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The Economic Impact of Higher Education Institutions in Ireland

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Abstract

In the context of Ireland, there is scarce evidence of the economic impact of higher education institutions. Building upon previous research that undertakes such an analysis using input output approaches, this chapter contributes to our knowledge in two aspects. On the one hand, it adopts a Keynesian multiplier approach, and thus enables comparisons between the results of the two methods. On the other hand, this chapter allows a closer examination of the role of higher education institutions at the regional level. In line with the existing evidence, this chapter finds that both Irish universities and institutes of technology are a significant economic force in the economy. Also, it is found that there is a negative relationship between the estimated multipliers and the size of institutions measured as total expenditure.

Keywords

Multiplier, Keynesian, Impact analysis, Universities, Institutes of technology

Introduction

From a historical perspective, the economic way of thinking has not been prevalent in the development of and policy making in the Irish higher education sector. There is a lack of economic analysis underlying decisions of the government either to expand the size of the sector, to cut the exchequer funding, or to strengthen the role of the sector in building the knowledge based economy. Nevertheless, we argue that greater importance should be placed on the understanding of the economic impact of students, institutions and the higher education sector as a whole, especially in the current period of funding crisis as termed by some scholars as well as media. Without such understanding, the relevant policies and practices which are intended to address challenges faced by the sector would probably be unable to achieve their full potential.

Since the establishment of Trinity College Dublin in 1592, the higher education sector in Ireland has grown significantly in size. The rapid expansion of the third level education, however, did not begin until the 1960s, when the founding of institutes of technology (IoTs) remarkably increased the number of higher education institutions (HEIs) in the country. Meanwhile, Ireland has seen its HEIs evolve from being concentrated in a few large cities to being dispersed throughout the country. In 1960, a total of 11 institutions were situated within five Irish counties, while within the next two decades, the number of HEIs more than doubled to 24, spanning across 12 counties. Formerly known as Regional Technical Colleges (RTCs), IoTs were created to provide courses mainly aimed at filling gaps in the industrial manpower structure, particularly in the technician area.

Along with the size expansion of the sector, the increase in student numbers was to continue from the early 1970s to the present day. The latest data show that 214,694 students enrolled at Irish HEIs in 2014-2015 and the sector employed 17,000 core staff, including over 9,000 academic staff (Higher Education Authority, 2015). Following the milestone event of introducing free higher education in 1996 by the Minister for Education, the amount of government funding in the sector increased considerably during the Celtic Tiger years. The economic crisis in 2008 overturned the trend, with state grant income to the sector dropping by 25% in the five year period to 2011 and tuition fees now overtaking state grants as the highest source of income (Grant Thornton, 2014).

Universities and IoTs in Ireland began to be considered as part of a national innovation, research and development industrial policy from the 1990s. Over a decade, the Universities Act 1997 and the Institutes of Technology Act 2006 were passed. Science Foundation Ireland (SFI) was established with the passage of the Industrial Development Act 2003. In 2006, the Department of Enterprise, Trade and Employment published the Strategy for Science, Technology and Innovation aimed at placing research and higher education at the core of the Irish economic policy (Department of Jobs, Enterprise and Innovation, 2006). This was followed by the Innovation Task Force, which reported in 2010, again placing the role of higher education in research and development (R&D) at the core of the Irish industrial policy.

Despite all these developments of the sector, little in the way of economic analysis has been undertaken. Presumption and inference were the norm – a presumption of more being better and inference from other jurisdictions, notably the UK. The expansion of the sector across regions was largely driven by the need for more technical and commercially linked training and upskilling, but we have not seen much analysis of the impact of those institutions on the regional economy. Similarly, few studies have examined the potential of a massive increase in the number of students attending HEIs leading to a crisis in higher education funding. National policies which call for greater contributions from universities and IoTs to the economy have, to a large extent, not been supported by robust economic analysis. As Irish HEIs currently form an important part of the economic infrastructure and generate substantial economic activity, now is the time to undertake detailed economic analyses of the sector.

While there are many levels at which research could be focused, in this chapter we examine the economic impact of Irish HEIs, focus on both individual institutions and the university and IoT

sectors, and aim to provide a broad overview of the impact of the sector. In the history of impact studies, two main methodological strands have been used, often concurrently – one relies on the use of input output analysis, the other on a Keynesian multiplier approach. There is little existing modelling in the public domain in Ireland on university multipliers, except for the reports on the social and economic impact of two Irish HEIs (Viewforth Consulting, 2014, 2015) and the study by Zhang *et al*. (2015) on the economic impact of the whole higher education sector. Built upon previous research which all undertakes input output analysis, this chapter adopts a Keynesian multiplier approach and is organised as follows. The methodology for the empirical estimation of our model is described in Section 2, followed by Section 3 which outlines the data set collected for the analysis. Next, the results are presented in Section 4 and are compared with those of other international and national studies. Section 5 offers some concluding remarks.

Methodology

Our analysis is undertaken using the model originally defined by Bleaney *et al*. (1992) and later by Armstrong *et al*. (1994), Huggins and Cooke (1997), and more recently by Sen (2011), all having measured the economic impact of individual universities on the local and regional economy. In particular, our analysis is confined to a single base year, 2010-11, which reflects the latest year for which *comprehensive* comparable accounting data are available for Irish universities. This also facilitates comparison with the Zhang et al (2015) analysis of Irish HEI's which uses the same data period. As Sen (2011) has stated, "the full impact of any expenditure injection is likely to occur over a number of years", therefore the results should be interpreted with caution. In the analysis it is necessary to make a number of assumptions, which are noted throughout the chapter wherever needed.

