INDECON INDEPENDENT ASSESSMENT OF THE ECONOMIC AND SOCIAL IMPACT OF IRISH UNIVERSITIES

Presented to

The Irish Universities Association

4th April 2019

Prepared by

Indecon International Economic Consultants

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The Economic Impact of the University Sector in Ireland

€8.89 Billion Contribution of the University Sector to the Irish economy in 2017 / 2018

Irish Universities Directly Support 15,724 FTEs

Contribute to the Economy via:
- Teaching and skills development
- R&D and innovation
- Direct employment and expenditure
- Attracting overseas students

€2,802 Million

Contributed to total output in the Irish Economy in 2017 including direct, indirect and induced effects of non-research university expenditure

Lifetime Value of an Irish University Education

€106,000 — €62,000

#1 Net Lifetime Earnings Premium for Undergraduates

#2 Net Lifetime Benefits to the Exchequer

Net Graduate Income benefit of **€2,566 Million**
For 2017/18 student cohort

Net Exchequer Benefit of **€1,606 Million**
For 2017/18 cohort

Research & Development Impact

€1,531 Million

Contribution to the economy of R&D expenditure by Irish Universities in 2017 / 2018 via direct, indirect, induced and spillover impacts

Export Impact

€386 Million

Contribution to the economy of overseas students attending Irish Universities in 2017 / 2018

Executive Summary

Introduction

Indecon Research Economists (Indecon) is the largest independent economic research consultancy practice in Ireland and is part of the Indecon International Consultancy Group, which includes the leading European consultancy, London Economics. Following a competitive tender process, Indecon was appointed by the Irish Universities Association (IUA) to conduct a rigorous socio-economic impact assessment of the university sector in Ireland. The member organisations of the IUA are Dublin City University, Maynooth University, National University of Ireland Galway, Trinity College Dublin, University College Cork, University College Dublin and the University of Limerick. This report represents an independent evidence-based examination of the impacts of universities in Ireland on the wider Irish economy.

This report provides new insights into the impact of the Irish university sector in terms of:

- The direct impact of expenditures by the universities in the Irish economy;
- The indirect and induced impacts of university expenditures;
- The impact of Irish universities on research and knowledge transfer in Ireland;
- The economic contribution of overseas students attending Irish universities;
- The impact of teaching and learning on employment and earnings; and
- The role played by Irish universities in contributing to social and cultural facets of life in Ireland.

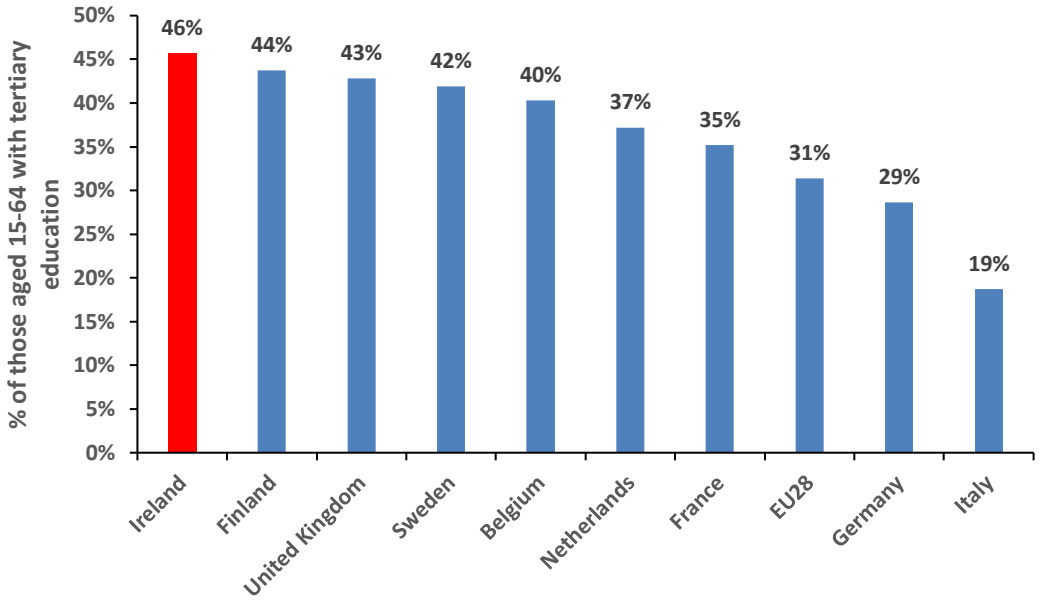
Indecon's methodological approach utilises evidence from a range of sources to provide a rigorous evidence base for establishing the impact of the Irish university sector on the wider Irish economy. In line with best practice approaches, a counterfactual analysis of the impact of university education on incomes and on the Exchequer has been undertaken. This approach ensures that the impact of university education is not overstated. Our analysis is based on the evidence from:

- Analysis of data and other inputs from the Irish universities;
- Analysis of Higher Education Authority (HEA) and Central Statistics Office (CSO) datasets;
- Detailed econometric modelling of the premiums from higher education in terms of improving the employment and earnings potential of graduates;
- A survey of Irish university alumni and leading enterprises in Ireland; and
- Macro-economic modelling of the direct, indirect and induced impact of expenditure by Irish universities based on outputs from the Indecon model of the Irish economy.

It is useful to first consider the wider economic context in which the Irish university sector operates. The sector has played a critical role in the development of the Irish economy since the foundation of the State, however, as noted by the leading US Nobel Prize winning economist, Kenneth Arrow, in a review of economic growth policy for Ireland: "*Universities are now moving into a more important role in increasing labour productivity than in the past*". Arrow also noted that "*graduate education plays a special role in facilitating the acquisition of advanced technologies*".[1] Ireland's educated workforce has been widely cited as one of a number of reasons for Ireland's success in continuing to attract foreign direct investment and in supporting indigenous enterprises. Ireland now has a more highly educated population than the EU average. Ireland's comparative position in relation to educational attainment for those aged 25-64 is illustrated in the following figure and represents a competitive advantage for Ireland.

[1] See Arrow, K. J., Stanford University, Economic Growth Policy for a Small Country, in Gray, A. W. (ed), *International Perspectives on the Irish Economy*, Indecon, 1997, ISBN 0 953131807

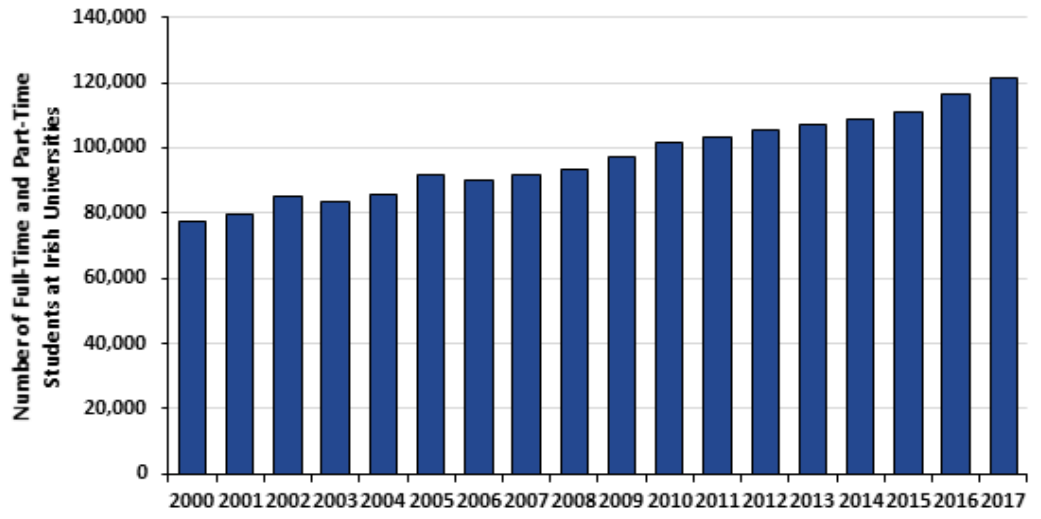
Percentage of Persons Aged 25-64 with a Third-Level Qualification (2017)



Source: Indecon analysis of Eurostat data

The move towards a higher skilled, more educated population in Ireland is reflected in the number of enrolments in Irish universities which exceeded 120,000 in 2017, compared to less than 78,000 in 2000, an increase of over 50%. This reflects both the growth in the population, in particular the growth in the university aged cohort, over this period and the shift towards more highly skilled employment in Ireland. Of note is that some sectors of the Irish economy now have over 65% graduate employment.

Total Number of Students Enrolled in Irish Universities (2000-2017)



Source: Indecon analysis of CSO data

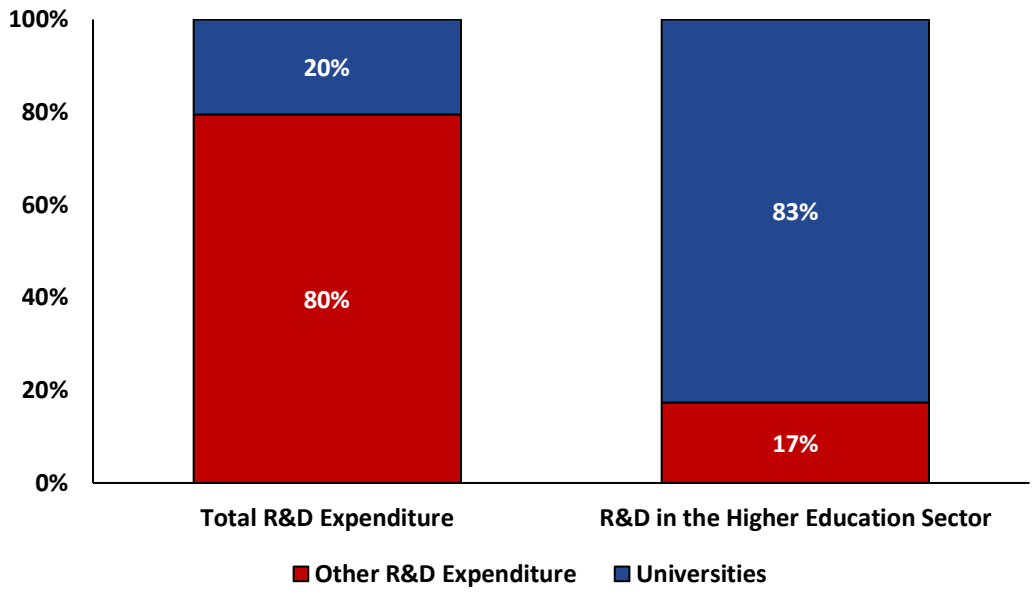
The Impact of Irish Universities on Research and Knowledge Transfer

The university sector in Ireland plays an important role in R&D and innovation. The universities in Ireland invest significantly in research and are also involved in joint research with enterprise. The seven universities cumulatively spent €631.8 million on research in 2017.

Engineering and technology had the highest level of research funding, with €188.9 million (29.9%) in 2017. Natural sciences and medical and health sciences were the second and third highest accounting for 24.5% and 22.6% of total research funding respectively.

Irish universities account for 20% of total annual national expenditure on R&D and this also represents 83% of all R&D expenditure in the higher education sector. This is indicative of the role played by the Irish university sector in innovation and R&D in the Irish economy.

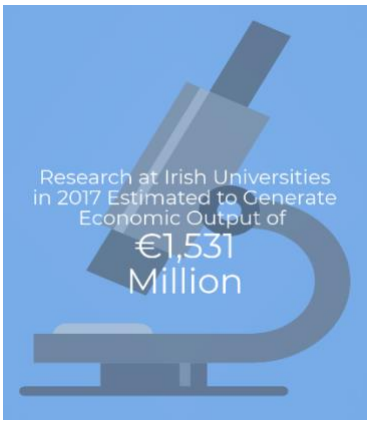
Contribution of Irish Universities to Total R&D Expenditure



Note: Based on 2017 estimates of total research expenditure by Irish universities and 2017 total R&D expenditure data from Eurostat
Source: Indecon analysis of information request to Irish universities and Eurostat data

An indicator of the contribution to research and innovation by Irish universities is the number of patents and research agreements in the university system. There were 611 patent families owned by Irish universities at the end of 2017. In addition, there were 584 collaborative research agreements or joint research projects between Irish universities and companies in Ireland undertaken in 2017.

Irish universities represent an important source of innovation in Irish enterprise. There were 93 active spin-outs in existence at the end of 2017. In addition, 188 enterprises were supported within Irish university incubators in 2017. Based on international evidence on the potential spillovers from research expenditure to the wider economy, Indecon estimates a spillover value from research expenditure in Irish universities in 2017 amounting to €373.1 million in net present value terms. The spillovers from the universities to the private sector are enabled through direct R&D collaborations between the universities and firms, the publication and dissemination of research findings, or through universities' graduates who enter into the labour market.



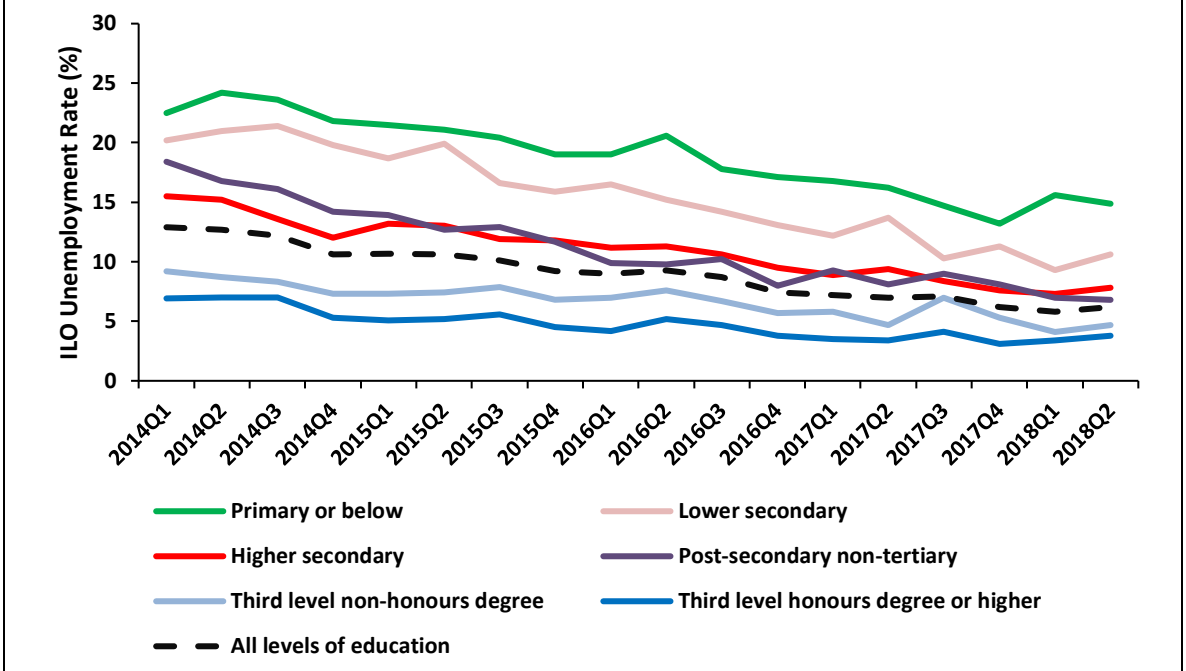
When combined with the research undertaken directly by Irish universities and the indirect and induced impacts of this expenditure it is estimated that the research undertaken over this period had a €1.531 billion impact on the Irish economy.

The Impact of Irish Universities on Earnings and Employment

A core function of the Irish university sector is the teaching of students. The universities represent institutions of educational excellence and play a vital role in providing students with the education and skills required to succeed in their careers both in terms of securing higher value sustainable employment and increasing lifetime earnings.

As outlined in the following figure, those with an honours degree or higher have consistently had lower unemployment rates than any other education level, reflecting their higher likelihood of finding and sustaining employment. Those with higher education also have a significantly higher labour force participation rate.

ILO Unemployment Rate by Education Level (2014 Q1 – 2018 Q2)



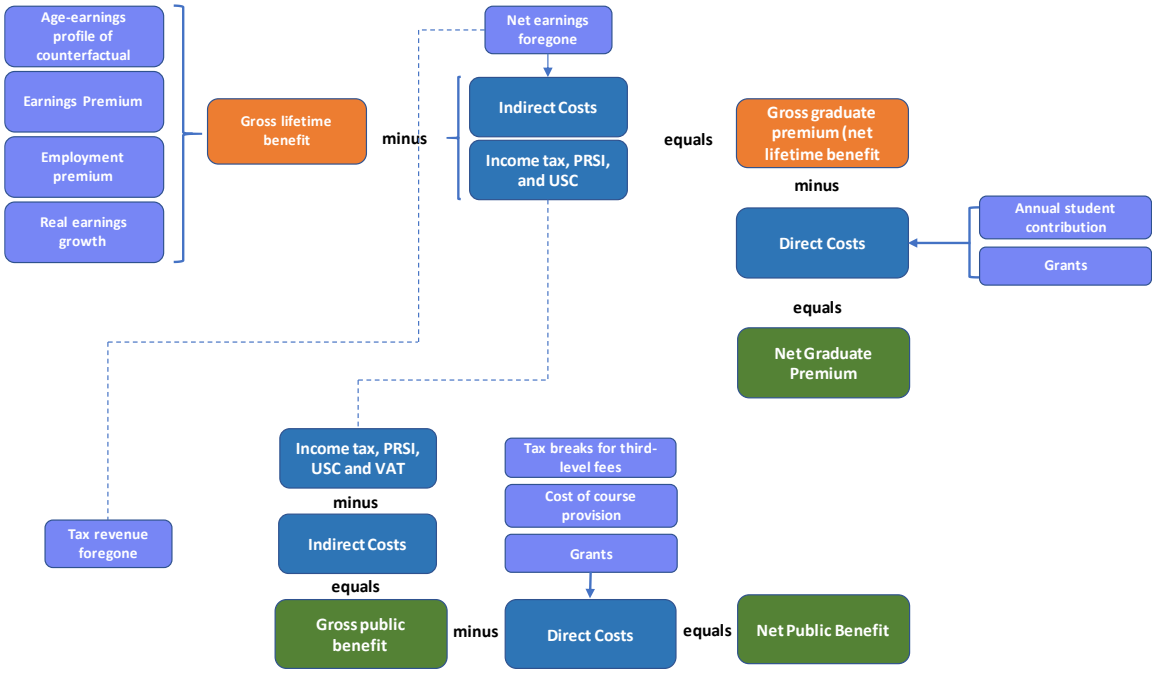
Source: Indecon analysis of CSO's Labour Force Survey

In examining the impact of the Irish university sector on earnings outcomes, Indecon undertook rigorous econometric modelling to estimate the employment and earnings premia associated with third-level education in Ireland. In line with best practice, Indecon utilised a range of models to estimate the premium associated with university education. The Ordinary Least Squares (OLS) and panel models suggest an earnings premium for third-level education of 38%-43% for graduates compared with individuals who have no formal education/primary education. For the counterfactual treatment models undertaken by Indecon, between a 21% and 30% premium for education to third-level was found. Unlike the OLS and panel models these treatment models compare earnings of graduates to similar individuals on a range of other socio-economic characteristics and aims to control for individuals' inherent abilities and other factors. The results of the treatment model are indicative of the earnings premium for those with a university qualification versus those with secondary level qualifications.

The results of Indecon's econometric modelling clearly demonstrate the returns to education for Irish students. The differential in earnings for third-level graduates is likely to reflect their increased productivity and benefit to the wider economy. The positive impacts suggested by the econometric evidence are confirmed by the views of graduates, with over 94% of respondents to Indecon's alumni survey indicating that their university education had a very positive or positive impact on their employment prospects. A majority of graduates also indicated that university education had a positive impact on their earnings potential and their individual productivity.

The Impact of Irish Universities on Lifetime Graduate Earnings

The following figure outlines the calculations undertaken in estimating the net lifetime earnings premium associated with obtaining an undergraduate degree from an Irish university, in addition to the Exchequer impact. This takes into account the costs of university education as well as the loss in earnings while students are attending college.



The estimated net graduate income premia achieved by students commencing undergraduate degrees in the 2017/2018 academic year are presented in the following table. The analysis indicates that the net graduate premium achieved by a representative student in the 2017/2018 cohort who completes a full-time undergraduate degree at an Irish university is €106,000 in present (2018) money terms. This finding of an average premium of €106,000 compares favourably to the findings of previous research undertaken in the UK which found a premium of £88,000 (€101,000) for the Russell Group Universities[2]. These figures are net of tax

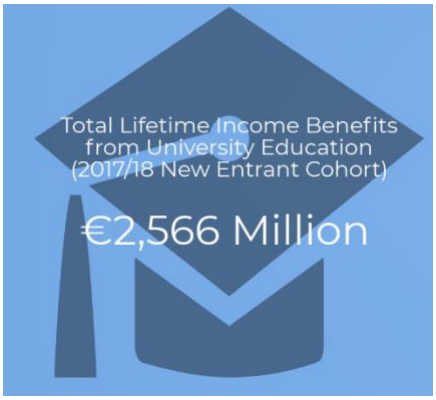
[2] London Economics, 2017, "The Economic Impact of Russell Group Universities"

and net of the costs incurred by students in obtaining their degrees as well as the costs of income foregone during the years in which they attend university. The estimates have been discounted by 4% per annum, in line with the latest technical paper from the Department of Public Expenditure and Reform published as part of the review of the Public Spending Code[3]. If a lower discount rate was used, the net graduate premia would be higher.

Estimated net graduate premiums to undergraduate degrees	
	Net graduate premium €
Male	118,000
Female	96,000
Average	106,000
Source: Indecon analysis	

Similar estimates for the premia associated with postgraduate and PhD qualifications are outlined in the following table. These premia are relative to individuals with an undergraduate qualification and reflect the additional lifetimes earnings benefits to further higher education.

Estimated Net Graduate Premiums to Postgraduate and PhD Qualifications – Relative to Undergraduate Qualifications		
		Net graduate premium €
Male	Taught Masters	36,000
	PhD	118,000
Female	Taught Masters	44,000
	PhD	115,000
Average	Taught Masters	40,000
	PhD	116,000
Note: All estimates are presented in 2018 prices, discounted to reflect net present values, and rounded to the nearest €1,000. ***Source: Indecon analysis***		



Building on the above analysis, it is estimated that the total lifetime earnings increase for the new entrant cohort of students who commenced their studies in 2017/2018 will amount to €2.57 billion, in present value terms.

The Exchequer Costs and Benefits of University Graduates

The preceding analysis can also be extended to estimate the net Exchequer costs and benefits from supporting university graduates. The expenditure by the Exchequer in providing undergraduate education constitutes a significant cost incurred by the Exchequer. It is important these costs are taken into account in estimating the net impact on the Exchequer. The costs to the Exchequer are compared to the Exchequer benefits from university graduates via increased income tax receipts associated with their higher incomes as well as increased taxation arising from the additional spending supported by these higher incomes. The results indicate that there is a net Exchequer benefit associated with supporting

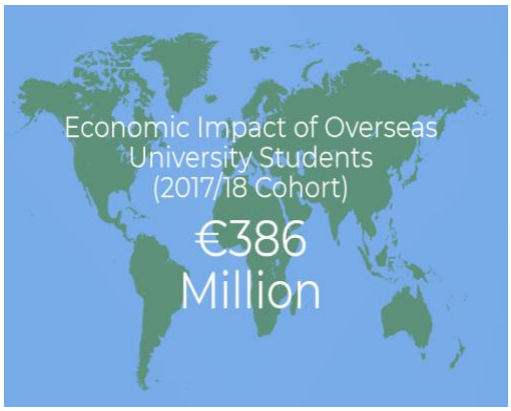
[3] The Department of Public Expenditure and Reform Technical Research paper is available at https://igees.gov.ie/wp-content/uploads/2018/11/Central-Technical-Appraisal-Parameters.pdf.

university education in Ireland. For a representative student completing a full-time undergraduate degree the net Exchequer benefit is estimated at €62,000, on average per graduate. In other words, the Exchequer gains a net €62,000 over the lifetime of the graduate in today's money terms when all costs to the exchequer are taken into account. Indecon estimates the net exchequer benefit to postgraduate qualifications at €46,000 and the benefit to a PhD qualification at €126,000.

This analysis can then be grossed up to provide an estimate of the overall Exchequer impact associated with the 2017/2018 cohort of university students. Our estimates indicate a net Exchequer benefit from this cohort of students amounting to €1.606 billion in net present value terms. This estimate takes account of the Exchequer tax receipts from these individuals had they not obtained a university education and is thus an estimate of the net benefit to the exchequer of these graduates.

Impact of Overseas Students Attending Irish Universities

The Irish university sector contributes to exports in the form of tuition-fee income from EU and non-EU students (net of any Exchequer costs), as well as non-tuition fee (off-campus) expenditures undertaken by these overseas students during the course of their studies at Irish universities. Data from the HEA indicates that there were 16,701 non-Irish domiciled students enrolled in Irish universities in 2017/2018. Irish universities accounted for 73% of all international students studying in Ireland. Net of the costs to the Exchequer, we estimate the annual net benefits of international students from tuition fees in 2017/2018 to be €216 million. We would note that this estimate is based on the current numbers of students, their breakdown between EU and non-EU origins and the current fee levels charged by each university.

