

The economic, social and cultural impact of the University of York

Final Report to the University of York



UNIVERSITY
of York



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Economics

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Table of Contents

Page

Executive Summary	iii
The impact of the University of York's teaching and learning activities	iii
The impact of the University of York's research activities	iv
The contribution of the University of York to educational exports	v
The direct, indirect and induced impact of the University of York	vi
The aggregate economic impact of the University of York	vii
The social and cultural impact of the University of York	viii
1 Introduction	9
1.1 Structure of the report	9
2 The impact of the University of York's teaching and learning activities	11
2.1 Introduction and rationale	11
2.2 Valuing the economic contribution of a higher education institution	11
2.3 The 2016-17 cohort of University of York students	12
2.4 Completion rates	13
2.5 Defining the returns to higher education qualifications	14
2.6 Estimating the returns to higher education qualifications	15
2.7 Estimated net graduate premium and net public purse benefit	19
2.8 Internal rate of return	21
2.9 Aggregate results of the economic impact of teaching and learning	22
3 The impact of research and knowledge transfer activities	24
3.1 Direct research impact	24
3.2 Productivity spillovers	26
3.3 Aggregate impact of the University of York's research activities	28
4 The impact on exports	33
4.1 The 2016-17 cohort of non-UK-domiciled students	33
4.2 Net tuition fee income associated with international students	34
4.3 Non-tuition fee income associated with international students	36
4.4 Aggregate impact on exports	39
5 Direct, indirect and induced impacts	41
5.1 The impact of the University of York's expenditure	42
5.2 The impact associated with University of York students' expenditures	46
5.3 Adjusting for double counting with other strands of impact and transfers between different agents in the economy	49
5.4 Total direct, indirect and induced impact of the University of York	49
6 The social and cultural impact of the University of York	52
6.1 Methodological approach	52

Table of Contents

Page

6.2	Assessing the wider economic and social benefits	52
7	Aggregate economic impact of the University of York	60
	Index of Tables, Figures and Boxes	61
	ANNEXES	65
	Annex 1 References	66
	Annex 2 Technical Annex	68
	A2.1 Impact of the University of York's teaching and learning activities	68
	A2.2 Impact on exports	86

Executive Summary

London Economics were commissioned to analyse the economic, social and cultural impact of the University of York across the United Kingdom in 2016-17. In addition to assessing the **direct, indirect and induced** impact associated with the University of York's physical footprint, we also generated estimates of the economic benefits associated with the University's **teaching and learning** activity associated with the 2016-17 cohort of students, the impact of the University's **research activities**, as well as the impact of **educational exports** generated by the University's overseas students.

On top of the purely economic impacts associated with the University's teaching and research activities, there are a multitude of non-quantifiable **societal impacts** generated at home and abroad. These were addressed through a survey of University of York alumni, with additional case studies showcasing the University of York's real-world impact.

The impact of the University of York's teaching and learning activities

The analysis of the impact of the University's teaching and learning activities estimates the **enhanced employment** and **earnings benefits** to students, and the **additional taxation receipts** to the Exchequer associated with higher education qualification attainment, adjusted for the characteristics of the **5,665** UK-domiciled students who started a qualification or credit-bearing module at the University of York in the 2016-17 academic year.

Incorporating both the costs and benefits to students, the analysis suggests that, for an English-domiciled student, the **net graduate premium** associated with a representative full-time first degree from the University of York (with GCE 'A' Levels as their highest level of prior attainment) was approximately **£78,000** for male students and **£58,000** for female students (in 2016-17 money terms). This corresponds to a rate of return of **12.7%** and **11.8%** respectively¹.

Taking account of the costs and benefits to the public purse, the analysis indicates that the **net Exchequer benefit** associated with a representative English-domiciled full-time first degree student at the University of York stands at **£85,000** for men and **£51,000** for women, corresponding to a rate of return on investment of **14.6%** and **12.7%** respectively.

The net graduate premiums and net Exchequer benefits (by students' gender, study mode, study level, domicile and prior attainment, and adjusted for the specific subject mix of the cohort) were combined with information on the number of students starting qualifications at the University in 2016-17, as well as expected completion rates. The analysis suggests that the aggregate economic impact generated by the University of York's teaching and learning activities stood at approximately **£487.9 million**. Of this total, **£232.3 million (48%)** was accrued by students, while **£255.6 million (52%)** was accrued by the Exchequer.

The impact of teaching and learning generated by the 2016-17 cohort of University of York students stood at £487.9 million.

¹ This compares to the yield associated with a 30 year Treasury Gilt of **1.92%** (30 year generic Gilt yield as of 1st October 2018).

Table 1 Total impact of the University of York's teaching and learning activities (£m), by type of impact, domicile and study mode

Type of impact	Student domicile				
	England	Wales	Scotland	Northern Ireland	Total
Students	£224.9m	£4.1m	£2.1m	£1.2m	£232.3m
Full-time	£224.7m	£4.1m	£2.1m	£1.2m	£232.1m
Part-time	£0.2m	£0.0m	£0.0m	£0.0m	£0.2m
Exchequer	£248.9m	£3.4m	£2.2m	£1.1m	£255.6m
Full-time	£245.4m	£3.4m	£2.2m	£1.1m	£252.1m
Part-time	£3.5m	£0.0m	£0.0m	£0.0m	£3.5m
Total	£473.8m	£7.4m	£4.4m	£2.3m	£487.9m
Full-time	£470.1m	£7.4m	£4.4m	£2.3m	£484.2m
Part-time	£3.7m	£0.0m	£0.0m	£0.0m	£3.7m

Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values and rounded to the nearest £0.1m.

Source: *London Economics' analysis*

The impact of the University of York's research activities



The University of York is at the forefront of international research activity. Ranked in the top 125 of higher education institutions globally², academic staff across the University consistently generate world-class research.

To estimate the **direct** economic impact associated with the University of York's research activities, we used information on the total research-related income accrued by the University in 2016-17, including **research grants and contracts** (e.g. provided by the UK Research Councils and charities; public corporations, Local Authorities and UK government; UK industry, or EU and overseas sources) and **quality related (QR) funding** provided by the Higher Education Funding Council (HEFCE).

Aggregating the income from these sources, the analysis indicates that the total research-related income accrued by the University of York in 2016-17 stood at **£89.1 million**. The majority of this income was received through funding from the UK Research Councils (**£30.5 million, 34%**), the recurrent research grant allocated by HEFCE (**£23.1 million, 26%**), and funding from UK government bodies, Local Authorities, health and hospital authorities (**£12.9 million, 15%**). A further **£10.7 million (12%)** was received from EU sources (i.e. government bodies and other organisations).

To arrive at the net impact of the University's research activities, we deduct the public costs of funding the University's research (including HEFCE recurrent (QR) research funding, as well as funding from the UK Research Councils). Together, these public costs amount to **£53.5 million**, implying a **net direct research impact of £35.5 million** generated by the University in 2016-17.

Existing econometric research³ suggests that there is strong evidence of the existence of **spillovers** from public investment in university research. Our analysis implies a spillover multiplier of approximately **5.6** associated with the University of York's research income (in the 2016-17 academic year). In other words, **every £1 million invested in research at the University results in an additional economic output of £5.6 million for UK companies**.

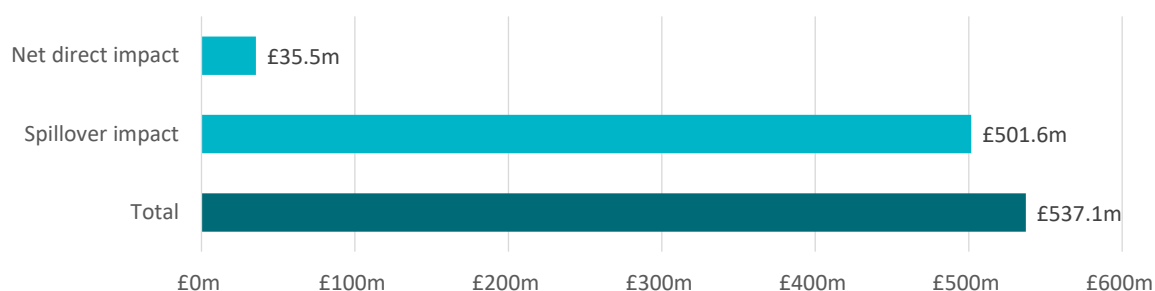
Combining the **direct economic value** of the University's research activities (**£35.5 million**) with the **productivity spillovers** estimated for private companies in the UK (**£501.6 million**), the total

² See 2019 Times Higher Education World University Rankings (Times Higher Education, 2018).

³ See Haskel and Wallis (2010), and Haskel et al. (2014).

economic impact of research conducted by the University in 2016-17 was estimated to be **£537.1 million**.

Figure 1 Total impact of the University of York's research activities in 2016-17, in £m



Note: All values are presented in 2016-17 prices, and rounded to the nearest £0.1 million.

Source: London Economics' analysis based on University of York data



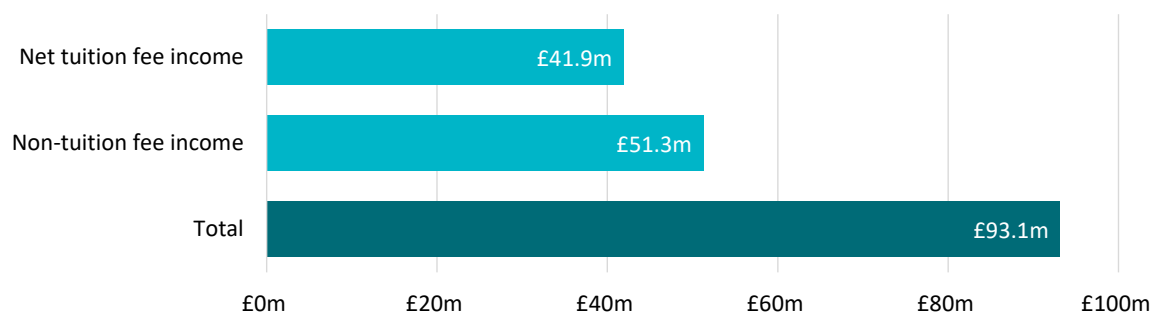
The contribution of the University of York to educational exports

There were a total of **1,945** non-UK-domiciled students starting courses or standalone modules at the University of York in 2016-17 (representing approximately **26%** of all students in the 2016-17 cohort). Of these, **315 (16%)** were domiciled within the European Union and **1,630 (84%)** were students coming from outside the European Union.

The University of York generated £93.1 million in export income in 2016-17.

After deducting the costs to the UK Exchequer, the analysis indicates that the total **net tuition fee income** generated by overseas students in the 2016-17 cohort – over their entire study duration - stood at **£41.9 million**, of which **£3.2 million** was associated with students from the EU, and **£38.7 million** was generated by non-EU students. In addition, the total **non-tuition fee income** generated by overseas students in the 2016-17 cohort stood at **£51.3 million** (with **£8.6 million** generated by EU students and **£42.7 million** associated with non-EU students). The total value of educational exports generated by the University of York from these non-UK students attending the University was estimated to be **£93.1 million** in 2016-17.

Figure 2 Total contribution of the University of York to exports by type of impact (£m)



Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £0.1 million

Source: London Economics' analysis



The direct, indirect and induced impact of the University of York

The University of York’s physical footprint supports jobs and promotes economic growth throughout Yorkshire and the Humber and the rest of the UK economy. With **3,585** full-time equivalent employees, the University of York spent a total of **£191.2 million** in 2016-17 on staff related costs, as well as **£110.8 million** on non-staff costs⁴. The total direct, indirect and induced impact on the UK economy associated with the University’s expenditures amounted to **£555.5 million** in 2016-17, supporting a total of **5,820** full-time equivalent jobs.

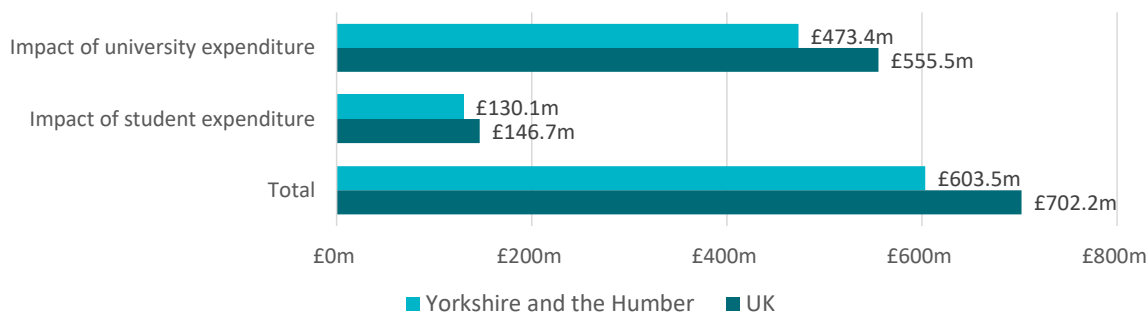
With an additional **£146.7 million** in impact associated with student expenditure (supporting **1,265 jobs**), the total direct, indirect and induced impact generated by the University of York’s institutional and student expenditure on the UK economy stood at **£702.2 million**, with **7,085** jobs supported. Of this total, approximately **£603.5 million** (corresponding to **6,325** jobs) occurred in the Yorkshire and the Humber region.

The economic impact associated with the University of York’s physical footprint was £702.2 million in 2016-17.

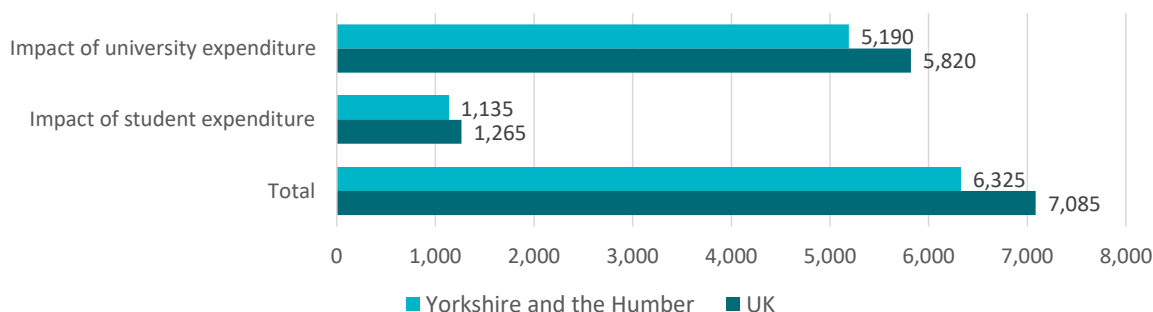
This physical footprint supported a total of 6,325 full-time equivalent jobs in Yorkshire and the Humber – and 7,085 nationally.

Figure 3 Direct, indirect and induced impact associated with the University’s institutional and student expenditures - £m and # of full-time equivalent jobs supported

Economic output (£m)



Employment (# of FTE jobs supported)



Note: All estimates are presented in 2016-17 prices, and rounded to the nearest £0.1m. **Source: London Economics’ analysis**

⁴ Note that this exclude **£30.5 million** in depreciation costs, as it is assumed that these are not relevant from a procurement perspective (i.e. these costs are not accounted for as income by other organisations).

The aggregate economic impact of the University of York







In 2016-17, the University of York educated **17,395** students and employed **3,585** full-time equivalent staff located at its main campuses. The total economic impact associated with the University's educational activities across the UK was estimated to be **£1,820.5 million** in 2016-17.

In terms of the components of economic impact, the value of the University's **teaching and learning** activities stood at approximately **£487.9 million (27%** of total), while **research** activity contributed a further **£537.1 million (30%)**. The economic contribution associated with the **direct, indirect and induced impact** associated with the University's operational expenditure and the expenditure of its students was estimated to be **£702.2 million (39%)**. The remaining **5%** (or **£93.1 million**) was associated with the University's contribution to **educational exports**

The total economic impact associated with the University of York's activities in 2016-17 was estimated to be approximately £1,820.5 million.

Compared to the University's total operational costs of approximately **£332.5 million** in 2016-17, the total economic contribution to the UK in 2016-17 was estimated to be approximately **£1,820.2 million**, which corresponds to a benefit to cost ratio of approximately **5½:1**.

Table 2 Aggregate economic impact of the University of York in the UK (£m and % of total)

Type of impact (£m in 2016-17)	£m	%
 Impact of teaching and learning	£487.9m	27%
Students	£232.3m	13%
Exchequer	£255.6m	14%
 Impact of research	£537.1m	30%
Net direct research income	£35.5m	2%
Spillover impact	£501.6m	28%
 Impact of exports	£93.1m	5%
Net tuition fee income	£41.9m	2%
Non-tuition fee income	£51.3m	3%
 Direct, indirect and induced impacts	£702.2m	39%
Impact of university expenditure	£555.5m	31%
Impact of student expenditure	£146.7m	8%
Total economic impact	£1,820.5m	100%

Note: All estimates are presented in 2016-17 prices, and rounded to the nearest £0.1m. *Source: London Economics' analysis*

The social and cultural impact of the University of York



There are a multitude of non-economic or societal benefits associated with education including **improvements in employability, health and wellbeing outcomes; social capital and cohesion; intergenerational transmission of skills and improved social mobility; the acquisition of further learning and qualifications; and improved communication and autonomy**. To assess these wider impacts of the University of York on its students and society at large, the University of York conducted an **online survey among its alumni** (achieving complete responses from a total of **4,298** alumni).

In terms of **job-related or employability skills**, respondents were asked about whether they felt that their ability to do their job had improved, where:

- **89%** indicated that their level of competency or ability to do their job had increased either 'a lot' or 'a little', with **88%** of respondents indicating that their general transferable skills that might be usable across a range of jobs or industries improved. **84%** of respondents believed that they were better prepared for their career; **78%** believed that their career had been advanced; **81%** had got a better job; **62%** believed that they had a more secure job; and **79%** believed that their level of job interest had improved.
- **76%** of respondents reported that the improvements in their circumstances were as a **direct result** of the qualification, or that the qualification had **helped a lot**. These responses demonstrate the very high degree of **additionality** associated with the University of York's provision.

In relation to **general skills**, approximately **95%** of respondents believed that their analytical skills had improved; with the corresponding estimates relating to critical thinking skills standing at (**94%**); writing skills (**88%**); problem solving (**90%**); communication (**86%**); presentation skills (**77%**); social skills (**77%**); literacy (**76%**); team-working (**72%**); and numeracy (**52%**).

In terms of the impact on respondents' **personal development and well-being**:

- **78%** of learners had become more enthusiastic about learning; **73%** of respondents believed that they were more likely to undertake further learning and **70%** believed that they were more likely to undertake further learning at a higher level.
- **92%** of respondents stated that the learning episode had helped them meet new people and make friends; **62%** of respondents suggested that the learning episode had provided them with something useful to do in their spare time; while **57%** mentioned that it had raised their aspirations (or those of their families) or made them more innovative (**67%**).
- **78%** of learners experienced increased self-esteem; **84%** believed that the learning experience had increased their self-confidence, while **76%** of respondents indicated that the qualification had improved their quality of life.