Initial injection (expenditure base)

At the outset, the model simply involves estimating the size of the initial monetary injection into the local economy.

This expenditure base is given as:

$$E = L + G$$

E = expenditure base, L = labour services bought by the HEI, G = goods and services bought from outside by the HEI. E excludes pensions (though not employees pensions contributions) and depreciation.

First-round gross local output (GLO)

$$Y1 = L + A + hG$$

Y_1 = first-round GLO, h = the proportion of G generated locally, A = the additional labour incomes of HEI employees.

First-round local disposable Income (LDI)

$$D1 = (1 - t)(Y1 - hiG)$$

D_1 = first-round impact on disposable incomes of local residents, i = indirect tax rate (e.g. Value Added Tax (VAT)), t = a direct tax rate (which allows for reduced unemployment benefits as well as income taxation).

Second-round gross local output (GLO)

$$Y2 = vZ + wcD1$$

Z = total spending by students, v = proportion of student expenditures made on local produced goods and services, w = proportion of staff spending on locally produced and services, c = proportion of staff income consumed (the remainder being saved) – the marginal propensity to consume.

Second-round local disposable income (LDI)

$$D2 = (1 - t)(1 - i)Y2$$

Assuming once more a rate of local re-expenditure of w, a third round of expenditure is obtained as:

$$Y3 = wcD2$$

$$D3 = (1 - t)(1 - i)Y3$$

Again assuming once more a rate of local re-expenditure of w, a fourth round of expenditure is obtained as:

$$Y4 = wcD3$$

$$D4 = (1 - t)(1 - i)Y4$$

The full multiplier for gross local output (all rounds)

The gross local output multiplier is given as:

$$\frac{Yf}{Y1} = \frac{(Y1+Y2+Y3+\ldots)}{Y1}$$
$$= 1 + \frac{(1 + wc(1 - t)(1 - i) + \cdots)Y2}{Y1}$$
$$= 1 + Y2/[1 - wc(1 - t)(1 - i)]Y1$$

Y_f = the final GLO (after all rounds of the multiplier process).

The full multiplier for local disposable income (all rounds)

The local disposable income multiplier is given as:

$$\frac{Df}{D1} = \frac{(D1 + D2 + D3 + \cdots)}{D1}$$
$$= 1 + \frac{(1 - t)(1 - i)(1 + wc(1 - t)(1 - i) + \cdots)Y2}{D1}$$
$$= 1 + \frac{(1 - t)(1 - i)Y2}{[1 - wc(1 - t)(1 - i)]D1}$$

D_f = the final LDI (after all rounds of the multiplier process).

Data and parameters

Data

Our analysis draws on a number of data sources, both secondary and primary. Ireland's higher education is provided mainly by seven universities, 14 IoTs, including Dublin Institute of Technology (DIT), and seven colleges of education. Due to data limitations we exclude the colleges of education

and private HEIs such as the Royal College of Surgeons in Ireland. There are also a number of third level institutions which provide specialist education in such fields as art and design, medicine, business studies, rural development, theology, music and law. The main focus of our analysis is on the seven universities and the 14 IoTs, where the bulk of third level public and private spending and students are located and we report the results for the university sector and the IoT sector respectively.

Data on the institution income and expenditure in 2010-11 was sourced from the Higher Education Authority (HEA), the statutory planning and policy development body for higher education and research in Ireland. Both the university and IoT sectors include institutions which vary significantly in terms of size measured by expenditure.

In order to analyse the regional impact of institutions, it is key to understand what a 'region' means in this context and how to define it. Our initial choice of regional classification followed the geographical locations of institutions, which in Ireland are defined as local authorities. In that sense, there are three universities situated in Co. Dublin, while the rest four universities are situated in Co. Galway, Co. Kildare, Co. Cork and Co. Limerick respectively. This classification may not be the best way to capture the expenditure linkages of universities in Ireland which itself is a rather small country with the majority of its economic activities concentrated in a few city-regions. To capture this and for consistency with other data sources we use Nomenclature of Territorial Units for Statistics (NUTS) III regions. Thus we run the analyses with the Dublin and Mid-East regions being combined, covering four universities – Dublin City University (DCU), Maynooth University (MU), Trinity College Dublin (TCD) and University College Dublin (UCD) – and four IoTs (Blanchardstown, Dublin, Dún Laoghaire and Tallaght). We refer to this as Greater Dublin Area (GDA). We use NUTS III region Mid-West for the University of Limerick (UL), covering Co. Clare and Co. Limerick, and so forth.

Based on the above classification, we calculated the proportion of goods and services purchased by universities from regionally-based businesses and from nationally-based businesses. Data underlying this calculation was based on an analysis of university supplier information in 2010-11, which has kindly been provided by the Irish Universities Association (IUA). The Financial Analysis Made Easy (FAME) database was accessed to geo-locate the businesses. Additional web searching was undertaken when it was difficult to determine the address of a business based on the results from the FAME.

The number of top suppliers examined in our analysis varies from 96 for UL to 124 for TCD. The total expenditure made to this small band of top suppliers is substantial, ranging from over €15 million for MU to more than €43 million in the case of UCD. The value of expenditure covered in our list of firms represents 30% of the total expenditure of UL on goods and services, and this number increases to 40% for University College Cork (UCC) and over 51% for MU. As suggested by the findings of Armstrong *et al*. (1994) and Huggins and Cooke (1997), universities tend to make a substantial number of small purchases from local businesses. It is reasonable for one to argue that our selection of top suppliers only could lead to an underestimation of the impact of universities on local economy.