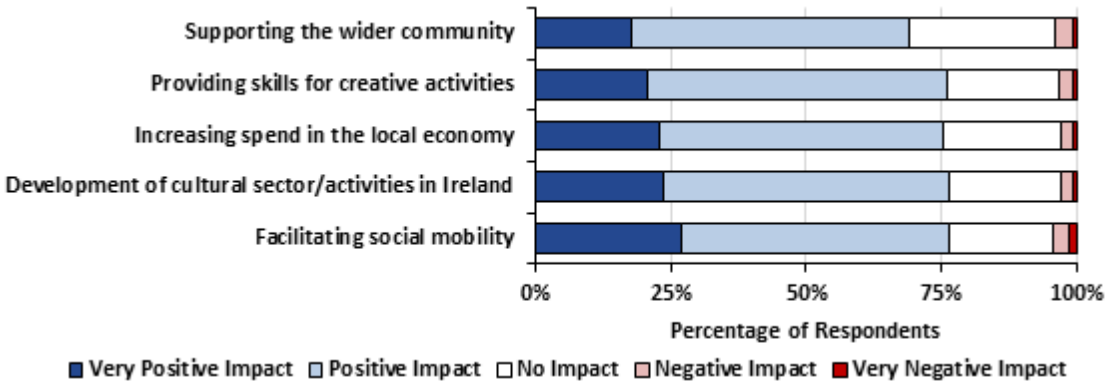


International students also contribute to the Irish economy via their non-tuition fee expenditure. Our analysis estimates that full-time international undergraduates spent an estimated €65.6 million over the course of the 2017/2018 academic year, with postgraduates spending approximately €54 million. Combining these gives an estimated total non-tuition expenditure by international students in Irish universities of €119.5 million. The indirect and induced impacts of this expenditure amounted to €50 million in 2017/2018. The total annual export income generated for the Irish economy arising from non-Irish domiciled students attending Irish universities is estimated to be approximately €386 million per annum.

The Social and Cultural Impacts of the Irish Universities Sector

As part of this impact assessment, Indecon also assessed the social and cultural impact of universities in Ireland. As illustrated in the below figure, over 75% of respondent alumni stated that university education had either a very positive or positive impact on facilitating social mobility, developing cultural sector/activities in Ireland, increasing spend in the local economy, and providing skills for creative activities.

Views of Alumni on the Impact of University Education on Social, Cultural and Community Outcomes



Source: Indecon Survey of Alumni of Irish universities

Irish universities also play an evolving role in encouraging social inclusion and mobility. As illustrated in the following table, over 15% of new entrants in the 2017/18 academic year were socio-economically disadvantaged, while 9.9% of new entrants had some form of disability and 6.6% were mature students. Given the significant economic returns arising from university education identified in this report, this emphasises the significance of the initiatives taken by the universities to provide opportunities for all suitable candidates to study at the universities.

Breakdown of New Entrants to Universities (2017/18)

	Number	Percentage of Total
Total New Entrants	21,082	-
Socio-Economically Disadvantaged New Entrants	3,273	15.5%
Disability New Entrants	2,081	9.9%
Traveller New Entrants	142	0.7%
Mature New Entrants	1,387	6.6%

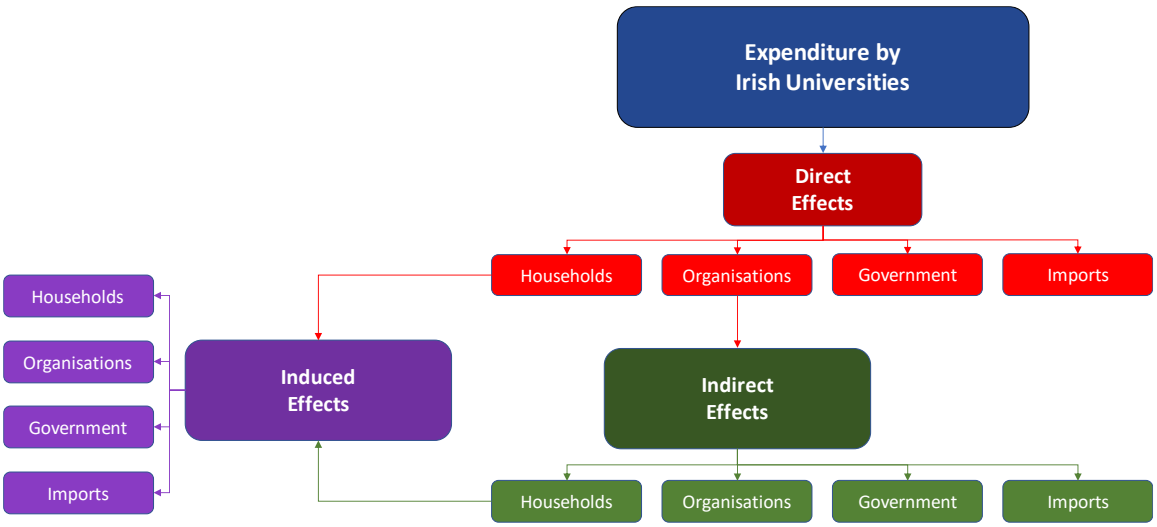
Source: Indecon analysis of data provided by universities.
Note: Figures based on the latest available data provided by Universities, with figures for some universities estimated with figures from other years.

There are also other social benefits from university participation and students and staff at Irish universities make a significant social contribution via their volunteering efforts. Based on data from the Irish universities, an estimated 17,569 students from the 2017/18 academic year engaged in volunteering which is valued at an estimated €28.4 million. The university sector is also an important contributor to the arts in Ireland. The majority of the people working in arts-related occupations have a degree or higher. Over 80% of authors, writers and translators are graduates, suggesting a link between university education and arts occupations.

Direct, Indirect and Induced Economic Impact of Irish Universities

Beyond the impact of teaching and learning on employment outcomes, research spending and exports, the Irish universities also contribute to the wider economy via other forms of expenditure. In order to estimate the wider economic impact of Irish universities, Indecon applied its input-output model of the Irish economy, which takes into account the direct, indirect and induced impacts of the economic activity of Irish universities. Direct multipliers allow for the estimation of the direct effects of economic activity in terms of expenditure and employment. Type I multipliers estimate the indirect impacts of economic activity. Indirect impacts include the knock-on business activity that is supported through direct economic activity, while Type II multipliers include both indirect and induced effects. Induced effects are concerned with the knock-on impact

of household consumption due to the direct and indirect impacts on economic activity. The following figure outlines how these different effects are connected.



Irish universities had expenditures totalling €2.16 billion in 2017. Excluding research related expenditure (discussed above), total expenditure amounted to €1.53 billion. There were 15,724 full-time equivalent (FTE) employees at Irish universities in 2017. These figures represent the direct output and employment impacts of Irish universities in 2017.

Utilising multipliers from the Indecon model of the Irish economy based on input-output tables published by the CSO, we have estimated the indirect and induced impact of the non-research related expenditure by Irish universities on the wider economy. Indecon however notes that caution is required in interpreting macro-economic impacts as all parts of the economy impact on other sectors. The estimates however indicate that the overall non-research related gross direct expenditure of €1.53 billion undertaken by Irish universities in 2017 led to an indirect and induced impact of €1.28 billion, giving an estimated total gross economic impact of €2.80 billion. Irish universities were estimated to support a total of 21,801 FTEs across the Irish economy, in 2017 when the indirect and induced impacts (6,077 FTEs) are included.

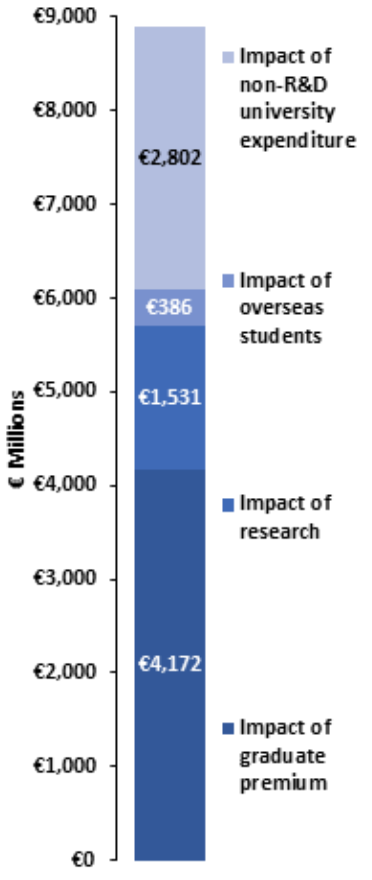
Conclusions

Indecon's independent analysis has indicated that Irish universities make a significant contribution to the economy. There is an estimated economic impact of €8.9 billion on the Irish economy from the university sector in 2017/2018. The following table illustrates the breakdown of the components of this overall economic impact. The earnings premium to graduates of Irish universities accounted for €4.17 billion of the total annual impact of Irish universities. Indecon estimates that annual research undertaken in Irish universities amounted to €1.53 billion of the economic impact while the other direct, indirect and induced impacts of non-research expenditure by Irish universities amounted to €2.80 billion in additional economic output. There are also wider impacts of universities in terms of their social and cultural contributions and their role in maintaining Ireland's reputation as a high-skilled, economy. The qualitative evidence presented in this report suggests that these benefits represent an important consideration when assessing the overall impact of the university sector. The new evidence presented also shows that while there are significant Exchequer costs in funding undergraduate university education, when account is taken of the tax arising from higher resultant incomes, there is a net benefit to the Exchequer.

The analysis in this report has been undertaken in line with the key provisions of the Public Spending Code and the latest guidance from the Department of Public Expenditure and Reform. Indecon has also ensured that the assumptions underlying our estimates are conservative to ensure that the benefits of the university sector are not overstated. As, such, this report reflects a robust estimate of the important role played by the Irish universities in supporting the Irish economy and ensuring that the skills of the Irish labour force remain a national asset and a key factor in Ireland's competitive advantage.

Aggregate economic impact of Irish Universities in 2017/2018

Type of impact	€ Million.	%
Impact of Graduate Premium	**€4,172**	**47%**
Students' income	€2,566	29%
Exchequer returns	€1,606	18%
Impact of research	**€1,531**	**17%**
Net direct research expenditure	€632	7%
Spillover impact	€373	4%
Indirect and Induced Effects	€526	6%
Impact of overseas students	**€386**	**4%**
Net tuition fee income	€216	2%
Impact of overseas student expenditure	€120	€0
Indirect and induced impact of overseas student expenditures	€50	1%
Direct, indirect and induced impacts of non-research expenditure by universities in the Irish Economy[4]	**€2,802**	**32%**
Total economic impact	**€8,891**	**100%**



Employment Supported (FTEs)

	Direct	Indirect	Induced	Total
Employment supported (FTEs)	15,724	2,246	3,831	**21,801**

Source: Indecon analysis

Acknowledgements and Disclaimer

Indecon would like to particularly acknowledge with thanks the insights provided by over almost seven thousand university alumni who took the time to input to our detailed survey and to also provide individual

[4] Note: This figure differs from that reported in Section 8 in order to avoid double counting. The direct, indirect and induced impacts of research spending have been reported above in the 'Impact of research' section.

insights into the views of alumni on the impact of universities in Ireland. The views highlighted the wider societal benefits of university education as well as the more restricted economic impacts as measured in this report. Thanks are also due to 150 enterprises who took the time to provide their views in response to the Indecon survey. These enterprises accounted for 14,330 employees in Ireland and 500,064 internationally.

Indecon would also like to acknowledge the valuable contributions of officials from the seven universities for their assistance with providing data and other information throughout the completion of this impact assessment. We are also grateful for the inputs from Jim Miley, Michael Casey, Lewis Purser, Lisa Keating, Lia O'Sullivan, Marguerita Lardner, and other colleagues of the IUA as well as the IUA steering committee: Professor Orla Feely, Vice-President for Research, Innovation and Impact, University College Dublin, Tony Donohoe, Head of Education and Social Policy, Ibec and Ian Mathews, former Chief Financial Officer, Trinity College Dublin, for their valuable inputs throughout the process. We would also like to acknowledge with thanks the co-operation of the IUA Council including Professor Brian MacCraith, President, Dublin City University, Ciarán Ó hÓgartaigh, President, NUI Galway, Professor Philip Nolan, President, Maynooth University, Dr. Patrick Prendergast, Provost, Trinity College Dublin, Professor Patrick O'Shea, President, University College Cork, Professor Andrew J Deeks, President, University College Dublin and Professor Desmond Fitzgerald, President, University of Limerick. Finally, we are very grateful to the Heads of the Alumni offices in each of the Universities for their assistance in securing the very high number of responses from graduates to our survey research, including John Dillon, Alumni Director, Trinity College Dublin, Nicole Black, Executive Director, UCD Foundation, Ross Munnelly, Director of Alumni Relations, Dublin City University, Majella O'Connell, Executive Director, UL Alumni, University of Limerick, Rob Donelson, Executive Director, Development and Alumni Relations Office, University College Cork, Catherine Conroy, Associate Director Alumni Relations, NUI Galway and Rebecca Doolin, Director of External Relations, Maynooth University.

The usual disclaimer applies and the views and analyses contained in this document are the sole responsibility of Indecon research economists.

1 Introduction and Background

1.1 Introduction

Indecon Research Economists (Indecon) is the largest independent economic research consultancy practice in Ireland and is part of the Indecon International Consultancy Group, which includes the leading European consultancy, London Economics. Following a competitive tender process, Indecon was appointed by the Irish Universities Association (IUA) to conduct a socio-economic impact assessment of the university sector in Ireland. The member organisations of the IUA are Dublin City University, Maynooth University, National University of Ireland Galway, Trinity College Dublin, University College Cork, University College Dublin and the University of Limerick. This report represents an independent evidence-based examination of the impacts of universities in Ireland on the wider Irish economy. This report aims to provide a rigorous evidence base for assessing the value of the university sector.

This report provides new insights into the impact of the Irish university sector in terms of:

- The direct impact of expenditure by the universities on the Irish economy;
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- The impact of Irish universities on research and knowledge transfer in Ireland;
- The economic contribution of overseas students attending Irish universities;
- The impact of teaching and learning on employment and earnings; and
- The role played by Irish universities in contributing to social and cultural facets of life in Ireland.

1.2 Methodological Approach

Indecon's methodological approach utilises evidence from a range of sources to provide a rigorous evidence base for the impact of the Irish university sector on the wider Irish economy. In line with best practices a counterfactual analysis of the impact of university education on incomes and on the Exchequer has been undertaken. This prudent approach ensures that the impact of university education is not overstated, and is instead based on rigorous analysis in line with the requirements of the Public Spending Code and latest guidance from the Department of Public Expenditure and Reform. Our analysis is based on the evidence from:

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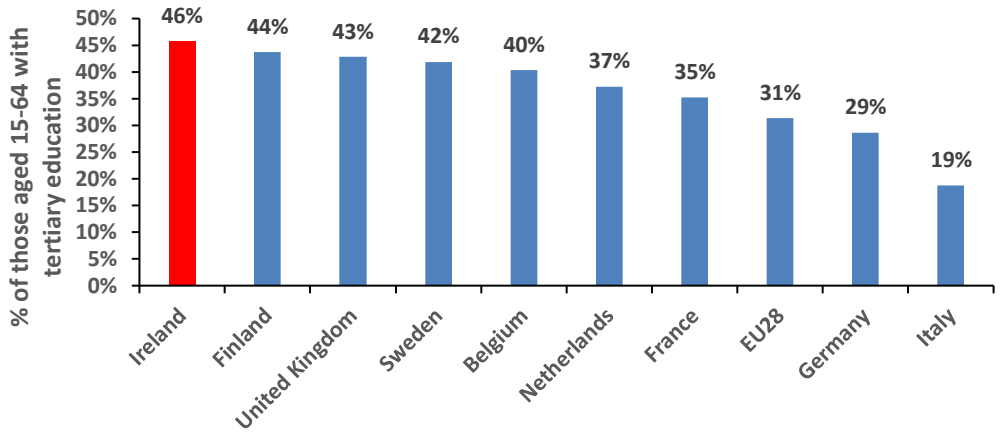
1.3 Wider Role of University Education in the Irish Labour Force

It is useful to first consider the wider economic context in which the Irish university sector operates. The Irish university sector has played a critical role in the development of the economy since the foundation of the State. However, as noted by the leading US Nobel Prize winning economist, Kenneth Arrow, in a review of economic growth policy for Ireland: "*Universities are now moving into*

a more important role in increasing labour productivity than in the past". Arrow also noted that "*graduate education plays a special role in facilitating the acquisition of advanced technologies*".[5] Ireland's educated workforce has been widely cited as one of a number of reasons for Ireland's success in continuing to attract foreign direct investment to the economy and in supporting indigenous enterprises. Ireland has a more highly educated population than the EU average. The differential in educational attainment for those aged 25-64 between Ireland and comparators is illustrated in the following figure and represents a competitive advantage for Ireland.

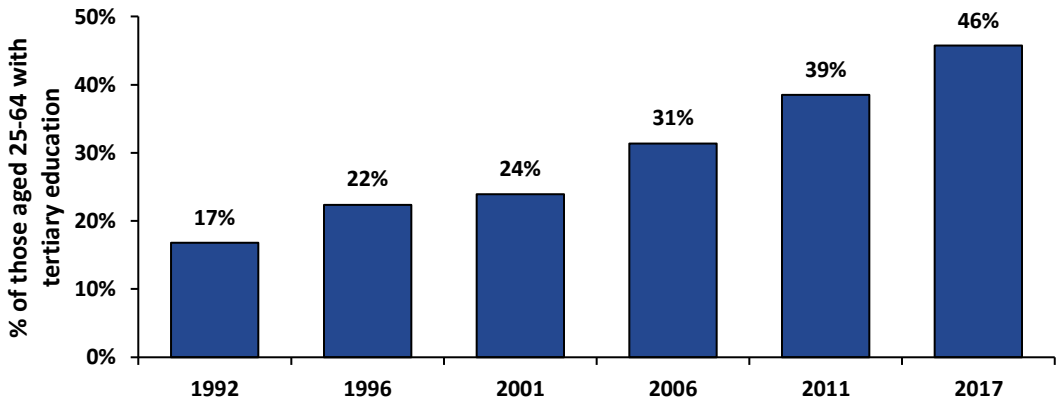
Figure 1.1: Percentage of Those Aged 25-64 With a Third-Level Qualification (2017)



Source: Indecon analysis of Eurostat data

Figure 1.2 shows the growth in the percentage of the population aged 25-64 with a third-level qualification. Over 46% of the population in this cohort in 2017 had a third-level qualification, compared to 17% in 1992. The percentage has grown in each period, demonstrating the rise in the number of people going on to complete third-level education in Ireland in recent times.

Figure 1.2: Percentage of Those Aged 25-64 With a Third-Level Qualification in Ireland



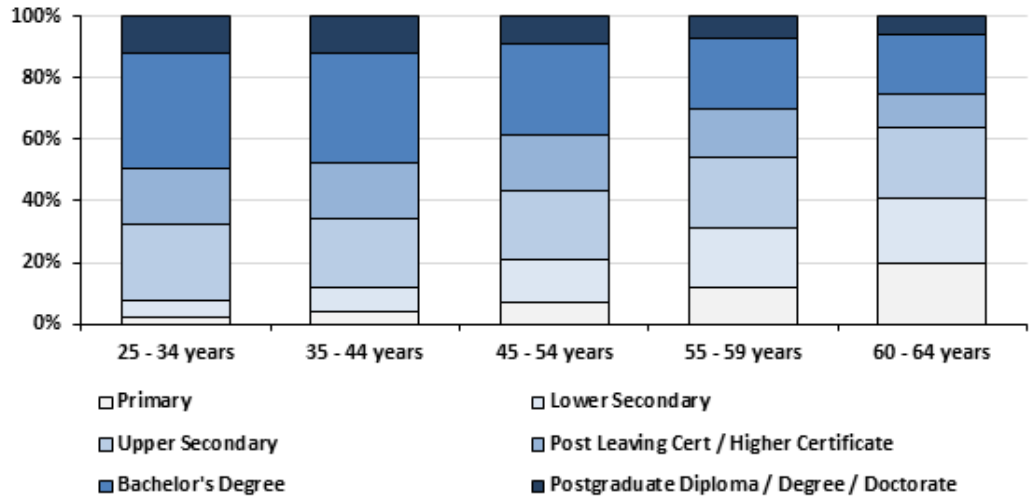
Source: Indecon analysis of Eurostat data

Figure 1.3 shows the highest level of education attained by different age groups, demonstrating that a higher percentage of those under the age of 45 have a third-level degree than those aged 45

[5] See Arrow, K. J., Stanford University, Economic Growth Policy for a Small Country, in Gray, A. W. (ed), *International Perspectives on the Irish Economy*, Indecon, 1997, ISBN 0 953131807

and over. Over 40% of those aged 60-64 attained lower secondary level or primary school level, compared to less than 10% amongst 25-34-year olds.

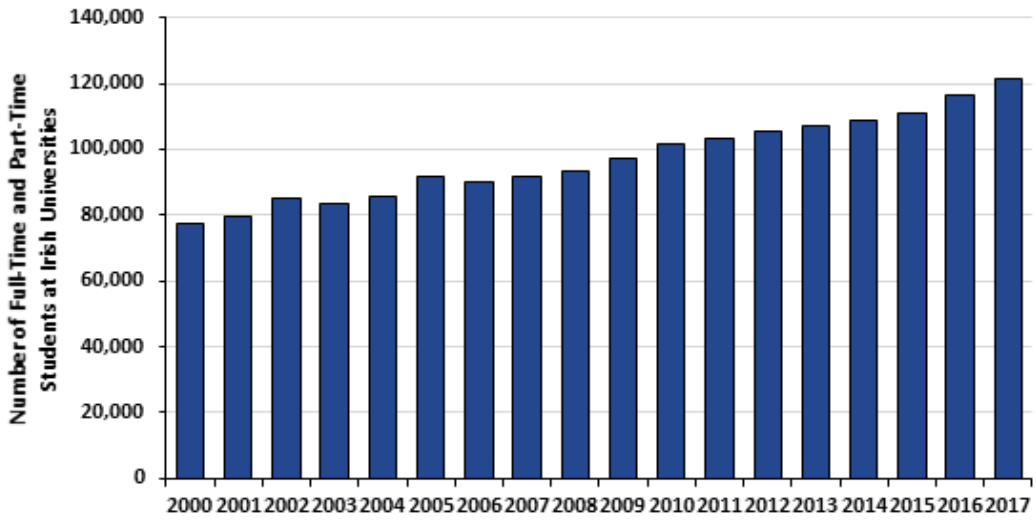
Figure 1.3: Highest Education Level Attained by Age (Q2 2017)



Source: Indecon analysis of QNHS
Note: Percentages are based on the total number no longer in education who have stated an education level.

The move towards a higher skilled more educated population in Ireland is reflected in the number of enrolments in Irish universities which exceeded 120,000 in 2017, compared to fewer than 78,000 in 2000, an increase of over 50%. This reflects both the growth in the population over this period and the shift towards more highly skilled employment in Ireland.

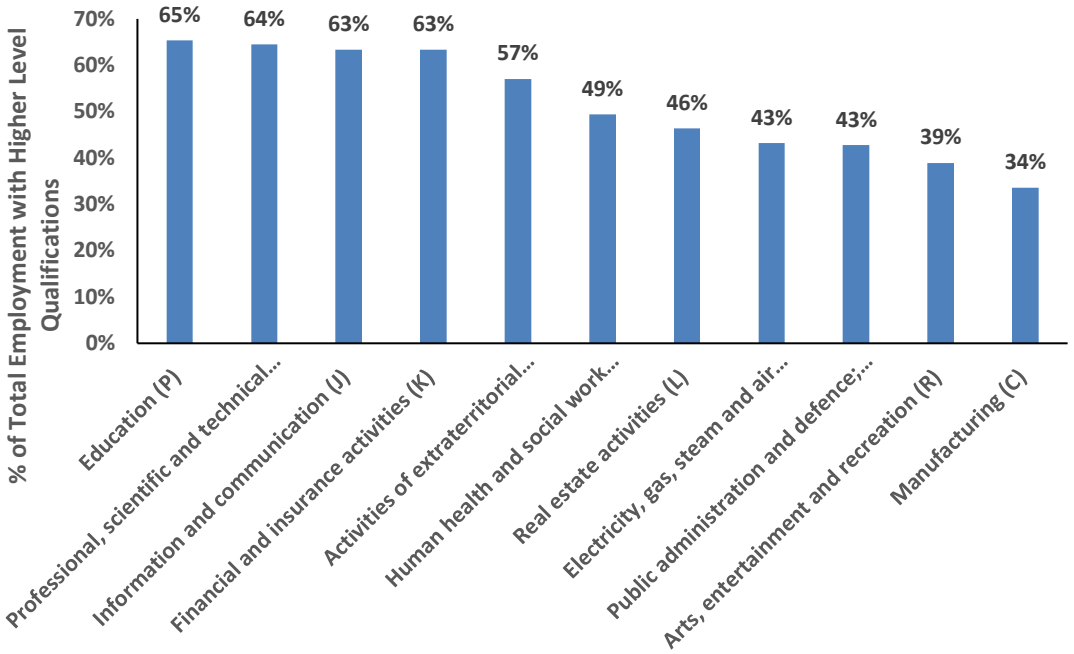
Figure 1.4: Total Number of Students Enrolled in Irish Universities (2000-2017)



Source: Indecon analysis of CSO data

Of note is that some sectors of the Irish economy now have over 65% graduate employment, as illustrated in the following figure. In particular the proportion of graduate employment in the information and communication and professional, scientific and technical activities sectors is indicative of the importance of higher education in the high value-added sectors of the Irish economy.

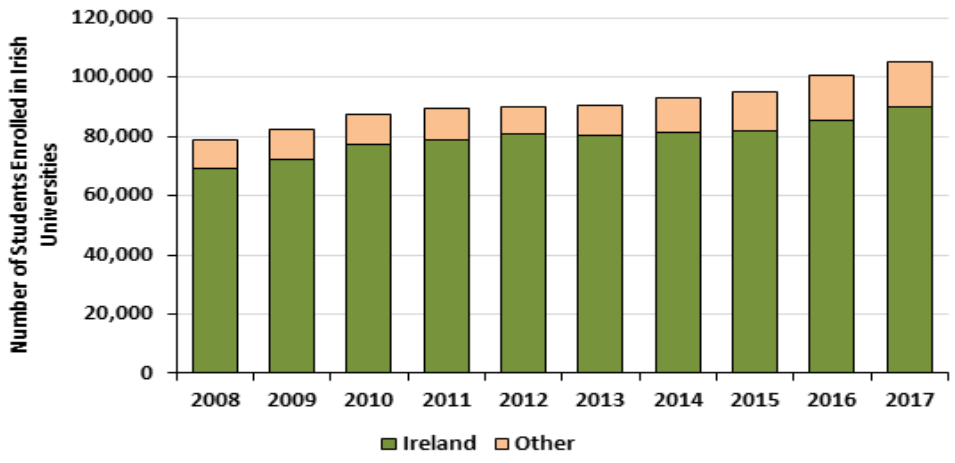
Figure 1.5: Percentage of Total Employment With Higher-Level Qualifications by Sector



Source: Indecon analysis of CSO Census data

Figure 1.6 shows that the numbers of Irish and non-Irish students has been growing in recent years, with full-time students reaching over 100,000 in 2017. The growth in overseas students represents a source of export earnings for the Irish economy.