1 Introduction

Education has a transformative effect on people's lives. Affecting both the individuals in receipt of the education, as well as those around them, there are a multitude of benefits associated with higher education, including improvements in health and wellbeing outcomes; stronger community cohesion, engagement and tolerance; intergenerational transmission of skills; improved social mobility; acquisition of further learning and qualifications; and improved communication and autonomy. Moreover, educational attainment is one of the key long term-drivers of economic growth and national prosperity. As such, understanding the role of higher education institutions in their local, regional and national economies is of critical importance.

London Economics were commissioned to estimate the **economic, social and cultural impact of the University of York in Yorkshire and the Humber and across the UK as a whole**.

1.1 Structure of the report

Our general approach to addressing these many impacts is as follows. In the first section of this report (**Section 2**), we assess the improved labour market earnings and employment outcomes associated with higher education attainment. Through an assessment of the lifetime benefits and costs associated with educational attainment, we estimate the net economic benefits of the University of York's **teaching and learning** activity for the **5,655** UK-domiciled students starting qualifications or standalone modules at the University in 2016-17, as well as the impact on the public purse (through enhanced taxation receipts).

In **Section 3**, we combine information on the research-related income accrued by the University of York in 2016-17 (by income source) with estimates from the wider economic literature on the extent to which public investment in research activity results in additional or subsequent private sector productivity (i.e. positive 'productivity spillovers'). This results in an **estimate of the impact of the University of York's research activities**.

In addition to the **5,665** UK-domiciled students starting qualifications or modules at York in the 2016-17 academic year, a further **1,945** international students enrolled with the University. As such, the University of York contributes to the value of UK **educational exports** through the receipt of income from overseas. **Section 4** of this report assesses the monetary value of the tuition fee and non-tuition fee income associated with non-UK-domiciled students at the University of York, and estimates the contribution of these activities to the UK economy⁵.

With **3,585** full-time equivalent staff and total expenditure of **£332.5 million** in 2016-17, the **direct economic impact** of the University of York is substantial. In addition to these direct effects, the University also **indirectly** supports economic output generated throughout the institution's extensive supply chain, and results in **induced** economic benefits through the expenditures of its staff. Similarly, the expenditures of the University's students within the local economy result in direct, indirect and induced economic benefits to local businesses and throughout their supply chains. In **Section 5**, using information from the University's financial accounts, the Student Income and Expenditure Survey, as well as the wider economic literature, we estimate both the direct impact of the University of York's expenditure and the spending of its students, as well as the

⁵ Note that the estimated aggregate impact on exports does not take account of export revenues associated with the off-campus expenditures generated by international visitors to York, due to data limitations, particularly a lack of information on the number of such visitors attracted by the University.

indirect and induced impact across Yorkshire and the Humber and throughout the rest of the United Kingdom.

In addition to the many economic impacts associated with skills and qualification acquisition, there are a multitude of non-economic or societal benefits associated with higher education qualification attainment. In **Section 6** of this report, using results from a survey of University of York alumni, we demonstrate the depth of the impact of learning at the University of York on students' jobs, lives, families, learning and prospects.

Section 7 of this report summarises our main findings.

2 The impact of the University of York's teaching and learning activities



2.1 Introduction and rationale

Traditional economic impact analyses of higher education institutions typically only consider the direct, indirect and induced economic effects of universities' expenditures on their local and regional economies (including the institution's extensive supply chain and the expenditures on its staff), as well as the economic effects associated with the off-campus expenditures of domestic and international students attending the institution. However, given that the University of York's primary 'products' include undertaking world-class research and delivering teaching and learning, a traditional study of this nature would significantly underestimate the economic (and social) impact of the University on the Yorkshire and the Humber and UK economies.

Box 1 Developing the next generation of filmmakers and gamers

The University of York is at the heart of an initiative to **make the Yorkshire and Humber region a powerhouse in next generation film-making, gaming and creative digital content.**

Creative Media Labs: Innovation in Screen Storytelling in the Age of Interactivity and Immersion is a new partnership led by the University of York, Screen Yorkshire and the British Film Institute. It aims to establish the region as a leader in digital storytelling by **investing in research and development in experimentation, re-skilling, innovation and commercialisation of ideas and content.**



The project is supported by funding from the Arts and Humanities Research Council (AHRC) and is one of only nine creative clusters across the UK to receive AHRC funding for this rapidly growing area of the UK economy.

Professor Damian Murphy is leading the project, which is a collaboration between York's Department of Electronic Engineering, Department of Theatre, Film and Television, and Digital Creativity Labs. *Creative Media Labs* will bring together film, TV, games and digital media businesses from across the Yorkshire and Humber region, in collaboration with leading national and international companies and organisations, and a consortium of regional universities.

Professor Murphy says: *"The UK film, TV and games industries are world-leaders and a significant part of the country's creative economy, but on-demand services, streaming, gaming, virtual reality and other immersive and interactive technologies, are changing how we create and consume this content. These developments present both challenges and opportunities for our creative screen industries. The AHRC support for the programme is an exciting opportunity to build on an already impressive reputation at York and will further enable the success and growth of our creative industries across both our city and region."*

Source: The University of York

2.2 Valuing the economic contribution of a higher education institution

Traditionally, to estimate the value associated with **education outcomes**, straightforward *input-output* analysis has been used. This approach simply asserts that the value of inputs into the education system essentially equals the value of outputs associated with educational attainment.

However, this approach in no way captures the productivity or growth impacts associated with having a more highly educated workforce, and as such undervalues the productivity benefits associated with higher education. Although there are many non-economic benefits associated with higher education, Atkinson's (2005) report to the Office for National Statistics asserted that the economic value of education and training is essentially the **value placed on that qualification as determined by the labour market**.

In this section of the report, we detail the methodological approach used to place a value on the **teaching and learning activities** undertaken at the University of York, by considering the labour market benefits associated with enhanced qualification attainment and skills acquisition – to **both the individual and the public purse**.

2.3 The 2016-17 cohort of University of York students

The analysis of the economic impact of the University of York's teaching and learning activities is based on the **2016-17 cohort** of **UK-domiciled** students. In other words, instead of considering the University's entire student body of **17,395** students in that academic year (irrespective of when these individuals may have commenced their studies), we focus on determining the economic impact generated by the **5,665** UK-domiciled⁶ students **starting a formally recognised qualification or new stand-alone credit bearing module in the 2016-17 academic year**⁷.

In terms of **level of study** (Figure 4), approximately **67% (3,785)** students of UK-domiciled students in the 2016-17 cohort were undertaking **first degrees**, with a further **805 (14%)** undertaking **postgraduate taught degrees**, and **225 (4%)** undertaking postgraduate research degrees. An additional **850 (15%)** were enrolled in **other undergraduate or postgraduate qualifications**⁸.

In relation to the composition of the 2016-17 cohort of students by **mode**, the information in Figure 5 illustrates that there were **4,960 (88%)** full-time students and **705 (12%)** part-time students in the cohort of domestic students. In terms of the **domicile** of these students (Figure 6), approximately **5,545 (98%)** were from England, with **60** from Wales, **40** from Scotland and **20** from Northern Ireland⁹.

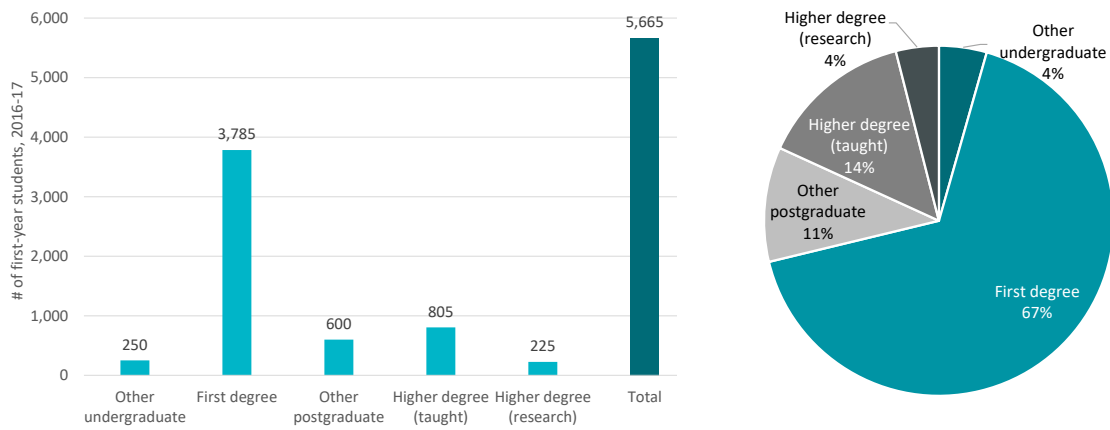
⁶ It is likely that a proportion of EU and non-EU domiciled students undertaking their studies at the University of York will remain in the UK to work following completion of their studies; similarly, UK-domiciled students might decide to leave the UK to pursue their careers in other countries. Given the uncertainty in predicting the extent to which this is the case, and the difficulty in assessing the net labour market returns for non-UK students, the analysis of teaching and learning focuses on UK-domiciled students only. In other words, we assume that all UK students studying with the University of York will enter the UK labour market upon graduation, and that non-UK students will leave the UK upon qualification completion.

⁷ We received HESA data on a total of **7,610** students from the University of York, from which we excluded **1,945** students with a non-UK-domicile to undertake the analysis of the impact of teaching and learning.

⁸ 'Other undergraduate' includes higher education qualifications at first degree level and below (e.g. Foundation Degrees). 'Other postgraduate' includes qualifications such as postgraduate diplomas, certificates, and professional training courses such as Postgraduate Certificate in Education and Masters of Public Administration.

⁹ For more detailed information on the 2016-17 University of York cohort of UK-domiciled students, please refer to Annex A2.1.6.

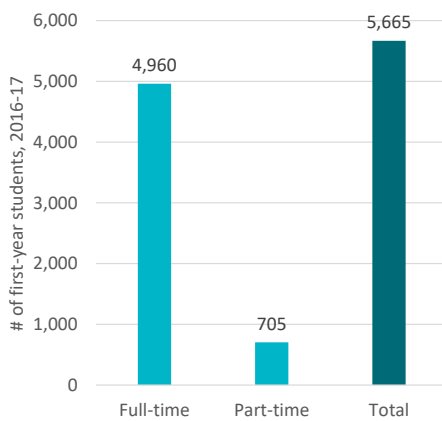
Figure 4 UK-domiciled students in the 2016-17 cohort by level of study



Note: 'Other undergraduate' includes higher education qualifications at first degree level and below (e.g. Foundation Degrees). 'Other postgraduate' includes qualifications such as postgraduate diplomas, certificates, and professional training courses such as Postgraduate Certificate in Education and Masters of Public Administration.

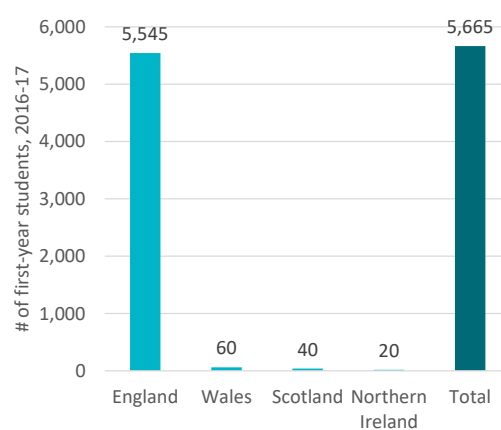
Source: London Economics' analysis based on University of York data submitted to the Higher Education Statistics Agency (HESA)

Figure 5 UK-domiciled students in 2016-17 cohort, by study mode



Source: London Economics' analysis based on University of York HESA data

Figure 6 UK-domiciled students in 2016-17 cohort, by study level



Source: London Economics' analysis based on University of York HESA data

2.4 Completion rates

The above information provided an overview of the number of students *starting* qualifications or modules at the University of York in the 2016-17 academic year. However, to aggregate individual-level impacts of the University's teaching and learning activity, it is necessary to adjust the number of 'starters' to account for **completion rates**.

Table 3 presents the completion rates assumed throughout the analysis¹⁰, using information on progression outcomes for historical cohorts of University of York students in 2016-17. Based on this information, we assume that of those individuals starting a first degree at the University of York in 2016-17, approximately **86.4%** will complete the qualification as intended, while the remaining **13.6%** will either complete a different (usually lower) qualification or only undertake one or more

¹⁰ The same completion rates are applied to estimate the impact of the University of York on exports (Section 4) and the direct, indirect and induced impact of the University's students' expenditures (see Section 5).

of the modules associated with their degree before discontinuing their studies¹¹. In all of these cases, the analysis calculates the estimated returns associated with the *completed* qualification or standalone credit-bearing module(s).

Table 3 Completion rates of University of York students by level of intended attainment

Completion outcome	Qualification level /study intention				
	Other undergraduate	First degree	Other postgraduate	Higher degree (taught)	Higher degree (research)
Complete as intended	100.0%	86.4%	96.8%	78.3%	81.0%
Other outcome	0.0%	13.6%	3.2%	21.7%	19.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Students are included in the 'other outcome' category if they do not complete the qualification which they started, but instead either complete a different (usually lower) qualification, or only undertake one or more modules required as part of their programme before discontinuing their studies.

Source: London Economics' analysis based on University of York data on progression outcomes for the 2016-17 academic year

2.5 Defining the returns to higher education qualifications

The fundamental objective of the analysis of the impact of University of York's teaching and learning activities is to generate the **net graduate premium** to the individual and the **net public purse benefit** to the Exchequer associated with higher education qualification attainment. These concepts are defined in Box 2. The specific components of the analysis are presented in Figure 7, and discussed in greater detail in subsequent sections.

Box 2 Definition of gross and net graduate premiums and benefits to the public purse

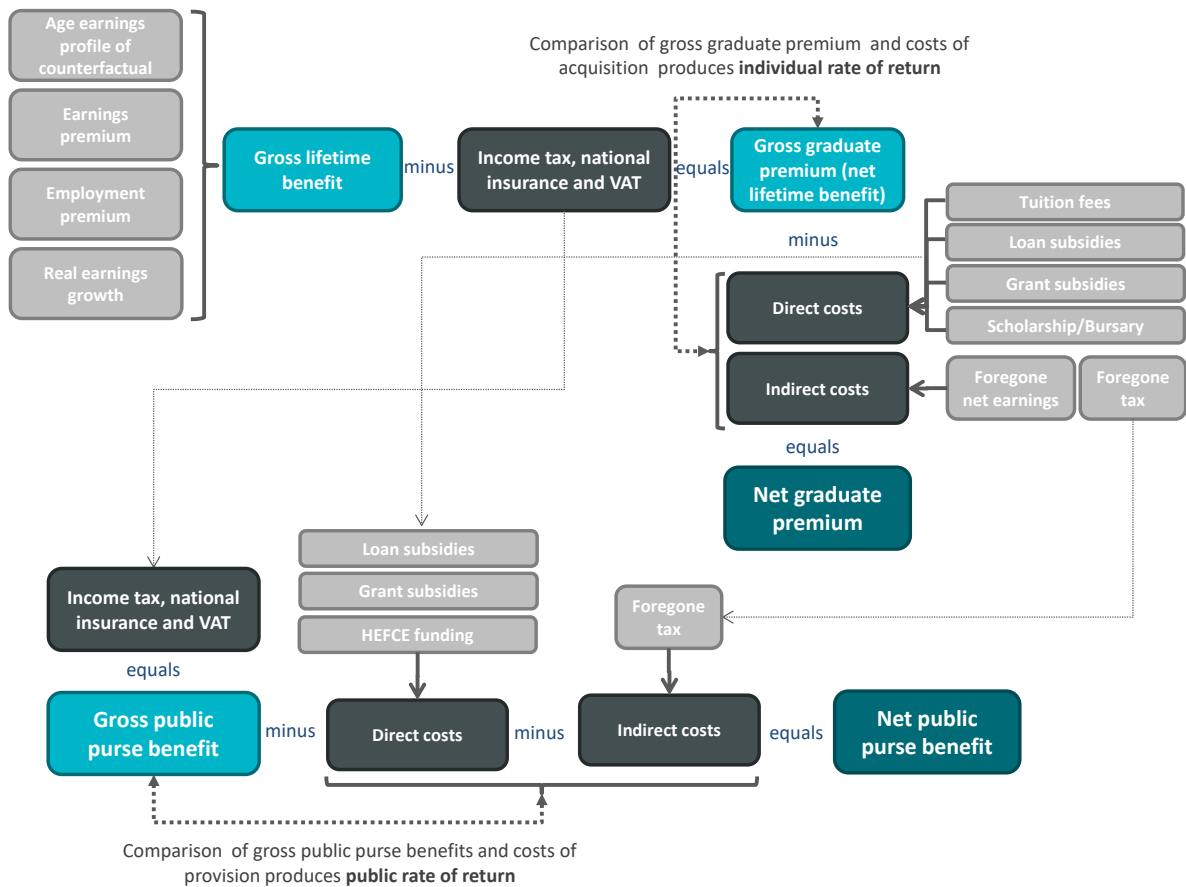
The **gross graduate premium** associated with qualification attainment is defined as the **present value of enhanced after-tax earnings** (i.e. after income tax, National Insurance and VAT are removed, and following the deduction of any foregone earnings) relative to an individual in possession of the counterfactual qualification.

The **gross benefit to the public purse** associated with qualification attainment is defined as the **present value of enhanced taxation** (i.e. income tax, National Insurance and VAT, following the deduction of the costs of foregone tax earnings) relative to an individual in possession of the counterfactual qualification.

The **net graduate premium** is defined as the gross graduate premium *minus* the present value of the direct costs associated with qualification attainment. Similarly, the **net benefit to the public purse** is defined as the gross benefit minus the direct costs of provision during the period of attainment.

¹¹ Both of these other outcomes are modelled as completion at 'other undergraduate' level.