We have no comparable detailed information on the supplier base of IoTs, however it was considered reasonable to use the university data as proxies for them. In particular, as we have found out, universities in GDA tend to report a much higher value of *h (regional)* than those situated elsewhere, a pattern we consider would also hold for the IoTs. Therefore, we use the average value of *h* reported by the four GDA-based universities in the calculation of institutes of technology Blanchardstown, Dublin, Dún Laoghaire and Tallaght, and the average value of *h* reported by the other three universities in the calculation of institutes of technology located outside the Greater Dublin Area.

Parameters

To implement the model we require a number of parameters. As is common in this area of research we find ourselves using parameters sourced from different data sources across a number of years, and

these years do not necessarily align to the accounting data. The implicit assumption therefore is that the parameters are constant, or slowly changing, across time. Given the relatively short time frame across which data are sourced in this study this seems a reasonable assumption.

The *additional labour income of HEI employees (A)* was set at 0, partly because of a lack of valid data. We contend that it is likely to be low in any case. Irish revenue data suggest that employees on Pay As You Earn (PAYE) taxation (which includes all staff covered here) have a typical additional income of approximate 1% per annum. To this extent, there is additional income uncaptured by this measurement, meaning that our results represent the economic impact of Irish HEIs in a conservative way.

Data on the *direct tax rate (t)* and *indirect tax rate (i)* was sourced from the Nevin Economic Research Institute (NERI). Collins and Turnbull (2013) used data from the most recent Household Budget Survey (HBS), which was published in 2012 covering data for the period 2009-10, to estimate both the direct and indirect taxation contributions of households. According to the authors, Irish households contribute, on average, 13.74% of their gross income in direct taxes and 10.3% of their income in indirect taxes, which values we use in our analysis.

To determine the *total spending by students (Z*) and the *proportion of student expenditures on goods and services in the locality (v)*, a student expenditure survey was designed and circulated to students enrolled at two Irish universities, namely the National University of Ireland Galway (NUIG) and TCD. This was undertaken in late spring 2013 and we were able to elicit 758 responses from TCD students and 482 responses from NUIG students, all of whom indicated their weekly expenditure during term time of 2013-14. For the purpose of this study part-time graduates were excluded when analysing the responses, as they were assumed to be from the locality and already be in residence. It was found that average weekly spending was €149.60 for a TCD student and €151.04 for a NUIG student, suggesting no significant difference between the expenditure of Dublin-based and non-Dublin-based students. Our results appear to be comparable to those of the fifth Irish Eurostudent survey 2013 – published by the HEA and Insight Statistical Consulting which claimed the average monthly expenditure met by the student themselves was €607 – see Harmon and Foubert (2014). In the absence of information for other institutions, we therefore used the TCD student results for the other Dublin/Kildare institutes, and applied the NUIG student results in the analysis of institutions situated outside GDA. On examination of the academic calendars of Irish HEIs, we decided to include 30 and 38 weeks in the calculation of total spending by undergraduates and full-time postgraduates respectively. The number of students enrolled at the universities was sourced from the HEA. Of total spending by TCD students, it was estimated that 86% took place within the Greater Dublin Area and 96% took place in Ireland. From the NUIG student survey, 83% of expenditure took place within the same region), while only 2% of expenditure took place outside Ireland.

Alongside the student survey we also carried out a staff expenditure survey to measure the *spending pattern of employees in Irish universities (w)*. In total the survey generated 383 usable responses from TCD staff and 176 from NUIG staff. Survey results indicated that 77% of TCD staff expenditure took place inside of the Greater Dublin Area and a further 12% of expenditure was spent in other Irish regions. For staff working at NUIG, around 73% of their expenditure was spent within Co. Galway, with only 10% of expenditure taking place outside Ireland. Similar to the student survey results, the TCD staff results were used for the other institutions situated within the Greater Dublin Area, while the NUIG staff results were applied when examining the case of those HEIs located outside Dublin/Kildare area.

The *marginal propensity to consume (c)* in Ireland was estimated as 0.31, based on the findings of an International Monetary Fund (IMF) study. Bhattacharya and Mukherjee (2010) used data from 18 Organisation for Economic Co-operation and Development (OECD) countries and showed a wide variation in the marginal propensity to consume across countries. Furthermore, the value of *c* in Ireland is, as we would expect for a small open economy which has very significant imported

consumption, much smaller than that undertaken in the other studies: for example, *c* was estimated as 0.65 in the Izmir study by Sen (2011) and 0.90 in the Cardiff study by Huggins and Cooke (1997).

Results

Results for the university sector

A number of multipliers were found by applying the analysis above. We calculated sectoral and individual multipliers, of different types, for both regional and national impact. These are summarised in Table X.1.

[Insert Table X.1 about here]

In 2010-11, Irish universities had the effect of generating a gross local output nationally of €2.12 billion, with a concomitant generation of local disposable income nationally of €1.71 billion. Overall, the gross local output multiplier on an output basis was estimated as 1.75. Every €1 of initial increase (decrease) in the expenditure base would result in a rise (fall) of €1.75 in gross local output in Ireland. For income, the local disposable income multiplier on an output basis was estimated as 1.70. Every €1 of initial increase (decrease) in the value of disposable income from universities would lead to a rise (fall) of €1.70 in local disposable income. To compare with the results of input output analysis, we will concentrate on the gross local output multiplier from output approach (GLO-O-M) measures.