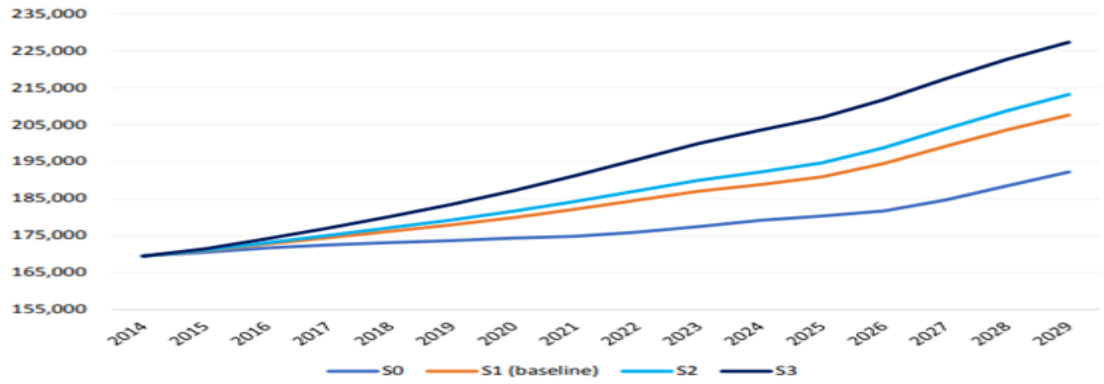
Figure 1.6: Number of Full-Time Students Enrolled in Irish Universities by Domiciliary Origin



Source: Indecon analysis of CSO data

The Department of Education and Skills projects that the number of third-level students is expected to rise between 2018 and 2029, as shown in Figure 1.7. While this expansion has the potential to further enhance the economic contribution of Irish universities, it also has important implications for the funding challenges faced by the sector.

Figure 1.7: Department of Education Third-level Demographic Projections



Source: DES in DPER Spending Review[6]
Note: Scenarios are based on changes in transfer rate from second level, the number of mature entrants and the number of international entrants.

1.4 Report Structure

This report is structured as follows:

- Section 2 presents an examination of the contribution of Irish universities to research and knowledge transfer in the Irish economy.
- Section 3 details the impact of university education on employment and earnings.
- Section 4 estimates the life time incomes returns to university qualification.
- Section 5 analyses the Exchequer impact of university degrees.
- Section 6 contains an analysis of the contribution of overseas students.
- Section 7 provides an overview of the social and cultural impacts of the Irish university sector.
- Section 8 outlines Indecon's analysis of the overall direct, indirect and induced impacts of expenditure by Irish universities on total economic activity in Ireland.
- Section 9 presents the key conclusions.

[6] Department of Public Expenditure and Reform, July 2018. Spending Review 2018 – Understanding the Funding Needs in Higher Education.

2 Impact of Universities on Research and Knowledge Transfer

2.1 Introduction

In this section Indecon investigates the impact of Irish universities on research and knowledge transfer in Ireland.

2.2 Research Undertaken at Irish Universities

The Irish university sector plays an important role in R&D and innovation. The universities in Ireland invest significantly in research and are involved in joint research with enterprise. Irish universities cumulatively spent €631.8 million on research in 2017. Engineering and technology had the highest level of research funding in 2017, with €188.9 million. Natural sciences and medical and health sciences were the second and third highest with 24.5% and 22.6% of total funding, respectively.

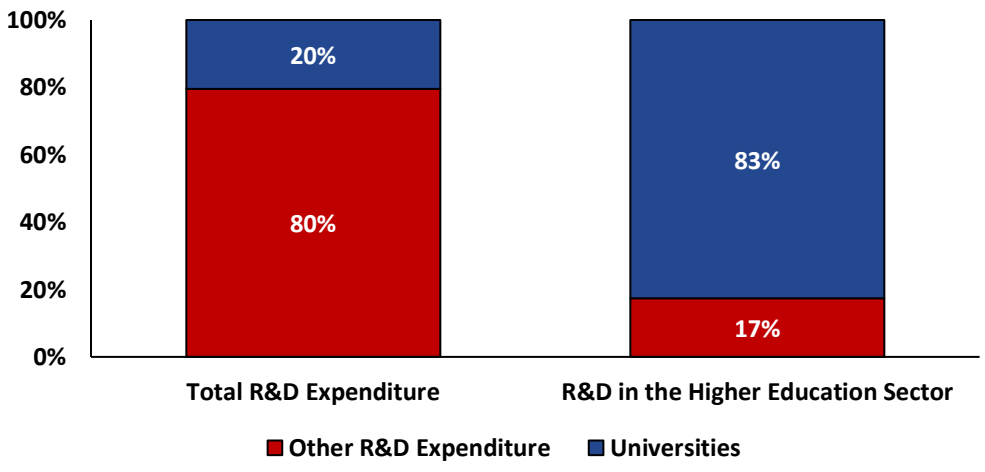
Table 2.1: Estimate of Total Funding for Research by Field of Science (2017)

	Research Funding (€ Million) *	Percentage of Total
Engineering and Technology	188.9	29.9%
Natural Sciences	154.7	24.5%
Medical and Health Science	142.5	22.6%
Social Sciences	59.0	9.3%
Agricultural Sciences	32.6	5.2%
Humanities	17.5	2.8%
Other / Not Classified	36.5	5.8%
Total	**631.8**	**100%**

Note: Includes funding from the block grant
Source: Indecon analysis of information request to Irish universities

Irish universities account for 20% of total annual national expenditure on R&D and represent 83% of all R&D expenditure in the higher education sector. This is indicative of the role played by the Irish university sector in innovation and R&D in the Irish economy.

Figure 2.1: Contribution of Irish Universities to Total R&D Expenditure



Source: Indecon analysis of information request to Irish universities and Eurostat data
Note: Based on 2017 estimates of total research expenditure by Irish universities and 2017 total R&D expenditure data from Eurostat

Irish universities accounted for 50% of total funding raised by Irish enterprises and institutions under the EU's Horizon 2020 programme between 2015 and 2017. Horizon 2020 is the biggest EU research and innovation programme with the aims of ensuring Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation. The predominance of the Irish universities as the destination for Horizon 2020 funding in Ireland is indicative of their important role in supporting innovation in Ireland. In the context of Brexit, there may be additional opportunities for Irish universities and enterprises to build on this success.

Table 2.2 shows that there were 8,396 academic and research staff/posts in Irish universities at the end of 2017. There were a further 7,328 non-academic staff at Irish universities at the end of 2017.

Table 2.2: Staff at Irish Universities (End of Year 2017)		
	FTEs	**Percentage of Total**
Academic	4,713	30.0%
Non-Academic	5,097	32.4%
Research and Specialist - Academic	3,683	23.4%
Research and Specialist – Non-Academic	2,231	14.2%
Total	**15,724**	**100%**
Source: Indecon analysis of HEA data		

In examining the impact on research and knowledge transfer it is useful to note that there are 1,485 principal investigators in Irish universities. The natural sciences (26%) and engineering and technology (24.2%) are the two largest in terms of the number of principal investigators.

Table 2.3: Principal Investigators in Irish Universities by Field (2017)		
	Number	**Percentage of Total**
Natural Sciences	386	26.0%
Engineering and Technology	359	24.2%
Social Sciences	282	19.0%
Medical and Health Science	256	17.2%
Humanities	153	10.3%
Agricultural Sciences	39	2.6%
Other / Not Classified	10	0.7%
Total	**1,485**	**100%**
Source: Indecon analysis of information request to Irish universities		

It is important to note that the research undertaken at the universities plays an important role in the ability of the universities to attract faculty at the leading edge of their disciplines. These faculty contribute to delivering an education that prepares Irish university graduates to succeed in their careers post-graduation. In addition to this, the quality of the staff at Irish universities also supports the international reputation of the sector and is an important factor in attracting international students. While the preceding analysis outlines the level and nature of the research undertaken in Irish universities, these additional knock-on impacts of this research should not be discounted.

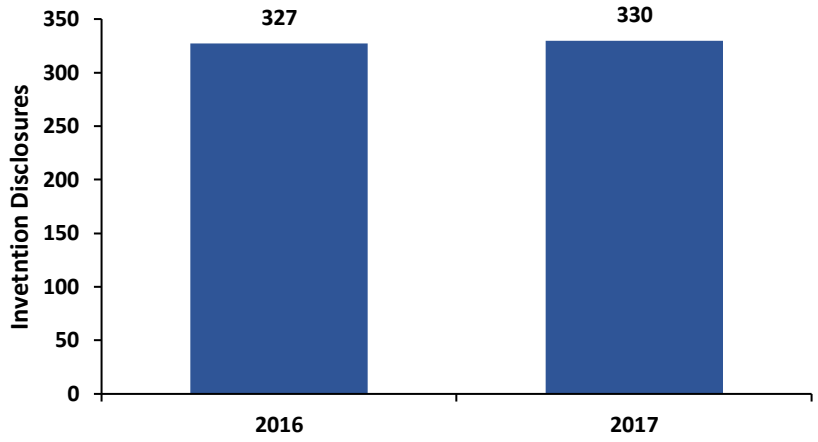
2.3 Enterprise Supports

An indicator of the contribution to research and innovation by Irish universities is the number of patents and research agreements in the university system. There are currently an estimated 611 patent families owned by Irish universities.

Table 2.4: Patent Families Owned by Irish Universities 2016-2017		
	2016	**2017**
Total number of patent families owned	581	611
Source: KTI Review and Annual Knowledge Transfer Survey 2016 & 2017		

Figure 2.2 shows the number of invention and software disclosures received from 2016-2017. The number of inventions and software disclosures exceeded 320 in each of these years.

Figure 2.2: Invention Disclosures Received During the Year (2016-2017)



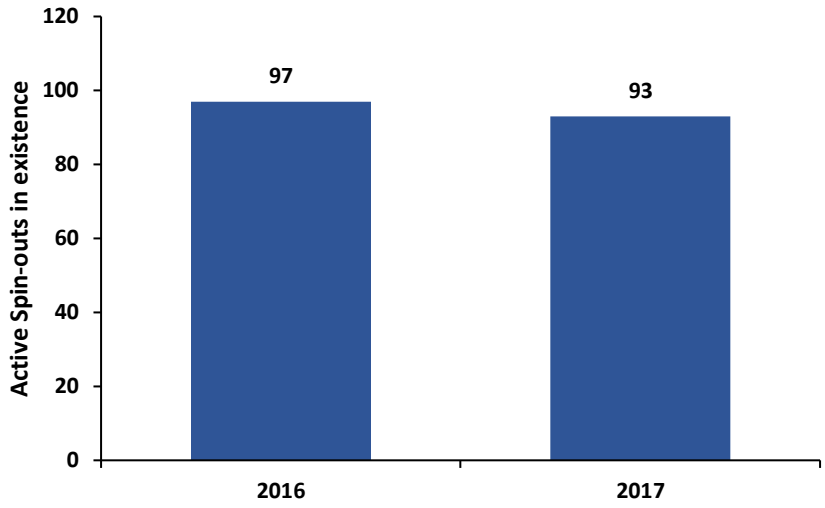
Source: KTI Review and Annual Knowledge Transfer Survey 2016 & 2017

Table 2.5 shows the number of research agreements and joint research projects undertaken by the university sector with companies in Ireland, as well as the number of EI Innovation Vouchers project agreements with industry and the number of consultancy service agreements. There were 584 collaborative research agreements or joint research projects between Irish universities and companies in Ireland in 2017. Of these agreements, there were 96 EI Innovation Vouchers project agreements and 48 consultancy service agreements.

Table 2.5: Research Agreements and Collaboration with Enterprise (2017)	
Number of Collaborative Research Agreements with Industry	440
Number of Innovation Voucher Project Agreements with Industry	96
Number of Consultancy Services Agreements with Industry	48
Total Number of Collaboration, Innovation Voucher and Consultancy Services Agreements with Industry	584
Source: KTI Review and Annual Knowledge Transfer Survey 2017	

Irish universities represent a source of innovation in Irish enterprise and it is estimated that there were 93 active spin-outs[7] in existence at the end of 2017.

Figure 2.3: Active Spin-Outs in Existence in Irish Universities (2016-2017)



Source: KTI Review and Annual Knowledge Transfer Survey 2016 & 2017

Table 2.6 outlines the number of companies supported within the incubators at Irish universities since 2016.

Table 2.6: Companies Supported by Incubator at Irish Universities

	2016	2017
Number of companies supported within the incubator in year	174	188

Source: KTI Review and Annual Knowledge Transfer Survey 2016 & 2017

The number of licenses, options and assignments executed at Irish universities since 2016 is contained in Table 2.6. Licenses accounted for 67 of the 119 LOAs executed in 2017.

Table 2.7: Total Number of Licences, Options and Assignments Executed (LOAs) at Irish Universities (2016-2017)

	2016	2017
Number of Licences, Options and Assignments Executed (LOAs)	134	119

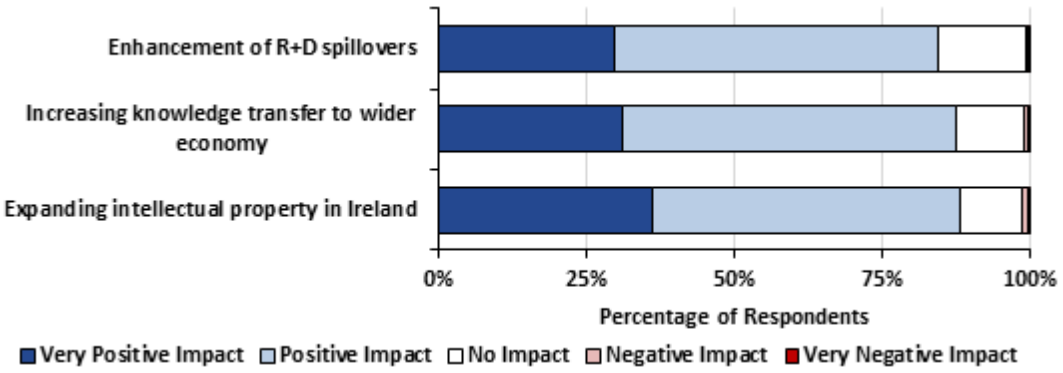
Source: KTI Review and Annual Knowledge Transfer Survey 2016 & 2017

[7] An Active Spin-out is defined as an RPO-created spin-out company that is at least three years post-formation and, as at the end of the reference year, has at least one paid employee and has raised equity and/or has booked sales revenue.

2.4 Wider Economic Impact of Research in Irish Universities

Irish universities engage in significant expenditure on R&D and other forms of innovation. While this expenditure makes a direct contribution to the economy, the capacity for R&D and innovation expenditure to provide positive externality benefits to the economy is a key issue. Indecon's survey of graduates asked respondents their views on the impact of university education on R&D and knowledge transfers. The following figure shows that the vast majority of respondents deemed university education to have had a very positive or positive impact on the enhancement of R&D spillovers, increasing knowledge transfer to the wider economy and expanding intellectual property in Ireland.

Figure 2.4: Views of Alumni on the Impact of University Education on R&D and Knowledge Transfers



Source: Indecon Survey of Alumni of Irish universities

Indecon's survey of employers in Ireland found similar responses in relation to the impact of universities on R&D and knowledge transfer. 78.1% of respondents stated that they believed universities to have either a very positive or positive impacts on expanding intellectual property in Ireland. Similar levels were found in relation to the impact of universities on increasing knowledge transfer to the wider economy and enhancement of R&D spillovers.

Table 2.8: Views of Respondent Organisations on Influence of Universities on R&D and Knowledge Transfer

	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know/No Opinion
Expanding intellectual property in Ireland	23.3%	54.8%	13.0%	0.7%	0.0%	8.2%
Increasing knowledge transfer to wider economy	20.4%	59.9%	12.2%	1.4%	0.0%	6.1%
Enhancement of R&D spillovers / wider impact of R&D	20.0%	53.1%	16.6%	0.7%	0.0%	9.7%

Source: Indecon analysis of Survey of Companies in Ireland

It is important, however, to consider whether the impacts of university research can be quantified in terms of economic returns. There is significant international evidence[8] of the existence of spillovers from R&D expenditure. In economic terms, R&D spillover benefits can be defined as the positive externalities from R&D expenditure in a given organisation on the wider economy.

Economists refer to the term 'externality' to describe situations in which the activities of one 'agent' in the market induces external effects on other agents in that market. In other words, 'an externality is present whenever the well-being of a consumer or the production possibilities of a firm are directly affected by the actions of another agent in the economy' (Mas-Collell et al., 1995). In the context of the economic impact of research activities, the literature assesses the existence and size of the positive productivity and knowledge spillovers, where knowledge generated through the research activities of one agent increases the productivity of other organisations.

There are many ways in which research generated at Irish universities can induce such positive spillover effects. The spillovers from the universities to the private sector are enabled through direct R&D collaborations between the universities and firms, the publication and dissemination of research findings, or through universities' graduates who enter into the labour market.

The existing research also indicates that the spillover benefits of public spending on research in higher education may be greater than those from other R&D areas supported by government. A recent study[9] provided further evidence of the existence of productivity spillovers from research undertaken by universities. A number of previous studies outline estimated rates of return on research and development investment, and show that the estimates for the social rate of return tends to be higher than the private rate of return[10]. These studies find rates of return ranging from 4% to over 100%. Indecon's recent work for the Irish Government has also considered evidence on spillover R&D benefits.[11] An example of wider benefits is seen in Hill, Mairesse, and Mohnen (2009)[12] who examined econometric and other research measuring both economic and private returns to R&D, and covering 50 years of economic research. Using this sample of papers estimating the rate of return on R&D Investment, Indecon presents conservative estimates for the annual economic return on the level of research expenditure in Irish universities in 2017. Using a 7% social rate of return, the research expenditure in Irish universities in 2017 is estimated to provide a social return of €44.2 million each year. A spillover benefit ranging from 3.5%-7% per annum is aligned with the latest guidance utilised by the IDA and Enterprise Ireland when appraising the impact of R&D expenditure based on research completed by Indecon for the Department of Business, Innovation and Enterprise. While international estimates suggest that the spillover benefit of university research may be significantly higher than our estimates as outlined below, Indecon believes it is prudent to use conservative estimates so as to ensure the impacts are not overestimated. The results therefore represent lower bound estimates of the potential impact of the research being undertaken in Irish universities.

[8] Haskel, J., and Wallis, G. (2010). 'Public support for innovation, intangible investment and productivity growth in the UK market sector'.

[9] Haskel, J., Hughes, A., and Bascavusoglu-Moreau, E. (2014). 'The economic significance of the UK science base: a report for the Campaign for Science and Engineering'.

[10] See Bernstein and Nadiri (1990), Mohnen-Lepine (1991), Mohnen-Nadiri-Prucha (1986), Bernstein-Mohnen (1998), Mohnen (1992), Nadiri-Kim (1996), Mansfield et al. (1977), Tewksbury et al. (1980), Mohnen (1990), Mohnen (1992), Coe-Helpman (1995), Ornaghi (2006), Bloom et al. (2013), Aghion and Xavier (2015), Corrado et al (2017).

[11] Indecon study for the Department of Business, Innovation and Enterprise concerning Review of European Agency Cost Benefit Model, 2018 forthcoming.

[12] Hill, Mairesse, and Mohnen (2009). Measuring the returns to R&D. In B. H. Hall and N. Rosenberg (Eds.), Handbook of the Economics of Innovation.

Table 2.9: Social Rate of Return from Research Funding – 2017	
	2017
Research Expenditure (€ Million)	631.8
7% Annual Social Return (€ Million)	44.2
Source: Indecon analysis of information request to Irish universities	

For the purposes of assessing the wider spillover benefits of annual research spending in Irish universities, we replicate the methodological approach utilised by the IDA and Enterprise Ireland by assuming that these benefits accrue for a ten-year period following the initial research expenditure. Discounting these spillover benefits by the discount rate specified in the latest technical paper from the Department of Public Expenditure and Reform published as part of the review of the Public Spending Code[13] of 4% provides a total spillover benefit from university research of €373.1 million for 2017, assuming an annual return of 7%. The estimation of the spillover benefits is outlined in the following table.

Table 2.10: Discounted Total Social Return from Research Funding 2015-2017 (€ Millions)											
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
2017	44.2	42.5	40.9	39.3	37.8	36.4	35.0	33.6	32.3	31.1	**373.1**
Source: Indecon analysis of information request to Irish universities											

If one was to assume a higher return to research expenditure, such as that used in the recent economic impact study of the Russell Group in the UK[14] which used a weighted average multiplier of 5.5, then the spillovers to research expenditure of Irish universities in 2017 would be €3,475 million.

2.5 Summary of Key Findings

- The Irish university sector plays an important role in R&D and innovation. The universities in Ireland invest significantly in research and are involved in joint research with enterprise. Irish universities cumulatively spent €631.8 million on research in 2017.
- Irish universities account for 20% of total annual national expenditure on R&D which represents 83% of all R&D expenditure in the higher education sector. This is indicative of the role played by the Irish university sector in innovation and R&D in the Irish economy.
- An indicator of the contribution to research and innovation by Irish universities is the number of patents and research agreements in the university system. There are an estimated 611 patent families owned in Irish universities.
- There were 584 collaborative research agreements or joint research projects between Irish universities and companies in Ireland undertaken in 2017.
- Irish universities represent a source of innovation in Irish enterprise and there were 93 active spin-outs in existence at the end of 2017. In addition, 188 enterprises were supported within Irish university incubators in 2017.

[13] The Department of Public Expenditure and Reform Technical Research paper is available at https://igees.gov.ie/wp-content/uploads/2018/11/Central-Technical-Appraisal-Parameters.pdf.

[14] London Economics, 2017, "The Economic Impact of Russell Group Universities"

- Using lower estimates from international evidence on the potential spillovers from research expenditure to the wider economy, Indecon provides a conservative estimate for the spillover value from research expenditure in Irish universities in 2017 of €373.1 million. When combined with the research undertaken directly by Irish universities it is estimated that the research undertaken over this period had a €1.01 billion impact on the Irish economy in net present value terms.

3 Impact of University Education on Employment and Earnings

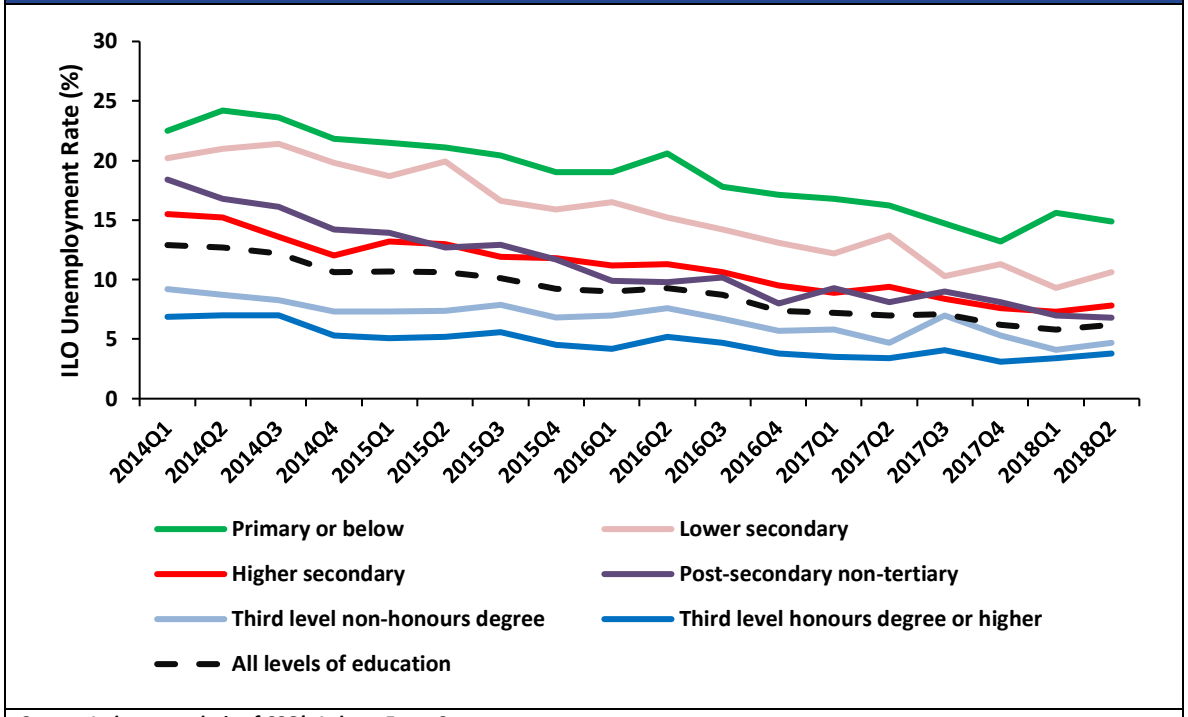
3.1 Introduction and Background

A core function of the Irish university sector is the teaching of students. The universities represent institutions of educational excellence and play a vital role in providing Irish students with the education and skills required to succeed in their careers both in terms of securing employment and increasing lifetime earnings. University education is also of more fundamental importance in enhancing individuals to realise their potential and to contribute to society.

3.2 Impact on Employment Outcomes

As outlined in the following figure, those with an honours degree or higher have consistently had lower unemployment rates than any other education level, reflecting their higher likelihood of being in employment.