Figure 7 Overview of gross and net graduate premium, and gross and net Exchequer benefit



Source: London Economics' analysis of Department for Business, Innovation and Skills (2011a)

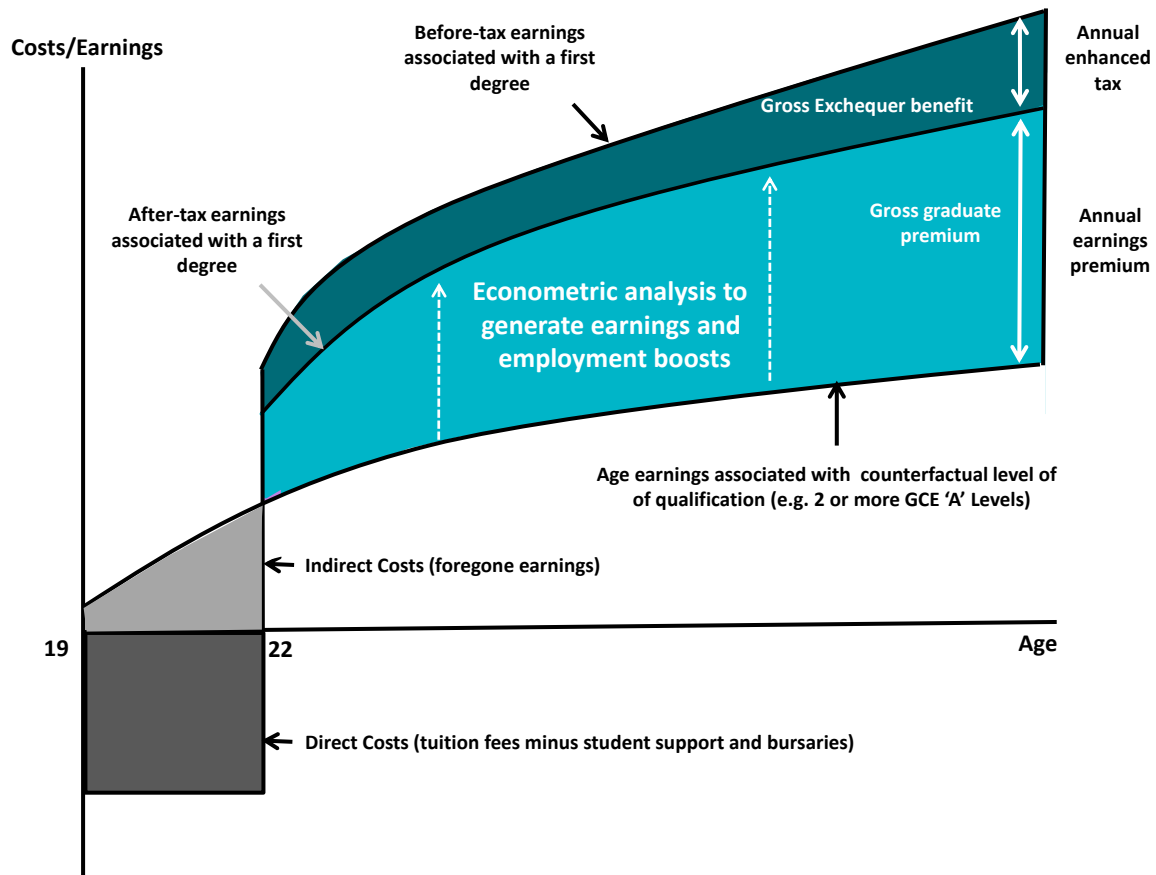
2.6 Estimating the returns to higher education qualifications

2.6.1 Assessing the gross graduate premium

To measure the **economic benefits to higher education qualifications**, we estimate the labour market value associated with particular education 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 is to undertake an **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 group 'strips away' those 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. An illustration of this is presented in Figure 8. Information on the treatment and counterfactual groups is presented in Annex A2.1.1, while full details of the econometric approach are presented in Annex A2.1.2.

Figure 8 Estimating the gross graduate premium



Note: The analysis assumes that the opportunity costs of foregone earnings associated with higher qualification attainment are applicable to full-time students only. For part-time students, we have assumed that these students are able to combine work with their academic studies and as such, do not incur any opportunity costs in the form of foregone earnings. This illustration is based on an analysis of the University of York's cohort data for 2016-17, where the mean age at enrolment for full-time undergraduate degree students stands at 19, and we have assumed that a full-time first degree requires 3 years to complete.

Source: London Economics

Throughout the analysis, the assessment of earnings and employment outcomes associated with higher education qualification attainment (at all levels) is undertaken *separately* by **gender**, reflecting the different labour market outcomes between men and women. Further, the analysis is undertaken **by subject of degree** to illustrate the fact that there is significant variation in post-graduation labour market outcomes depending on the subject of study, and to reflect the specific composition of subjects offered by the University of York. In addition, given the fact that part-time students undertake and complete higher education qualifications later in life than full-time students, the analysis of part-time students applies a '**decay function**' to the returns associated with qualification attainment, to reflect the shorter period of time in the labour market (see Annex A2.1.3). More detailed information on the calculation of the gross graduate premium (and public purse benefit) is provided in Annex A2.1.4.

Box 3 The York Festival of Ideas

Now in its eighth year, the York Festival of Ideas demonstrates the transformative power of ideas and education - and has grown, year-on-year, to become one of the largest free festivals of its kind in the UK.

The 2018 Festival took place under the banner of 'Imagining the Impossible'. With mostly free events, the Festival delivered events for all ages and interests. More than **40,000** people attended the **220 events held across 57 venues in York in June 2018**, including talks, exhibitions, theatre, music, films, guided walks and children's activities, across **16 themes**, including:

- A Date with History
- Evolving Society
- Fun for Families
- Power of Politics
- A Way with Words
- Explorations in Science and Technology
- Health and Wellbeing
- Revealing the Ancient World
- Art and Design
- Exploring York
- Of Women
- Sci-Fi Meets the Supernatural
- Eoforwic: Anglian-era York
- Food and Farming
- Performances
- Thinking and Learning

The Festival is made possible through the support of a range of sponsors and partners. The 2018 Festival was delivered **in partnership with 123 organisations**, including:

- BBC Radio 3
- BBC Radio 4
- Victoria and Albert Museum
- The Institution of Engineering and Technology
- Holbeck Charitable Trust
- Joseph Rowntree Foundation
- UPP Foundation
- Make it York
- BBC History Magazine

Showcasing the popularity of the Festival, according to the **2018 Audience Feedback Survey** (which achieved 975 respondents), **44%** of respondents had not attended the Festival before; **99%** would recommend the Festival; **94%** rated the festival as 'excellent' or 'very good'; and **94%** are likely to attend the Festival again in the future.



Source: The University of York

2.6.2 Assessing the gross benefits to the public purse

The 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 higher education qualification attainment, and combined with administrative information on the relevant taxation rates and bands (from HM Revenue and Customs), we estimated the **present value** of additional income tax, National Insurance and VAT associated with higher education qualification attainment (by gender, level of study, mode of study, and prior attainment).

2.6.3 Assessing the net graduate premium

The difference between the gross and net graduate premium essentially relates to the **direct costs** of acquisition¹². These direct costs refer to the **proportion of the tuition fee paid by the student**¹³ net of any **fee support** or **maintenance support** provided by the Student Loans Company (SLC) or Students Awards Agency for Scotland (SAAS)¹⁴ and minus any **fee waivers or other bursaries** provided by the University of York itself¹⁵. In this respect, the student benefit associated with tuition fee loans or maintenance loan support equals the **Resource Accounting and Budgeting Charge** (RAB charge, or interest rate subsidy)¹⁶, capturing the proportion of the loan that is not repaid. Given the differing approach to the support funding of students from each of the UK Home Nations, the direct costs incurred by students were assessed separately for students from England, Wales, Scotland and Northern Ireland.

2.6.4 Assessing the net public purse benefit

The direct costs¹⁷ to the public purse include the **teaching grant funding administered through the Higher Education Funding Council of England**¹⁸ and the above-described **student support** in the

¹² Note again that the *indirect* costs associated with qualification attainment, in terms of the foregone earnings during the period of study (for full-time students only), are already taken account of in the gross graduate premium.

¹³ We made use of information on average tuition fees for first-year students in 2016-17 provided by the University of York, separately by domicile (i.e. Home/EU vs non-EU students), study mode, and qualification level. To ensure that the fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2016-17 cohort, to arrive at the fees per part-time student, we multiplied the respective full-time rates by the average study intensity amongst part-time students in the cohort (by qualification level).

¹⁴ The analysis makes use of *average* levels of support paid per student, separately by study mode, study level (i.e. undergraduate or postgraduate taught), domicile and location of study, based on publications by the SLC on student support for higher education in England, Wales and Northern Ireland in 2016-17 (see Student Loans Company 2017a, 2017b and 2017c) and publications by the Student Awards Agency for Scotland on student support for higher education in Scotland (see Student Awards Agency for Scotland, 2017). To ensure comparability across the different Home Nations, we focus only on core student support in terms of tuition fee grants, tuition fee loans, maintenance grants and maintenance loans (where applicable), but *exclude* any Disabled Students' Allowance and other targeted support. Wherever possible, we focus on the average level of support for students in public providers only, for the most recent cohorts possible, split by domicile (i.e. 'Home' vs. EU) and location of study (i.e. 'Home' vs. the rest of the UK). Further, and again wherever possible, we adjusted the average levels of fee and maintenance loans for average loan take-up rates.

In addition, the assumed average fee loan per student has been adjusted downwards for any fee waivers which students receive directly from the University of York to help with the tuition fee costs of their study.

¹⁵ Average fee waivers and other bursaries per student were calculated based on information on total bursary spending in 2015-16 by the University of York from the Office for Fair Access (see OFFA, 2017). At the time of writing, the corresponding information for 2016-17 had not yet been published – so that we assume the same average bursaries per student in 2016-17 as in 2015-16.

Total bursary spending was split into fee waivers and other (non-fee) types of scholarships and bursaries. To arrive at averages per student (by bursary type), we then divided the total values by the total number of (first-year and continuing) students enrolled with the University of York in 2015-16 (using HESA information), *excluding* any non-EU students (i.e. we assume that bursary support is only available to UK or EU domiciled students). For part-time students, we again multiplied the respective full-time rates by the average study intensity amongst part-time students in the 2016-17 University of York cohort.

¹⁶ We have assumed a RAB charge of 45% associated with tuition fee and maintenance loans for English domiciled students (including the Postgraduate Master's Loan introduced in 2016-17), as well as Scottish and Northern Irish students (all relating to students studying in England). In addition, we have assumed a RAB charge of 10% for Welsh students studying in England (reflecting the relatively lower level of fee loans taken out by these students). Further, for the (newly introduced) postgraduate loans for English Masters students, we have assumed a RAB charge of 0% (IPPR, 2014). In other words, we assume that students repay the full amount of their loan to the Exchequer. The 45% RAB charge was based on London Economics' modelling of the resource costs associated with student support provided to English domiciled students, and to EU students studying in England, and reflects the recently announced increase of the loan repayment threshold to £25,000 and the upper interest rate threshold to £45,000 (see London Economics, 2017). The 10% estimate (for lower levels of loan) is based on estimates by the Diamond Review of Higher Education in Wales (Welsh Government, 2016).

¹⁷ Again, the indirect costs to the public purse in terms of foregone income-tax, National Insurance and VAT receipts foregone during the period of qualification attainment (applicable to full-time students only) are already incorporated in the gross public purse benefits as described above.

¹⁸ This is based on information on the total HEFCE teaching grant received by the University of York in 2016-17, divided by the total number of first year and continuing students enrolled with the University in 2016-17 (excluding any non-EU-domiciled students and postgraduate research students; i.e. it is assumed that there is no teaching funding associated with these students). We again adjusted for the average assumed study intensity amongst full-time and part-time students, to arrive at separate rates of teaching grant funding by study mode.

form of maintenance/fee grants as well as interest rate or write-off **subsidies** that are associated with maintenance and tuition fee loans (i.e. the RAB charge). Again, the analysis tailors the cost of student support to the student's specific Home Nation of domicile. For instance, in relation to fees, for Welsh-domiciled full-time undergraduate students in the 2016-17 cohort, we incorporate the **£5,100** annual (maximum) tuition fee grant offered by the Welsh Government, as well as the additional Exchequer cost associated with the remaining **£3,900** in tuition fee loans (using the relevant Welsh Government RAB charge). In contrast, for English domiciled students, we estimate the costs of public provision based on a full (maximum) **£9,000** fee loan in 2016-17, and the associated (higher) RAB charge.

The above-described direct costs associated with qualification attainment to both students and the Exchequer (by qualification level, study mode, Home Nation and gender) are calculated from start to completion of a student's learning aim. Throughout the analysis, to ensure that the economic benefits and costs are computed in **present value** terms (i.e. in 2016-17 money terms), all benefits and costs occurring at points in the future were discounted using the standard HM Treasury Green Book discount rate of **3.5%**¹⁹.

Deducting the resulting costs from the estimated gross graduate premium and gross public purse benefit, we arrive at the estimated **net graduate premium** and **net public purse benefit** per student.

2.7 Estimated net graduate premium and net public purse benefit

2.7.1 Net graduate premium and public purse benefit associated with first degrees

Table 4 presents the net graduate premiums and net Exchequer benefits achieved by English domiciled students²⁰ undertaking full-time qualifications at the University of York in 2016-17 (depending on student domicile and gender).

The analysis indicates that the **net graduate premium** achieved by a representative²¹ male student from England in 2016-17 completing a full-time first degree at the University of York with GCE 'A' Levels as their highest level of prior attainment is **£78,000** in today's money terms. The comparable estimate for a female first degree student stands at approximately **£58,000**²².

The net graduate premium associated with a representative full-time first degree student from England stands at approximately £78,000 for men and £58,000 for women.

¹⁹ See HM Treasury (2011).

²⁰ Estimated net graduate premiums and net Exchequer benefits for all domiciles (as well as study levels, study modes and prior attainment levels) are presented in Annex A2.1.5.

²¹ The analysis is based on an average age at graduation of 22 for students undertaking full-time first degrees at the University of York.

²² It is important to note that the economic benefits associated with higher education qualification - expressed in monetary terms - are generally lower for women than men - predominantly as a result of the increased likelihood of spending time out of the active labour force. However, as with the majority of the wider economic literature, it is often the case that the marginal benefit associated with higher education qualification attainment - expressed as either the percentage increase in hourly earnings or enhanced probability of employment - are greater for women than for men.

Table 4 Estimated net graduate premium and net Exchequer benefit associated with University of York qualifications - full-time students from England only

Level of study at the University of York	Men		Women	
	Net graduate premium	Net public purse benefit	Net graduate premium	Net public purse benefit
Other undergraduate ¹	£31,000	£35,000	£39,000	£32,000
First degree ¹	£78,000	£85,000	£58,000	£51,000
Other postgraduate ²	-£38,000	-£6,000	£1,000	£23,000
Higher degree (taught) ²	£12,000	£28,000	£21,000	£28,000
Higher degree (research) ²	£47,000	£95,000	£44,000	£62,000

Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values and rounded to the nearest £000.

The negative estimates for students at 'other postgraduate' level are based on the relatively limited earnings and employment returns associated with this type of qualification, resulting in relatively low additional lifetime earnings, which are outweighed by the cost of foregone earnings during study.

¹ Net graduate premiums and net public purse benefits associated with qualifications at 'other undergraduate' and first degree level are estimated relative to possession of GCE 'A' Levels.

² Net graduate premiums and net public purse benefits associated with qualifications at 'other postgraduate', higher degree (taught) and higher degree (research) level are estimated relative to the possession of undergraduate degrees.

Source: London Economics' analysis

The **net Exchequer benefit** for a representative full-time male undergraduate student from England with GCE 'A' levels as their highest level of prior attainment stands at approximately **£85,000** in 2016-17 money terms. The comparable estimate for a female undergraduate stands at approximately **£51,000**.

2.7.2 Net graduate premiums and public purse benefits associated with other qualifications

The net public purse benefit associated with a representative full-time first degree student from England stands at approximately £85,000 for men and £51,000 for women.

The analysis was replicated for the full range of qualifications offered by the University of York. Again focusing on just those net graduate premiums and net Exchequer benefits generated by full-time students/graduates who were English domiciled prior to commencing their study, the analysis indicates that the **net (post)graduate premium** associated with a representative²³ English-domiciled student undertaking a **postgraduate research degree** at the University of York (relative to an undergraduate degree) stands at approximately **£47,000** for men and **£44,000** for women. Reflecting the limited public funding associated with these degrees, the **net public purse benefit** associated

with these higher research degree students stands at approximately **£95,000** for men and **£62,000** for women.

A similar impact is identified for individuals undertaking postgraduate taught qualifications. Specifically, the analysis suggests that the **net (post)graduate premium** associated with a representative²⁴ English-domiciled University of York postgraduate taught degree student stands at

²³ This is based on an average age at graduation of 30 for full-time higher degree (research) students.

²⁴ This is based on an average age at graduation of 25 for full-time higher degree (taught) students.

approximately **£12,000** for a man and **£21,000** for a woman (relative to an undergraduate degree)²⁵. The corresponding **net Exchequer benefits** stand at approximately **£28,000** for both men and women, respectively.

In relation to sub-degree higher education qualifications, the modelling suggests that there is a small net graduate premium associated with undertaking 'other undergraduate' qualifications (such as Foundation Degrees). The net graduate premium for representative²⁶ English-domiciled male students at the University of York stands at approximately **£31,000**, compared to **£39,000** for a woman (relative to 2 or more GCE A Levels). The corresponding net Exchequer benefits stand at approximately **£35,000** and **£32,000** for men and women, respectively²⁷.

2.8 Internal rate of return

In addition to measuring the returns to higher education qualifications at the University of York in monetary terms, it is possible to estimate the **internal rate of return (IRR)**²⁸ to students and the Exchequer associated with these qualifications²⁹ (see Table 5). Essentially, from a financial perspective, the internal rate of return is a means of comparing alternative investment decisions.

In relation to the return to students/graduates, the analysis indicates that the IRR for a representative full-time English-domiciled first degree student in the 2016-17 University of York cohort stands at **12.7%** for a male student, and **11.8%** for a female student (see Table 5). In other words, in deciding whether or not to undertake a full-time first degree at the University of York, a man would need to achieve a return of more than **12.7%** on an alternative activity to make that alternative activity more worthwhile than the University of York qualification. The comparable IRR to the public purse was estimated at **14.6%** and **12.7%** for male and female students, respectively

Table 5 Estimated internal rate of return (%) to students and the Exchequer associated with University of York first degrees (relative to GCE 'A' Levels) - full-time students from England only

	Men		Women	
	Students	Public purse	Students	Public purse
Internal rate of return	12.7%	14.6%	11.8%	12.7%

Note: The estimates are based on an average age at graduation of 22 for students undertaking undergraduate degrees at the University of York on a full-time basis.

Source: *London Economics' analysis*

Putting this into wider context, compared to the yield associated with a 30 year Treasury Gilt of **1.92%**³⁰, the estimated internal rates of return again highlight the **very substantial returns** to both

²⁵ In this instance, the higher net graduate premium for female students is primarily driven by higher estimated (subject-adjusted) marginal earnings and employment returns to taught higher degrees for women as compared to men.

²⁶ Based on an average age at graduation for University of York full-time students at 'other undergraduate' level of 21.

²⁷ Note that the negative estimates for students at 'other postgraduate' level are based on the relatively limited earnings and employment returns associated with this type of qualification, resulting in relatively low additional lifetime earnings, which are outweighed by the cost of foregone earnings during study.

²⁸ Technically, the internal rate of return is the discount rate at which the present value of the costs equals the present value of the benefits.

²⁹ The internal rate of return was calculated based on the estimated annual costs and benefits per student associated with qualification attainment at the University of York incurred by graduates and the public purse. Note that some of these 'annual cash flows' had already been consolidated over multiple years. In particular, instead of estimating students' annual loan fee loans and maintenance loan repayments over their lifetime, the analysis applied the assumed percentage RAB charge to the level of tuition fee and maintenance loan per year during the period of study (to estimate the share of the loan which students do not repay).

³⁰ Compared to the yield associated with a 30 year Treasury Gilt of **1.92%** (30 year generic Gilt yield as of 1st October 2018).

students and the public purse associated with higher education qualifications at the University of York.

2.9 Aggregate results of the economic impact of teaching and learning

The total economic impact of teaching and learning generated by the 2016-17 cohort of University of York students stands at £487.9 million.