Turning to the individual universities, we note that in all cases the impact nationally is greater than that regionally. This is as we would expect – the foot print of any industry or unit is diffused geographically, and in a small country such as Ireland this diffusion is likely to be almost nationwide. People in the South West and in Donegal are suppliers to and consumers of the Dublin based universities, people in Dublin similarly for the western universities. There is a quite evident negative relationship in the estimated multipliers (Figure X.1). The universities with lower spends are those with the greatest multipliers. One possible explanation for this would be if universities exhibited decreasing returns to scale. The three largest universities in terms of expenditure, UCD/TCD/UCC also show GLO-M metrics lower than the national average, across all measures.

[Insert Figure X.1 about here]

Results for the IoT sector

This section presents the results for the IoT sector, for which we also calculated sectoral and individual multipliers (Table X.2).

[Insert Table X.2 about here]

In 2010-11, IoTs had the effect of generating a gross local output nationally of €1.33 billion, with a concomitant generation of local disposable income nationally of €1.08 billion. Overall, the gross local output multiplier on an output basis was estimated as 1.90. Every €1 of initial increase (decrease) in the expenditure base would result in a rise (fall) of €1.90 in gross local output in Ireland. For income, the local disposable income multiplier on an output basis was estimated as 1.86. Every €1 of initial increase (decrease) in the value of disposable income from universities would lead to a rise (fall) of €1.86 in local disposable income. These two multipliers of the IoT sector are both larger than those of the university sector.

Figure X.2 shows the association between the estimated multipliers and expenditure bases of IoTs. In comparison to the university sector, the IoT sector shows a more complicated pattern. With the largest expenditure base, Dublin IoT has the smallest multipliers, a finding in line with the university sector that implies decreasing returns to scale. But there are many exceptions in the IoT sector to this phenomenon. Carlow IoT, for example, is in the middle range in terms of expenditure base, but it

exhibits the largest multiplier in all IoTs, significantly higher than those shown by a few IoTs which are much smaller in scale. Except Dublin IoT, all IoTs are much smaller than their university counterparts and closely clustered. It is possible to think that part of the reason for a complicated pattern of the association between the multipliers and expenditure bases of IoTs is their similar size. Without a significant difference in 'scale', there is a less obvious pattern of decreasing returns to scale.

[Insert Figure X.2 about here]

International and national comparisons

In this section, we undertake two sets of comparisons. First, we benchmark our results with those from studies which also use a Keynesian multiplier approach. These studies examine the case of universities in other countries such as the United Kingdom (UK) and Turkey. Second, we compare our results with those from Zhang *et al*. (2015), which examines the economic impact of Irish HEIs but uses input output analysis.

Hermannsson *et al*. (2012) shows multipliers for a number of Scottish universities derived from both Keynesian and input output models. Those multipliers range from a high of 2.15 to a low of 1.24, with the great majority in the 1.5-1.75 range. In Hermannsson *et al*. (2014) a series of multipliers for London based HEIs are given, which tend to be in the region of 3. Sen (2011) gives a range of 2.5 to 3 for multipliers calculated on a comparable basis to here. Huggins and Cooke (1997) provides a set of UK comparable multipliers, ranging from 1 to 3, with the majority in the 1.5-2 region. Bleaney *et al*. (1992) calculate a multiplier set of between 1.2 and 1.7 for their study. We can thus see that the multipliers found here are in broad agreement with the findings of other research that also uses the Keynesian multiplier approach, with the exception of the London universities. London however is a very concentrated market with over 50 HEIs in a very concentrated area, and thus it is highly probable that factors such as economies of co-production across the city are at play in the generation of these high multipliers. A number of the London institutions are also both highly specialised and high in expenditure given this specialisation. With the arguable exception of the Royal College of Surgeons in Ireland Irish higher education institutions, and especially those covered here, are broad in nature. Most IoT's have small elements of arts, humanities and social sciences, as an example, despite their STEM and technology focus.

We should also note that although not strictly comparable these multipliers are higher by a significant margin than the overall national fiscal multiplier of 0.5 as used by the International Monetary Fund (IMF) and the Irish Fiscal Advisory Council (IFAC) and those of the Economic and Social Research Institute (ESRI) (Irish Fiscal Advisory Council, 2013; Kearney *et al*., 2013). The ESRI multipliers range from 0.3 to 1.2. Out estimates here are closer to but in most cases greater than the overall expenditure multipliers in O'Farrell (2013) which range from 1.06 to 1.76.

The comparison between our results and those from studies which also adopts a Keynesian multiplier approach is essential, but it is also of interest to compare our results with previous research that focuses on the Irish higher education sector. As already indicated, there is little such evidence existing in the Irish context, with a few notable exceptions. Although the reports by Viewforth Consulting reveal insightful results for two individual universities, we would ideally like to compare results at both institutional and sectoral levels. Zhang *et al*. (2015) in their input output analysis examine the economic impact of the whole higher education sector in Ireland, including both the seven universities and 14 IoTs. Thus, it is more pertinent to compare our results with those of Zhang *et al*. (2015).

It is beyond the scope of this chapter to explain in great detail the methodology employed for input output analysis. A comprehensive review of some of the methodological and interpretational challenges can be found in Siegfried *et al*. (2007). Simply put, there are a variety of multiplier effects one could derive from the input output analysis, including output, income, employment or gross domestic product (GDP). The output multiplier for each sector refers to "the change in total output for

the economy as a whole resulting from a unit change in the final demand for that sector" (Hermannsson *et al*., 2014). The Type I output multiplier for a particular industry is defined to be "the total of all outputs from each domestic industry required in order to produce one additional unit of output" (Scottish Government, 2011), while the Type II output multiplier incorporates "not only the increase in demand for intermediate inputs but also induced household consumption effects" (Hermannsson *et al*., 2014). In other words, the Type I multiplier can be defined as direct and indirect effects, and the Type II multiplier can be defined as direct, indirect and induced effects.