Figure 3.1: ILO Unemployment Rate by Education Level (2014 Q1 – 2018 Q2)

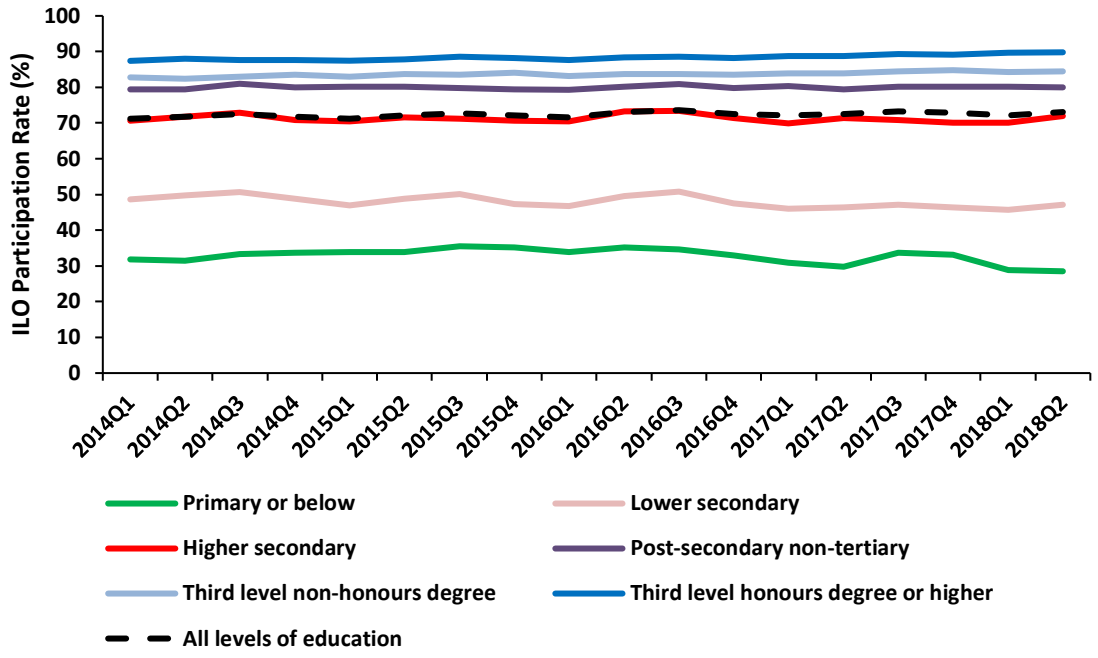


Source: Indecon analysis of CSO's Labour Force Survey

Whilst those with a third-level honours degree or higher have a low probability of being unemployed, they also have the highest ILO participation rate[15] amongst the different cohorts presented in the following figure. The ILO participation rate of those holding a third-level honours degree or higher has been consistently between 87% and 90% in each quarter since 2014.

[15] The ILO (International Labour Office) participation rate is a measure of the proportion of a country's working-age population that engages actively in the labour market, either by working or looking for work

Figure 3.2: ILO Participation Rate by Education Level (2014 Q1 – 2018 Q2)



Source: Indecon analysis of Labour Force Survey

When asked about the impact of university education on individual graduate outcomes, over 94% of responding alumni said that it had a very positive (52.9%) or positive (41.5%) impact on their employment prospects. The majority also said it had a positive impact on their earnings potential and their individual productivity.

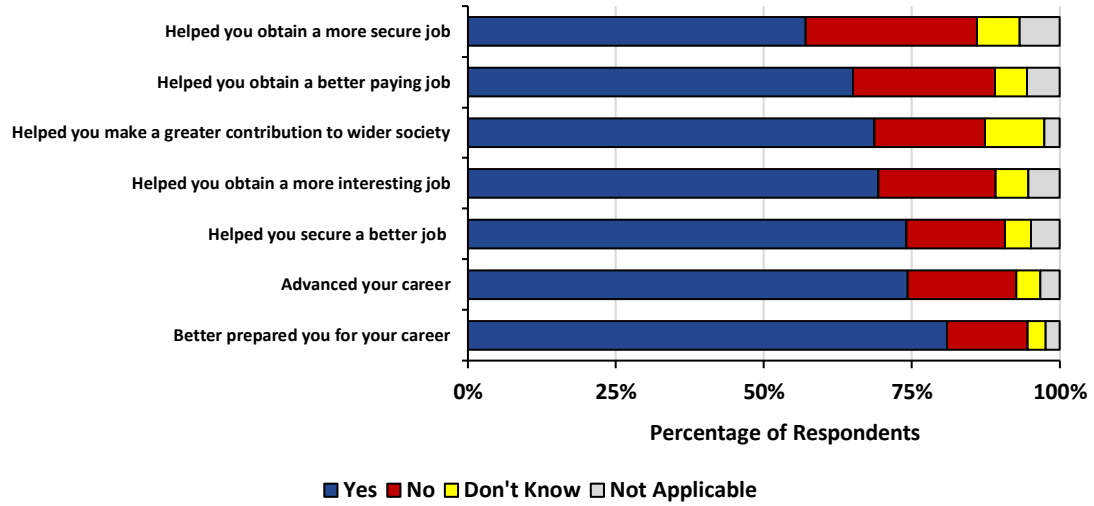
Table 3.1: Views of Alumni on the Impact of University Education on Individual Graduate Outcomes

Outcomes	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact
Enhancement of employment prospects	52.9%	41.5%	4.7%	0.7%	0.3%
Increasing earnings potential	45.2%	47.7%	6.0%	0.8%	0.3%
Increasing individual productivity	26.4%	50.3%	21.3%	1.5%	0.5%

Source: Indecon Survey of Alumni of Irish universities

Over 75% of responding alumni said that their university education had better prepared them for their career, with just under 75% saying that it advanced their career or helped them secure a better job.

Figure 3.3: Views of Alumni on the Impact of University Education on Personal Outcomes



Source: Indecon Survey of Alumni of Irish universities

The evidence from the analysis of employment outcomes in the Irish labour force is consistent with the findings of the Indecon survey of alumni of Irish universities. It is, however, useful to examine more rigorously the evidence on the impact of university education on employment outcomes, compared to what would be the case without university education.

Methods

To estimate the impact of university education on employment we employed a logit model. The logit model is a standard model for estimating the impact of independent variables on a dichotomous dependent variable.

The logit function is a function of the log odds ratio of the outcome given the independent variables. The odds ratio is the quotient of the probability something occurs divided by the probability it does not occur. The general specification is:

Equation 1: $$y = lnL(X) = ln\left\{e^{\beta_0 + \sum_i^N \beta_i X_i}\right\} = \beta_0 + \sum_i^N \beta_i X_i$$

The beta parameters are then estimated by maximum likelihood methods. We estimated the logit model with data from the Labour Force Survey (LFS) which provided a sample of circa just over 300,000 observations. Our dependent variable was created by taking the main economic status variable from the LFS. There are ten different categories including no response. Categories 1 and 2, respectively, were at work and unemployed. In our specification, the following variables were used from the LFS:

- y – respondent is employed or unemployed in the survey
- age_class: an index grouping variable creating a set of group dummies for each age group by 19 to over 65 years of age by five-year increments.
- Hat_lev_idx: index to group individuals into one of twelve groups for highest education level achieved.
- Nace2_idx: an index to group individuals into NACE 2 code industrial sectors.
- Natsum_idx: an index variable to group respondents into six summary nationality groups: Irish, UK, EU-15 Ex UK and IRL, Rest of Europe, USA & Canada, Rest of World.
- Region – a dummy (0,1) for greater Dublin and not.

- Year: an integer for year.

Results

The table below shows the impacts of each of the variables included in the model and the coefficient estimates from the logit models. The coefficients are comparable as log-odds ratios, and so are comparable to each other in a relative sense, and for understanding significance, but are difficult to interpret in terms of marginal impact. Most of the coefficient estimates are statistically significant. One can observe that age group as well as education level, and region, and NACE industry, are significant determinants of employment. Note that we restrict the reporting of model outputs in the following table to the relevant variables for education level.

Table 3.2: Employment Premium Third-Level Degree

	Logit Base Model	Male	Female
Dependent variable: d_employment			
Sex/Male=1	-0.369***		
	(0.000)		
group(hatlevel)=1	0	0	0
	(.)	(.)	(.)
group(hatlevel)=2	0.364***	0.556***	-0.207
	(0.000)	(0.000)	(0.380)
group(hatlevel)=3	0.944***	1.230***	0.0434
	(0.000)	(0.000)	(0.853)
group(hatlevel)=4	1.788***	1.950***	0.946***
	(0.000)	(0.000)	(0.000)
group(hatlevel)=5	0.950***	1.309***	-0.152
	(0.000)	(0.000)	(0.573)
group(hatlevel)=6	1.766***	1.984***	0.862***
	(0.000)	(0.000)	(0.000)
group(hatlevel)=7	1.655***	1.912***	0.663**
	(0.000)	(0.000)	(0.004)
group(hatlevel)=8	2.237***	2.443***	1.232***
	(0.000)	(0.000)	(0.000)
group(hatlevel)=9	2.667***	2.835***	1.738***
	(0.000)	(0.000)	(0.000)
group(hatlevel)=10	2.850***	3.030***	1.878***
	(0.000)	(0.000)	(0.000)
group(hatlevel)=11	3.139***	3.518***	1.976***
	(0.000)	(0.000)	(0.000)
REFYEAR: Year of survey	0.159***	0.165***	0.149***
	(0.000)	(0.000)	(0.000)
Constant	-1.340***	-1.662***	-0.309
	(0.000)	(0.000)	(0.198)
Observations	302,183	166,127	135,712

p-values in parentheses
Source: Indecon/LE analysis of CSO LFS data
* p < 0.05, ** p < 0.01, *** p < 0.001

The marginal impact of the dummy variables plus the baseline are presented in the following table.

Table 3.3: Impact of Education Levels on Probability of Employment (2014-2016)				
Education Level		**Baseline Model**	**Males**	**Females**
ISCED Level 0	No Formal Ed	**59.6%**	**51.9%**	**80.7%**
ISCED Level 1	Primary	**67.4%**	**64.3%**	**77.5%**
ISCED Level 2	Lower 2nd	**78.1%**	**77.2%**	**81.3%**
ISCED Level 3a	Upper 2nd a	**88.9%**	**87.1%**	**91.2%**
ISCED Level 3b	Upper 2nd b	**78.2%**	**78.5%**	**78.3%**
ISCED Level 3c	Upper 2nd c	**88.7%**	**87.4%**	**90.5%**
ISCED Level 4	post 2nd non-third	**87.6%**	**86.6%**	**88.8%**
ISCED Level 5	short 3rd	**92.5%**	**91.6%**	**93.2%**
ISCED Level 6	Bachelors	**95.0%**	**94.1%**	**95.7%**
ISCED Level 7	Masters	**95.8%**	**95.1%**	**96.3%**
ISCED Level 8	PhD	**96.8%**	**96.9%**	**96.6%**
Source: Indecon/LE analysis; Statistical significance indicated by bold.				

The results in the table provide the estimates of the probability of employment at each level of education and illustrate the premium associated with higher education levels. This indicates that the probability of employment rises from about 60% with no formal education to 97% at PhD level.

3.3 Impact on Incomes

Important previous research undertaken by the ESRI (2012)[16] suggested a wage premium from third-level education in Ireland. This was aligned with international evidence. For example, research undertaken for the OECD suggests that despite an increase in the numbers of third-level graduates, the premium from higher education persists, particularly within certain subject areas.[17] UK research reached a similar conclusion as regards the continued existence of the graduate wage premium and this was also demonstrated by a range of significant research projects recently undertaken by London Economics. Other research suggests this may vary by subjects studied.[18]

Research in the UK has also interestingly suggested that the wage premiums differ for graduates from universities of differing quality. Hussein et al (2009)[19] find that there is an increase in the wage premium for those graduates from higher quality universities. Naylor et al (2015)[20] investigate the existence of a differential premium for graduates with different degree classifications in the UK. They find that the premium for better degrees has risen over time and that it ranges from 7-9% over those with ordinary degrees. Research undertaken by London Economics in the UK found that the net lifetime wage premium for graduates from the Russell Group Universities with an undergraduate degree was equivalent to £88,000 in today's monetary terms for a student in the 2015-2016 cohort.

[16] Seamus McGuinness, Adele Bergin, Elish Kelly, Selina McCoy, Emer Smyth, and Kevin Timoney (2012) A Study of Future Demand for Higher Education in Ireland. Research Series no. 30, Dec. 2012. ESRI.

[17] Machin, Stephen and McNally, Sandra (2007) Higher education and the labour market. Centrepiece, 12 (2). pp. 6-9. ISSN 1362-3761

[18] Walker, I. & Zhu, Y. (2008). The College Wage Premium and the Expansion of Higher Education in the UK. Scandinavian Journal of Economics, 110 (4), 695-709.

[19] Hussain, I., McNally, S. and S. Telhaj (2009), "University Quality and Graduate Wages in the UK", Centre for the Economics of Education (CEE) DP 99.

[20] Robin Naylor, Jeremy Smith, and Shqiponja Telhaj. Graduate returns, degree class premia and higher education expansion in the UK. Oxford Economic Papers, page gpv070, 2015.

In examining the impact of the Irish university sector on earnings outcomes Indecon undertook rigorous econometric modelling to estimate the earnings premia associated with third-level education in Ireland. In line with best practice, Indecon utilised a range of models to estimate the premium associated with university education. Our results are based on panel data using the EU-SILC (Survey of Income and Living Conditions). The current SILC micro data (AMF) was obtained from ISSDA/CSO/UCD after application.[21] EU-SILC collects data on a number of different earnings categories and education levels for individuals over time. The dataset covers the years from 2003 to 2016. There are 13,186 observations and 260 variables in the dataset. This includes 5,219 households and 13,186 interviewed individuals and about 180,693 total observations over time and, including derived variables in our dataset, over 350 variables.

The data tracks several thousand households over time, but there is a controlled rollover of households (so the same households are not tracked continuously). Data is recorded at both individual and household levels. The sample is representative with weights and some oversampling to ensure inclusion of smaller cross-categorical groups is included in the sample. As part of our modelling we used annual employment earnings as the main dependent variable. The educational levels were selected as highest education level attained, and are coded as a categorical variable in the SILC. Testing of regressions, collinearity, and dealing with missing observations or poorly/sparsely coded variables (some variables contain more 'missing' values than others) was undertaken carefully. Testing was then undertaken using ordinary least squares and tests of significance of individual variables and impacts on adjusted R-squared values to determine the inclusion of explanatory variables, as well as the appropriateness of model functional form.

The following variables were then selected and included in our models. These variables aim to ensure that the model is capturing the impact of education levels on earnings, controlling for other factors that may influence earnings including age, gender, occupation, sector of the economy in which an individual is employed and other relevant variables.

[21] Central Statistics Office. (2018). European Union Survey of Income and Living Conditions (EU-SILC), 2016. [dataset]. Version 1. Irish Social Science Data Archive. SN: 0015-14, URL, http://www.ucd.ie/issda/eu-silc

Table 3.4: Variables Included in Modelling of Wage Premium	
Variable	**Description**
Suryear	Survey year
Euroweight	Household and Individual weight
Hhld_no	ID number of household. Members of the same household will have the same ID number
Pers_no	ID number of person in household.
Natscl	National equivalence scale
Urb_rur	Urban or rural area
Sex	Gender
Nat	nationality
Born	Country of birth
Region2	NUTS2 region of household
Aggp2	Age category 2
Pes	Principal economic status
Emplstat	Employment type
Soccode2	Occupation
Ilostat_p	Economic status (employed, unemployed, not seeking work, etc)
Wrk_time	Full-time/part-time
Wrk_type	If employee or self-employed
Edu	Highest level of education attained
Man_pos	Managerial position
Ann_emp_inc_i	Total individual's annual employee income
marital	marital status
Nace2	The NACE code economic sector of primary work
lounit	number of persons in the local unit
hrs_uwm	Hours worked main job
hrs_uwo	Hours worked other jobs
Source: SILC	

The method used in our modelling is to estimate log-wage equations econometrically. This proposes a general equation to estimate of the form:

Equation 2: $$lnw = \alpha + \beta \boldsymbol{X} + \gamma \boldsymbol{E} + \varepsilon$$

Where, lnw is the natural log of the wage, X is a matrix of socio-demographic or other characteristics, E is a matrix of education levels, β and γ are parameters to be estimated and ε is a random error term.

Our first set of models tracks households and individuals within households over time. This enables us to control for unobserved individual heterogeneity that might otherwise bias estimation results. For the standard fixed effects panel model, we can re-write Equation 1 indicating indexation by time (year) and individual, i. as:

Equation 3: $$lnw_{it} = \boldsymbol{\alpha}_j + \beta \boldsymbol{X}_{it} + \gamma \boldsymbol{E}_{it} + \varepsilon_{it}$$

Where alpha (α) is now a vector of parameters by individual unit j (a family in our case) (the fixed effects (or random effects in the error term as it may be)). We tested a number of specifications and explanatory variables with the following being the preferred model:

Equation 4:

$$lnann\_emp\_inc_{it} = \boldsymbol{\alpha}_i + \beta_1 Sex + \beta_2 age + \beta_3 socode + \beta_4 edu\_idx + \beta_5 lnhrs_{tot} + \beta_6 socode + \beta_7 nat + \beta_8 lounit + \beta_9 nace + \beta_{10} marital + \varepsilon_{it}$$

We present estimation results from OLS, fixed effects and random effects.

Results from OLS and panel wage models

The next table presents the main results from an OLS model, our panel model with fixed effects, and a random effects model. Our models find that those with a third-level qualification have a wage premium of 38%-43% over those with no formal education/primary education. The models control for socio-demographic factors such as age and gender and also control for sector of occupation, total hours worked and size of the company in which an individual is employed. LnGDP also controls for economic activity in the year of employment.

Table 3.5: Wage Premium by Education Level			
	OLS	**Fixed Effects**	**Random Effects**
Age	0.159***	0.201***	0.176***
	(0.000)	(0.000)	(0.000)
Sex/Female	-0.182***	-0.247***	-0.205***
	(0.000)	(0.000)	(0.000)
Lower Secondary	0.122***	0.129***	0.126***
	(0.000)	(0.000)	(0.000)
Upper Secondary	0.169***	0.138***	0.164***
	(0.000)	(0.000)	(0.000)
Post-Secondary	0.200***	0.265***	0.237***
	(0.000)	(0.000)	(0.000)
Cert/Diploma	0.292***	0.291***	0.302***
	(0.000)	(0.000)	(0.000)
3rd Level Degree or higher	0.435***	0.382***	0.433***
	(0.000)	(0.000)	(0.000)
Female - Lower Secondary	-0.0164	-0.0972*	-0.0446
	(0.575)	(0.024)	(0.152)
Female - Upper Secondary	0.0353	0.0557	0.0416
	(0.184)	(0.142)	(0.135)
Female - Post Secondary	-0.0216	-0.0690	-0.0507
	(0.517)	(0.138)	(0.144) *
Female - Cert/Diploma	0.0391	0.0653*	0.0418
	(0.166)	(0.099)	(0.156)
Female - 3rd Level Degree	0.0451*	0.0669*	0.0447
	(0.084)	(0.071)	(0.101)
log GDP	-0.0309	0.109**	0.00241
	(0.164)	(0.002)	(0.921)
log total hours worked	0.756***	0.655***	0.717***
	(0.000)	(0.000)	(0.000)
Not Irish	-0.159***	-0.176***	-0.159***
	(0.000)	(0.000)	(0.000)
Marital=married	0.234***	0.321***	0.263***
	(0.000)	(0.000)	(0.000)
marital=widowed	0.0445*	0.217***	0.0785**
	(0.064)	(0.000)	(0.004)
marital=divorced/separated	0.163***	0.261***	0.182***
	(0.000)	(0.000)	(0.000)
Constant	7.168***	5.857***	6.917***
	(0.000)	(0.000)	(0.000)
Observations	38,494	38,494	38,494
R-squared	0.554	0.454	0.552
Source: London Economics analysis of EU-SILC data			
p-values in parentheses: * p < 0.1, ** p < 0.01, *** p < 0.001			

The models show an overall good fit with over 50% of the total variation in the dependent variable explained by the independent variables for both the OLS model and the Random effects model, and about 45% for the fixed effects model. Almost all the regressors[22] are statistically significant and of expected sign i.e. they appear to be having the effect which one would have anticipated prior to undertaking this regression. For example, age shows a positive relationship between age and incomes.

[22] We have not presented coefficient estimate results for NACE code and local unit type, and some other categorical variables included in the models.

Additional models run, including age-squared and categorical age variables, did not significantly alter the key results on education. Models trying regional groupings and other factor variables did not have a significant impact either. A number of different specifications were tested and studied, such as including regional dummies, occupational codes, more granular nationality variables, all of which had little impact on the results, coefficients of interest, or r-squared statistics.

According to the fixed effects model, third-level degree and higher education has about a 38% premium over no education/primary education, or about a 12% premium over secondary post-leaving cert, and 25% premium over lower second-level.

In addition to our fixed effects modelling, we also used treatment models which attempt to ensure that the impacts on education do not reflect possible treatment bias, i.e. the likelihood that those who obtain university education may have other advantages in terms of abilities or socio-economic factors. To do this we utilise a number of treatment models to measure the counterfactual impact of university education. Specifically, we utilise three separate models, namely, propensity score matching (PSM), regression adjustment (RA), and inverse-probability-weighted regression adjustment (IPWRA).

Results

As might be expected, the treatment models yield somewhat lower values for the impacts of educational attainment on wages, indicating that it is likely some proportion of the wage premium is due to factors outside the treatment (the education itself). Further, the treatment models are designed to estimate the impact of the treatment alone, holding other socio-demographic characteristics and associated correlations constant. Thus, since the previous panel models estimated a premium relative to primary education, then higher premiums would be expected in the panel models, since one might expect those 'similar' on socio-demographic characteristics to those who attend third-level education to be more likely to have achieved education levels near third-level. In other words, the matched or weighted treatment models are likely to have a higher baseline education level to which third-level is compared to than the panel models.

The results are presented in the table below. This illustrates the estimated Average Treatment Effect on the Treated (ATET). The coefficients of .29, .30, and .21 for the RA, PSM and IPWRA models are interpreted as the estimated premium for education to third level being between 21% and 30%. The baseline potential outcome is in log-annual wage total income (about 10.08 for the RA model), with the interpretation that is about a 29% treatment effect, i.e. the estimated wage premium to a third-level degree is 29% using the RA model.

Table 3.6: Wage Premium Third-Level Degree

Model	RA	PSM	IPWRA
Measure	ATET	ATET	ATET
Dependent Variable			
Log-annual_wage_income	0.29***	0.30***	0.21***
	(0.000)	(0.000)	(0.000)
Potential outcome-mean			
No 3rd Level Degree	10.08***	NA	10.41***
	(0.000)		(0.000)
Observations	40,469	50,641	39,291

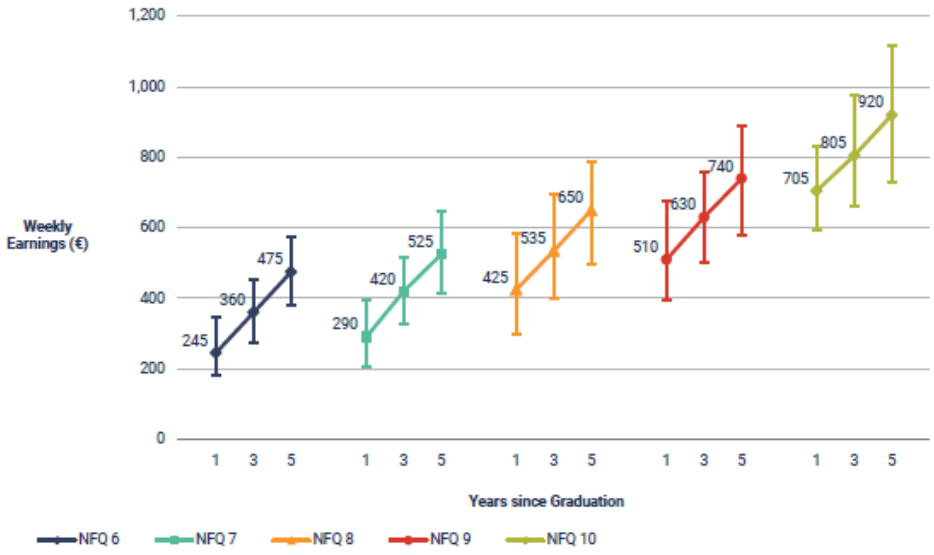
Source: London Economics Econometric Analysis; EU-SILC data
p-values in parentheses: * p < 0.05, ** p < 0.01, *** p < 0.001

Education with a third-level degree was coded as a zero one variable, so it is important to interpret these results carefully. The results should be interpreted as the premium for third-level education from the matched sample, i.e., after matching (or weighting). The reported ATET is the average effect, predicted across the treated population, however. Thus, the premiums, although lower than the previous premiums estimated, are substantial in that this is in terms of comparing those with third-level degrees to either matched or weighted samples of those with similar socio-demographic characteristics to the treated (educated). That is to say that these models compare the impact of higher-level education to the outcomes for those without higher level education who are as similar as possible to those with higher education qualifications with regards to other socio-demographic factors.

A limiting factor of the SILC data is that no differentiation can be made as to the level of higher education qualification. It is not possible to identify those in the SILC dataset with a postgraduate degree or qualification above level 8.

Previous research conducted by the HEA[23] has shown differences in median incomes between those who have graduated with an undergraduate degree and those who have graduated with a Master's degree or PhD. The HEA study examined the earnings of graduates with different qualifications 5 years following completion of their studies. The following figure shows that the median weekly earnings of 2010 PhD graduates was €920, 41.5% higher than those who graduated with an NFQ Level 8 qualification. Those with NFQ Level 9 qualifications earned 13.8% more than those with an NFQ Level 8 qualification. It is important to note that these figures use median earnings to compare outcomes and thus may not reflect the true Master's or PhD premia as this first order analysis fails to control for other factors influencing earnings. Other factors and the characteristics of individuals who undertook those degrees may explain part of the difference in the median weekly earnings. Nevertheless, the HEA study is indicative of the potential earnings premia from advanced qualifications.