Combining the information on completion rates with the number of UK-domiciled students in the 2016-17 University of York cohort and the net graduate and public purse benefits associated with the different qualification levels (relative to students' specific prior attainment), the analysis estimates that the **aggregate economic benefit of teaching and learning** associated with the 2016-17 University of York cohort in the UK stands at approximately **£487.9 million**.

Of this total, **48% (£232.3 million)** is accrued by students undertaking qualifications at the University of York, while the remaining **52% (£255.6 million)** is accrued by the Exchequer. Further, reflecting the profile of the student cohort, **99% (£484.2 million)** is generated by the University's full-time students, with the remaining **1% (£3.7 million)** being associated with part-time students.

It is important to emphasise that these impacts are associated with the 2016-17 cohort of students only. Depending on the size and composition of subsequent cohorts of University of York students, a comparable assessment of the economic impact associated with teaching and learning activities would need to be estimated for each successive cohort of starters.

Table 6 Aggregate impact of the University of York's teaching and learning activities (£m), by type of impact, domicile and study mode

Type of impact	Domicile				Total
	England	Wales	Scotland	Northern Ireland	
Students	£224.9m	£4.1m	£2.1m	£1.2m	£232.3m
Full-time	£224.7m	£4.1m	£2.1m	£1.2m	£232.1m
Part-time	£0.2m	£0.0m	£0.0m	£0.0m	£0.2m
Exchequer	£248.9m	£3.4m	£2.2m	£1.1m	£255.6m
Full-time	£245.4m	£3.4m	£2.2m	£1.1m	£252.1m
Part-time	£3.5m	£0.0m	£0.0m	£0.0m	£3.5m
Total	£473.8m	£7.4m	£4.4m	£2.3m	£487.9m
Full-time	£470.1m	£7.4m	£4.4m	£2.3m	£484.2m
Part-time	£3.7m	£0.0m	£0.0m	£0.0m	£3.7m

Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values and rounded to the nearest £0.1m.

Source: *London Economics' analysis*

Box 4 Student volunteering

Each year, thousands of University York students get involved in a range of community volunteering opportunities. In 2016-17, the University offered around **2,700 volunteer opportunities**, to which students committed approximately **66,000 hours** of their time. Some of the core volunteering activities undertaken in 2016-17 are described in the following:

- **A sporting delight:** SNAPPY is a play and activities group for children and young people with disabilities. Working with the charity, the University of York Students' Union's (YUSU) volunteering officers and sports teams came together to make a difference to the lives of young people with special needs. They led a sports takeover day at the charity, making a wide range of sports accessible to the young people.
- **Students tackle key issues for York:** In 2016-17, the University of York saw students start up projects to support older people through a CommuniTea project with medical students and Woolnough Care Home. Another group took up the challenge to inspire young people through a one-day conference on the right to education, as part of the move towards York declaring itself the first Human Rights city in the UK.
- **National success for History students:** Over 50 first-year History students joined students from English, History of Art, Politics and Education to tackle a range of projects for community clients over the summer term. The resources, including films, research materials and educational resources, are being picked up at a national level by English Heritage, the National Trust and Robertson's Construction.
- **Teams of volunteers from Colleges helped to transform Tang Hall Community Centre:** In June 2017, over 200 volunteers, including 40 students, helped to transform Tang Hall Community Centre outdoor spaces, including the building of raised beds, removing the basketball court and building a pizza oven. Student volunteers worked alongside employee volunteers over three days.
- **Volunteer 'one to watch' for Undergraduate of the Year:** Adam Tilley, a management undergraduate at the University of York, was listed in the top 10 to watch in the Undergraduate of the Year awards. Adam helped set up a new project to promote sustainability in primary schools. He worked with Tesco's to help Acomb Primary Eco-Council reduce the school's food waste. Adam's success landed him an internship for the summer in Jersey.



Source: The University of York

3 The impact of research and knowledge transfer activities



In addition to providing teaching and learning opportunities, the University of York is at the forefront of international research activity. Ranked in the top 125 of higher education institutions globally³¹, academic staff across the University consistently generate world-class research.

The analysis of the economic impact of the University of York's research activities takes into account both the **direct** effects of the University's research as well as the **productivity spillovers** from these research activities to the rest of the UK economy.

Box 5 Assuring the safety of autonomous systems

In 2016, the International Federation of Robotics reported that the number of industrial robots deployed worldwide will rise to 2.6 million by 2019 - that's one million more than in 2015, which itself was a record breaking year.

With the amount of robotics and autonomous systems (RAS) throughout the world on an inexorable rise, these systems will become commonplace on our roads, in hospitals, food production, shipping, energy and manufacturing. RAS will touch almost every aspect of our lives in some way. That means there's a **vital need for industry, regulators and research teams across the world to work together to understand this new technology and develop an appropriate and flexible regulatory framework**, so the public can have full confidence in the systems around them.

The University of York has partnered with the Lloyd's Register Foundation to run the **Assuring Autonomy International Programme (AAIP)**, led by a world-leader in systems and software engineering, Professor John McDermid, based at the University's Department of Computer Science.

"The next generation of robotics and autonomous systems holds significant promise and opportunity for commerce and society as a whole," says Professor McDermid. "But it is essential for all of us that the systems are dependable and safe. The University of York is leading this programme, focusing on assurance of RAS so that the benefits can be realised without unacceptable risk to end users or technology developers. The programme is building on York's 30 years of pioneering research and training in this sector, and we're keen to work with organisations across the world."



Source: The University of York

3.1 Direct research impact

The analysis of the direct economic impact of the research activities undertaken at the University of York was based on the total research-related income accrued by the University in the 2016-17 academic year, including:

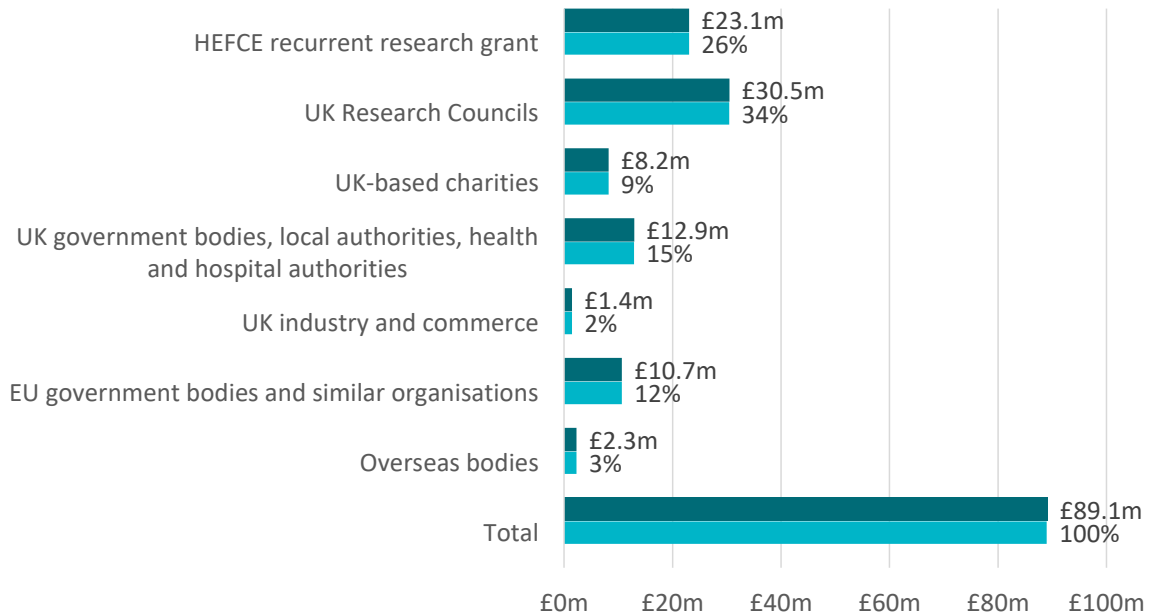
- **Research grants and contracts** provided by:
 - The UK Research Councils;

³¹ See 2019 Times Higher Education World University Rankings (Times Higher Education, 2018).

- UK-based charities;
- UK government bodies, Local Authorities, health and hospital authorities;
- UK industry and commerce;
- EU government bodies and similar organisations;
- Overseas bodies; and
- **Research funding grants allocated by the Higher Education Funding Council for England (HEFCE)** (including quality-related and postgraduate research funding).

Aggregating across these sources, the total research-related income accrued by the University of York in the 2016-17 academic year amounted to **£89.1 million** (see Figure 9). The majority of this income was received through funding from the UK Research Councils (**£30.5 million, 34%**), the recurrent research grant allocated by HEFCE (**£23.1 million, 26%**), and funding from UK government bodies, Local Authorities, health and hospital authorities (**£12.9 million, 15%**). A further **£10.7 million (12%)** was received from EU sources (i.e. government bodies and other organisations).

Figure 9 University of York research income by type, £m in 2016-17



Note: All values are presented in 2016-17 prices, and rounded to the nearest £0.1 million.

Source: London Economics' analysis based on University of York data

To arrive at the net direct impact of the University of York's research activities on the UK economy, we deducted the costs to the public purse of funding the research activities undertaken by the University from the above total research income. These public costs relate to the direct block grants provided by the **UK Research Councils (£30.5 million)** as well as the **recurrent research grants provided by the HEFCE (£23.1 million)**, amounting to a total of **£53.5 million** in the 2016-17 academic year. Deducting these public purse costs from the total research-related income (**£89.1 million**), the analysis suggests that the (net) direct impact associated with the University of York's research activity in the 2016-17 academic year stands at **£35.5 million**.

3.2 Productivity spillovers

In addition to the above direct impact of research activities, the wider academic literature indicates that investments in intangible assets such as R&D may induce positive **externalities**. 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 (where these external effects can be either positive or negative and are not reflected in the price mechanism). 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, existing academic literature assesses the existence and size of the **positive productivity and knowledge spillovers**, where knowledge generated through the research activities of one agent enhances the productivity of other organisations.

There are many ways in which research generated at universities can induce such positive spillover effects to the private sector³². For example, spillovers are enabled through direct R&D collaborations between universities and firms, the publication and dissemination of research findings, or through university graduates who enter into the labour market.

3.2.1 Literature estimates of productivity spillovers from higher education research

Of particular interest in the context of research conducted by universities, a study by Haskel and Wallis (2010)³³ investigates evidence of **spillovers from public funding of Research & Development** through a number of channels. The authors analyse productivity spillovers to the private sector from public spending on R&D by the UK Research Councils, as well as public spending on civil and defence-related R&D³⁴. They also investigate the relative effectiveness of these channels of public spending in terms of their impact on the ‘market sector’.

Haskel and Wallis find strong evidence of the existence of market sector productivity spillovers from public R&D expenditure originating from UK Research Councils³⁵ ³⁶. Their findings imply that, although there is no spillover effect associated with public funding of civil and defence Research & Development, the marginal spillover effect of public spending on research through the **Research Councils** stands at **12.7 (i.e. for every £1 spent on university research through the Research Councils results in an additional annual output of £12.70 in UK companies)**. The analysis also suggests that the spillover benefits of public spending on research in higher education are greater than those from other R&D areas supported by government.

A more recent study by Haskel et al. (2014) provides additional insight into the size of potential productivity spillovers from university research. Rather than estimating effects on the UK economy as a whole, the authors analyse the size of spillover effects from public research across different UK

³² Note that there are clearly significant economic and social spillovers to the public sector associated with university research. However, despite their obvious importance, these have been much more difficult to estimate robustly, and are not included in this analysis.

³³ For a summary of Haskel and Wallis’ (2010) findings, please refer to Imperial College London (2010).

³⁴ The authors use data on government expenditure published by the Department for Business, Innovation and Skills for the financial years between 1986-87 and 2005-06.

³⁵ This is undertaken by regressing total factor productivity growth in the UK on various measures of public sector R&D spending.

³⁶ Note that the authors’ regressions only test for correlation, so that their results could be subject to the problem of reverse causation (i.e. it might be the case that increased market sector productivity induced the government to raise public sector spending on R&D). To address this issue, the authors not only test for 1-year lags, but for lags of 2 and 3 years respectively, and receive similar estimates. These time lags imply that if there was a reverse causation issue, it would have to be the government’s *anticipation* of increased total factor productivity growth in 2 or 3 years which would induce the government to raise its spending on research; as this seems an unlikely relationship, Haskel and Walls argue that their results appear robust in relation to reverse causation.

industries³⁷. The authors investigate the correlation between the combined research conducted by the Research Councils, the higher education sector, and central government itself (e.g. through public research laboratories)³⁸, interacted with measures of industry research activity, and total factor productivity within the different market sectors³⁹. Their findings imply a total rate of return on public sector research of **0.2 (i.e. every £1 spent on public R&D results in an additional annual output of £0.20 within the UK private sector)**.

Box 6 New bioeconomy initiative launched in York

As the global demand for food and energy grows, and the need to produce materials using environmentally friendly methods becomes ever more urgent, **the need for effective partnerships between the bioscience academic community and industries in the bioeconomy sector has never been greater.**

In the north of England, with more than 16,000 bioeconomy companies driving a turnover of £91 billion and employing well over 400,000 people, there are golden opportunities for researchers to interact with businesses at the cutting edge of the bioeconomy. To harness this wealth of knowledge and expertise, the University of York has formed **BioYork**, to bring together the region's researchers and industry colleagues, with a focus on **meeting major 21st century challenges in pharmaceuticals, food sustainability and fuel production.**



This new initiative will create ways for academic teams and those working in industry to come together and drive forward new technologies, services and products, thus making 'bio-based' solutions to global resource depletion, population growth and climate change a reality. One example of BioYork's partnership with industry will be to create demonstrator facilities which businesses can use to test their technologies at a 'multi-tonne' scale.

Professor Ian Graham FRS from the University of York's Department of Biology has been appointed Director of BioYork. He said: *"BioYork brings together researchers and industry to translate and transform cutting edge research into technologies, processes and products across the bioeconomy. As part of this initiative, we aim to establish the BioYork Translational Hub, which will build on the work of the University's Biorenewables Development Centre and BioVale."*

Source: The University of York

3.2.2 Estimating productivity spillovers

In order to estimate the productivity spillovers associated with the University of York's research activities, we follow the above literature and apply the pertinent productivity spillover multipliers to the different items of research-related income presented in Figure 9. Specifically, assigning the multiplier of **12.7** to the research funding that the University of York received from UK Research

³⁷ Haskel et al. (2014) use data on 7 industries in the United Kingdom for the years 1995 to 2007.

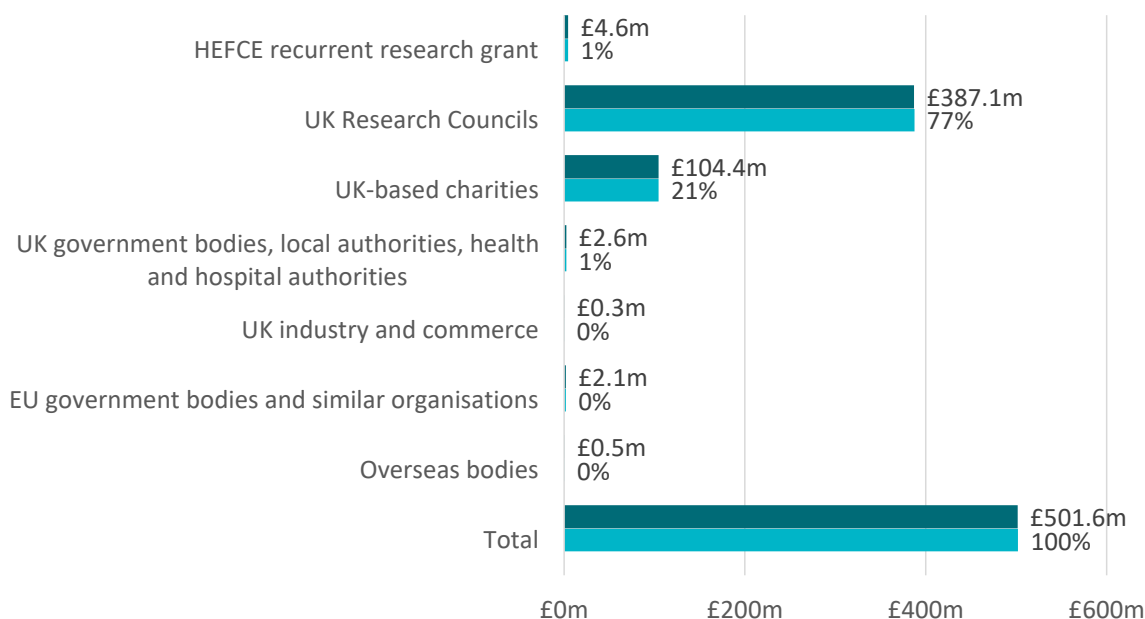
³⁸ A key difference to the multiplier estimate for Research Council spending provided by Haskel and Wallis (2010) lies in the distinction between *performed* and *funded* research, as outlined by Haskel et al. (2014). In particular, whereas Haskel and Wallis estimated the impact of research *funding* by the Research Councils on private sector productivity, Haskel et al. instead focus on the *performance* of R&D. Hence, they use measures of the research undertaken by the Research Councils and the government, rather than the research funding which they provide for external research, e.g. by higher education institutions. The distinction is less relevant in the higher education sector: to measure the research performed in higher education, the authors use Higher Education Funding Council funding (where research is both funded by and performed in higher education).

³⁹ In particular, the authors regress the three-year natural log difference of total factor productivity on the three-year and six-year lagged ratio of total research performed by the Research Councils, government and the Higher Education Funding Councils over real gross output per industry. To arrive at the relevant multiplier, this ratio is then interacted with a measure of co-operation of private sector firms with universities and public research institutes, capturing the fraction of firms in each industry co-operating with government or universities. The lagged independent variables are adjusted to ensure that the resulting coefficients can be interpreted as annual elasticities and rates of return.

Councils and UK based charities⁴⁰ in 2016-17 (amounting to **£38.7 million**), and using the multiplier of **0.2** for all other research funding received by the University of York in that academic year (amounting to **£50.4 million**)⁴¹, we infer a weighted average spillover multiplier of approximately **5.63** associated with the University of York’s research activities. This means that for **every £1 invested in the University of York’s research activities, an additional annual economic output of £5.63 is generated across the UK economy.**

Applying these productivity spillover multipliers to the research-related income the University accrued in 2016-17, we estimate that the research conducted by the University of York results in **total market sector productivity spillovers of approximately £501.6 million** (see Figure 10).

Figure 10 Productivity spillovers associated with University of York research, by income type, £m in 2016-17



Note: All values are presented in 2016-17 prices, and rounded to the nearest £0.1 million.