As this chapter considers the economic impact of the spending made by HEIs, students and staff, it is more suitable to compare our results with the Type I output multipliers as found by Zhang *et al*. (2015). It thus should be noted that analyses of this type miss out on "downstream" effects, but have the advantage of providing a clean "sectoral" impact. While we think that the comparison should be made with great caution due to the significant differences between the two methodologies, it is still of interest to show whether HEIs perform similarly or differently in the two approaches. In other words, in this comparison, we are more interested in the patterns of institutional performance than in the exact multipliers shown by institutions as the multipliers are determined by the exact methods used for analysis. For example, we would like to know if decreasing returns to scale still exists in input output analysis as appears to be the case in the Keynesian multiplier approach.

In Figure X.3 we show the comparisons between the results of the two methods for the university and the IoT sector respectively. For Irish universities, there seems no a clear evidence of decreasing returns to scale in the input output analysis. UCD, the largest HEI in Ireland measured by expenditure, shows the highest value of Type I output multiplier. MU, the institution which exhibits the largest Keynesian multiplier, falls at the bottom of the rankings in the input output analysis. While the Type I output multipliers of Irish universities are in general smaller than the Keynesian ones, they are still larger than 1, indicating a positive impact of the institutions. In the IoT sector, most institutions show Type I output multipliers between 1.06 and 1.08, and the difference between institutions is really minor. What this comparison tends to suggest is that, although each methodology has its own advantages and disadvantages, in many ways different methods lead to quite different results. We would thus suggest that, as is good practice, great care should be taken with using any one model and a triangulation is more likely to yield sensible results.

[Insert Figure X.3 about here]

Concluding remarks

In Ireland, the higher education sector has increasingly been considered by policy makers to be a crucial component of the national economic strategy. From the late 1990s onwards, Ireland has seen the release of a series of national policies targeting investment in science and technology, in particular in its HEIs. Despite the strong commitment of the state resources to the sector, little in the way of formal economic impact analysis has been undertaken. There is however a need to do so from both the theoretical and practical perspectives. This chapter aims to address this gap and provides some evidence of the economic impact of seven Irish universities and 14 IoTs, the two main types of institutions in Ireland that provide third level education and conduct research activities.

There have been two main methodological strands used in the examination of economic impact of a wide range of actions. In this chapter we use a Keynesian multiplier approach, which used to be undertaken by most early studies on the modelling of university impact, as more recent work has tended to concentrate on input output modelling. The reason for us to choose this more conventional approach over input output analysis is that there exists none modelling on university multipliers using this approach, while a few notable exceptions undertake input output analysis of the Irish higher education sector.

Our chapter measures the economic impact of Irish HEIs through two main channels: 1) purchases of goods and services from external organisations and 2) expenditure of staff and students. In 2010-11,

the Irish higher education sector generated a gross output of €3.45 billion to the Irish economy, of which €2.12 billion was from the university sector and €1.33 billion from the IoT sector. The picture painted overall is a higher education sector which adds considerable gross value to the economy, in line with the findings of previous studies.

The sector is now faced with funding gap while taking in a growing number of students, which could inevitably undermine the quality of education Irish HEIs could provide. In an era of global competition for staff, international students and research funding, these difficulties may result in undesirable outcomes for the Irish higher education sector as a whole. As argued, the economic way of thinking has not been prevalent in the policy making in the sector but there is an urgent need to do so now. Along with those few existing studies, this chapter contributes in forming an evidence base for policy decision.

Table X.1 Multipliers of Irish universities

		Output Approach		Expenditure Approach	
		GLO-O-M	LDI-O-M	GLO-E-M	LDI-E-M
All	Ireland	1.75	1.70	1.69	1.36
DCU	Regional	1.66	1.62	1.60	1.29
	National	1.77	1.72	1.72	1.38
NUIG	Regional	1.81	1.75	1.33	1.08
	National	1.83	1.78	1.80	1.44
MU	Regional	1.81	1.75	1.68	1.35
	National	1.91	1.85	1.87	1.50
TCD	Regional	1.58	1.53	1.45	1.18
	National	1.67	1.62	1.57	1.29
UCC	Regional	1.70	1.63	1.29	1.06
	National	1.74	1.69	1.72	1.39
UCD	Regional	1.61	1.56	1.53	1.24
	National	1.70	1.65	1.66	1.34
UL	Regional	1.84	1.77	1.21	0.98
	National	1.85	1.80	1.64	1.32

Source: Authors' own calculation. GLO-O-M refers to gross local output multipliers from an output approach. GLO-O-E refers to gross local output multipliers from an expenditure approach. LDI-O-M refers to local disposable income multipliers from an output approach. LDI-E-M refers to local disposable income multipliers from an expenditure approach.