Figure 3.4: Median Weekly Earnings of 2010 Graduates by NFQ Level



Source: HEA/CSO" Higher Education Outcomes – Graduation Years 2010-2014"

However, despite these figures not being directly comparable to econometric evidence, in the absence of data to facilitate more detailed econometric analysis, it is possible to adjust the

[23] HEA/CSO" Higher Education Outcomes – Graduation Years 2010-2014"

econometric findings with the inputs from the CSO report to provide some indicative estimates of the differential income premia for undergraduate, postgraduate and PhD level qualifications. Indecon estimates, based on the proportion of the population with undergraduate degrees, post-graduate qualifications and PhDs, suggest that the premium from third level qualifications estimated by our econometric modelling would be 28% lower for undergraduates than the baseline model finds. While an econometric estimate of the earnings differential by levels of qualification is not possible given the nature of the data available, this adjustment is indicative of the likely differential. In order to ensure that our analysis of the benefits of university education does not overestimate the returns, we utilise the lower adjusted earnings premium in the analysis in the following chapters.

Adjusting the findings of the econometric analysis with the insights from the CSO data also allows us to estimate the differential premium for post-graduate qualifications relative to undergraduate qualifications. While me note the findings of the recent HEA Graduate Outcome Survey for the class of 2017[24], in our modelling we have used the HEA/CSO longitudinal study to derive earning differentials. The more detailed HEA/CSO data is based on administrative data as opposed to the survey analysis which allows consideration of the entire graduate population. The HEA/CSO data also appraises graduate outcomes over a longer time period.

3.4 Summary of Findings

- A core function of the Irish university sector is the teaching of students. The universities represent institutions of educational excellence and play a vital role in providing Irish students with the education and skills required to succeed in their careers both in terms of securing employment and increasing lifetime earnings.
- Those with an honours degree or higher have consistently had lower unemployment rates than any other education level, with this cohort having an unemployment rate of 3.8% in Q2 2018 compared to the overall rate of 6.2%, reflecting their higher likelihood of being in employment.
- The results of Indecon's econometric modelling clearly demonstrate the returns to education for Irish students. The differential in earnings for third-level graduates is likely reflective of their increased productivity and benefit to the wider economy. Indecon's modelling finds that those with a third level qualification are likely to earn between 21-30% more than similar individuals who lack a third level qualification.
- The positive impacts suggested by the econometric evidence is confirmed by the views of graduates and over 94% of respondents to Indecon's alumni survey indicated that their university education had a very positive or positive impact on their employment prospects. The majority of graduates also indicated that university education had a positive impact on their earnings potential and their individual productivity.

[24] HEA, 2017, "Graduate Outcomes Survey: Class of 2017"

4 Quantifying the Lifetime Income Returns to University Qualifications

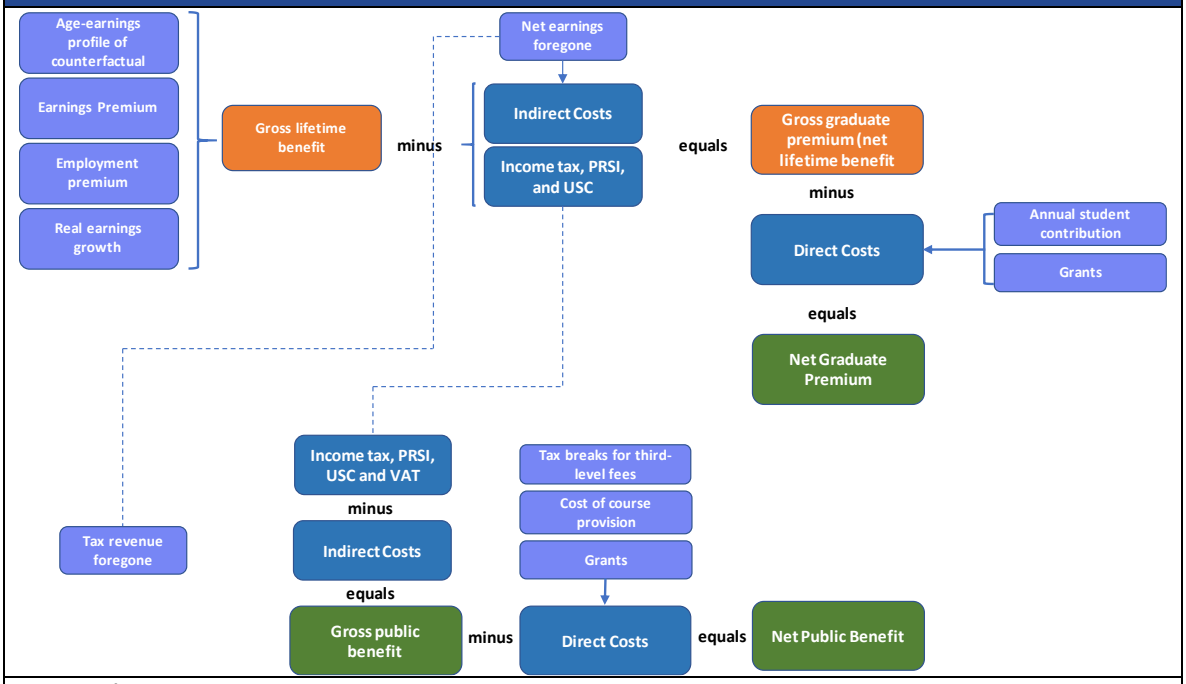
4.1 Introduction

The econometric analysis outlined in the preceding chapter utilised the available data in Ireland on education, earnings and employment to estimate the benefits to individuals from completing a third-level qualification in Ireland. This analysis illustrated the premium in terms of the probability of employment and enhanced earnings accruing to university graduates. This chapter builds on this analysis by quantifying the impact of university on lifetime earnings.

4.2 Defining the Returns to Higher Education Qualifications

The following figure outlines the calculations undertaken in estimating the net lifetime earnings premium associated with an undergraduate degree from an Irish university and the estimation of the Exchequer impact. This takes into account the costs of university education as well as the loss in earnings while students are attending college. It should be noted that all monetary values in these calculations are discounted using the discount rate from the latest research note published by the Department of Public Expenditure and Reform.

Figure 4.1: Overview of Gross and Net Graduate Premium and Net Exchequer Benefit



Source: Indecon

4.3 Estimating the Returns to University Qualifications

To measure the economic benefits to higher education, we estimate the labour market value associated with third-level qualifications, rather than simply assessing the labour market outcomes achieved by individuals in possession of a higher education qualification. To achieve this, the standard approach, as pursued in the preceding chapter, is to undertake a standard econometric analysis where the 'treatment' group consists of those individuals in possession of the qualification of interest, and the 'counterfactual' group consists of those individuals with comparable personal and socioeconomic characteristics but with the next highest level of qualification.

The rationale for adopting this approach is that the comparison of the earnings and employment outcomes of the treatment group and the counterfactual groups removes other personal and socioeconomic characteristics that might affect labour market earnings and employment (such as gender, sector or region of employment), leaving just the labour market gains attributable to the qualification itself (i.e. the contribution of the higher education institution). While we undertook several modelling approaches in the preceding chapter to estimate the impact of third-level qualifications on employment and earnings in an Irish context, we utilise findings from the IPWRA model in the additional analysis undertaken in this chapter, as this model presents the most conservative estimate of the graduate premium. We utilise this model to ensure that our estimates are prudent and do not overstate the benefits to higher education.

The differences between the gross and net graduate premium relate to the direct and indirect costs of acquisition of higher education. These direct costs constitute the costs incurred by the student in undertaking their studies. This cost in Ireland for an Irish domiciled student is the annual student contribution of €3,000 per annum, net of any grants or other subsidies received by the student. The cost to non-EU international students is significantly higher and differs by university and course. For the purposes of our analysis, we assume average undergraduate annual fees of €18,000 for non-EU international students in Ireland. The indirect costs are the earnings foregone during the years in which a student is obtaining their qualification which could otherwise have been spent in full-time employment. We include in our analysis the impact of earnings from students who work during their studies in this calculation of earnings foregone.

The direct costs associated with qualification attainment to students are calculated from start to completion of a student's learning. Throughout the analysis, to ensure that the values of the economic benefits and costs are computed in present value terms (i.e. in 2018 money terms), all benefits and costs occurring at points in the future were discounted using the discount rate as outlined in the latest research note from the Department of Public Expenditure[25]. Deducting the resulting costs from the estimated gross graduate premium, we arrive at the estimated net graduate premium per student.

For the purposes of our analysis, we assume that an individual undergraduate student is undertaking their studies in 2018 and will complete a course of an average length of 3.8 years[26]. We assume that this undergraduate student is aged 18 years and will work until 65. It is this span of time between ages 18 and 65 over which we appraise the net benefits of third-level education to both the individual and the Exchequer. We use as our baseline earnings estimate the average earnings of those with a second level qualification in the 2016 SILC. The earnings premium is calculated based on this baseline and the findings of the econometric modelling outlined in the preceding chapter, adjusted to reflect the CSO research on the differential between the earnings of those with undergraduate, postgraduate and PhD level qualifications. Similarly, the probability of employment for those with a second level qualification and a third-level qualification is based on the econometric estimates using the LFS data. Average earnings are adjusted by this probability of employment for both the 'treatment' and 'control' groups in our analysis.

Our approach to estimating the net graduate and Exchequer premiums can be summarised in the following steps:

[25] We utilise a 4% discount rate for the first 30 years and a 3.5% rate from this point onwards in our analysis. The 4% discount rate and the reduction in the rate over longer time periods are in line with the latest Staff Paper on appraisal parameters published by the Department of Public Expenditure and reform available at: https://igees.gov.ie/wp-content/uploads/2018/11/Central-Technical-Appraisal-Parameters.pdf. While these values have not been formally adopted in the Public Spending Code, we believe that they represent the latest guidance and are appropriate for use in our modelling. We include alternative discount rates in our scenario analysis of the model findings.

[26] This 3.8 average length is based on the average length of undergraduate courses offered in Irish universities.

1. We estimated the employment-adjusted annual earnings achieved by individuals in the counterfactual groups (i.e. completed secondary education).
2. We adjusted these baseline or counterfactual earnings using the earnings premiums and employment probabilities estimated in the preceding chapter.
3. We adjusted these age-earnings profiles to account for the fact that earnings would be expected to increase in real terms over time[27].
4. Based on the earnings profiles generated by qualification holders, and income tax, PRSI, USC and allowances for the relevant academic year, we computed the future stream of net earnings (i.e. post-tax). It should be noted that the analysis assumes fiscal neutrality, i.e. it is asserted that the earnings tax, PRSI and USC bands grow at the same rate of annual earnings growth. The tax adjustment also takes account of increased VAT revenues for the Exchequer, by assuming that individuals spend 70%[28] of their annual income consuming goods and services within the economy (i.e. assuming a 70% propensity to consume), and a VAT rate of 23%. Using similar assumptions, we further calculated the stream of (employment-adjusted) foregone earnings (based on earnings in the relevant counterfactual groups) during the period of study, again net of tax, for students.
5. Foregone earnings are adjusted to reflect the proportion of students who work during their studies both during term time and between terms. Our analysis assumes that these students make the minimum wage and we base the proportion of students who work and the average hours worked on evidence from the 2016 HEA Eurostudent survey[29].
6. We calculated the discounted stream of additional (employment-adjusted) future earnings compared to the relevant counterfactual group (using a standard discount rate of 4% for the first 30 years and 3.5% thereafter[30]), and the discounted stream of foregone earnings during qualification attainment, to generate a present value figure. We thus arrive at the gross graduate premium.
7. The discounted stream of enhanced taxation revenues minus the tax income foregone during students' qualification attainment derived in preceding steps provides an estimate of the gross public benefit associated with higher education qualification attainment. This is a relevance to the calculations for the Exchequer impact discussed in more detail in the following chapter.

The estimated net graduate income premia achieved by students commencing undergraduate degrees in the 2017/2018 academic year are presented in the following table.[31] The analysis indicates that the net graduate premium achieved by a representative student in the 2017/2018 cohort completing a full-time undergraduate degree at an Irish university is €106,000 in today's money terms. These figures are net of tax and net of the costs incurred by the students in obtaining their degrees as well as the costs of income foregone during the years in which they attend university. The estimates have been discounted by 4% per annum, in line with the latest research note from the Department of Public Expenditure and Reform. If a lower discount rate was used, the

[27] We assume a 2% per annum real earnings growth rate in line with the long-run real earnings growth rate of the Irish economy as per CSO analysis available at https://www.cso.ie/en/releasesandpublications/ep/p-hes/hes2015/aiw/.

[28] Gerlach-Kristen, Petra. "Testing the permanent income hypothesis for Irish households, 1994 to 2005." *The Economic and Social Review* 45.4, Winter (2014): 511-535. We take the average of the MPC for mortgage and tenant households from the 2004/2005 HBS.

[29] Available at: http://hea.ie/assets/uploads/2018/01/HEA-Eurostudent-Survey.pdf

[30] See footnote 24 for discussion of discount rates.

[31] The graduate earnings premium utilised in this analysis is based on the findings of the econometric analysis undertaken by Indecon and the evidence from CSO research on the differential between earnings of those with primary degrees, postgraduate degrees and PhD qualifications.

net graduate premiums would be higher. The impact of alternative discount rates is outlined in the following sections.

These findings of an average premium of €106,000 compare favourably to the findings of previous research undertaken in the UK which found a premium of £88,000 (€101,000) for the Russell Group Universities[32].

Indecon's baseline model estimates that the after-tax benefits to an undergraduate education in Ireland, accounting for the costs of acquiring this education, amount to €106,000. Gross of taxation we estimate this benefit to amount to €154,000, however, economically we believe that the figure net of taxation is the more appropriate measure of the benefits to an undergraduate education in Ireland.

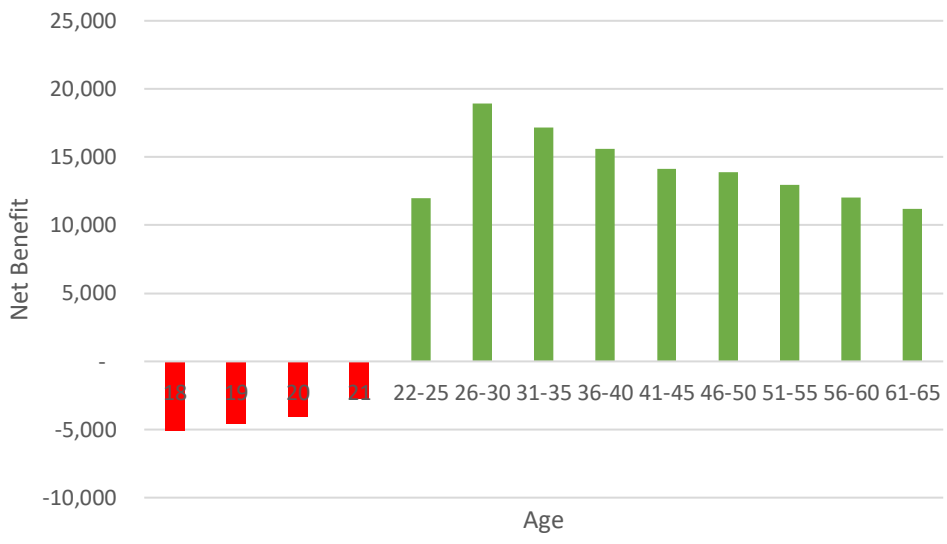
Table 4.1: Estimated net graduate premiums to undergraduate degrees

	Net graduate premium €
Male	118,000
Female	96,000
Average	106,000

Note: All estimates are presented in 2018 prices, discounted to reflect net present values, and rounded to the nearest €1,000. The estimates are based on an average age at graduation of 22 for students undertaking undergraduate qualifications.
Source: Indecon analysis

Figure 4.2 outlines graphically the net graduate premium in discounted terms over the period included in our analysis.

Figure 4.2: Net Graduate Premium €



Source: Indecon analysis

[32] London Economics, 2017, "The Economic Impact of Russell Group Universities"

It should be noted that the above estimates are made using conservative assumptions as regards the graduate premium in Ireland. This estimate is based on the lower findings from the econometric models undertaken and the premium has been adjusted downward to reflect the impact of postgraduate qualifications in the underlying SILC data. Should an unadjusted premium be utilised, we estimate that the average graduate premium would amount to €139,000 for an Irish domiciled undergraduate student.

Using a similar methodological approach to that described above for estimating the benefit to undergraduate education, we can estimate the additional earnings premium from postgraduate education. The following table outlines the estimates of the additional premia from a single year taught postgraduate course and a level 10 PhD qualification. These estimates can be interpreted as the additional premium for these qualifications above that experienced for an undergraduate qualification. These estimates are based on the following assumptions:

- The average age for students undertaking a taught postgraduate course is 24[33];
- The average age for students beginning a PhD is 27 years of age;
- It takes an average of 4 years to complete a PhD qualification;
- An average PhD stipend of €8,000 per annum;
- The earnings premia for taught postgraduate degrees and PhDs are based on the findings from the econometric analysis undertaken by Indecon adjusted using evidence from CSO research on graduate outcomes[34];

The following table outlines the estimated lifetime net premia for postgraduate qualifications. It should be noted that these premia are relative to those with an undergraduate degree.

Table 4.2: Estimated net graduate premiums to postgraduate and PhD qualifications – Relative to Undergraduate Qualifications

		Net graduate premium €
Male	Taught Masters	36,000
	PhD	118,000
Female	Taught Masters	44,000
	PhD	115,000
Average	Taught Masters	40,000
	PhD	116,000

Note: All estimates are presented in 2018 prices, discounted to reflect net present values, and rounded to the nearest €1,000.
Source: Indecon analysis

4.4 Aggregate Earnings Premium

The preceding analysis estimated the net premium in terms of lifetime earnings for the average student commencing their studies in 2017/2018 in Ireland. Using data on the number of students commencing studies in Irish universities in 2017/2018, we can utilise the average numbers previously calculated to estimate the aggregate impact of this cohort of students. Given the open

[33] This estimate is informed by the findings of the 2016 HEA Eurostudent Survey which found that the average age of postgraduate students was 24.9. We have adjusted this downwards to account for the inclusion of PhD students in this estimate of 24.9 years.

[34] More details on this adjustment can be found in chapter 3 of this report

nature of the Irish labour market, it is important in these calculations that account is taken of the fact that some Irish graduates emigrate at least for a period following completion of their undergraduate studies. Also, of relevance is that a percentage of international students are likely to remain in Ireland following the completion of their studies. We have estimated the likely graduate and exchequer returns to foreign students in Ireland for the purposes of assessing the aggregate premium. The primary difference in these estimates is the additional cost of education to non-EU international students studying in Ireland.

HEA statistics indicate that there were 21,411 Irish domiciled undergraduate new entrants to Irish universities in 2017. In our baseline analysis we assume that 12% of these graduates will emigrate following graduation. This is based on the findings of the HEA "*What Do Graduates Do?*[35]" report for the class of 2017. This report indicated that 12% of university graduates who were employed one year after graduation were employed outside of Ireland. We note that the 2016 version of this report found that 8% of graduates were employed overseas. This indicates that there is some uncertainty around this figure, however, for the purposes of ensuring that our estimates do not overstate the benefits of universities, we take the higher, 12% figure in our baseline modelling. While some of these emigrants may be short-term in nature, Indecon notes that other graduates are likely to emigrate at later stages in their careers. We test the implications of higher emigration assumptions in later sensitivity analysis. We adjust our modelling to reflect the fact that this proportion of students who emigrate will not represent a gain to the Irish economy should they move abroad post-graduation. However, a countervailing effect is the proportion of foreign students who will remain in Ireland following completion of their studies. The Indecon alumni survey suggests 31% of non-Irish domiciled students were still in Ireland following graduation. We utilise this as our baseline assumption on the proportion of international students who remain in Ireland following graduation. As with the assumption on emigration rates for Irish domiciled graduates, we test the implications of alternative assumptions in this regard in subsequent sensitivity analysis. We undertake similar calculations for students undertaking masters and PhD level courses in 2017/2018.

Grossing up the average benefits of a third-level qualifications suggests that, for this cohort of students, there is a total net lifetime income benefit to these students of €2.57 billion in discounted terms. This benefit is net of taxes and the costs of education and calculated on the assumption that graduates will continue to work until age 65, on average. It is important to emphasise that these benefits are associated with a given cohort of students entering Irish universities in 2017/2018. Should the size of these cohorts increase in future years then it is likely that the aggregate benefit to the Irish economy for each annual group of entrants to universities will also increase.

Table 4.3: Estimated Aggregate Impact of Third-level Education in Irish Universities for 2017/2018 Cohort

	€ Billions
Aggregate lifetime income benefit of 2017/18 cohort	2.57

Source: Indecon analysis

Given the uncertainty surrounding some aspects of the estimate of the total impact of university education on graduate incomes in Ireland, it is prudent to outline a number of scenarios in which

[35] HEA, 2018, "What Do Graduates Do? The Class of 2017". Available at: http://hea.ie/assets/uploads/2019/02/HEA-Graduate-Outcomes-Survey.pdf

alternative assumptions are imposed. The following table estimates the aggregate lifetime income benefit under a range of alternative assumptions. The scenarios conducted include:

- Scenario 1: Doubles the emigration rate for Irish graduates assumed in the baseline analysis.
- Scenario 2: Halves the retention rate for non-Irish graduates assumed in the baseline analysis.
- Scenario 3: Assuming graduates continue to work, on average, until age 68.
- Scenario 4: Limits the analysis to Irish domiciled students and assumes no graduate emigration.
- Scenario 5: Combines the assumptions under scenarios 1 and 2.
- Scenario 6: Utilises a 4% discount rate for full graduate lifetime earnings.

Alternative assumptions for emigration rates and retention rates for non-Irish graduates provide a range of alternative total income benefits for the 2017/2018 cohort of €2.39 billion to €2.76 billion.

Table 4.4: Scenario Analysis for Aggregate Lifetime Income Benefit from Higher Education for 2017/18 Cohort

		Aggregate lifetime income benefit of 2017/18 cohort (€ Billions)
	Alternative Assumption	
Scenario 1	16% Emigration Rate for Irish Graduates	2.48
Scenario 2	16% Retention Rate for Non-Irish Graduates	2.53
Scenario 3	Increase in working age to 68 from 65	2.76
Scenario 4	Excluding Non-Irish Graduates and Assuming 0% Emigration Rate for Irish Graduates	2.76
Scenario 5	A combination of scenarios 1 & 2	2.44
Scenario 6	4% discount rate for full graduate lifetime earnings	2.39

Source: Indecon analysis

4.5 Summary of Findings

- The net graduate premium achieved by an undergraduate student in the 2017/2018 cohort completing a full-time undergraduate degree at an Irish university is €106,000 in today's money terms.
- The premium from a postgraduate degree amounts to €40,000 while the premium for a PhD amounts to €116,000. These premia are relative to income of an individual with an undergraduate degree.
- It is estimated that the total lifetime earnings increase for the cohort of students commencing their undergraduate studies in 2017/2018 will amount to €2.57 billion in discounted terms over their working lifetimes.

5 Exchequer Costs and Benefits of University Graduates

5.1 Introduction

The expenditure by the Exchequer in providing higher-level education constitutes a significant cost incurred by Irish taxpayers. It is important that these costs are taken account of in our estimates of net impact on the Exchequer. The costs to the Exchequer are compared to the Exchequer benefits from university graduates via increased income tax receipts from their higher incomes as well increased taxation from additional spending supported by higher incomes.

5.2 Estimating the Net Returns to the Exchequer from Each Graduate

The direct costs to the Exchequer include the subsidies paid directly to universities by the government to cover the costs of the provision of the higher education place. For the purposes of our analysis we use an average per-student cost of €10,379 as per figures published by the HEA in 2017[36]. The figure estimates the total annual cost of an undergraduate place and is inclusive of capital and pension costs. It, however, does not represent the cost to the exchequer of providing this place. Analysis of the latest available financial data from the HEA[37] suggests that, a combination of the block grant and the exchequer contribution to fees amount to 43% of university income[38]. We thus assume that the exchequer contributes 43% of the average cost of providing an undergraduate education. We also include in our analysis the costs to the Exchequer of providing grants to students. The latest figures made available to Indecon by the IUA indicate that total spending on SUSI grants for university students in 2016/2017 amounted to €152 million. Based on the number of full-time students enrolled in Irish third-level institutions in 2017, we estimate an average cost of €1,419 per university student per annum to the Exchequer in SUSI grants. This annual cost per student is utilised in our modelling of the costs of the provision of undergraduate education to the Exchequer. We also include in our exchequer impacts the costs to the exchequer of tax breaks offered for those paying third level fees. Analysis of data from the Revenue Commissioners and the total number of students attending Irish third level institutions indicates that the average cost to the exchequer per student from this tax relief is €61.

Any Exchequer implications are adjusted for the shadow cost of public funds in the calculation of the Exchequer impact. This provision is outlined in the Public Spending Code and implies that all costs to the Exchequer should be 'shadow priced' at 130% to reflect the distortionary impact of taxation. As such, we adjust all costs to the Exchequer and subsequent taxation returns to 130% in our analysis.

The gross benefit to the public purse associated with higher education qualification attainment is defined as the present value of enhanced taxation (following the deduction of the costs of foregone tax earnings) relative to an individual in possession of the counterfactual qualification. The potential benefits accruing to the Exchequer from the provision of higher education are derived from the enhanced taxation receipts that are associated with a higher likelihood of being employed, as well as the enhanced earnings associated with more highly-skilled and productive employees. Based on the analysis of the lifetime earnings and employment benefits associated with third-level qualification attainment, and combined with administrative information on the relevant taxation

[36] Higher Education Authority, "Review of the Allocation Model for Funding Higher Education Institutions", December 2017

[37] Higher Education Authority, "Higher Education System Performance: Institutional and Sectoral Profiles 2015-16", October 2018

[38] Excluding income for research grants and contracts

rates and bands, we estimated the present value of additional income tax, PRSI, USC and VAT associated with higher education qualifications.

The below table presents the corresponding net Exchequer benefits associated with Irish domiciled students undertaking undergraduate degrees in 2017/2018. The results indicate that the net Exchequer benefit associated with a representative student in this cohort completing a full-time undergraduate degree is €62,000 in today's money terms, with the premium accruing from men standing at €75,000 compared to a premium of €51,000 generated by women.