Source: London Economics’ analysis based on University of York data

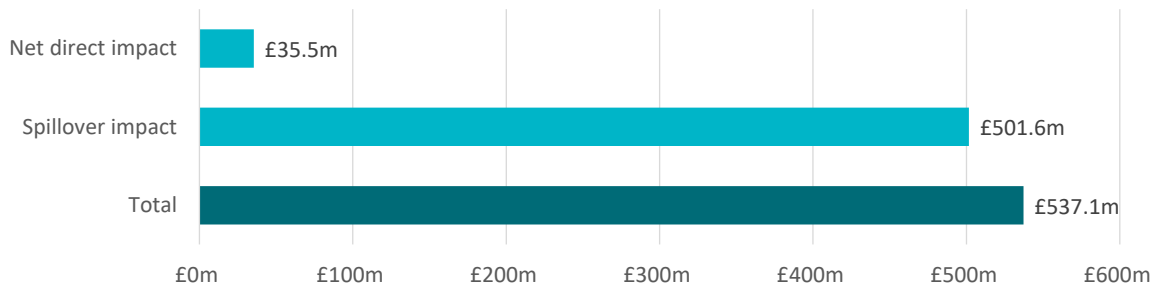
3.3 Aggregate impact of the University of York’s research activities

The impact of the University’s research activities in 2016-17 was estimated at £537.1 million.

The aggregate impact of the University of York’s research activities is then calculated by combining the direct economic impact of the University’s research (**£35.5 million**) with the estimated productivity spillovers associated with this research (**£501.6 million**), thus arriving at a total research impact of **£537.1 million** in the 2016-17 academic year (see Figure 11).

⁴⁰ Where we assume that funding provided by UK charities relates to projects commissioned through an open competitive process.
⁴¹ In terms of the large difference in magnitude between these multipliers, explaining the size of the 12.7 multiplier in particular, Haskel and Wallis (2010) argue that they would expect the productivity spillovers from Research Council funding to be large, ‘given that the support provided by Research Councils is freely available and likely to be basic science’. To the best knowledge of the authors, there exists no further and recent empirical evidence to support this. As a result, we apply the separate multipliers to the different income strands.

Figure 11 Total impact of the University of York’s research activities in 2016-17, in £m



Note: All values are presented in 2016-17 prices, and rounded to the nearest £0.1 million.

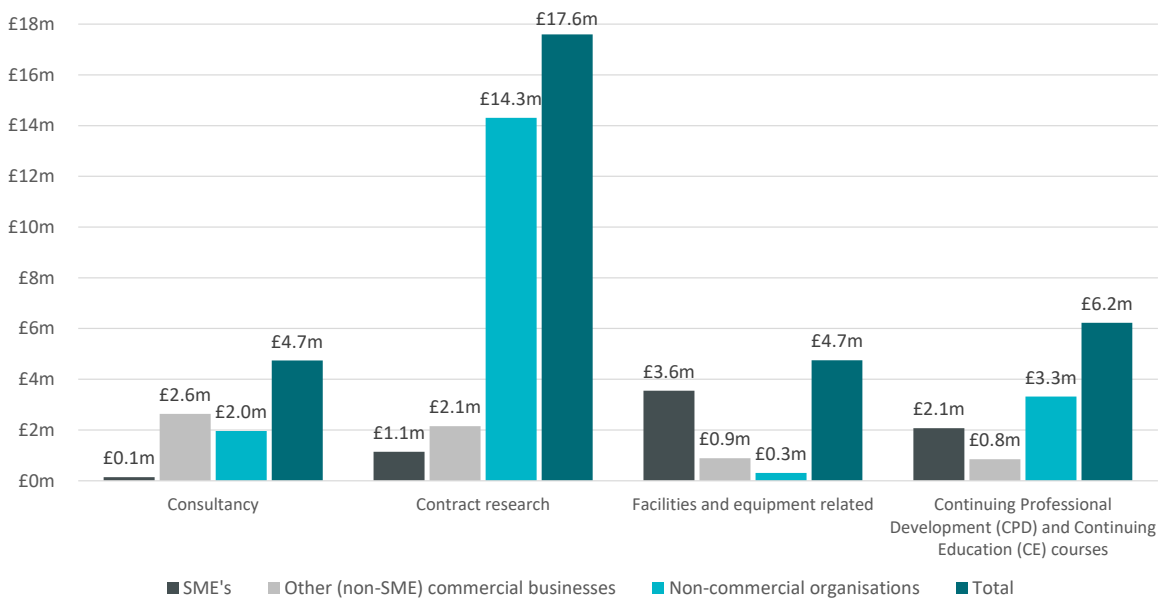
Source: London Economics’ analysis based on University of York data

3.4 The University of York’s research outputs

In addition to the above-examined direct and spillover research impacts, information from the Higher Education Business and Community Interaction (HE-BCI) provides further valuable insights into the University of York’s collaboration with the business community, and the ways in which its research outputs are disseminated throughout the economy.

In terms of **business and community services** (see Figure 12), the HE-BCI data indicate that the value of contract research and consultancy contracts held by the University of York in 2016-17 stood at **£17.6 million** and **£4.7 million**, respectively. The majority of income from contract research originated from non-commercial organisations (**£14.3 million**), with **£1.1 million** generated from contract research for SMEs, and **£2.1 million** generated from other commercial organisations. An additional **£4.7 million** was received from facilities and equipment related services, and **£6.2 million** of income generated through Continuing Professional Development and Continuing Education courses.

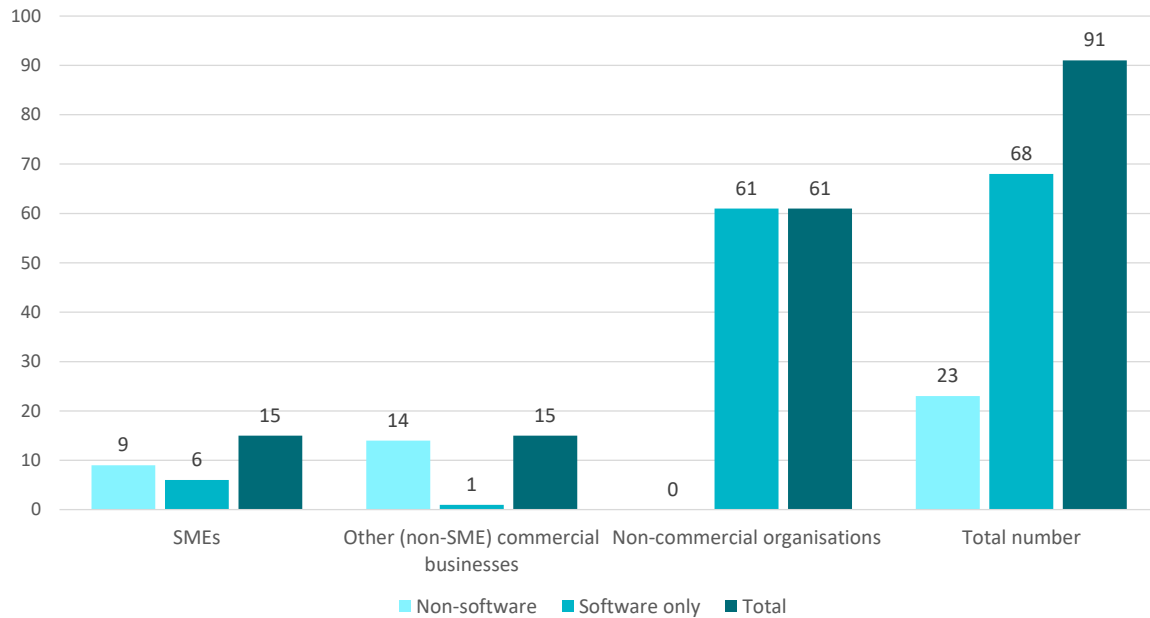
Figure 12 Contract value of business and community services provided by the University of York in 2016-17, £m



Source: University of York HE-BCI results 2016-17 (see Higher Education Statistics Agency, 2018a)

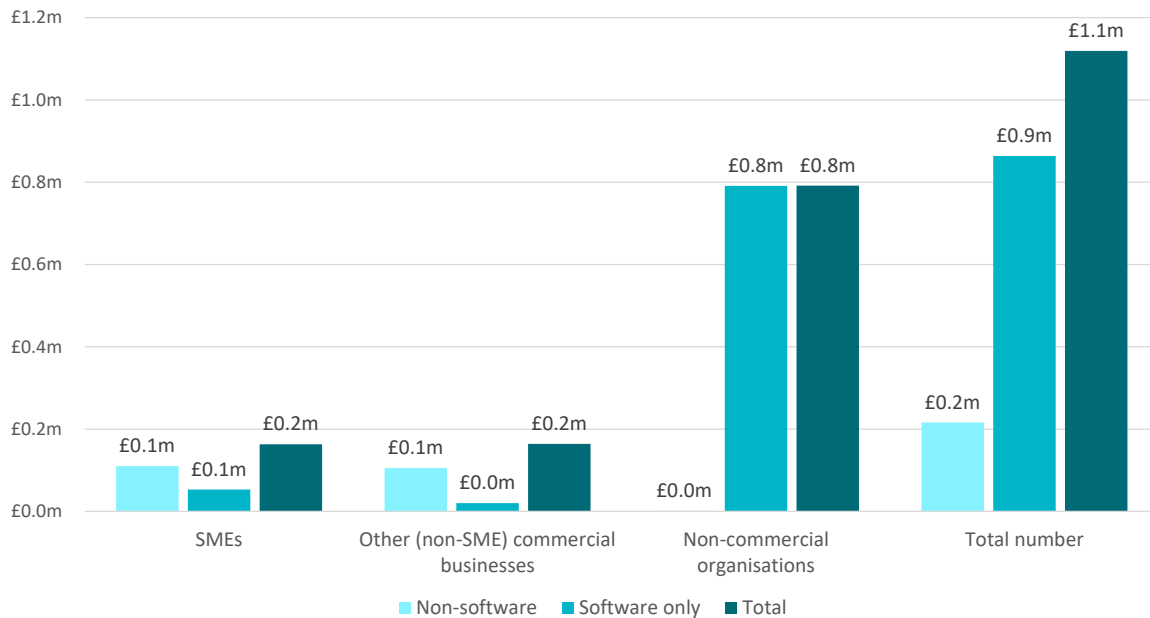
As presented in Figure 13, the number of **intellectual property licenses** granted by the University of York in 2016-17 stood at **91** in total (generating **£1.1 million** of income (Figure 14)), predominantly granted to non-commercial organisations (**61, £0.8 million**), followed by other commercial businesses (**15, £0.2 million**) and SMEs (**15, £0.2 million**).

Figure 13 Number of intellectual property licenses granted by the University of York in 2016-17



Source: University of York HE-BCI results 2016-17 (see Higher Education Statistics Agency, 2018a)

Figure 14 Income from intellectual property licenses granted by the University of York in 2016-17, £m

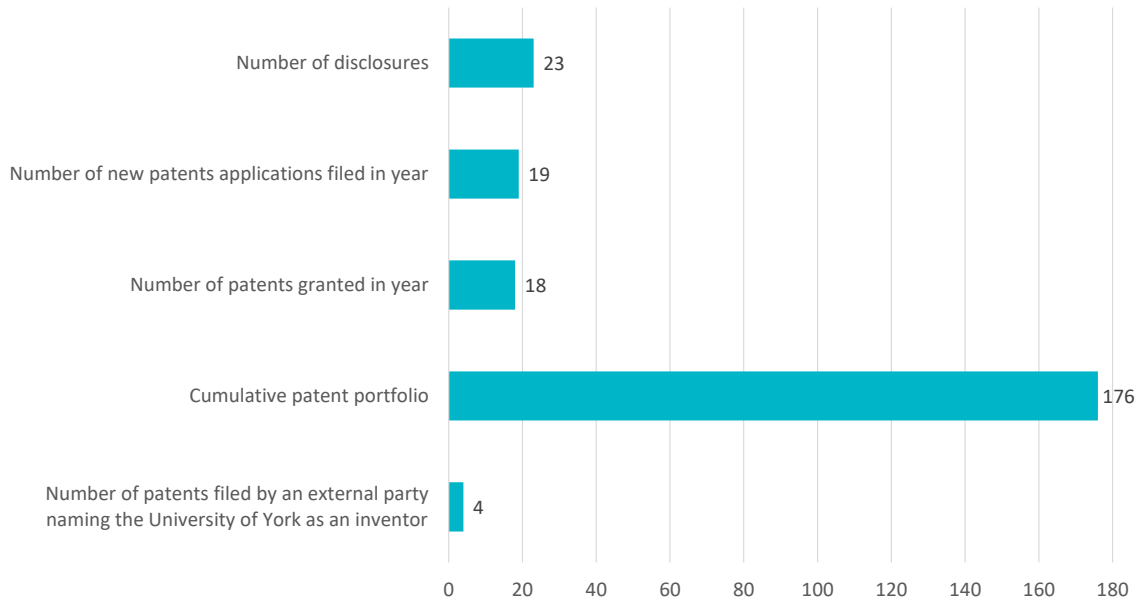


Source: University of York HE-BCI results 2016-17 (see Higher Education Statistics Agency, 2018a)

The number of **invention disclosures** filed by or on behalf of the University of York stood at **23** in 2016-17, while the number of new patent applications filed stood at **19** (see Figure 15). **Eighteen**

patents were granted during the year, bringing the number of patents held by the University of York's portfolio to **176** in total. Further, **4** patents were filed by an external party naming the University of York as an inventor.

Figure 15 Number of disclosures and patents filed by or on behalf of the University of York in 2016-17

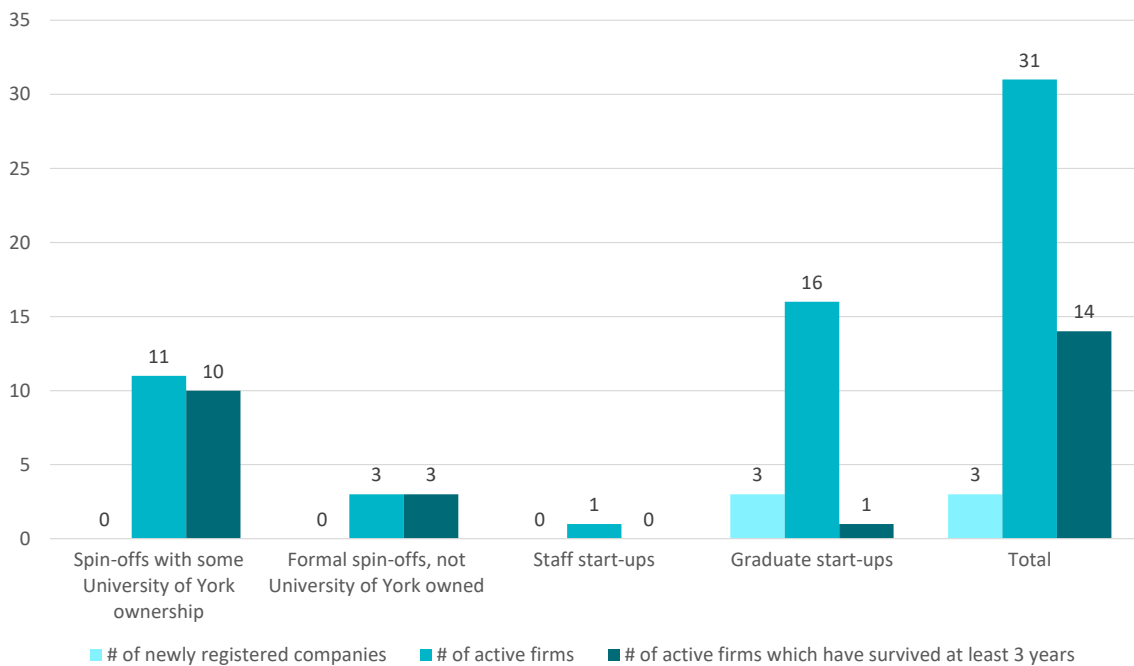


Source: University of York HE-BCI results 2016-17 (see Higher Education Statistics Agency, 2018a)

Finally, as illustrated in Figure 16, the University of York also generates and supports a number of **start-ups and spin-off companies**. In 2016-17, the number new start-ups set up by University of York graduates stood at **3**, bringing the number of active University of York start-ups to **16**. Out of these, **1** organisation has been active for at least three years.

In addition to these graduate start-ups, there were **14** active University spin-off companies in 2016-17 (of which **11** were at least partly owned by the University of York, and **3** were formal spin-offs without University ownership). In total, **13** of these active spin-offs have survived for at least three years.

Figure 16 University of York spin-offs and start-ups in 2016-17



Source: University of York HE-BCI results 2016-17 (see Higher Education Statistics Agency, 2018a)

Box 7 Developing next generation cancer treatments



Researchers at the University of York have played a major role in improving our understanding of a **protein molecule which can destroy cancerous cells while leaving healthy ones intact**. This could pave the way for ‘next generation’ cancer treatments, meaning that cancer patients would suffer far fewer side effects as part of their treatment. At present, current therapies such as chemo and radiotherapy are damaging to healthy cells as well as cancerous ones, and their side effects can be severe.

Professor Jenny Southgate, from the University’s Department of Biology, is Director of the University’s Jack Birch Unit for Molecular Carcinogenesis, which was set up in 1992 to conduct research into epithelial tissues - the tissues which line our body organs. The Unit’s main focus is bladder cancer, which is studied little, despite being one of the UK’s more common cancer types.

The research team worked with Dr Nik Georgopoulos, a former member of Professor Southgate’s team now at the University of Huddersfield, to develop and patent a cancer treatment regime that exploits the unique properties of the molecule – **a protein named Cluster of Differentiation 40 (CD40)**.

Professor Southgate said: *"Most cancer therapies are toxic to all cells, and finding a therapy that can kill cancer cells selectively, whilst sparing a patient's normal cells, is the 'Holy Grail' for cancer researchers. By using the urothelial research platform developed by our team, together we were able to discover how one promising drug target, called CD40, is able to distinguish between normal and cancer cells, resulting in cancer cell death."*

The Huddersfield team also worked on a way of using CD40 in targeted, intravenous bio-therapy by discovering the best method to deploy the molecule. The discovery has been patented, and the University of Huddersfield is exploring commercialisation through a spin-out company.

Source: The University of York



4 The impact on exports

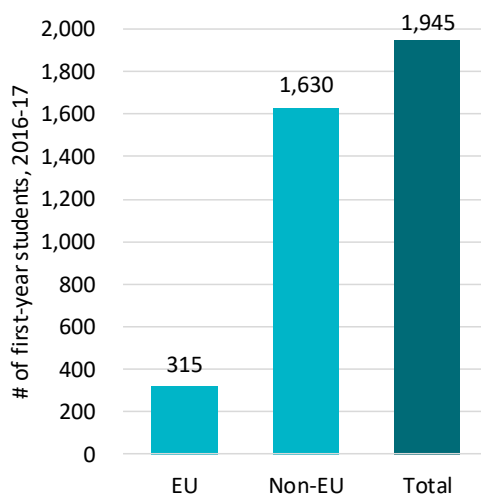
Overseas trade, or international trade, is the sale of goods and services across international borders. With the United Kingdom currently being a destination for many overseas students, the higher education sector is a tradeable industry with imports and exports like any other tradeable sector.

In this component of the analysis, we focus on the educational exports generated by the University of York, contributing to the UK economy as an injection of funding from overseas. In particular, we focus on overseas income in the form of tuition fee revenues from EU and international students (net of any Exchequer costs) and non-tuition fee (off-campus) expenditure of EU and international students over the entire course of their studies at the University of York⁴².