Figure X.1 Relationship between the GLO multipliers of Irish universities (regional and national) and their expenditure bases

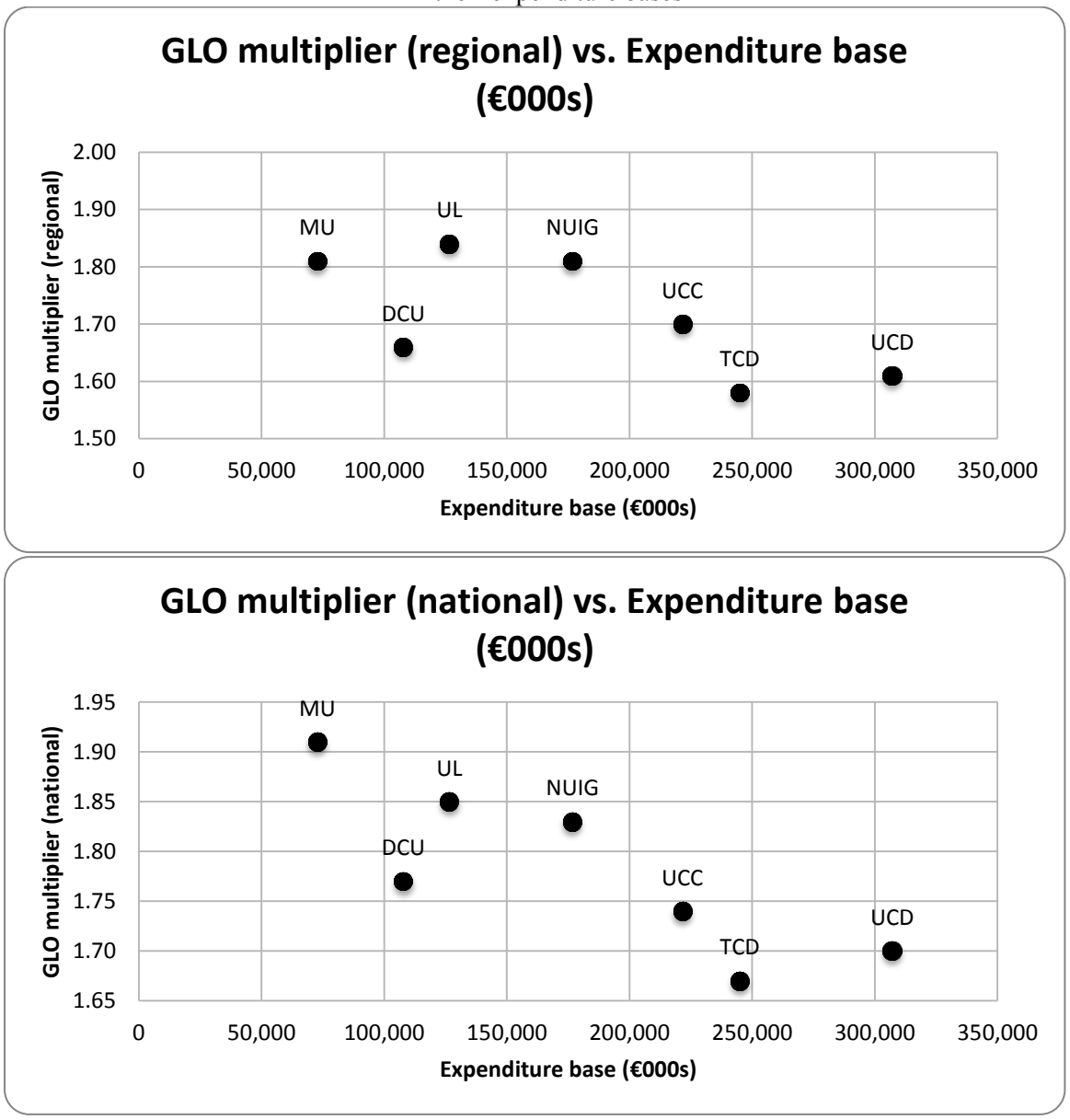


Table X.2 Multipliers of Irish IoTs

		Output Approach		Expenditure Approach	
		GLO-O-M	LDI-O-M	GLO-E-M	LDI-E-M
All	Ireland	1.90	1.86	1.86	1.50
Athlone	Regional	1.83	1.76	1.49	1.21
	National	1.92	1.85	1.86	1.51
Blanchardstown	Regional	1.89	1.82	1.83	1.48
	National	2.03	1.95	1.99	1.61
Carlow	Regional	2.06	1.96	1.72	1.40
	National	2.18	2.08	2.12	1.71
Cork	Regional	1.84	1.76	1.49	1.22
	National	1.92	1.85	1.87	1.51
Dublin	Regional	1.67	1.62	1.60	1.30
	National	1.78	1.72	1.73	1.41
Dundalk	Regional	1.80	1.73	1.54	1.26
	National	1.91	1.84	1.87	1.52
Dún Laoghaire	Regional	1.82	1.76	1.72	1.39
	National	1.94	1.87	1.88	1.51
Galway-Mayo	Regional	1.87	1.79	1.56	1.27
	National	1.97	1.89	1.92	1.55
Letterkenny	Regional	1.77	1.70	1.55	1.27
	National	1.89	1.82	1.86	1.51
Limerick	Regional	1.87	1.79	1.56	1.27
	National	1.98	1.90	1.93	1.56
Sligo	Regional	1.86	1.78	1.57	1.28
	National	1.97	1.89	1.92	1.56
Tallaght	Regional	1.89	1.81	1.82	1.47
	National	2.02	1.94	1.98	1.60
Tralee	Regional	1.72	1.66	1.41	1.15
	National	1.81	1.75	1.76	1.43
Waterford	Regional	1.75	1.68	1.46	1.19
	National	1.85	1.78	1.80	1.46

Source: Authors' own calculation. GLO-O-M refers to gross local output multipliers from an output approach. GLO-O-E refers to gross local output multipliers from an expenditure approach. LDI-O-M refers to local disposable income multipliers from an output approach. LDI-E-M refers to local disposable income multipliers from an expenditure approach.