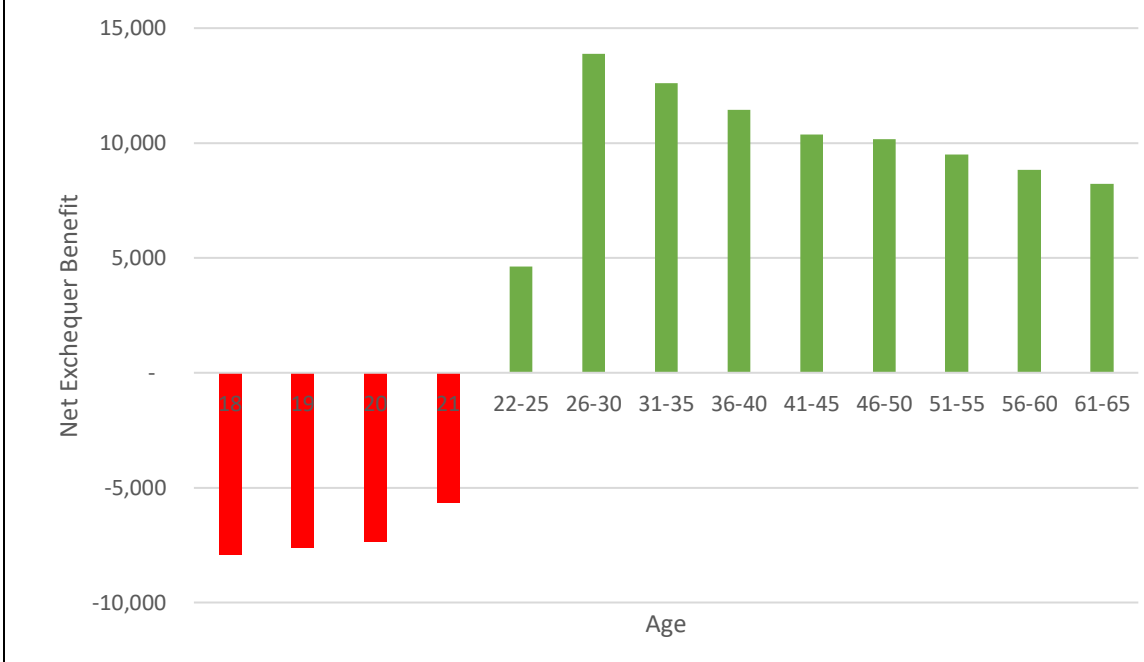
Table 5.1: Estimated Net Exchequer Premium to Undergraduate Degrees

	Net Exchequer premium €
Male	75,000
Female	51,000
Average	62,000

Note: All estimates are presented in 2018 prices, discounted to reflect net present values, and rounded to the nearest €1,000. The estimates are based on an average age at graduation of 22 for students undertaking undergraduate qualifications.
Source: Indecon analysis

Figure 5.1 outlines graphically the net graduate premium in discounted terms over the period included in our analysis.

Figure 5.1: Net Exchequer Benefit €



Source: Indecon analysis

As was the case for the graduate income premium, we have also estimated the exchequer premium for both postgraduates and those undertaking PhDs in Irish universities. The average exchequer premium for postgraduate qualifications is €46,000 compared to an individual with an

undergraduate qualification. The premium for a graduate with a PhD is €126,000 over an individual with an undergraduate degree.

Table 5.2: Estimated Net Exchequer Premiums to Postgradaute and PhD Qualifications – Relative to Undergraduate Qualifications		
		Net exchequer premium €
Average	Taught Masters	46,000
	PhD	126,000
Note: All estimates are presented in 2018 prices, discounted to reflect net present values, and rounded to the nearest €1,000.		
Source: Indecon analysis		

5.3 Aggregate Exchequer Impact

The preceding analysis estimated the net premium in terms of Exchequer benefits for the average graduate commencing their studies in 2017/2018 in Ireland. This analysis can be grossed up to provide an estimate of the total Exchequer impact from the 2017/2018 cohort of university students. The estimates indicate a net Exchequer benefit of this cohort of €1.61 billion in net present value terms. This estimate has also taken account of what would have been the Exchequer tax income received from these individuals if they had not obtained their qualifications.

Table 5.3: Estimated Aggregate Exchequer Benefit From Third-level Education in Irish Universities for 2017/2018 Cohort	
	€ Billions
Aggregate Exchequer benefit of 2017/18 cohort	1.61
Source: Indecon analysis	

5.4 Scenario Analysis

As was the case when estimating the total income benefit to the 2017/2018 cohort of students, given the uncertainty surrounding aspects of the estimate of the total Exchequer impact of university graduates, we outline a number of scenarios in which alternative assumptions are imposed. This scenario analysis reflects the range of reasonable estimates for the aggregate lifetime income benefit of higher education to the 2017/2018 cohort of students, based on the available evidence. We test scenarios for the same alternative assumptions as in the previous chapter. Alternative assumptions for emigration rates and retention rates for non-Irish graduates provide a range of alternative total income benefits for the 2017/2018 cohort of €1.47 billion to €1.75 billion.

Table 5.4: Scenario Analysis for Aggregate Exchequer Benefit from Higher Education for 2017/18 Cohort		
		Aggregate lifetime exchequer benefit of 2017/18 cohort (€ Billions)
	Alternative Assumption	
Scenario 1	16% Emigration Rate for Irish Graduates	1.53
Scenario 2	16% Retention Rate for Non-Irish Graduates	1.56
Scenario 3	Increase in working age to 68 from 65	1.72
Scenario 4	Excluding Non-Irish Graduates and Assuming 0% Emigration Rate for Irish Graduates	1.75
Scenario 5	A combination of scenarios 1 & 2	1.48
Scenario 6	4% discount rate for full graduate lifetime earnings	1.47
Source: Indecon analysis		

5.5 Summary of Findings

- The expenditure by the Exchequer in providing undergraduate education constitutes a significant cost incurred by the Exchequer. It is important these costs are taken account of in our estimates of net impact on Exchequer. The costs to the Exchequer are compared to the Exchequer benefits from university graduates via increased income tax receipts from their higher incomes as well as increased taxation from additional spending supported by higher incomes.
- The results indicate that there is a net Exchequer benefit associated with supporting graduate education in Ireland. For a representative student completing a full-time undergraduate degree there is a net Exchequer benefit of €62,000.
- The net exchequer benefits to a postgraduate qualification amounts to €46,000 relative to an undergraduate education. A PhD yields a net exchequer benefit of €126,000.
- This analysis can be grossed up to provide an estimate of the total Exchequer impact from the 2017/2018 cohort of university students. The estimates indicate a net Exchequer benefit of this cohort of undergraduates of €1.61 billion in total in net present value terms. This estimate has also taken account of what would have been the Exchequer tax income received from these individuals if they had not obtained university education.

6 Economic Impact of Overseas University Students

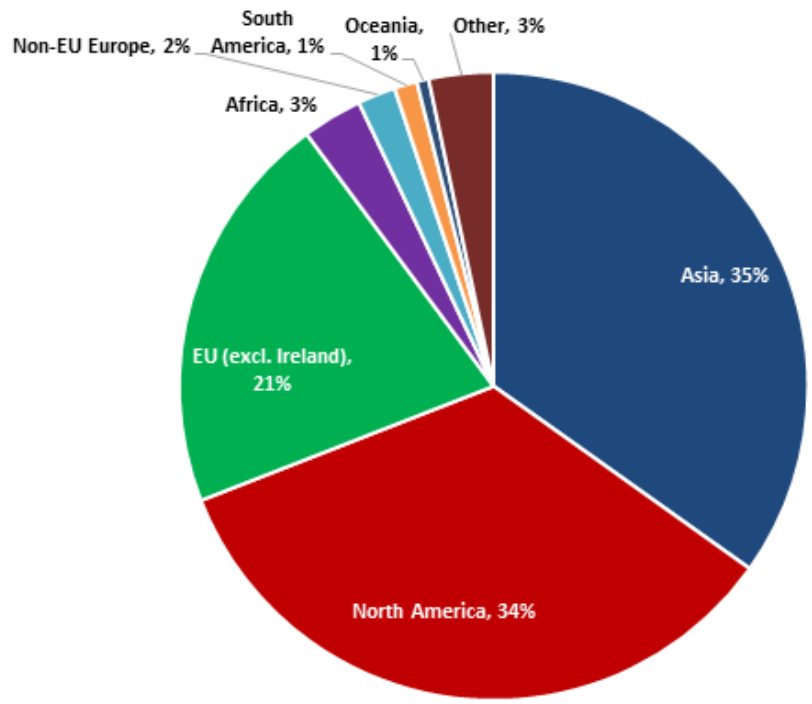
6.1 Introduction

The Irish university sector contributes to exports in the form of tuition-fee income from EU and non-EU students (net of any Exchequer costs), as well as non-tuition fee (off-campus) expenditure of EU and non-EU students during the course of their studies at Irish universities.

6.2 International Students Attending Irish Universities

Data from the HEA indicates that there were 16,701 non-Irish domiciled students enrolled in Irish universities in 2017/2018. The following figure illustrates the geographic distribution of origins of these non-Irish students.

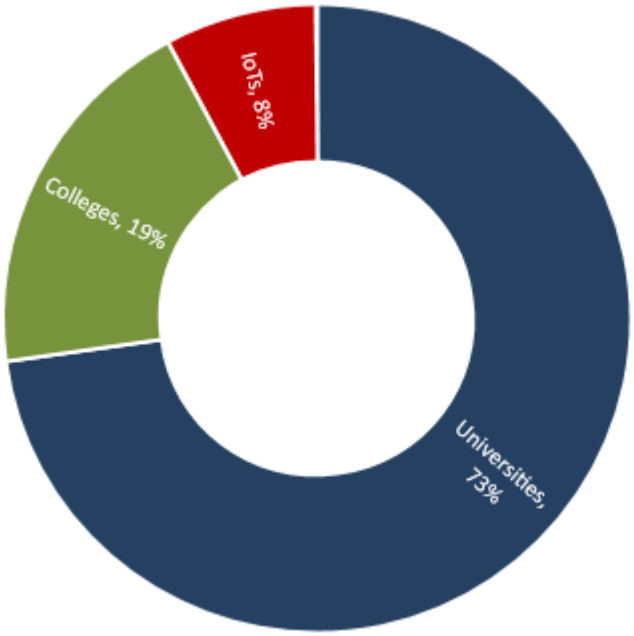
Figure 6.1: Origins of Non-Irish Domiciled Students 2017/2018



Source: Indecon analysis of HEA data

Irish universities represent the largest destination for international students in Ireland. Irish universities accounted for 73% of all international students studying in Ireland, as illustrated in the below figure.

Figure 6.2: Destinations of Non-Irish Domiciled Students 2017/2018



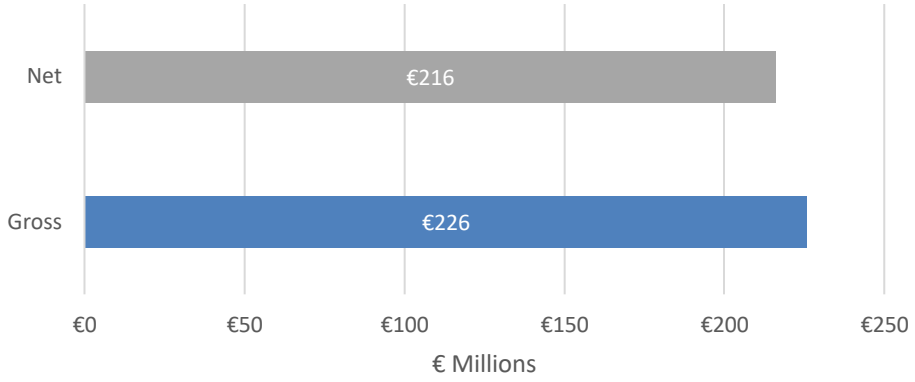
Source: Indecon analysis of HEA data

6.3 Tuition Fee Income from International Students

International students are subject to differing fees based on whether they are entitled to EU fees or non-EU fees. Those students from EU countries only need to pay the student contribution of €3,000 per annum for undergraduate studies, the same as Irish students. These EU students are also subject to the same fees for postgraduate courses as Irish students. Non-EU international students are subject to different, and typically higher, fee regimes. These fees for non-EU international students vary significantly between universities and courses.

In analysing the contribution of international students attending Irish universities in terms of tuition fee income, Indecon was provided with data by the IUA on total fee income to the universities from non-Irish students. As with the analysis of the premium to the Exchequer from Irish students, we estimate both a gross and net tuition fee income from international students. The net benefit deducts the costs to the Exchequer of providing education for EU international students. Indecon have estimated the total annual net tuition fee income to the Irish economy from international students. The following figure illustrates our estimates for the contribution of the Irish university sector to Irish exports via tuition fee income for 2017/2018. Net of the costs to the Exchequer, we estimate the annual net benefits of international students from tuition fees in 2018 to be €216 million. We would note that this benefit is based on the current numbers of students, their breakdown between EU and non-EU origins and the current fees levels charged by each university. The future contribution of the sector to exports will depend on how each of these variables changes into the future.

Figure 6.3: Estimated Gross and Net Exports via Tuition Fee Income from Irish Universities in 2017/2018



Source: Indecon analysis

6.4 Non-Tuition Fee Income from International Students

In addition to the tuition fee income that overseas students generate, these students also incur expenditure on non-tuition fee related items whilst acquiring their qualification. Such expenditure includes, but is not limited to, accommodation costs, subsistence costs, direct course costs and facilitation costs. Assuming that international students' non-tuition fee expenditure is similar to that incurred by Irish students, non-tuition fee expenditure constitutes a significant component of Ireland's export income from overseas students. The Higher Education Authority's Eurostudent survey provides estimates of non-tuition expenditure per student, outlined in Table 6.1. This gives a breakdown of monthly non-tuition expenditure by type of study. For example, full-time postgraduates spend an average of €915 per month on non-tuition expenses.

Table 6.1: Non-Tuition Expenditure per Full-Time Student

	Monthly Non-Tuition Expenditure (€)	Annual Non-Tuition Expenditure (€)
Undergraduates	718	6,462
Postgraduates	915	8,235

Source: HEA Eurostudent Survey
Note: Annual figures based on students residing in Ireland for 9 months.

There were 16,701 full-time international students in the 2017/18 academic year in Irish universities, with 10,144 of these being undergraduate students.

Table 6.2: Full-Time Enrolments in Irish Universities (Domiciliary Origin Outside Ireland) - 2017/18

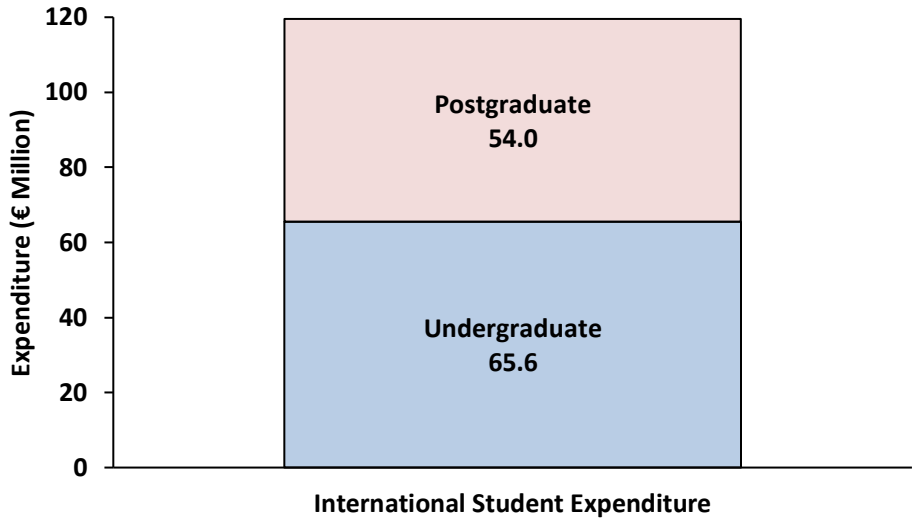
	Undergraduate	Postgraduate	Total
Number of Students	10,144	6,557	16,701

Source: HEA

The following figure shows the estimated annual non-tuition expenditure of international students in Irish universities. It shows that full-time international undergraduates spent an estimated €65.6

million over the course of the 2017/2018 academic year, with postgraduates spending approximately €54 million. Combining these gives an estimated total non-tuition expenditure by international students in Irish universities of €119.5 million.

Figure 6.4: Estimated Annual Non-Tuition Expenditure of International Students in Irish Universities

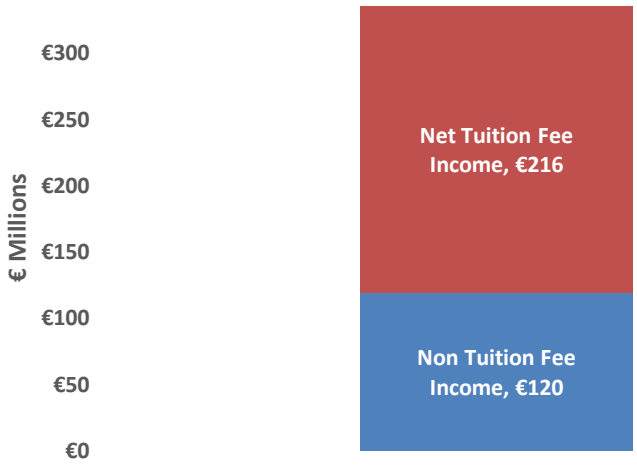


Source: Indecon

6.5 Aggregate Impact of Irish Universities on Exports

Combining the information on both tuition fee and non-tuition fee expenditure provides estimates of the aggregate impact of Irish universities on exports. The total annual export income generated for the Irish economy as a result of the non-Irish domiciled students is estimated to be approximately €336 million. The following figure illustrates the breakdown of total annual exports between net tuition fee income and non-tuition fee expenditure.

Figure 6.5: Total Exports from Irish Universities in 2017/2018



Source: Indecon analysis

The services offered by Irish universities to international students who attend these institutions represent an export from Ireland and are an inflow of foreign revenue to the Irish economy.

Additionally, the non-tuition fee expenditure of international students attending Irish universities also represent a 'second order' export effect from Irish universities. As outlined above, for a cohort of international students of the size and characteristics in terms of type of study and institutional distribution, Indecon's analysis suggests that the total export revenue to the Irish economy amounts to €336 million in 2017/2018.

The benefits to the Irish economy of international students may exceed the revenue inflows during their studies should a proportion of these foreign students remain in Ireland following the completion of their studies. A percentage of these students are likely to remain in Ireland and continue to make a positive contribution to the Irish economy via their high-skilled labour, their contribution to the Exchequer from income taxation and their spending in the Irish economy. These benefits are not included in our estimates in this chapter. In addition, visits by parents and family to Irish based international students will also make a contribution to the economy and exchequer as a result of their spending in Ireland.

6.6 Summary of Findings

- The Irish university sector contributes to exports in the form of tuition-fee income from EU and non-EU students (net of any Exchequer costs), as well as non-tuition fee (off-campus) expenditure of EU and non-EU students during the course of their studies at Irish universities.
- Data from the HEA indicates that there were 16,701 non-Irish domiciled students enrolled in Irish universities in 2017/2018. Irish universities accounted for 73% of all international students studying in Ireland.
- Net of the costs to the Exchequer, we estimate the annual net benefits of international students from tuition fees in 2017/2018 to be €216 million. We would note that this estimate is based on the current numbers of students, their breakdown between EU and non-EU origins and the current fees levels charged by each university. The future contribution of the sector to exports will depend on how each of these variables changes into the future.
- Our analysis estimates that full-time international undergraduates spent an estimated €65.6 million over the course of the 2017/2018 academic year, with postgraduates spending approximately €54 million. Combining these gives an estimated total non-tuition expenditure by international students in Irish universities of €119.5 million. The total annual export income generated for the Irish economy as a result of the non-Irish domiciled students is estimated to be approximately €336 million.

7 Social and Cultural Impacts of the Irish University Sector

7.1 Introduction

In this section Indecon discusses the social and cultural impact of universities in Ireland. While these impacts are perhaps not as readily quantifiable as some of the impacts discussed in the preceding chapters, they nonetheless represent an important consideration when assessing the totality of the impact of the university sector on the wider Irish economy and society.

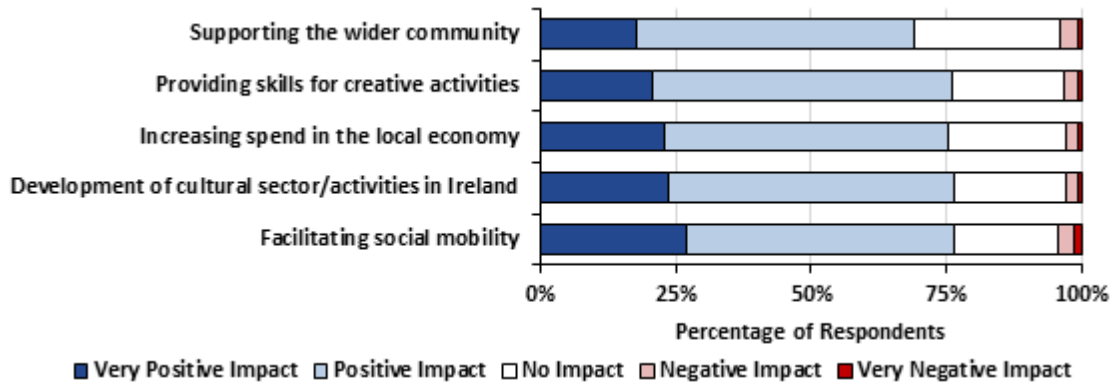
7.2 Views of Alumni on Social, Cultural and Community Impacts

Indecon's survey of alumni asked respondents for their views on the impact of Irish universities on social, cultural and community outcomes. Over 75% of respondents said that Irish universities had either a very positive or positive impact on the following areas:

- Facilitating social mobility;
- Development of cultural sector/activities in Ireland
- Increasing spend in the local economy; and,
- Providing skills for creative activities.

The majority of respondents also said it had a positive or very positive impact on supporting the wider community.

Figure 7.1: Views of Alumni on the Impact of University Education on Social, Cultural and Community Outcomes



Source: Indecon Survey of Alumni of Irish universities

The following table, Table 7.1, provides a breakdown of the percentage of respondents who said Irish universities had a positive or very positive impact on each of the outcomes by their employment status. Those who were looking for work tended to have a lower percentage than those in employment or not looking for work.

Table 7.1: Percentage of Alumni Stating that University Education had a Very Positive or Positive Impact on Social, Cultural and Community Outcomes by Current Employment Status						
Employment Status	**Percentage of Respondents in Cohort**	**Supporting the wider community**	**Providing skills for creative activities**	**Increasing spend in the local economy**	**Development of cultural sector/ activities in Ireland**	**Facilitating social mobility**
Full-time employed	66.3%	69.0%	75.4%	76.4%	75.5%	76.4%
Part-time employed	5.8%	68.2%	77.5%	74.6%	77.2%	79.7%
Self-employed	10.3%	64.6%	75.1%	73.7%	76.2%	73.1%
Unemployed and looking for work	2.2%	58.2%	67.4%	57.4%	68.1%	58.2%
Full-time student (not looking for work)	2.8%	75.4%	78.0%	73.2%	79.2%	77.6%
Part-time student and looking for work	0.3%	50.0%	61.1%	61.1%	55.6%	44.4%
Part-time student (not looking for work)	0.2%	68.8%	75.0%	93.8%	75.0%	81.3%
Retired (not looking for work)	10.7%	77.1%	81.5%	77.7%	84.8%	80.8%
Homecare responsibilities (not looking for work)	1.3%	60.7%	72.6%	78.6%	79.8%	73.8%
Source: Indecon Survey of Alumni of Irish universities						

7.3 Social Engagement and Inclusion by Irish Universities and Students

The following table presents data on social and community engagement by Irish universities, their staff and their students. It is important to note that the below figures are based on averages from Irish universities who collect this data. An average of 13.8% of students are involved in formally recorded volunteering[39], with a further 10% of staff involved in volunteering. Staff are over twice as likely to be engaged in socially-engaged research (13.5%) than students (6%).

[39] It is possible that a higher proportion of students are engaged in voluntary activities but that these are not formally recorded.

Table 7.2: Social and Community Engagement at Irish Universities	
Proportion of programmes that provide curricular options for accredited community engaged learning	42.1%
Proportion of students engaged in socially engaged research	6.0%
Proportion of students involved in community based/community engaged learning	6.1%
Proportion of staff engaged in socially engaged research	13.5%
Proportion of staff involved in community based/community engaged learning	9.3%
Proportion of staff involved in volunteering	10.0%
Proportion of students involved in volunteering	13.8%
Source: Indecon analysis of data provided by Irish universities. Note: Not all universities had data available in this area. Percentages are averages of the percentages provided by universities with available data.	

Using the figure of percentage of students from the previous table, Indecon has estimated the value of volunteering by students at Irish universities. According to the HEA there were 127,775 enrolments in Irish universities for the 2017/18 academic year, with over 17,500 of these estimated to be involved in volunteering based on the percentage of student engaged in volunteering provided by various Irish universities. The QNHS special module on volunteering allows an estimate for the average number of hours of volunteering per year for the 15-24-year-old age group. Indecon uses this and the minimum wage of €9.55 to estimate a value of volunteering by students in 2017/18 of €28.37 million, as shown in Table 7.3.