4.1 The 2016-17 cohort of non-UK-domiciled students

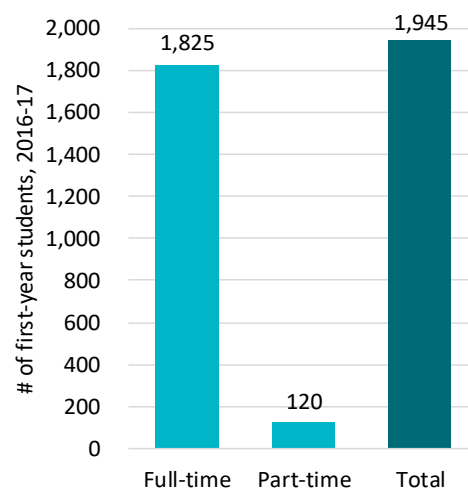
Out of the total **7,610** students starting courses or undertaking stand-alone modules at the University of York in 2016-17, **26% (1,945)** were international students domiciled outside of the UK. Of these, **315 (16%)** were domiciled within the **European Union** while **1,630 (84%)** were from **non-EU countries** (see Figure 17). In terms of study mode (Figure 18), the vast majority (**1,825, 94%**) of non-UK students in the cohort were enrolled on a **full-time** course, with only **120 (6%)** students undertaking qualifications on a **part-time** basis.

Figure 17 Non-UK-domiciled students in the 2016-17 cohort by domicile



Source: London Economics' analysis based on University of York HESA data

Figure 18 Non-UK-domiciled students in the 2016-17 cohort by study mode



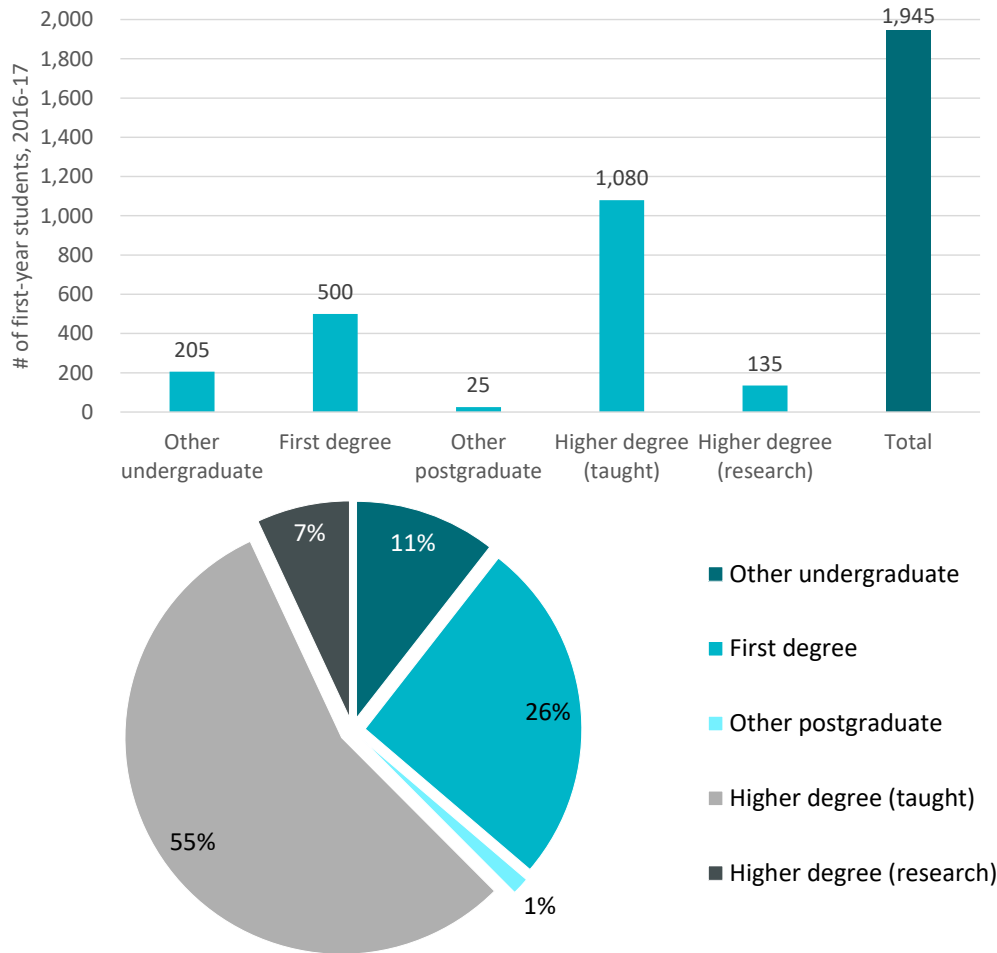
Source: London Economics' analysis based on University of York HESA data

In terms of qualification **level** (Figure 19), over half of non-UK-domiciled students were enrolled on a **postgraduate taught degree (1,080, 55%)**, followed by **500 (26%)** students enrolled on a **first**

⁴² Note that other types of export income accrued directly by the University (such as research income from international sources, or any other income received from non-UK sources) are taken account of in our analysis of the impact of the University's research activity (Section 3) and the direct, indirect and induced impacts (Section 5), and are thus excluded from the analysis of exports to avoid double-counting.

degree. A further 205 (11%) were enrolled in other undergraduate qualifications, and 135 students (7%) were undertaking postgraduate research degrees⁴³.

Figure 19 Non-UK-domiciled students in the 2016-17 University of York cohort by qualification level



Source: London Economics' analysis based on University of York HESA data

4.2 Net tuition fee income associated with international students

To assess the level of tuition fee income associated with overseas students in the 2016-17 cohort, we made use of data on average tuition fees charged by the University of York in the 2016-17 academic year (by qualification level, study mode and domicile⁴⁴). Making similar assumptions on average study duration as in the teaching and learning analysis (Section 2), we calculated the resulting tuition fee income per international student in the cohort from the start of a students' learning aim until completion. Expressing the total income until completion in 2016-17 prices, and using the HM Treasury Green Book real discount rate of 3.5% (see HM Treasury), we arrived at an

⁴³ For more detailed information on the 2016-17 University of York cohort of non-UK-domiciled students, please refer to Annex A2.2.1.

⁴⁴ As in the analysis of teaching and learning (Section 2), we made use of information on average tuition fees for first-year students in 2016-17 provided by the University of York, separately by domicile (i.e. Home/EU vs non-EU students), study mode, and qualification level. To ensure that the fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2016-17 cohort, to arrive at the fees per part-time student, we multiplied the respective full-time rates by the average study intensity amongst part-time students in the cohort (by qualification level).

estimate of the **gross tuition fee income per student** (in present value terms over the total study duration).

To calculate the **net tuition fee income** per student, we then deducted the direct costs to the UK Exchequer associated with funding higher education for non-UK students. These Exchequer costs include the subsidies associated with the tuition fee support provided by the Student Loans Company (SLC), in terms of the RAB charge on tuition fee loans provided to eligible EU-domiciled students studying in England⁴⁵, as well as the recurrent **HEFCE teaching grant** paid to the University in relation to the provision of teaching to EU-domiciled students⁴⁶. Note that no such public purse costs apply to students from non-EU countries, so that net tuition fee income equates to gross tuition fee income for this group of students. In addition to these public purse costs, we also deducted any **fee waivers and bursaries** paid to EU-domiciled students by the University of York itself⁴⁷.

Box 8 Building a Brexit evidence base

As the UK prepares to leave the European Union, a new research project led by experts at York Law School will explore how Brexit could affect the rights of European nationals living in the UK in the immediate aftermath of the UK's exit from the EU. Whether or not there is a transition phase, there is likely to be confusion around citizens' rights during this time. Whatever rights are agreed on paper, the project - **The European Economic Area Public Service Research Clinic** - will study the law in action. It will examine how legal rights for EEA nationals actually play out in practice during the withdrawal process.



Led by Professor Charlotte O'Brien, a specialist in EU welfare law, the project - the first of its kind - is a **national legal action research project**. It will set up a specialist clinic to give advice and support to organisations working with EU and EEA nationals to guide their rights to access public services such as the NHS and benefits system, while ethnographically capturing the problems encountered. Professor O'Brien will work with Dr Simon Parker from the University of York's Department of Politics, and Madeleine Sumption, Director of the Migration Observatory at the University of Oxford.

"It will document the challenges facing EEA nationals and will track possible administrative obstacles or discrimination encountered during what is likely to be a time of great uncertainty", said Professor O'Brien. "It will create an invaluable evidence base on the effects of Brexit."

The work builds on the EU Rights project, a study also led by Professor O'Brien, which looked at the effects of the UK Government clampdown on the benefits paid to EU workers, and documented the problems faced in particular by low income families, mothers and children.

Source: The University of York

Figure 20 presents the resulting **net tuition fee income** per student generated by international full-time students in the 2016-17 cohort (in present value terms over the total study duration), by student domicile and qualification level. The analysis indicates that the net tuition fee income (adjusted for duration) associated with a representative full-time **EU student** undertaking a **first degree** stood at **£13,000**, while the net tuition fee income associated with a full-time **EU-domiciled postgraduate taught degree** student was estimated at **£5,000**. The corresponding estimates for

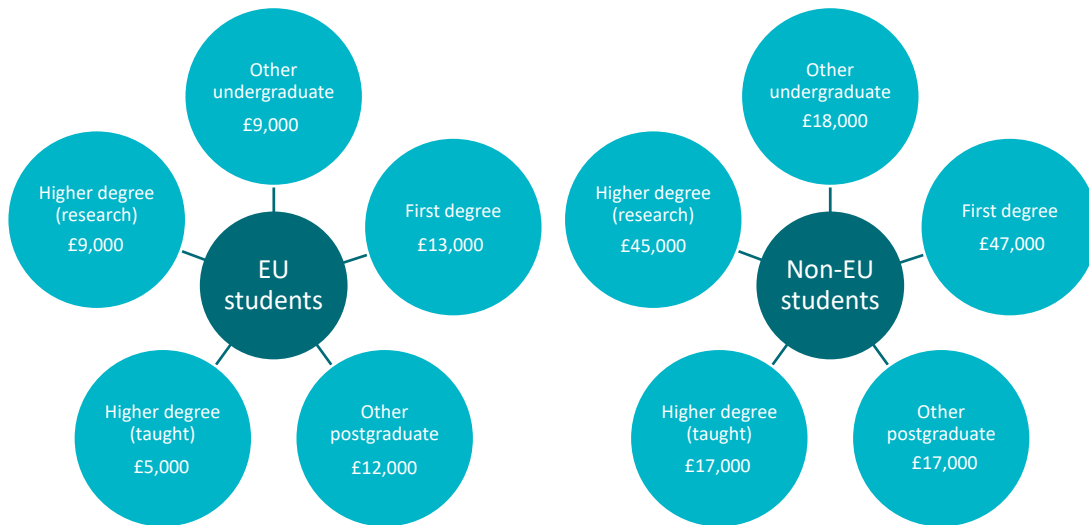
⁴⁵ Note that SLC student support for non-UK students is limited to tuition fee loans, and that the SLC does not provide any maintenance loans or non-repayable tuition fee and maintenance grants to EU students studying in England. For more information on our assumptions on student support funding, please refer to Section 2.6.3.

⁴⁶ For more information on the assumptions on HEFCE teaching grants, please refer to Section 2.6.4.

⁴⁷ Again, we assume that non-EU students are not eligible to receive fee waivers, bursaries or scholarships from the University of York, so this deduction applies to EU students only.

non-EU students stood at **£47,000** per full-time **first degree** student and **£17,000** for a full-time **postgraduate taught degree** student⁴⁸.

Figure 20 Net tuition fee income per international full-time student (present value over total study duration), by qualification level and domicile



Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £1,000.

Source: London Economics' analysis

Combining the above estimates per student with information on the number of international students in the 2016-17 cohort, and making similar assumptions on completion rates as in the analysis of the economic impact of teaching and learning (see Section 2), we arrived at estimates of the total net tuition fee income generated from EU and international students in the 2016-17 cohort of University of York students. As presented in Table 7, the **total net tuition fee income** generated by the University of York in the 2016-17 academic year was **£41.9 million**, of which **£3.2 million** was generated by **EU students**, and **£38.7 million** was associated with **non-EU students**.

Table 7 Net tuition fee income associated with international students in the 2016-17 cohort, by domicile and mode of study (£m)

Domicile	Mode of study		
	Full-time	Part-time	Total
EU	£3.2m	-	£3.2m
Non-EU	£36.8m	£1.9m	£38.7m
Total	£40.0m	£1.9m	£41.9m

Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £0.1m. There were no EU part-time students in the 2016-17 University of York cohort.

Source: London Economics' analysis

4.3 Non-tuition fee income associated with international students

In addition to tuition fees, the UK economy benefits from export income from overseas students' (other) **non-tuition fee expenditures** incurred during their studies at the University of York, including:

⁴⁸ For more detailed information on the estimated levels of net fee income per student, please refer to Annex A2.2.2.

- **Accommodation** costs (e.g. rent costs, council tax, household bills etc.);
- **Subsistence** costs (e.g. food, entertainment, personal items, non-course travel etc.);
- **Direct course** costs (e.g. course-related books, subscriptions, computers etc.);
- **Facilitation** costs (e.g. course-related travel costs); and
- Spending on **children** (including childcare that is not related to students' course participation).

The level of non-tuition fee expenditure by overseas students is often found to be greater than the direct tuition fee expenditure⁴⁹, making this expenditure a significant component of the UK's export income from overseas students coming to study in the UK.

To analyse the level of non-tuition fee expenditure associated with the 2016-17 cohort of University of York students, we used UK non-tuition fee expenditure estimates from the **2014-15 Student Income and Expenditure Survey (SIES)**⁵⁰. The survey provides estimates of the average expenditure by English domiciled students on living costs, housing costs, participation costs (including tuition fees) and spending on children – separately for full-time and part-time students.

For the purpose of this analysis we made the following adjustments of the 2014-15 SIES estimates:

- We excluded estimates on **tuition fee expenditure** to avoid double-counting with the analysis presented in Section 4.2.
- We also excluded any **on-campus expenditure** that students may have had, to avoid double-counting with the analysis undertaken in Section 5.1 (relating to the direct, indirect and induced impacts of the expenditure of the University itself)⁵¹.
- Since the SIES results do not provide expenditure estimates for non-UK-domiciled students, our analysis implicitly assumes that non-tuition fee expenditure levels do not vary significantly between UK and overseas students. We do however adjust the SIES estimates for the longer **average stay durations** in the UK of non-EU students compared to EU students⁵².
- Finally, we adjusted the resulting estimates for **inflation**⁵³.

Similar to the estimates relating to tuition fee expenditure, we calculated the non-tuition fee expenditure over the entire duration of students' higher education courses (and discounted to reflect present values). The resulting estimates provide the total average (off-campus) non-tuition fee expenditure per student in 2016-17 prices by level of study, mode and domicile.

Figure 21 presents the resulting estimated **non-tuition fee income** per student generated by international full-time students in the 2016-17 cohort. The analysis indicates that the non-fee income associated with a representative full-time **EU student** undertaking a **first degree** stood at **£31,000**, while the income associated with a full-time **EU-domiciled postgraduate taught degree** student was estimated at **£14,000**. The corresponding estimates for **non-EU students** stood at

⁴⁹ See Department for Business, Innovation and Skills (2011b).

⁵⁰ See Institute for Employment Studies & National Centre for Social Research (2018). Note that, at the time of writing, estimates for a more recent academic year were not available.

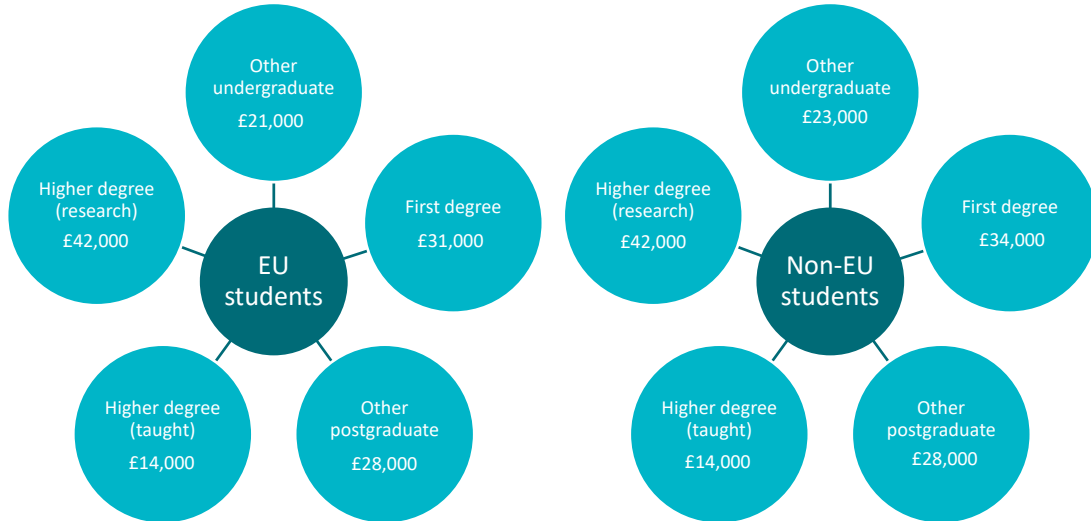
⁵¹ Following the approach undertaken by Kelly et al. (2014), who analyse the collective economic impact of higher education institutions in Yorkshire and the Humber, we assume that **13%** of students' non-tuition fee expenditures are spent on campus (i.e. are accrued as income by the University of York itself).

⁵² These adjustments are based on the approach outlined by the Department for Business, Innovation and Skills (2011b) in estimating the value of educational exports to the UK economy. For more information, please refer to Annex A2.2.3.

⁵³ Inflation estimates are based on Consumer Price Index data published by the Office for National Statistics (2018).

£34,000 per full-time **first degree** student (reflecting the slightly longer assumed length of stay⁵⁴ in the UK for these students) and **£14,000** for a full-time **postgraduate taught degree** student⁵⁵.

Figure 21 Non-fee income per international full-time student (present value over total study duration), by qualification level and domicile



Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £1,000.

Source: London Economics’ analysis

Again combining the non-tuition fee estimates per student with the 2016-17 cohort information and the assumptions on the number of completers, the **total monetary value of (off-campus) non-tuition fee expenditure** associated with international students in the cohort was estimated to be **£51.3 million** (Table 8). Considering the breakdown by domicile, **£8.6 million** of this income was associated with **EU students**, whereas **£42.7 million** was generated by **non-EU students** in the 2016-17 University of York cohort.

Table 8 Non-tuition fee income associated with international students in the 2016-17 cohort, by domicile and mode of study (£m)

Domicile	Mode of study		
	Full-time	Part-time	Total
EU	£8.6m	-	£8.6m
Non-EU	£33.7m	£9.0m	£42.7m
Total	£42.3m	£9.0m	£51.3m

Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £0.1m. There were no EU part-time students in the 2016-17 University of York cohort. Source: London Economics’ analysis

⁵⁴ Again, please refer to Annex A2.2.3 for more information.