Figure X.2 Relationship between the GLO multipliers of Irish IoTs (regional and national) and their expenditure bases

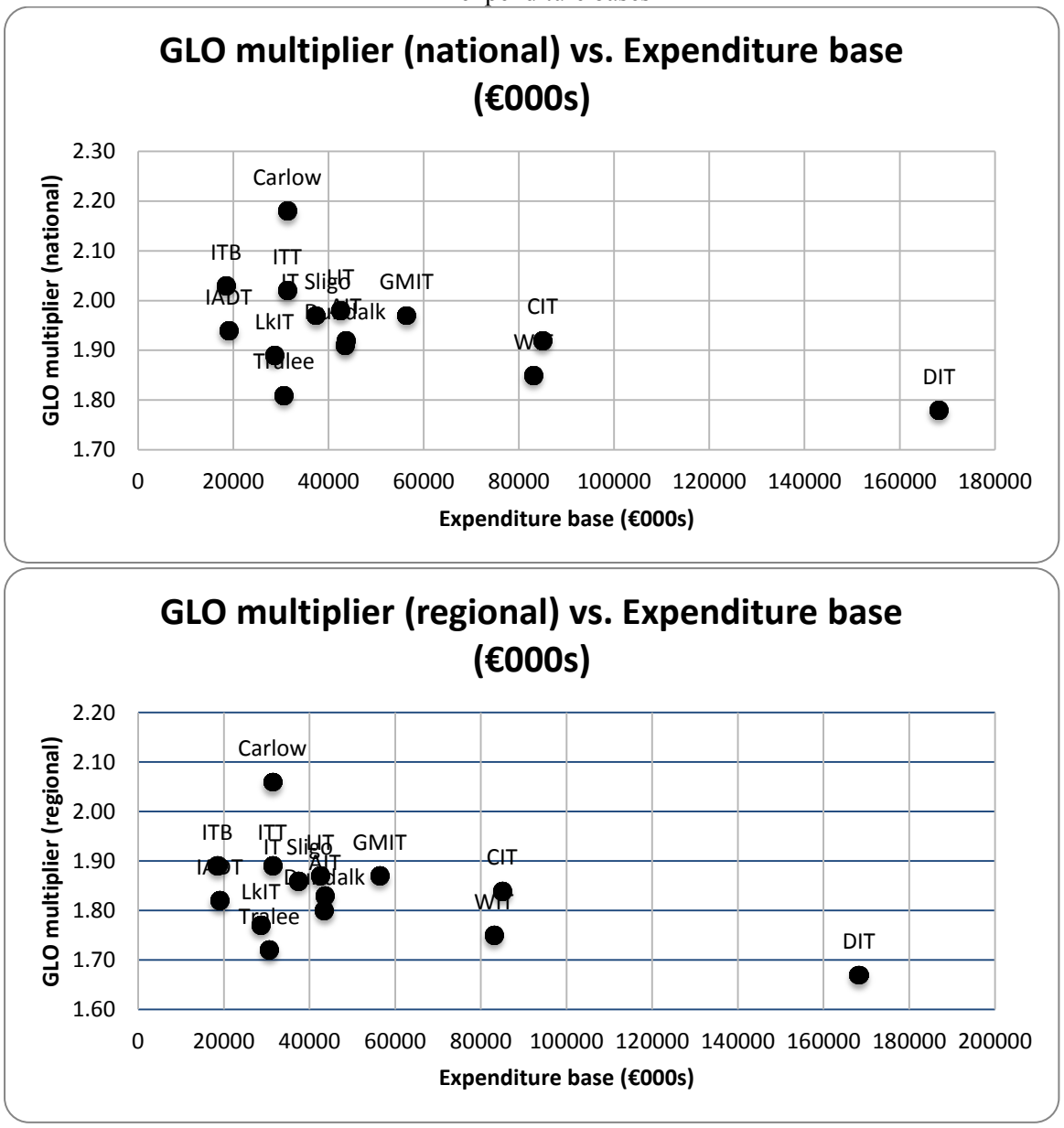
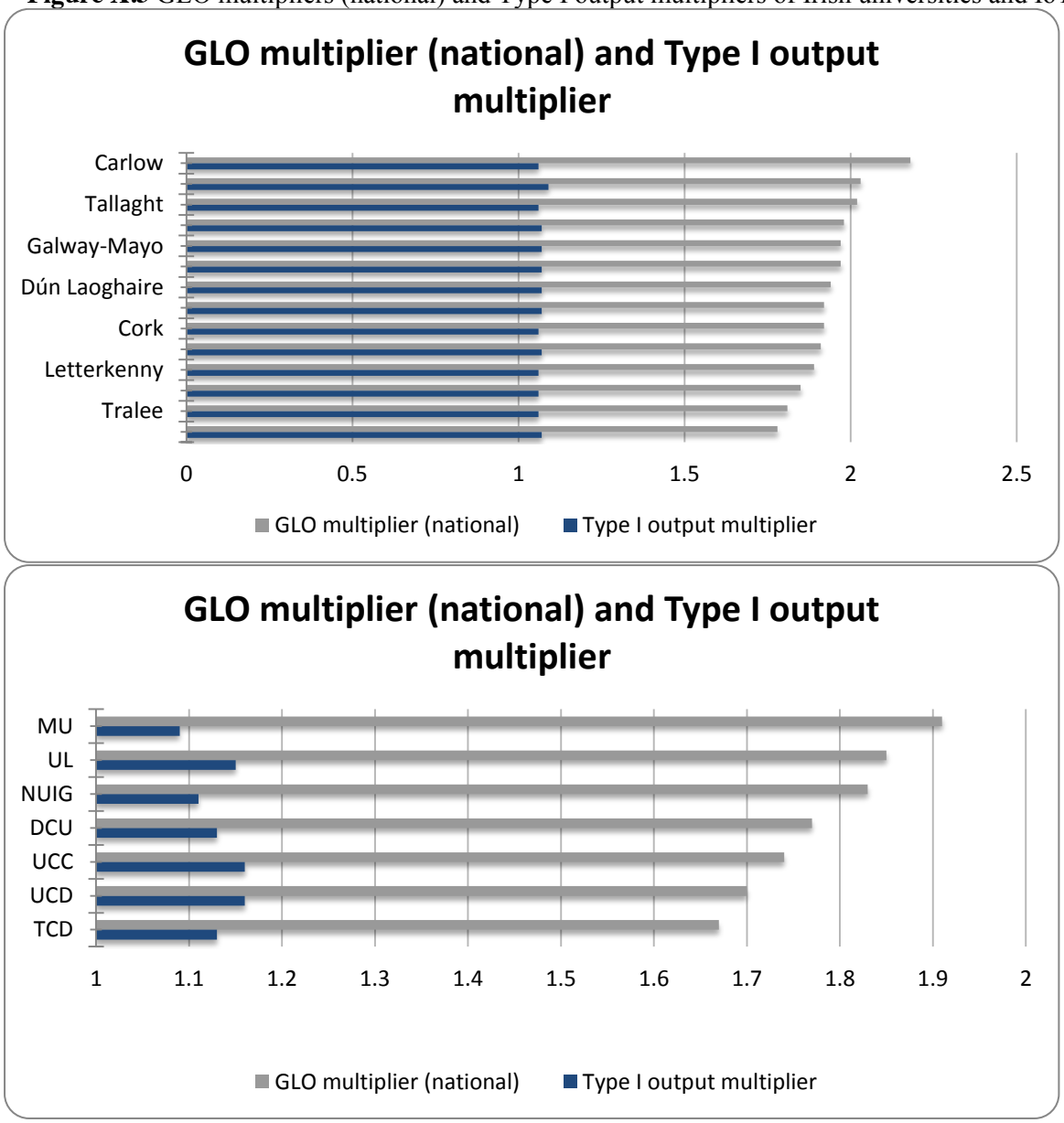