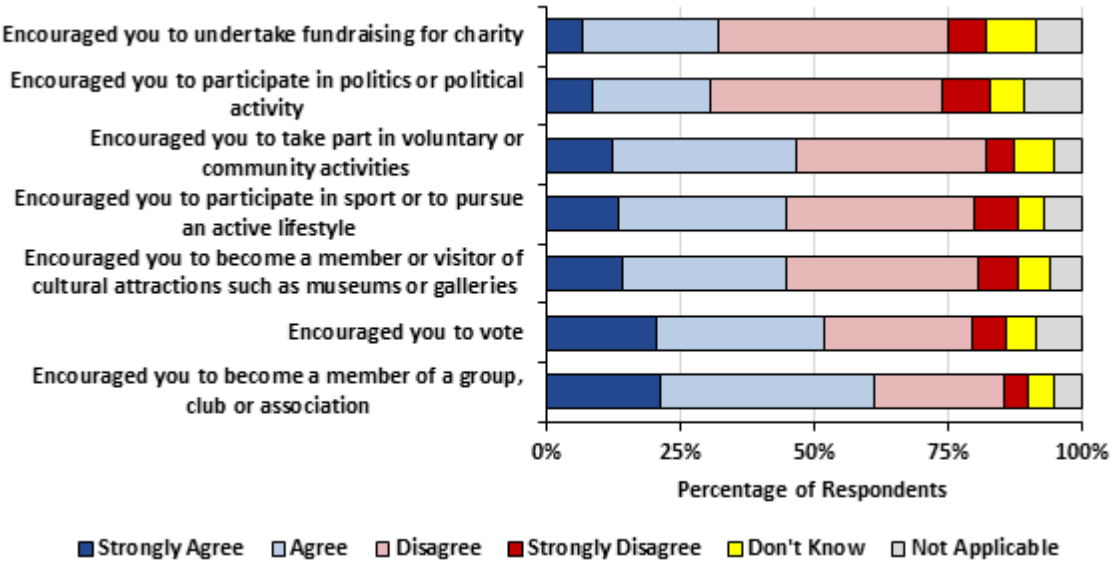
Table 7.3: Estimated Value of Volunteering by Students in 2017/18	
Number of Enrolments in Irish universities (2017/2018)	127,775
Percentage of Students Engaged in Volunteering	13.8%
Estimated Number of Students Engaged in Volunteering	17,569
Average Number of Hours Volunteering per Year (For those aged between 15-24)	169.1
Minimum Wage in 2018 (€)	9.55
Estimated Value of Volunteering by Students (€m)	28.37
Source: Indecon analysis of HEA, Irish University, QNHS and CSO data	

Universities in Ireland are involved in a wide range of social and cultural activities, investing over €14.5 million in 2017, with capital expenditure of over €0.75 million. The events held by Irish universities attracted over two million visitors in 2017, with some of these events and attractions having very significant visitor numbers. Some examples of these cultural activities are contained in the following table.

Table 7.4: Examples of Cultural Activities in Irish Universities (2017)
Galway International Arts Festival – The Galway International Arts Festival, founded in 1978, is a cultural organisation which produces one of Europe's leading international arts festivals. NUI Galway have been working closely with the GIAF for a number of years. NUI Galway hosted a large number of events in the 2017 festival.
UCD Student Services facilitated a wide range of diverse initiatives throughout 2017. Most notable was the UCD Festival and the Women's Rugby World Cup, both events significantly impacting positively on UCD's campus visitation numbers.
The Maynooth Music Concert Programme includes a number of recitals, concerts and events run by the Music Department throughout the year. The Music Department runs a Lunchtime Concert series, as well as major university events such as the Choral Society Concert.
The Helix Theatre in DCU is a multi-purpose venue serving the people and audiences with a mixture of high-quality music, drama and entertainment, which attracted 300,000 visitors in 2017.
The Glucksman is a contemporary art museum in University College Cork, which had over 10,000 active participants in its education and events programme in 2017 and in 2017 was the first museum in Munster to receive full accreditation on the Museum Standards Programme for Ireland.
The Book of Kells in Trinity College Dublin is one of Ireland's most visited tourist attractions. The 9th century book is a richly decorated copy of the four Gospels of the life of Jesus Christ.
University Concert Hall (UCH) is a 1,038-seat auditorium situated on the University of Limerick campus. It is also home to the Irish Chamber Orchestra, the Irish World Academy of Music & Dance, the Association of Irish Choirs, The Bourne Vincent Gallery, Desmond Kinney Mosaics and an extensive Art collection.
Source: Information provided to Indecon by individual universities and individual venue websites.

Having discussed the levels of social engagement by Irish universities, their students and staff, Indecon now presents the views of alumni on the impact of university education on personal development and in their wider contribution to society.

Figure 7.2: Views of Alumni on the Impact of University Education on Personal Development



Source: Indecon Survey of Alumni of Irish universities

The following table looks at the breakdown on new entrants to Irish universities over the 2017/18 academic year. Over 15% of new entrants were socio-economically disadvantaged while 9.9% of new entrants had some form of disability. Given the significant economic returns arising from university education identified in this report, Indecon believes that continued priority should be given by the universities to providing study opportunities for all suitable candidates. In this context continued investment in the successful access programmes is appropriate.

Table 7.5: Breakdown of New Entrants to Universities (2017/18)

	Number	Percentage of Total
Total New Entrants	21,082	-
Socio-Economically Disadvantaged New Entrants	3,273	15.5%
Disability New Entrants	2,081	9.9%
Traveller New Entrants	142	0.7%
Mature New Entrants	1,387	6.6%

Source: Indecon analysis of data provided by universities.
Note: Figures based on latest available data from Universities, figures for some universities estimated with figures from other years.

Table 7.6 shows the number of entrants to Irish universities that came directly from Further Education Colleges in the 2017/18 academic year. There were 829 direct entrants from Further Education Colleges over the academic year.

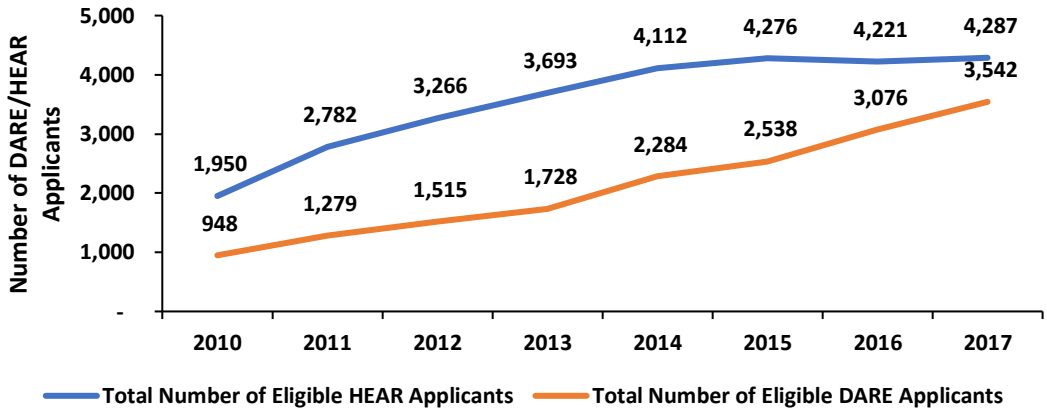
Table 7.6: Entrants to Irish Universities Directly from Further Education Colleges (2017/18)

Entrants to Irish universities Directly from Further Education Colleges	829

Source: Indecon analysis of data provided by Irish universities

Analysis of data on Higher Education Access Route (HEAR) and Disability Access Route to Education (DARE) further illustrates the role played by the universities and wider higher education institutions in promoting access to education and the progress that has been made on this front in recent years. The following figure illustrates the increase in the number of eligible HEAR and DARE applications made to the Irish third-level institutions between 2010 and 2017. There has been a 120% increase in eligible HEAR applicants since 2010 and a 274% increase in eligible DARE applicants over the same period.

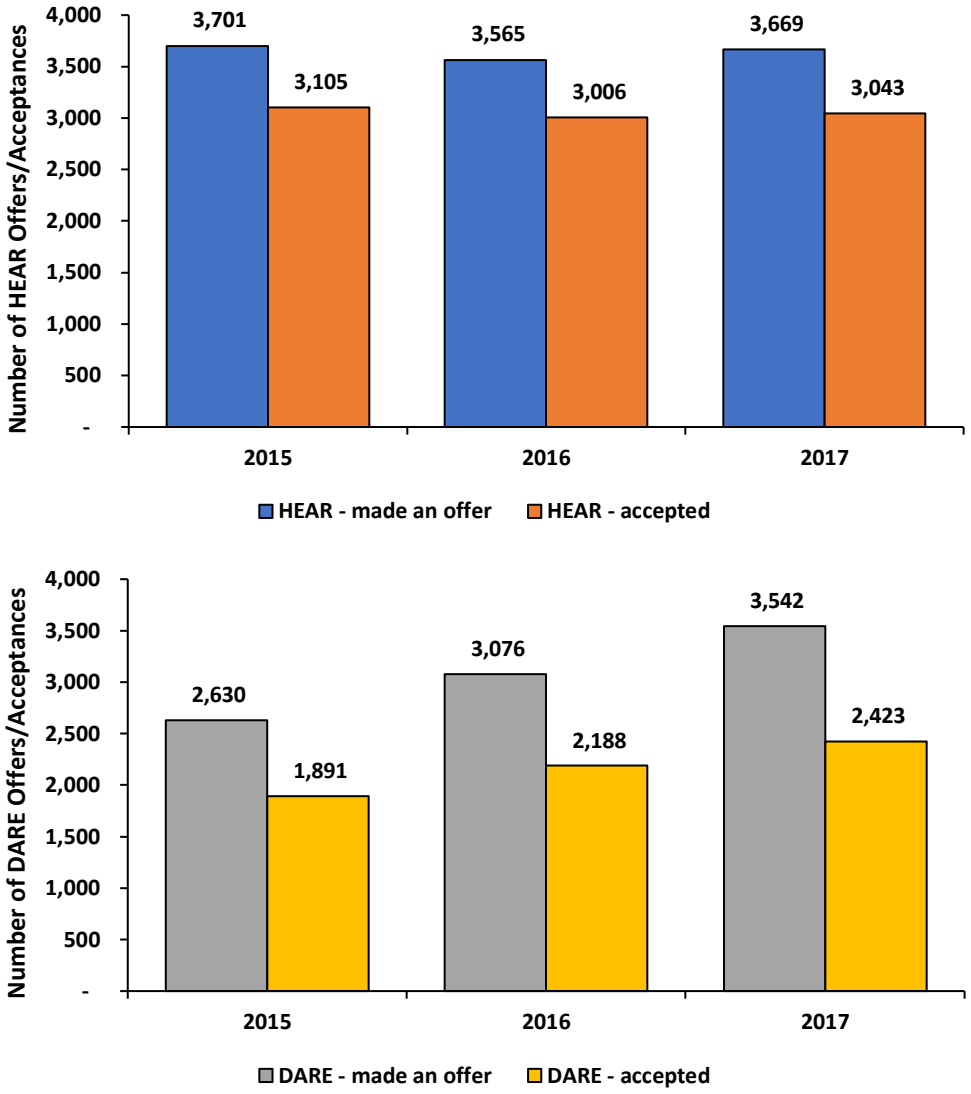
Figure 7.3: Eligible HEAR and DARE Applicants to Irish Third Level Institutions



Source: DARE|HEAR Facts and Figures 2017-2018

The following figure illustrates the trends in the proportion of students who were made offers under the HEAR and DARE programmes in recent years and those who accepted these offers. Between 2015 and 2017, on average, 84% of those applicants who were made an offer under HEAR accepted that offer while 70% of those applicants under DARE who were made an offer accepted this offer.

Figure 7.4: Eligible HEAR and DARE Applicants to Irish Third Level Institutions



Source: DARE|HEAR Facts and Figures 2017-2018

7.4 The University Sector and the Arts

The following table, Table 7.7, looks at various arts occupations, including artists, graphic designer, authors and writers, and the highest level of education attained by people in those occupations. The majority of those in each occupation hold a degree or higher, with 82.4% of authors, writers and translators holding degree or post-graduate qualifications. Occupations such as graphic design and arts officers have more people with ordinary or higher bachelor degrees than with post-graduate qualifications or doctorates. However, the 1,643 people with a postgraduate qualification in occupations in libraries, archives, museums and other cultural activities outweighs the number in those occupations with ordinary or higher bachelor degrees.

Table 7.7: Link Between University Sector and Arts Occupations (2016)				
Highest Level of Education Attained	**Artists**	**Authors, writers and translators**	**Arts officers, producers and directors**	**Graphic designers**
Ordinary bachelor degree/professional qualification or both	514	347	488	1,342
Honours bachelor degree/professional qualification or both	879	662	951	2,113
Postgraduate diploma or degree	618	1,117	823	741
Doctorate (Ph.D.)	34	147	18	14
Total with Degrees/Post Graduate Qualification	**2,045**	**2,273**	**2,280**	**4,210**
Percentage with Degree/Post Graduate Qualifications of Total	68.4%	82.4%	70.5%	67.3%
Highest Level of Education Attained		**Creative, arts and entertainment activities**	**Libraries, archives, museums and other cultural activities**	
Ordinary bachelor degree/professional qualification or both		809	395	
Honours bachelor degree/professional qualification or both		1,557	684	
Postgraduate diploma or degree		1,483	1,533	
Doctorate (Ph.D.)		103	110	
Total with Degrees/Post Graduate Qualification		**3,952**	**2,722**	
Percentage with Degree/Post Graduate Qualifications		57.4%	63.6%	
Source: Indecon Analysis of Census Data				

7.5 Summary of Key Findings

This chapter has briefly outlined the contribution of Irish universities to social and cultural life in Ireland. While the impact of the universities in this regard has not been monetised, this should not underplay the significance of the role played by the universities in these facets of Irish life. The findings of the Alumni survey clearly demonstrate the role played by the universities in supporting the development of the cultural sector in Ireland. Additionally, Irish universities play an important role in supporting social mobility and access to higher education for those from socio-economically disadvantaged backgrounds and for those with disabilities.

The following contains the key findings of this section:

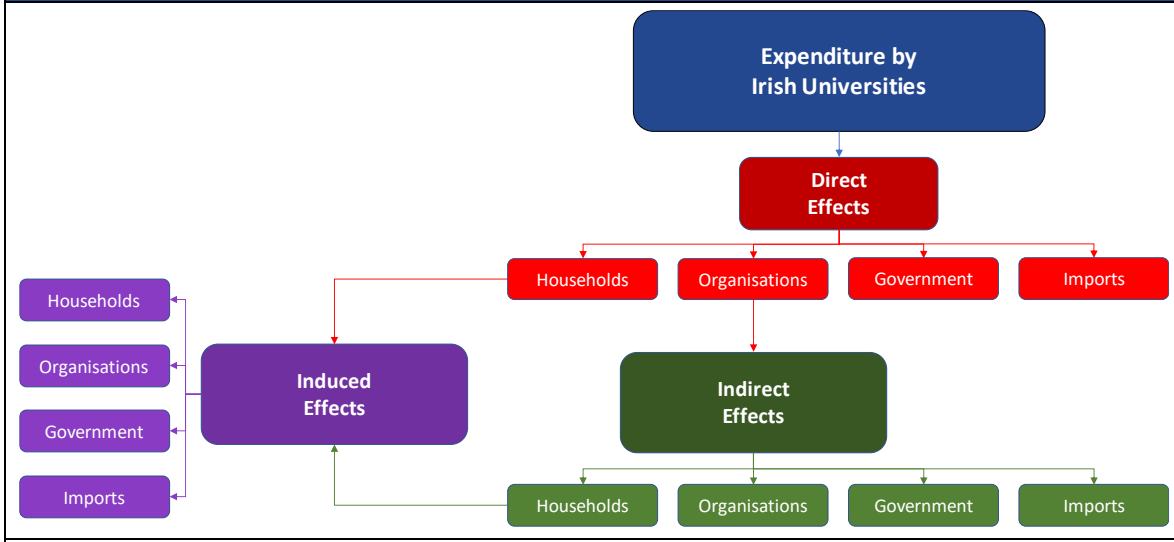
- The events held by Irish universities attracted over 2 million visitors in 2017.
- Over 75% of respondent alumni stated that university education had either a very positive or positive impact on facilitating social mobility, development of cultural sector/activities in Ireland, increasing spend in the local economy, and providing skills for creative activities.
- Based on data from Irish universities an estimated 17,569 students from the 2017/18 academic year engaged in volunteering worth an estimated €28.37 million (based on the minimum wage of €9.55).
- Over 15% of new entrants to Irish universities in 2017/2018 were from socio-economically disadvantaged backgrounds, reflecting the role played by the universities in widening participation in higher education;
- The majority of the people working in the five arts-related occupations included in this section have an ordinary bachelor degree or higher. Over 80% of authors, writers and translators having an ordinary bachelor degree or higher, suggesting a link between third-level education and these arts occupations.

8 Direct, Indirect and Induced Economic Impact of Irish Universities

8.1 Introduction

Beyond the impact of teaching and learning on employment outcomes, research spending and exports, the Irish universities contribute to the wider economy via their other forms of expenditure. In order to estimate the wider economic impact of Irish universities Indecon used its input-output model of the Irish economy, which takes into account the direct, indirect and induced impacts of the economic activity of Irish universities. Direct multipliers allow for the estimation of the direct effects of economic activity in terms of expenditure and employment. Type I multipliers estimate the indirect impacts of economic activity. Indirect impacts include the knock-on business activity that is supported through direct economic activity, Type II multipliers include both indirect and induced effects. Induced effects are concerned with the knock-on impact of household consumption due to direct economic activity. The following figure outlines how these different effects are connected.

Figure 8.1: Economic Impact of Irish Universities



Source: Indecon

These direct, indirect and induced impacts of a university on the economy are defined as follows:

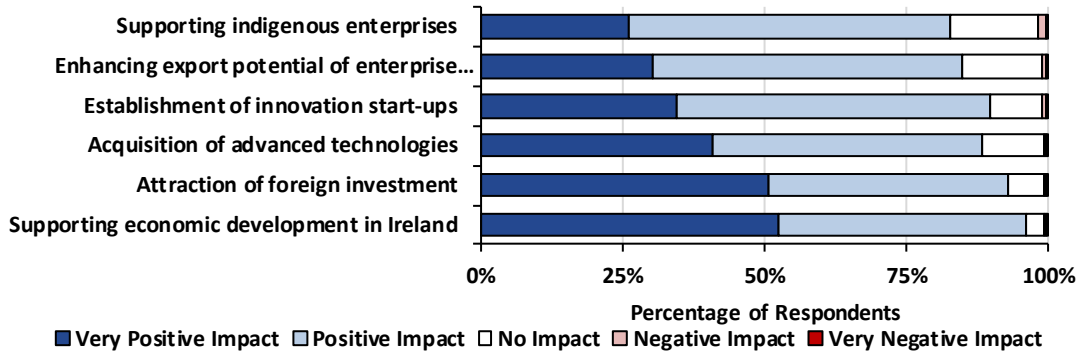
- Direct effect: This considers the economic output generated by a university itself, by purchasing goods and services (including labour) from the economy in which it operates.
- Indirect effect: This effect arises from a university's purchases of goods and services from other sectors in the economy to support its activities. These purchases generate income for the supplying industries, which they in turn spend on their own purchases from suppliers to meet the university's demands.
- Induced effect: The induced effect is based on a university's status as an employer. In return for their services, a university pays salaries to its employees, who will use this income to buy consumer goods and services within the economy. This generates wage income for employees within the industries producing these goods and services, who in turn spend their own income on goods and services. Again, this leads to subsequent rounds of wage income spending throughout the economy as a whole.

8.2 Estimated Impact of Irish Universities

Irish universities had expenditure of €2.16 billion in 2017. There were 15,724 full-time equivalents (FTEs) employees at Irish universities in 2017. These figures represent the direct output and employment impacts of Irish universities in 2017. Utilising multipliers from the Indecon model of the Irish economy based on input-output tables published by the CSO, we have estimated the indirect and induced impact of the expenditure by Irish universities on the wider economy. Indecon however notes that caution is required in interpreting macro-economic impacts as all parts of the economy impact on other sectors. The estimates however indicate that the gross direct expenditure of €2.16 billion by Irish universities in 2017 led to an indirect impact of €626 million and an induced impact of €1.17 billion, giving an estimated total gross economic impact of €3.96 billion. Additionally, the indirect and induced impact of spending by international students attending Irish universities amounted to €50 million in 2017/2018. Irish universities were estimated to support a total of 21,801 FTEs in 2017 including 6,077 FTEs supported through indirect and induced impacts.

As well as the quantified economic impacts, universities and their graduates' impact on the attractiveness of Ireland as a location for indigenous and foreign investment. In 2018 Ireland was ranked 9th in the world in terms of the ability of university education to meet the needs of a competitive economy[40]. In its strategy document[41], the IDA reinforces that "*the availability of talent will be the key differentiator for locations to win FDI in the future*" and emphasises the importance of the State's investment in education as a key factor in facilitating the IDA's success in attracting foreign direct investment to Ireland to date. This view is consistent with the findings from our survey of graduates where over 90% indicated that university education had a very positive or positive impact on supporting economic development and on the attraction of foreign investment, with over 50% saying that it had a very positive impact in each case. The majority of alumni said that Irish universities had a very positive or positive impact on each of the other outcomes.

Figure 8.2: Views of Alumni on the Impact of University Education on Economic Outcomes



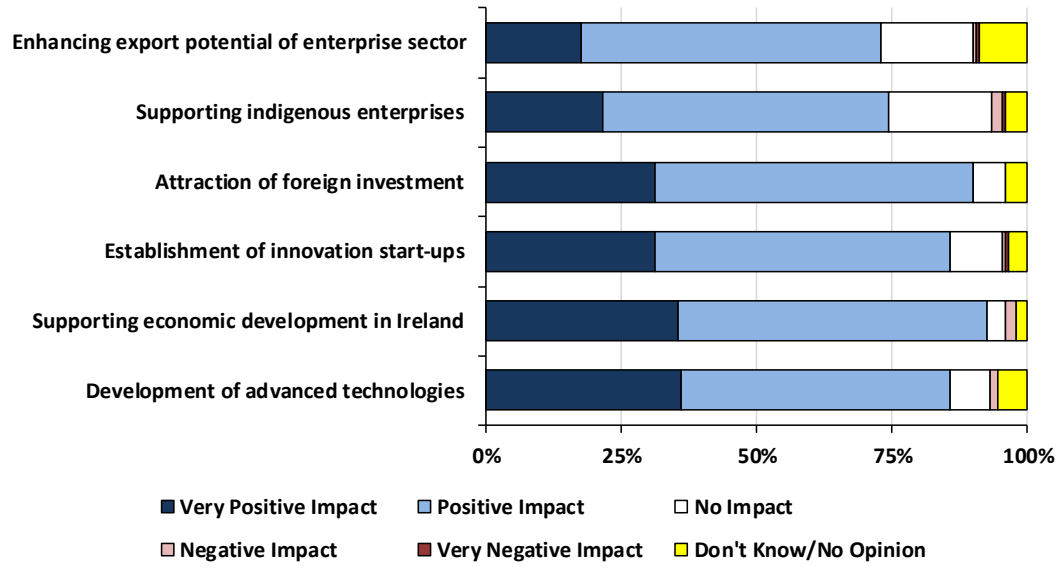
Source: Indecon Confidential Survey of Alumni of Irish universities

[40] IMD World Competitiveness Yearbook, 2018

[41] IDA Ireland, Winning: Foreign Direct Investment 2015-2019

From an enterprise perspective it is interesting to note that over 90% of enterprises surveyed judged that Irish universities had a very positive or positive impact on supporting economic development in Ireland, with the majority of employers saying Irish universities had a very positive or positive impact on each of the other outcomes contained in the following figure.

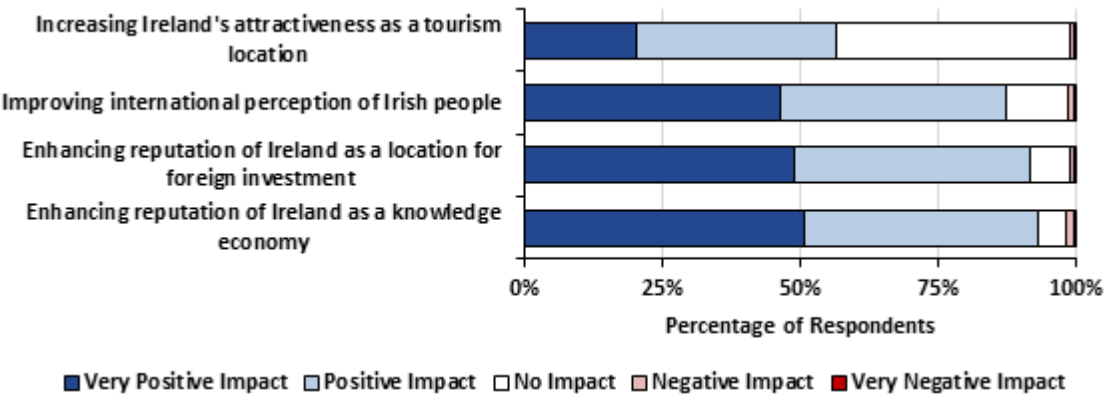
Figure 8.3: Views of Organisations on the Impact of University Education on Economic Outcomes



Source: Indecon Survey of Companies in Ireland

It is evident from Figure 8.4 that the majority of responding alumni believe that university education has a very positive or positive impact on Ireland's reputation as a location for foreign investment and Ireland's reputation as a knowledge economy. Over 85% deemed university education to have improved the international perception of Irish people.

Figure 8.4: Views of Alumni on the Impact of University Education on Ireland's Reputation



Source: Indecon Survey of Alumni of Irish universities

Analysis of the views of overseas students who lived outside of Ireland prior to attending university in Ireland also suggested that the majority of these alumni believed that university education enhanced the reputation of Ireland as a knowledge economy, as a location for foreign investment, improved the international perception of Irish people and increased Ireland's attractiveness as a tourism location.

Table 8.1: Percentage of Alumni Stating that University Education had a Positive Impact on Ireland's Reputation by Country of Residence Prior to Studying

	Ireland	Rest of the World
Enhancing reputation of Ireland as a knowledge economy	93.5%	92.3%
Improving international perception of Irish people	87.8%	87.5%
Enhancing reputation of Ireland as a location for foreign investment	92.5%	88.3%
Increasing Ireland's attractiveness as a tourism location	55.1%	69.1%

Source: Indecon Survey of Alumni of Irish universities

Table 8.2 shows that responding employers in Ireland had similar views to responding alumni. The vast majority of responding employers said that Irish universities had a very positive or positive impact on

- Enhancing Ireland's reputation as a location for foreign investment (90.3%);
- Enhancing Ireland's reputation as a knowledge economy (86.4%); and,
- Improving international perception of Irish people (83.5%).