⁵⁵ For more detailed information on the estimated levels of non-fee income per student, please refer to Annex A2.2.4.

Box 9 Supporting health for all in Malawi and Uganda

A collaborative project, led by health economists from York, is exploring **ways of improving health and reducing health inequalities in eastern and southern Africa.**

The **'Thanzi la Onse' (Health of All) project** will work closely with policy-makers in Malawi, Uganda and southern and east Africa to **inform decisions on health care budgets and resource allocation**, by generating high quality research and supporting the update and use of that research in policy. It will also enhance collaborations between UK and African researchers by addressing the challenges of decision making in health care in the face of heavily constrained resources.



The project's principal investigator, Professor Mark Sculpher from the University of York's Centre for Health Economics (CHE), said: *"Thanzi la Onse will apply evidence and high-quality analysis to support challenging resource allocation decisions in health systems in southern and eastern Africa."*

The project's Director of Research, Paul Revill, also from CHE said: *"The UK has been at the forefront of developing such methods for use in the NHS, and now we have the opportunity to work with international partners to further develop and employ these methods to meet the varied challenges faced in low income settings."*

The project is **funded by the UK government through Research Councils UK** as part of the Global Challenges Research Fund on 'Growing research capability to meet the challenges faced by developing countries', running from October 2017 to December 2021.

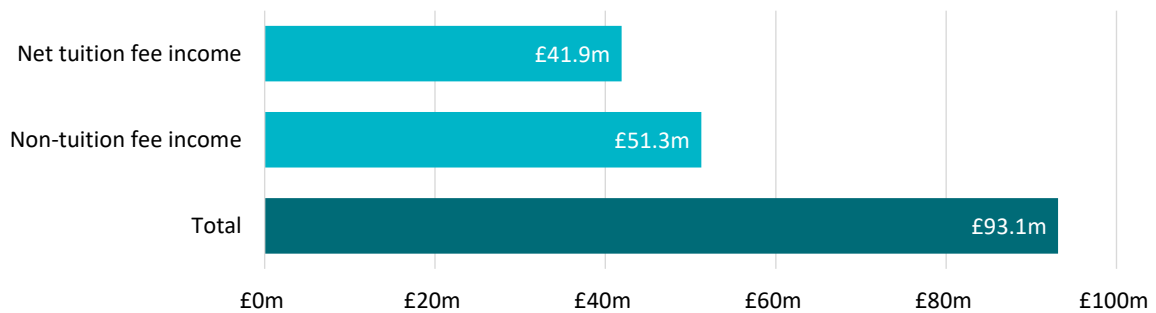
Source: The University of York

4.4 Aggregate impact on exports

The total export income generated by the 2016-17 University of York cohort was estimated at £93.1 million.

Combining our above estimates of tuition fee and non-tuition fee income, the analysis indicates that the **total export income** for the UK economy generated as a result of the **1,945** non-UK-domiciled students in the 2016-17 University of York cohort stood at **£93.1 million** (see Figure 22). Of this, approximately **£51.3 million (55%)** was generated from international students' non-tuition fee spending, while the remaining **£41.9 million (45%)** was generated from international students' tuition fees accrued by the University of York.

Figure 22 Aggregate economic impact on exports associated with non-UK students in the 2016-17 cohort, by domicile



Note: All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £0.1m

Source: London Economics' analysis

Box 10 Where the sea meets the sky

Air pollution and climate change are some of the most serious environmental challenges facing the planet today, with a major impact on health, society and the global economy. Research by atmospheric chemists at York aims to **understand the processes driving the creation and interaction of pollutants in the atmosphere of major towns and cities across the globe.**

But atmospheric emissions are not confined to human activities such as transport and industry. Studies by Professor Lucy Carpenter, Deputy Head (Research) of the Department of Chemistry at York, are focused on the **atmosphere above the ocean surface.** This area - where the sea meets the sky - plays a key role in regulating the composition of our atmosphere and our climate.

Professor Carpenter's research showed that chemical interactions between natural elements found in sea spray and on the ocean surface contribute to the destruction of ozone over the world's oceans. Ozone in the lower atmosphere acts as a greenhouse gas and air pollutant. The results indicated that air-sea processes were speeding up its destruction, opening an important new field of research for atmospheric chemists.

Professor Carpenter is also director of the **Cape Verde Atmospheric Observatory (CVO)**, a monitoring station situated on a remote rocky outcrop in the mid-Atlantic which captures air, dust and emissions blown over the Sahara from North America, the Middle East and North Africa.

Measurements at the observatory have led to over 50 scientific publications to date, and many significant discoveries which have improved our understanding of the global atmosphere and climate change.



Source: The University of York

5 Direct, indirect and induced impacts



The majority of the existing literature on the economic impact of higher education institutions focuses (almost exclusively) on the direct, indirect and induced impact of institutions on their local, regional or national economies. Assessments of these impacts consider a university as an economic unit creating output within the local economy by purchasing products and services from its suppliers, and hiring employees. 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 the university itself, by purchasing goods and services (including labour) from the economy in which it operates.
- **Indirect effect:** The university's purchases generate income for the supplying industries, which they in turn spend on their own purchases from suppliers to meet the university's demands. This results in a chain reaction of subsequent rounds of spending across industries, often referred to as the 'ripple effect'.
- **Induced effect:** The induced effect is based on a university's status as an employer. The university's employees will use their salary 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, i.e. a 'ripple effect' throughout the economy as a whole.

The total of the direct, indirect and induced effects constitutes the gross economic impact of the university on its local economy (commonly measured both in terms of monetary output as well as employment). An analysis of the net impact (potentially) needs to include two additional factors potentially reducing the size of any of the above effects:

- **Leakage** into other geographical areas, by taking account of how much of the additional economic activity actually occurs in the area of consideration. For example, it might be the case that the university sources some of its inputs from areas outside of its local economy, thus reducing the economic impact which it has on its local surroundings.
- **Displacement** of economic activity within the region of analysis, i.e. taking account of the possibility that the economic activity generated might result in the reduction of activity elsewhere within the region.

While the above definitions were discussed in the context of the **expenditures of higher education institutions themselves**, an additional important strand of impacts relates to the corresponding effects of the **spending of university students in the local economy**. Again, this spending leads to additional knock-on effects throughout the economy (through indirect effects within the supply chain, and induced effects arising from the additional wage income), adding further economic value to the university's physical footprint.

5.1 The impact of the University of York's expenditure

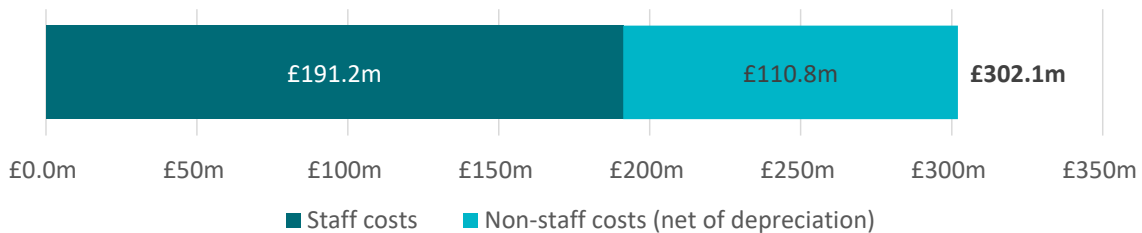
5.1.1 Direct impact of the University of York's expenditure

To measure the direct economic impact of the University of York's purchases of labour, goods and services within the UK economy, following the common approach across existing economic impact analyses of higher education institutions, we used data on the University's total direct economic output (captured by total staff and non-staff expenditure), as well as the number of staff employed (measured in terms of full-time equivalent employees). In accordance with the other strands of impact included in this analysis, we focus on expenditure and employment in the 2016-17 academic year.

The University employed 3,585 full-time equivalent staff in 2016-17, making it the 24th largest employer amongst UK higher education institutions.

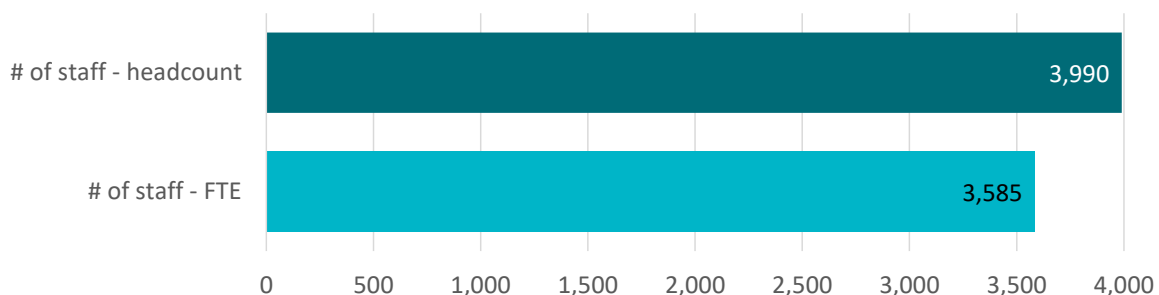
Based on this, in terms of economic **output**, the total **direct impact** associated with the University of York's expenditures (in terms of monetary output) was estimated at **£302.1 million** in 2016-17, based on approximately **£191.2 million** of staff costs and **£110.8 million** spent on other operating expenses in that academic year⁵⁶. In terms of **employment**, the University directly employed **3,585** full-time equivalent staff in the 2016-17 academic year (corresponding to a headcount of **3,990** staff)⁵⁷ (see Figure 24).

Figure 23 Direct economic impact associated with the University of York's expenditure in 2016-17



Note: The direct impact excludes £30.5 million in depreciation costs incurred by the University of York in the 2016-17 academic year. All estimates are presented in 2016-17 prices and rounded to the nearest £0.1m. *Source: London Economics' analysis based on University of York HESA data (see HESA, 2018b)*

Figure 24 Direct employment by the University of York in the UK in 2016-17



Note: We exclude any staff on atypical contracts.

Source: London Economics' analysis based on University of York HESA data (see HESA, 2018c)

⁵⁶ Note that we exclude from aggregate expenditure a total of **£30.5 million** in depreciation costs, as it is assumed that these are not relevant from a procurement perspective (i.e. these costs are not accounted for as income by other organisations).

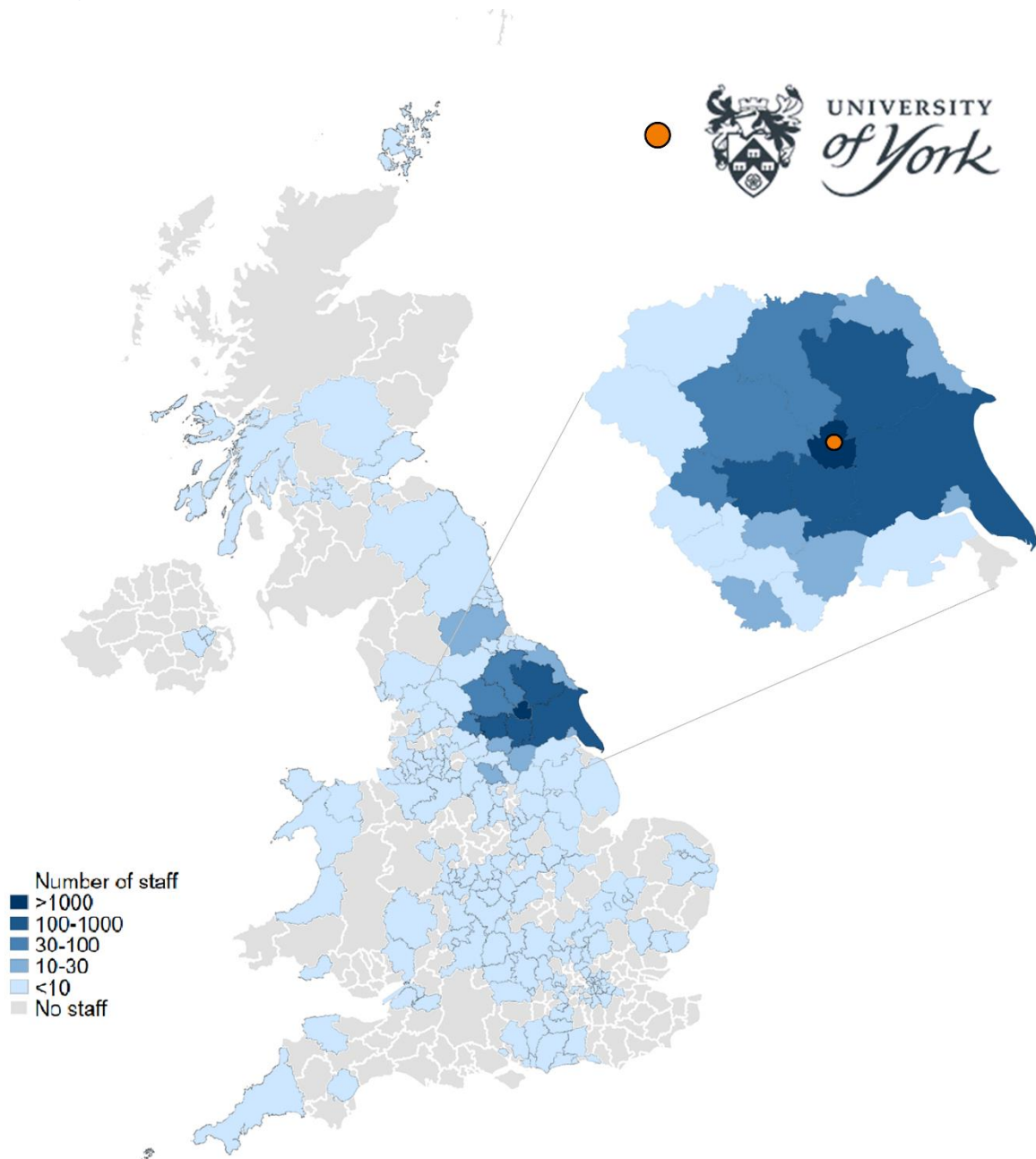
⁵⁷ Note that we exclude any staff on atypical contracts.

In addition to these aggregate values, an analysis of the University's expenditures and employment figures by geographical breakdown provides insights into the reach of the University of York across all regions of the United Kingdom.

Figure 25 presents the geographical distribution of **University of York staff** in 2016-17 by Local Authority (based on employees' home address). As expected, the analysis clearly demonstrates the concentration of the University's staff within **York** itself, where approximately **67%** of staff have their home address. However, there are also relatively large numbers of employees residing – and spending their wage income – in other areas within Yorkshire and the Humber, including **East Riding of Yorkshire (6%)**, **Selby (5%)**, **Leeds (4%)**, and **Ryedale (4%)**.

In addition to the number of staff, we further provide information on the geographic location of the University's **procurement expenditure** in 2016-17 (based on invoice destinations, see Figure 26). Although a number of organisations operating locally to the University might provide an official invoice with the postcode to the Head Office (thereby potentially inflating the estimated levels of expenditure in London or Birmingham (for instance)), the figure is nevertheless useful to demonstrate the geographical reach of the University's expenditures. Considering the spending across the UK **regions**, approximately **43%** of procurement expenditure took place within **Yorkshire and the Humber**, **11%** occurred in the **South East**, and **8%** (each) occurred in the **East of England** and the **North West**. Considering **Local Authorities**, **14%** of spending occurred in **York** itself, **11%** took place in **Leeds**, **4%** in **North Lincolnshire**, and **3%** (each) in **Bradford** and **Harrogate**, respectively.

Figure 25 Distribution of University of York staff in 2016-17, by Local Authority (of home address)

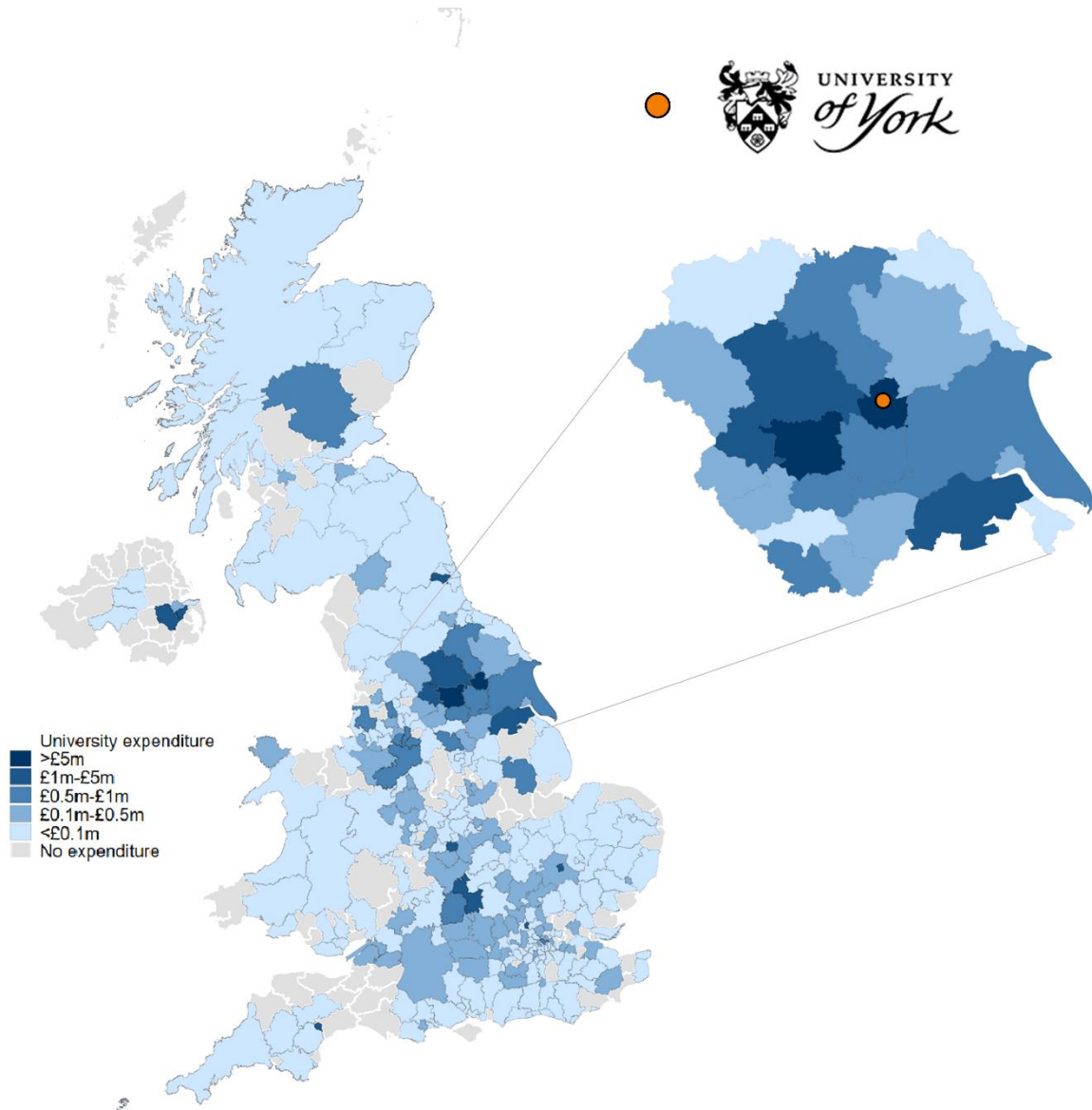


Note: We received data on home address postcode districts for 4,293 staff at the University of York. Of this total, we excluded 26 staff with missing information postcode district, and 62 with invalid postcode districts. The mapping thus focuses on a total of 4,205 University of York staff.