Figure X.3 GLO multipliers (national) and Type I output multipliers of Irish universities and IoTs



References

Armstrong, H., Darrall, J. and Grove-White, R. (1994) *Building Lancaster's future: The economic and environmental impacts of Lancaster University expansion to 2001*. Lancaster: Department of Economics and the Centre for the Study of Environmental Change, Lancaster University.

Bhattacharya, R. and Mukherjee, S. (2010) 'Private sector consumption and government consumption and debt in advanced economies: An empirical study', *IMF Working Paper*, November 2010.

Bleaney, M., Binks, M., Greenaway, D., Reed, G. and Whynes, D. (1992) 'What does a university add to its local economy?', *Applied Economics*, 24(3), pp. 305-311.

Collins, M. and Turnbull, D. (2013) *Estimating the direct and indirect tax contributions of households in Ireland*. Dublin: NERI.

Department of Jobs, Enterprise and Innovation (2006) *Strategy for science, technology and innovation 2006-2013*. Dublin: DJEI.

Grant Thornton (2014) *A changing landscape: Review of the financial health of the Irish higher education sector*. Dublin: Grant Thornton.

Harmon, D. and Foubert, O. (2014) *Eurostudent Survey V: Report on the social and living conditions of higher education students in Ireland 2013*. Dublin: HEA.

Higher Education Authority (2015) *Key facts and figures 2014/15*. Dublin: HEA.

Huggins, R. and Cooke, P. (1997) 'The economic impact of Cardiff University: Innovation, learning and job generation', *Geojournal*, 41(4), pp. 325-337.

Irish Fiscal Advisory Council (2013) *Fiscal assessment report April 2013*. Dublin: IFAC.

Hermannsson, K., Lisenkova, K., McGregor, P. G. and Swales, J. K. (2012) 'Policy scepticism and the impact of Scottish higher education institutions (HEIs) on their host region: Accounting for regional budget constraints under devolution', *Regional Studies*, 48(2). pp. 400-417.

Hermannsson, K., Lisenkova, K., McGregor, P. G. and Swales, J. K. (2014) 'The expenditure impacts of London's higher education institutions: The role of diverse income sources', *Studies in Higher Education*, DOI:10.1080/03075079.2014.899338.

Kearney, I., Fitzgerald, J. and Bergin, A. (2013) *The HERMES-13 macroeconomic model of the Irish economy*. Dublin: ESRI.

O'Farrell, R. (2013) *The effects of various fiscal measures*. Dublin: NERI.

Scottish Government (2011) *Input-output methodology guide*. Edinburgh: Scottish Government.

Sen, A. (2011) 'Local income and employment impact of universities: The case of Izmir University of Economics', *Journal of Applied Economics and Business Research*, 1(1), pp. 25-42.

Siegfried, J. J., Sanderson, A. R. and McHenry, P. (2007) 'The economic impact of colleges and universities', *Economics of Education Review*, 26(5), pp. 546-558.

Viewforth Consulting (2014) *Capturing the economic and social value of higher education: A pilot study of Dublin City University*. Gordon: Viewforth Consulting.

Viewforth Consulting (2015) *Delivering impact: The economic, cultural and social impact of University College Dublin*. Gordon: Viewforth Consulting.

Zhang, Q., Larkin, C. and Lucey, B. M. (2015) 'The economic impact of higher education institutions in Ireland: Evidence from disaggregated input-output tables', *Studies in Higher Education*, DOI: 10.1080/03075079.2015.1111324.