish economy will hopefully no longer be facing the same challenges.

Finally, in terms of closing the deficit, tax increases are generally more effective than spending cuts. Though cuts to public investment may be the most politically easy option, it has the second the least effect in terms of closing the deficit. It should also be noted that any changes in social welfare payments due to changes in employment are not accounted for in this analysis (nor is any change in migration), and these are likely to have a significant impact. This represents an important limitation in this analysis.

5 CONCLUSION

At the beginning of the crisis the economic problem was treated as though it was a problem of supply, rather than a lack of demand resulting from a financial crisis. Within a few years the narrative changed from one of a crisis of the financial system to one of government finances. The result has been that five years on economies across the world are still in a depressed state.

There have been some changes in rhetoric. The aim of austerity has been to restore the public finances to balance. However, notions such as expansionary fiscal contraction and that it is more

effective to tax than to cut were always based more on anecdotes and strongly held opinions than rigorous analysis. At best they relied upon economies facing supply side problems rather than the demand side crisis faced today.

Previously, research on the effect of a fiscal stimulus was considered a 'backwater' (Ramey, 2011). However, since the beginning of the crisis there has been a large increase in the literature regarding the effects of fiscal stimulus. This has shown that fiscal multipliers, at least in a time of recession, are higher than would otherwise be the case. This greatly strengthens arguments in favour of a fiscal stimulus, and a tax based consolidation. It should be noted that the impact on the cost of borrowing is excluded.

According to the analysis presented in this paper the most effective methods of closing the deficit are through increases in capital taxes, the effective rate of corporation tax, and indirect tax. The least effective method is by cuts to public investment and the public sector pay-bill.

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