As was the case with the responding alumni, a lower percentage said that Irish universities had a positive impact on Ireland's attractiveness as a tourism location.

Table 8.2: Views of Respondent Employer on Influence of Universities on Reputation Impacts for Ireland

	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know/ No Opinion
Enhancing reputation of Ireland as a location for foreign investment	37.9%	52.4%	4.8%	1.4%	0.0%	3.4%
Enhancing reputation of Ireland as a knowledge economy	37.4%	49.0%	8.2%	2.0%	0.0%	3.4%
Improving international perception of Irish people	30.1%	53.4%	11.0%	1.4%	0.0%	4.1%
Increasing Ireland's attractiveness as a tourism location	14.4%	34.9%	43.2%	0.7%	0.0%	6.8%

Source: Indecon analysis of Survey of Companies in Ireland

8.3 Summary of Key Findings

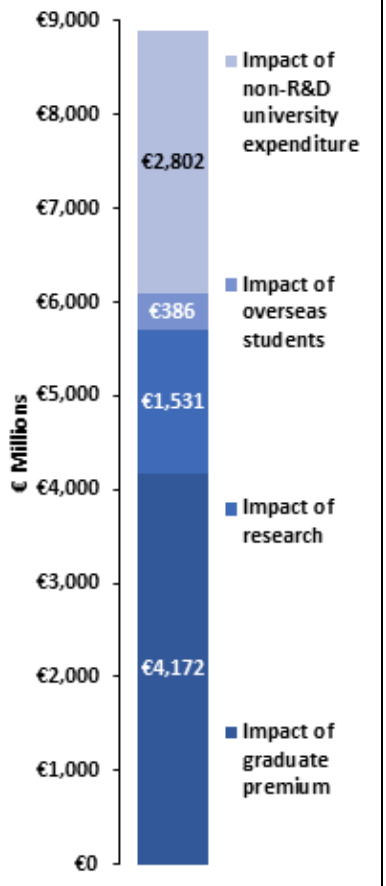
- Irish universities had expenditure of €2.16 billion in 2017. There were 15,724 full-time equivalents (FTE) employees at Irish universities in 2017. These figures represent the direct output and employment impacts of Irish universities in 2017.
- Utilising multipliers from the Indecon model of the Irish economy based on input-output tables published by the CSO, we have estimated the indirect and induced impact of the expenditure by Irish universities on the wider economy. Indecon however notes that caution is required in interpreting macro-economic impacts as all parts of the economy impact on other sectors.
- The estimates however indicate that the gross direct expenditure of €2.16 billion by Irish universities in 2017 led to an indirect impact of €626 million and an induced impact of €1.17 billion, giving an estimated total gross economic impact of €3.96 billion. Irish universities were estimated to support a total of 21,801 FTE's in 2017 including 6,077 FTEs supported through indirect and induced impacts.
- The majority of responding alumni and employers stated that university education had a positive impact on Ireland's reputation in a number of different areas, including as a location for foreign investment and as a knowledge economy.

9 Conclusions

Indecon's independent analysis has indicated that Irish universities make a significant contribution to the economy. There is an estimated economic impact of €8.9 billion on the Irish economy from the university sector in 2017/2018. The following table illustrates the breakdown of the components of this overall economic impact. The earnings premium to graduates of Irish universities accounted for €4.17 billion of the total annual impact of Irish universities. Indecon estimates that annual research undertaken in Irish universities amounted to €1.53 billion of the economic impact while the other direct, indirect and induced impacts of expenditure by Irish universities amounted to €2.80 billion in additional economic output. There are also wider impacts of universities in terms of their social and cultural contributions and their role in maintaining Ireland's reputation as a high-skilled, economy. The qualitative evidence presented in this report suggests that these benefits represent an important consideration when assessing the overall impact of the university sector. The new evidence presented also shows that while there are significant Exchequer costs in funding undergraduate university education, when account is taken of the tax arising from higher resultant incomes, there is a net benefit to the Exchequer.

Table 9.1: Aggregate economic impact of Irish Universities in 2017/2018

Type of impact	€ Million.	%
Impact of Graduate Premium	**€4,172**	**47%**
Students' income	€2,566	29%
Exchequer returns	€1,606	18%
Impact of research	**€1,531**	**17%**
Net direct research expenditure	€632	7%
Spillover impact	€373	4%
Indirect and Induced Effects	€526	6%
Impact of overseas students	**€386**	**4%**
Net tuition fee income	€216	2%
Impact of overseas student expenditure	€120	€0
Indirect and induced impact of overseas student expenditures	€50	1%
Direct, indirect and induced impacts of non-research expenditure by universities in the Irish Economy[42]	**€2,802**	**32%**
Total economic impact	**€8,891**	**100%**



Source: Indecon analysis

[42] Note: This figure differs from that reported in Section 8 in order to avoid double counting. The direct, indirect and induced impacts of research spending have been reported above in the 'Impact of research' section.

The following figure outlines Indecon's estimates for the total employment supported by the Irish University Sector. Our analysis suggests that, accounting for the indirect and induced impacts of spending by the university sector, the sector supports 21,801 full-time equivalent jobs in the Irish economy.

Table 9.2: Employment Supported by the Irish University Sector 2017/2018				
Employment Supported (FTEs)				
	Direct	**Indirect**	**Induced**	**Total**
Employment supported (FTEs)	15,724	2,246	3,831	**21,801**
Source: Indecon analysis				

The analysis in this report has been undertaken in line with the key provisions of the Public Spending Code and the latest guidance and publications from the Department of Public Expenditure and Reform. Indecon has also ensured that the assumptions underlying our estimates are conservative to ensure that the benefits of the university sector are not overstated. As, such, this report reflects a robust estimate of the important role played by the Irish universities in supporting the Irish economy and ensuring that the skills of the Irish labour force remain a national asset and a key factor in Ireland's competitive advantage.

Annex 1 Bibliography

Aghion, Philippe, and Xavier Jaravel. "Knowledge spillovers, innovation and growth." The Economic Journal 125.583 (2015): 533-573.

Alexander Plum, 2014. "The British Low-Wage Sector and the Employment Prospects of the Unemployed," FEMM Working Papers 140004, Otto-von-Guericke University Magdeburg, Faculty of Economics and Management.

Arrow, K. J., Stanford University, Economic Growth Policy for a Small Country, in Gray, A. W. (ed), International Perspectives on the Irish Economy, Indecon, 1997, ISBN 0 953131807

Biggar Economics. The Economic Impact of the University of Oxford. April 2017.

Bleaney, M. F., M. R. Binks, D. Greenaway, G. V. Reed, and D. K. Whynes. 1992. "What Does a University Add to its Local Economy?" Applied Economics 24 (3): 305–11.

Bloom, Nicholas, Mark Schankerman, and John Van Reenen. "Identifying technology spillovers and product market rivalry." Econometrica 81.4 (2013): 1347-1393

Bunel, M. & Guironnet, JP. Empir Econ (2017) 53: 755. https://doi.org/10.1007/s00181-016-1130-4

Caffrey, J., and H. Issacs. 1971. Estimating the Impact of a College or University on the Local Economy. New York: American Council on Education.

Caroleo, F.E. and F. Pastore (2017), Overeducation at a Glance: Determinants and Wage Effects of the Educational Mismatch, Looking at the Alma Laurea Data, IZA Discussion Papers 77–88.

Central Statistics Office. (2018). European Union Survey of Income and Living Conditions (EU-SILC), 2016. [dataset]. Version 1. Irish Social Science Data Archive. SN: 0015-14, URL, http://www.ucd.ie/issda/eu-silc

Chevalier, Arnaud, and Gavan Conlon. "Does it pay to attend a prestigious university?." (2003)

Conlon, G. The Determinants of Undertaking Academic and Vocational Qualifications in the United Kingdom. Education Economics, Volume 13, 2005

Corrado, Carol, Jonathan Haskel, and Cecilia Jona-Lasinio. "Knowledge spillovers, ICT and productivity growth." Oxford Bulletin of Economics and Statistics 79.4 (2017): 592-618

Department of Public Expenditure and Reform, July 2018. Spending Review 2018 – Understanding the Funding Needs in Higher Education.

Department of Public Expenditure and Reform, October 2018, Staff Paper 2018: Central Technical Appraisal Parameters. Discount Rate, Time Horizon, Shadow Price of Public Funds and Shadow Price of Labour

Economic and Social Research Council. Impact of Higher Education Institutions on Regional Economics. University of Strathclyde Glasgow. November 2010

Enrico Marelli and Marcello Signorelli (2017) Young People in Crisis Times: Comparative Evidence and Policies. https://www.cesifo-group.de/DocDL/CESifo-Forum-2017-2-marelli-signorelli-youth-unemployment-june.pdf

Gerlach-Kristen, Petra. "Testing the permanent income hypothesis for Irish households, 1994 to 2005." The Economic and Social Review 45.4, Winter (2014): 511-535. We take the average of the MPC for mortgage and tenant households from the 2004/2005 HBS

Gray, A. W., (ed), International Perspectives on the Irish Economy, Indecon, 1997, ISBN 0 953131807

Gray, A. W., Swinand, P., Batt, W. H., Economic Analysis of Ireland's Comparative Advantages for Foreign Investment, 2010, ISBN 978-0-9531318-1-5

Gray, A.W. (ed) (1993), Responses to Irish Unemployment, The views of Four Economists, Kennedy, K. Walsh, B., McAleese, D.F. Gray, A. W. Indecon

Haskel, J., and Wallis, G. (2010). 'Public support for innovation, intangible investment and productivity growth in the UK market sector'.

Haskel, J., Hughes, A., and Bascavusoglu-Moreau, E. (2014). 'The economic significance of the UK science base: a report for the Campaign for Science and Engineering'.

HEA, 2017, "Graduate Outcomes Survey: Class of 2017"

HEA, 2018, "What Do Graduates Do? The Class of 2016". Available at: http://hea.ie/assets/uploads/2018/01/HEA-What-Do-Grads-Do-2016.pdf

HEA/CSO" Higher Education Outcomes – Graduation Years 2010-2014"

Hermannsson, K., K. Lisenkova, and P. G. McGregor. 2011. The Expenditure Impacts of Individual Higher Education Institutions (HEIs) and their Students on the Northern Irish economy: Homogeneity or heterogeneity? Glasgow: Department of Economics, University of Strathclyde.

Higher Education Authority, "Review of the Allocation Model for Funding Higher Education Institutions", May 2017

Hill, Mairesse, and Mohnen (2009). Measuring the returns to R&D. In B. H. Hall and N. Rosenberg (Eds.), Handbook of the Economics of Innovation.

Huggins, R., and A. Johnston. 2009. "The Economic and Innovation Contribution of Universities: A Regional Perspective." Environment and Planning C: Government and Policy 27 (6): 1088–106.

Hussain, I., McNally, S. and S. Telhaj (2009), "University Quality and Graduate Wages in the UK", Centre for the Economics of Education (CEE) DP 99.

Hussain, Iftikhar, Sandra McNally, and Shqiponja Telhaj. "University quality and graduate wages in the UK." (2009)

Indecon International Research Economists. Indecon Review of National Training Fund. Completed for Department of Education and Skills, 2018. (See: https://www.education.ie/en/Press-Events/Press-Releases/2018-press-releases/indecon-review-of-national-training-fund.pdf)

Leading European Research Universities (LERU). The Economic Contribution of LERU universities 2016. December 2017.

London Economics (2016). The Impact of Literacy, Numeracy and Computer Skills on Earnings and Employment Outcomes. (See: https://londoneconomics.co.uk/blog/publication/the-impact-of-literacy-numeracy-and-computer-skills-on-earnings-and-employment-outcomes-march-2016/)

London Economics (2017). Peer Effects and Social Influence in Post-16 Educational Choice. Completed for the Centre for Vocational Education Research. (See: https://londoneconomics.co.uk/blog/publication/peer-effects-social-influence-post-16-educational-choice-november-2017/).

London Economics (2017). The Journey from Childhood Skills to Adult Financial Capability – Analysis of the British Cohort Study. (See: https://londoneconomics.co.uk/blog/publication/journey-childhood-skills-adult-financial-capability-analysis-1970-british-cohort-study-november-2017/)

London Economics (2018). Estimating the Returns to Part-Time Undergraduate Degrees, Report for The Open University (See: https://londoneconomics.co.uk/blog/publication/estimating-returns-part-time-undergraduate-degrees-september-2018/)

London Economics, 2017, "The Economic Impact of Russell Group Universities"

London Economics, 2017, "The Economic, Social and Cultural Impact of the University of Birmingham"

London Economics, 2018, "The economic and social impact of Cardiff University in 2016-17"

London Economics, 2018, "The Economic Impact of Group of Eight Universities"

Machin, Stephen and McNally, Sandra (2007) Higher education and the labour market. Centrepiece, 12 (2). pp. 6-9. ISSN 1362-3761

Mariana Balan, 2014. "Analysis Of Unemployment Among Young Individuals From Romania By Econometric Methods," Internal Auditing and Risk Management, Athenaeum University of Bucharest, vol. 35(1), pages 95-102, September.

Mas-Collell, A., Whinston, M. and Green, J. (1995). Microeconomic theory, New York: Oxford University Press

McGuinness, Seamus. "University quality and labour market outcomes." Applied Economics 35.18 (2003): 1943-1955.

New Zealand Institute of Economic Research. An analysis of the contribution of New Zealand universities to economic activity. August 2016.

Oppedisano, V. 2014. “Higher Education Expansion and Unskilled Labour Market Outcomes.” Economics of Education Review 40: 205–20.

Ornaghi, Carmine. "Spillovers in product and process innovation: Evidence from manufacturing firms." International Journal of Industrial Organization 24.2 (2006): 349-380

Robin Naylor, Jeremy Smith, and Shqiponja Telhaj. Graduate returns, degree class premia and higher education expansion in the UK. Oxford Economic Papers, page gpv070, 2015.

Sage Policy Group Inc. Impacts of the University of Maryland, College Park. June 2008

Seamus McGuinness, Adele Bergin, Elish Kelly, Selina McCoy, Emer Smyth, and Kevin Timoney (2012) A Study of Future Demand for Higher Education in Ireland. Research Series no. 30, Dec. 2012. ESRI.

Siegfried, J. J., A. R. Sanderson, and P. McHenry. 2007. “The Economic Impact of Colleges and Universities.” Economics of Education Review 26 (5): 546–58.

Stavros Rodokanakis & Vasileios A. Vlachos, 2013."Unemployment in the Greek regions of Attica and Central Macedonia: comparative econometric analysis between the 2nd and the 3rd CSFs," International Journal of Economics and Business Research, Inderscience Enterprises Ltd, vol. 6(2), pages 140-157.

Tripathi, Sabyasachi, 2016. "Determinants of employment and unemployment situation in India with Special reference to North Eastern states of India," MPRA Paper 71469, University Library of Munich, Germany.

Universities UK. Degrees of Value – How universities benefit society, the new economics foundation. 2011

University College Cork, “The Economic and Societal Impact of University College Cork”, University College Cork, 2018

University College Dublin, "Delivering Impact: "The Economic, Cultural and Social Impact of University College Dublin", University College Dublin, 2015

Walker, I. & Zhu, Y. (2008). The College Wage Premium and the Expansion of Higher Education in the UK. Scandinavian Journal of Economics, 110 (4), 695-709.

Walker, I. and Zhu, Y. 2011. Differences by degree: Evidence of the net financial rates of return to undergraduate study for England and Wales. Economics of Education Review 30: 1177-1186.

Zhang, Q., Larkin, C., & Lucey, B. M. (2017). An empirical study of the innovative culture in ireland's higher education institutions. Higher Education Policy, 30(4), 533-553. doi:10.1057/s41307-017-0039-7

Zhang, Q., Larkin, C., & Lucey, B. M. (2017). The economic impact of higher education institutions in ireland: Evidence from disaggregated input–output tables. Studies in Higher Education, 42(9), 1601-1623. doi:10.1080/03075079.2015.1111324

Zhang, Q., Larkin, C., & Lucey, B. M. (2017). The economic impact of higher education institutions. Economic insights on higher education policy in ireland: Evidence from a public system (pp. 199-219) doi:10.1007/978-3-319-48553-9_8

Zhang, Q., Larkin, C., & Lucey, B. M. (2017). Universities, knowledge exchange and policy: A comparative study of ireland and the UK. Science and Public Policy, 44(2), 174-185. doi:10.1093/scipol/scw047

Annex 2 Alumni Survey Questionnaire

Confidential Alumni Survey of Economic and Social Impacts of Irish Universities

Economic and social impacts of Irish university education

1. Please indicate your view on the significance or otherwise which university education (under-graduate and post-graduate) in Ireland is playing in facilitating the following outcomes:

	Very Positive impact	Positive impact	No Impact	Negative Impact	Very negative impact
Economic					
Supporting economic development in Ireland	❑	❑	❑	❑	❑
Establishment of innovation start-ups	❑	❑	❑	❑	❑
Attraction of foreign investment	❑	❑	❑	❑	❑
Supporting indigenous enterprises					
Acquisition of advanced technologies	❑	❑	❑	❑	❑
Enhancing export potential of enterprise sector	❑	❑	❑	❑	❑
Skills Development					
Providing skilled staff for indigenous and foreign enterprises	❑	❑	❑	❑	❑
Providing skills to support wider economic and social development	❑	❑	❑	❑	❑
Improving human capital development	❑	❑	❑	❑	❑
Impact on Individual Graduates					
Increasing earnings potential	❑	❑	❑	❑	❑
Enhancement of employment prospects	❑	❑	❑	❑	❑
Increasing individual productivity	❑	❑	❑	❑	❑
R+D and Knowledge Transfer					
Increasing knowledge transfer to wider economy	❑	❑	❑	❑	❑
Expanding intellectual property in Ireland	❑	❑	❑	❑	❑
Enhancement of R+D spillovers	❑	❑	❑	❑	❑
Social, Cultural and Community					
Development of cultural sector/activities in Ireland	❑	❑	❑	❑	❑
Providing skills for creative activities	❑	❑	❑	❑	❑
Increasing spend in the local economy	❑	❑	❑	❑	❑
Supporting the wider community	❑	❑	❑	❑	❑
Facilitating social mobility	❑	❑	❑	❑	❑
Reputational Impact for Ireland					
Enhancing reputation of Ireland as a knowledge economy	❑	❑	❑	❑	❑
Improving international perception of Irish people	❑	❑	❑	❑	❑
Enhancing reputation of Ireland as a location for foreign investment	❑	❑	❑	❑	❑
Increasing Ireland's attractiveness as a tourism location	❑	❑	❑	❑	❑

Personal impacts of your Irish university education

2. What impact has your Irish university degree(s) had on your job-related set of skills? Please choose the appropriate response for each item.

	No Impact	Positive Impact	Very Positive Impact	Don't know	Not applicable
Your ability to do your job	❑	❑	❑	❑	❑
Having skills and knowledge that are of benefit in your current/most recent area of work	❑	❑	❑	❑	❑
Having skills and knowledge that can be used across a range of jobs and industries	❑	❑	❑	❑	❑

3. Overall, how would you say that your Irish university qualification(s) helped you in the following areas? Please choose the appropriate response for each item.

	Yes	No	Don't know	Not applicable
Better prepared you for your career	❑	❑	❑	❑
Advanced your career	❑	❑	❑	❑
Helped you secure a better job	❑	❑	❑	❑
Helped you obtain a better paying job	❑	❑	❑	❑
Helped you obtain a more secure job	❑	❑	❑	❑
Helped you obtain a more interesting job	❑	❑	❑	❑
Helped you make a greater contribution to wider society	❑	❑	❑	❑

4. In terms of your personal development, to what extent do you agree or disagree concerning the following aspects arising from your Irish university experience? Please choose the appropriate response for each item.

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know	Not applicable
Encouraged you to take part in voluntary or community activities	❑	❑	❑	❑	❑	❑
Encouraged you to undertake fundraising for charity	❑	❑	❑	❑	❑	❑
Encouraged you to vote	❑	❑	❑	❑	❑	❑
Encouraged you to become a member of a group, club or association	❑	❑	❑	❑	❑	❑
Encouraged you to participate in politics or political activity	❑	❑	❑	❑	❑	❑
Encouraged you to participate in sport or to pursue an active lifestyle	❑	❑	❑	❑	❑	❑
Encouraged you to become a member or visitor of cultural attractions such as museums or galleries	❑	❑	❑	❑	❑	❑

Other Comments

5. Please outline any other comments you may have on your perspective on the economic and social impact of Irish universities.

_____

_____

_____

_____

Background Details for Statistical Purposes

6. What was your main country of residence immediately before your studies at a university in Ireland?
_____

7. What is your current main country of residence? _____

8. What is your current principal employment status? Please choose **only one** of the following:

Full-time employed	❑
Part-time employed	❑
Self-employed	❑
Unemployed and looking for work	❑
Full-time student (not looking for work)	❑
Part-time student and looking for work	❑
Part-time student (not looking for work)	❑
Retired (not looking for work)	❑
Homecare responsibilities (not looking for work)	❑
Other	❑

9. Please indicate your year of first graduation from a University in Ireland.
_____

10. Please indicate the university in Ireland at which you studied at undergraduate level, if applicable
_____

11. Please indicate the university in Ireland at which you studied at postgraduate level, if applicable
_____

Thank you very much for your contribution to this important study of economic and social impact of Irish universities. Your responses will be treated as strictly confidential and aggregated with those from other recipients.

Annex 3 Enterprise Survey Questionnaire

Confidential Information Request of Companies

Please find below a confidential information request concerning a research project which Indecon is undertaking on behalf of the Irish Universities Association, concerning the economic impact of universities in Ireland. Your assistance with this important study is greatly appreciated. Please note all responses to this information request will be treated as Strictly Confidential and will be aggregated in anonymous form only along with the responses provided by other enterprises.

Background Details

1. Name of Company (Optional): _____

2. Number of Employees: Ireland _____ Internationally _____

3. Number of Years of Operation in Ireland: _____

4. Main Ownership: Foreign/International ❑_____ Irish ❑_____

5. Main Focus of Irish Operations: Mainly Export ❑ Mainly Irish Market ❑

Factors Influencing Decision to Invest in Ireland

6. Please indicate your view on how important or otherwise you believe the following factors are in influencing decisions by enterprises to invest in establishing or expanding their operations in Ireland:

	Very Important	Important	Neither Important nor Unimportant	Not Important
Access to European markets	❑	❑	❑	❑
Proximity and ability to service customers	❑	❑	❑	❑
Corporate taxation rate	❑	❑	❑	❑
Quality of Irish University graduates	❑	❑	❑	❑
Quality of Irish University research	❑	❑	❑	❑
Costs of operating in Ireland	❑	❑	❑	❑
Other, please specify	❑	❑	❑	❑

Extent of Interaction with Irish Universities

7. Please indicate the extent to which your company has or has not had any of the following interactions with Irish universities:

	Yes	No	Don't Know
Co-operative Joint Research Projects	❑	❑	❑
Utilisation of research outputs of Universities	❑	❑	❑
Placement of employees on graduate or post-graduate programmes	❑	❑	❑
Interaction re recruitment of graduates/post-graduates	❑	❑	❑
Contribution to University funding (incl. donations, sponsorship of events etc.)	❑	❑	❑
Organisation of visits to Universities by clients/potential clients	❑	❑	❑
Other, please specify	❑	❑	❑

Economic Impacts of Irish University Education and Research

8. Please indicate your views on the significance or otherwise which university education and research in Ireland is playing in facilitating the following Economic outcomes:

Economic outcomes	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know / No Opinion
Supporting economic development in Ireland	❑	❑	❑	❑	❑	❑
Establishment of innovation start-ups	❑	❑	❑	❑	❑	❑
Attraction of foreign investment	❑	❑	❑	❑	❑	❑
Supporting indigenous enterprises	❑	❑	❑	❑	❑	❑
Development of advanced technologies	❑	❑	❑	❑	❑	❑
Enhancing export potential of enterprise sector	❑	❑	❑	❑	❑	❑

9. Please indicate your view on the significance or otherwise which university education and research in Ireland is playing in facilitating the following Skills Development-related outcomes:

Skills Development-related outcomes	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know / No Opinion
Providing skilled staff for indigenous and foreign enterprises	❑	❑	❑	❑	❑	❑
Providing skills to support wider economic and social development	❑	❑	❑	❑	❑	❑
Improving human capital development	❑	❑	❑	❑	❑	❑
Retraining and up-skilling of the workforce	❑	❑	❑	❑	❑	❑

10. Please indicate your view on the significance or otherwise which university education and research in Ireland is playing in facilitating the following R&D and Knowledge Transfer-related outcomes:

R&D and Knowledge Transfer-related outcomes	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know / No Opinion
Increasing knowledge transfer to wider economy	❑	❑	❑	❑	❑	❑
Expanding intellectual property in Ireland	❑	❑	❑	❑	❑	❑
Enhancement of R&D Spill-overs/Wider Impacts of R&D	❑	❑	❑	❑	❑	❑

11. Please indicate your view on the significance or otherwise which the Irish university system is playing in facilitating the following Reputational Impacts for Ireland:

Reputational Impacts for Ireland	Very Positive Impact	Positive Impact	No Impact	Negative Impact	Very Negative Impact	Don't Know / No Opinion
Enhancing reputation of Ireland as a knowledge economy	❑	❑	❑	❑	❑	❑
Improving international perception of Irish people	❑	❑	❑	❑	❑	❑
Enhancing reputation of Ireland as a location for foreign investment	❑	❑	❑	❑	❑	❑
Increasing Ireland's attractiveness as a tourism location	❑	❑	❑	❑	❑	❑

Other Comments

12. Please outline below any other comments you may have on your perspective on the economic and social impact of Irish universities, as well as any impact Irish universities may have had on your enterprise. Any specific examples of how universities may have interacted with your company would also be very much appreciated.

Thank you very much for your contribution to this important study of economic and social impact of Irish universities. Your responses will be treated as strictly confidential and aggregated with those from other recipients. If you have any queries re this survey, please contact Dr Ronnie O'Toole at Indecon, at e-mail: rotoole@indecon.ie.

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