We used the 2016 ONS Postcode Directory to determine the Local Authority district for each postcode district included in the dataset. Staff associated with postcode districts that mapped to multiple Local Authorities have been apportioned equally them.

Source: *London Economics' analysis based on University of York data and Office for National Statistics data. Contains National Statistics data, NISRA data, NRS data and Ordnance Survey data © Crown copyright and database right 2018.*

Figure 26 Distribution of University of York procurement expenditure in 2016-17, by Local Authority (invoice destination)



Note: We received information on approximately £87.8 million procurement expenditure in 2016-17. The information on expenditure and geographical location of suppliers was provided in two separate datasets. We matched these two datasets by performing a fuzzy matching on the supplier name, and thus identified the supplier address details for £83.2 million of procurement expenditure. Of this, £66.5 million was associated with valid UK postcodes and has been matched to the 2016 ONS Postcode Directory to determine the associated Local Authority. Expenditures on suppliers in postcode districts spread across multiple Local Authorities have been apportioned equally across them.

Source: *London Economics' analysis based on University of York data and Office for National Statistics data. Contains National Statistics data, NISRA data, NRS data and Ordnance Survey data © Crown copyright and database right 2018.*

5.1.2 Indirect and induced impacts of the University of York's expenditure

Across the wide body of existing literature assessing the economic impact of higher education institutions, the **indirect** and **induced** effects of universities are typically estimated with the help of Input-Output models. Such models develop a series of **multipliers** to estimate the **extent to which the direct output produced by a university generates additional activity throughout the economy**. As with the direct impact presented above, these knock-on multipliers are commonly measured in terms of both output (e.g. total turnover or expenditure by a university) and additional employment.

For the purpose of our analysis, we applied existing output and employment multipliers to the University of York's total direct expenditure and total direct employment, assessing the impact on the Yorkshire and the Humber region itself, as well as total impacts across the United Kingdom. Specifically, we made use of multiplier estimates provided by Kelly et al. (2014) in assessing the combined economic impact of higher education institutions in Yorkshire and the Humber on both the regional and UK economies^{58, 59}. These multipliers are presented in Table 9. Based on these estimates, we assume that every **£1 million** of expenditure by the University of York generates an **additional £0.96 million** of impact throughout the Yorkshire and the Humber, and a further **£0.34 million** in other parts of the UK. In terms of employment, for every **1,000** (FTE) staff employed by the University itself, we assert that an **additional 810** staff are supported throughout the Yorkshire and the Humber region, and a further **220** staff are generated throughout the rest of the UK⁶⁰.

Table 9 Economic multipliers applied to the University of York's expenditure and employment

Multiplier type	Location of impact	
	Yorkshire and the Humber	Total UK
Expenditure	1.96	2.30
Employment	1.81	2.03

Note: While we apply multiplier effects to the University's expenditure, the analysis by Kelly et al. (2014) instead focuses on institutional revenue as a measure of universities' output; however, the use of different measures of output should, in theory, not influence output measures to a large extent, based on the assumption that institutional revenue roughly equates to the expenditure of universities.

Source: *London Economics' analysis of Kelly et al. (2014)*

5.2 The impact associated with University of York students' expenditures

5.2.1 Direct impact of students' expenditure

In addition to the direct, indirect and induced impacts of institutional expenditure by universities, traditional university impact analyses further consider the impact of additional spending by students

⁵⁸ Kelly et al. (2014) base their estimates on the output of the 11 higher education institutions located in Yorkshire and the Humber, using data for the 2011-12 academic year. The authors model the indirect and induced effects associated with the expenditure of those universities based on actual UK data derived from the UK Input-Output Tables from the ONS, together with Labour Force Survey and Annual Business Inquiry data, and the 2008 UK HMT *Blue Book*. The direct expenditure impact, and the modelled indirect and induced impacts, are summed across all eleven universities, and divided by the aggregate direct output to derive the multipliers.

⁵⁹ Based on the estimates derived from their Input-Output models, Kelly et al. (2014) define the total multipliers capturing both indirect and induced effects as 'the ratio of the aggregate effect on economic activity arising from an initial injection [compared] to that initial injection'.

In mathematical terms, multipliers are thus calculated as: Output multiplier = (Direct output + Indirect output + Induced output) / Direct Output, and Employment multiplier = (Direct employment + Indirect employment + Induced employment) / Direct employment.

⁶⁰ Note that the size of the estimated output and employment multipliers increases as the geographical region of analysis is widened: the larger the geographical area under consideration, the larger the available labour force and the number of input suppliers that the university can source its demands from, implying a larger economic impact.

at these universities from outside the local economy, who move into the vicinity of the university to study. This includes the **non-tuition fee expenditure** associated with both **non-UK-domiciled students** and **UK-domiciled students**.

The non-tuition fee expenditure amongst **non-UK-domiciled students** in the 2016-17 cohort was already modelled and discussed in Section 4 (when deriving the impact of the University on educational exports).

We follow a similar approach to estimate the non-tuition fee expenditure associated with **UK-domiciled** students in the cohort. Specifically, we again made use of data on average non-tuition fee expenditure from the 2014-15 **Student Income and Expenditure Survey** for students domiciled in England⁶¹. Adopting a comparable approach as for non-UK-domiciled students, we adjusted the SIES estimates to exclude any on-campus expenditure that students might incur⁶², and to inflate the expenditure to reflect 2016-17 prices⁶³. The resulting estimates of the off-campus non-tuition fee spending per student per year (by domicile, study mode and level of study) were then adjusted for students' total study duration, and discounted to reflect present values.

In aggregating the estimates across the 2016-17 University of York cohort, we make an important adjustment with respect to the non-tuition fee expenditure of students from Yorkshire and the Humber. As highlighted by Kelly et al. (2014, p. 15), 'the personal living expenditure of local students – as ongoing residents of the region itself – is likely to have happened in the region anyway, irrespective of student status'. As a result, the analysis by Kelly et al. *excludes* the off-campus expenditure of students from Yorkshire and the Humber, as it should not be considered *additional* to the regional economy. While this is a conservative assumption, our analysis of the impact of the University of York's students' spending follows the same approach, by **excluding any expenditures associated with the 1,645 students in the 2016-17 cohort from Yorkshire and the Humber**⁶⁴.

Based on the number of expected completers in the 2016-17 cohort (from outside Yorkshire and the Humber), we then derived the total off-campus non-tuition fee expenditure of students in the cohort⁶⁵, estimated at **£165.3 million** in 2016-17 prices (see Table 10). Out of this total, approximately **£114.0 million** is generated by UK-domiciled students from outside Yorkshire and the Humber, with a further **£8.6 million** contributed by EU students, and **£42.7 million** contributed by non-EU students.

⁶¹ Hence, we implicitly assume implicitly assume that non-tuition fee expenditure levels do not vary significantly between English students and students from other Home Nations.

⁶² As with the analysis of the impact on exports (see Section 4), this is again based on the assumption that **13%** of students' non-tuition fee expenditures are incurred on campus (see Kelly et al., 2014).

⁶³ Again using Consumer Price Index inflation estimates provided by the Office for National Statistics (2018).

⁶⁴ Hence, our analysis focuses only on the **1,945** non-UK domiciled students and **4,020** UK-domiciled students from outside Yorkshire and the Humber in the 2016-17 cohort.

⁶⁵ Again, the aggregation is based on similar assumptions on study duration, wage growth, discount rates and completion information as the analyses of the impact of the University's teaching and learning activities (Section 2) and the impact on exports (Section 4).

Table 10 Total University of York student expenditure (£m), by domicile and study mode

Student domicile	£m
Yorkshire and the Humber	-
Rest of UK	£114.0m
EU	£8.6m
Non-EU	£42.7m
Total	£165.3m

Note: The analysis excludes any expenditures associated with students from Yorkshire and the Humber, as it is expected that this would have occurred irrespective of the learning at the University of York, and should therefore not be considered as additional.

All estimates are presented in 2016-17 prices, discounted to reflect present values, and rounded to the nearest £0.1m.

Source: *London Economics' analysis*

5.2.2 Indirect and induced impacts of student expenditure

To estimate the total direct, indirect and induced economic impacts of the above expenditures associated with the 2016-17 cohort of University of York students, we again make use of multipliers estimated by Kelly et al. (2014) (presented in Table 11). Based on their estimates, the analysis assumes that the multiplier associated with **non-UK student** expenditure stands at **1.06** in Yorkshire and the Humber, and **1.50** across the UK economy as a whole. The corresponding employment multipliers provide an assessment of the number of full-time equivalent jobs supported by a given level of student expenditure. Hence, the analysis assumes that amongst non-UK-domiciled students, **£1 million** in expenditure is associated with **9.25** jobs supported in Yorkshire and the Humber, and **12.69** supported across the UK as a whole.

In contrast, the multipliers for **UK-domiciled students** stand at **1.06** in terms of expenditure (throughout Yorkshire and the Humber and the UK as a whole⁶⁶), and **9.25** in terms of full-time equivalent jobs.

Table 11 Economic multipliers applied to students' expenditures

Student domicile and type of multiplier	Location of impact	
	Yorkshire and the Humber	Total UK
Output multipliers (£m impact per £m expenditure)		
UK students	1.06	1.06*
Non-UK students	1.06	1.50
Employment multipliers (FTE employees per £m expenditure)		
UK students	9.25	9.25*
Non-UK students	9.25	12.69

Note: *As outlined by Kelly et al. (2014), because of the wider displacement effects of domestic student expenditure (domestic student expenditure can be relevant to the regional economy but is not additional to the UK economy) the 'knock-on' impact of domestic student expenditure only on the UK as a whole is defined to be identically equal to the estimated impact on the region' (see Kelly et al (2014), p.16). Hence, for UK-domiciled students, multipliers for the UK as a whole equal those indicated for Yorkshire and the Humber.

Source: *London Economics' analysis of Kelly et al. (2014)*

⁶⁶ As outlined by Kelly et al. (2014), 'because of the wider displacement effects of domestic student expenditure (domestic student expenditure can be relevant to the regional economy but is not additional to the UK economy) the 'knock-on' impact of domestic student expenditure only on the UK as a whole is defined to be identically equal to the estimated impact on the region' (see Kelly et al (2014), p.16). Hence, for UK-domiciled students, multipliers for the UK as a whole equal those indicated for Yorkshire and the Humber.

5.3 Adjusting for double counting with other strands of impact and transfers between different agents in the economy

Before arriving at the total direct, indirect and induced impact associated with the University of York's institutional expenditure and the spending of its students, it is necessary to deduct a number of income and expenditure items to avoid double counting, and to take account of the 'netting out' between the costs and benefits associated with the University and its students to different agents in the UK economy.

Specifically, we deducted from the **impact of the University's expenditures**:

- **£6.1 million** in University of York bursary spending for UK-domiciled students⁶⁷ as this item was included in the analysis of teaching and learning (Section 2).
- The total research income received by the University in 2016-17 (**£89.1 million**), as this was included in the estimate of research impact (Section 3); and
- **£41.9 million** of net tuition fee expenditure generated by international students, **£1.4 million** costs relating to tuition fee loan support for EU students, **£0.4 million** in HEFCE teaching grant funding for EU students, and **£0.3 million** in University of York bursaries for EU students, as these were included in the impact on exports (Section 4).

Similarly, **£51.3 million** of non-tuition fee expenditure incurred by non-UK students was removed from the **impact of the expenditure of the University of York's students**, in order to avoid double-counting with the impact on exports (Section 4).

5.4 Total direct, indirect and induced impact of the University of York

Figure 27 presents the estimates of the total direct, indirect and induced impacts associated with expenditures incurred by the University of York and its students (based on the 2016-17 cohort) after the above-described double-counting and 'netting' adjustments have been made.

The economic impact of the University of York's expenditure and the personal spending of its students in the UK stands at £702.2 million (7,085 FTE jobs), of which £603.5 million (6,325 FTE jobs) is accrued in Yorkshire and the Humber.

The analysis indicates that the aggregate impact of the University of York's physical footprint on the UK economy associated with the 2016-17 academic year stood at approximately **£702.2 million**, of which **£555.5 million** was associated with the University itself, while **£146.7 million** is associated with the expenditures of the University's students. The majority of this aggregate impact (**£603.5 million**, or **86%**) occurs in Yorkshire and the Humber.

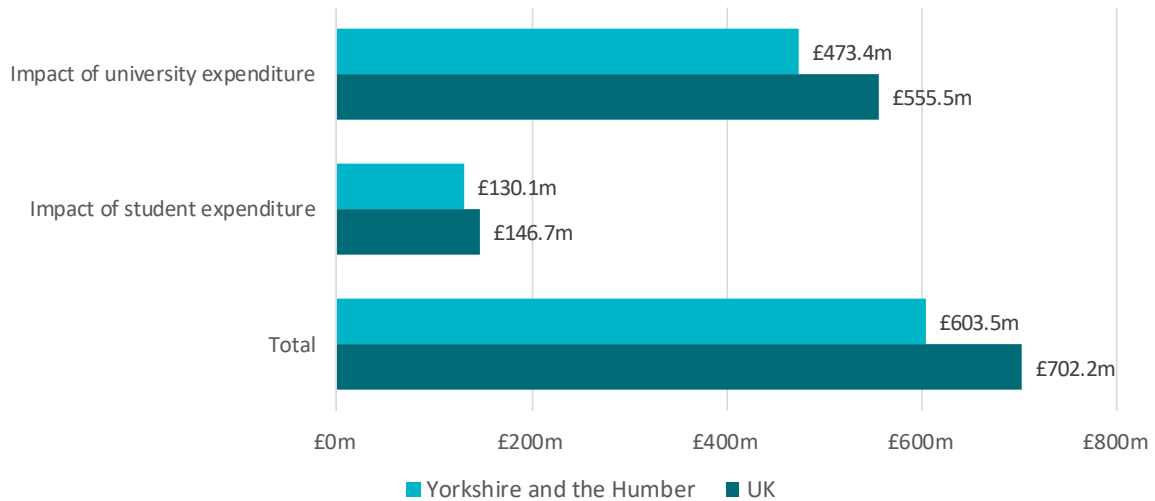
In addition to these monetary impacts, the analysis also estimated the direct, indirect and induced impact of the University's activities in terms of the number of jobs supported. The results indicate that in addition to the **3,585** full-time equivalent staff

⁶⁷ The University's bursary support to UK-domiciled students is considered as a benefit to the student in the analysis of the impact of teaching and learning activities. It is therefore necessary to deduct those support costs from the direct impact of the University's spending, to correctly take account of the fact that these bursaries are merely a transfer from the University to its students, and not an additional benefit to the UK economy.

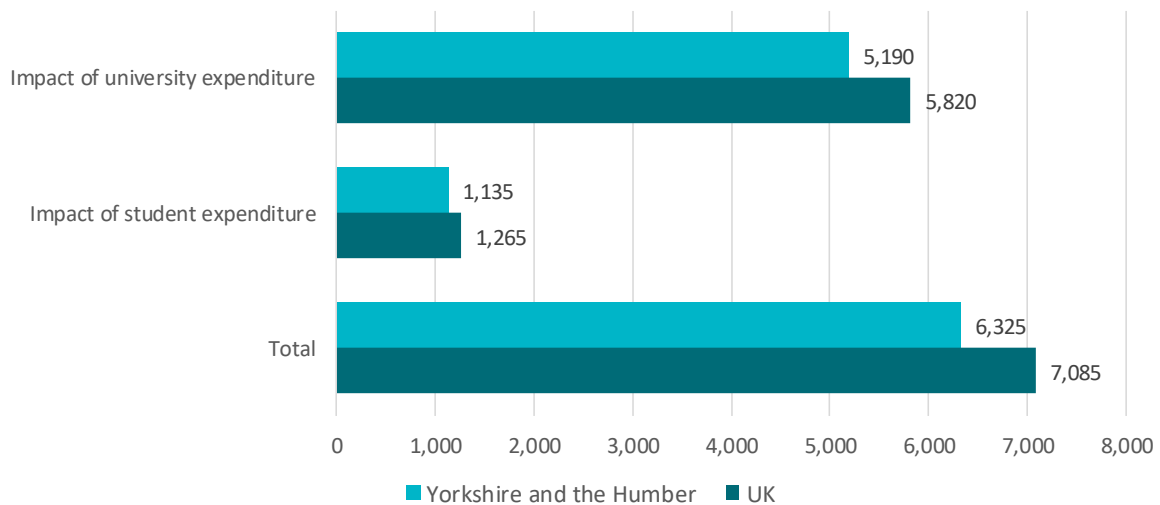
directly employed by the University itself, there are a further **3,500** jobs supported by the University and its students across the United Kingdom. Of the **7,085** total jobs supported, approximately **6,325** were located in Yorkshire and the Humber, and **760** in the rest of the United Kingdom.

Figure 27 Direct, indirect and induced impact (£m and # of FTE jobs supported) associated with the University’s institutional and student expenditures in 2016-17

Economic output (£m)



Employment (# of FTE jobs supported)

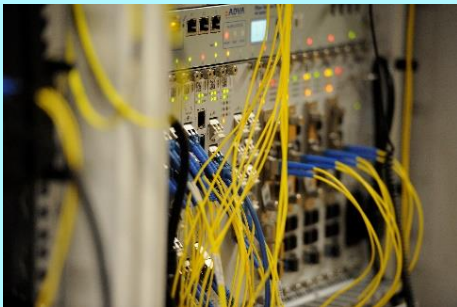


Note: All monetary estimates are presented in 2016-17 prices, discounted to reflect net present values and rounded to the nearest £0.1m. The number of FTE jobs supported are rounded to the nearest 5. **Source: London Economics’ analysis**

Box 11 Quantum technology: The key to secure communication

Researchers at the University of York are at the forefront of efforts to develop secure communications capable of protecting our digital networks from the growing threat of cyber-attacks.

The University of York leads the £24m **Quantum Communications Hub**, a UK collaboration of eight universities, plus numerous private and public sector organisations. The collaboration is developing prototype quantum technologies to provide secure communications and transactions. These technologies will create new quantum communications systems with major long-term economic implications for the UK communications infrastructure. The Hub is integrating new systems with conventional systems already in place, and developing applications for widespread use across a range of sectors including government, finance and banking, healthcare, defence and e-commerce.



Fundamental to the Hub's objectives is **Quantum Key Distribution (QKD)**, a technology that exploits the quantum properties of light. Although effective, widespread use of QKD has been restricted by the cost and bulk of the existing technology. Hub researchers are scaling the technology down to produce chip-based miniaturised systems, thus **addressing issues of cost, energy-efficiency and manufacture for mass-market deployment**. They are also developing short-range, free-space QKD technologies, to enable 'many-to-one' secure exchanges, allowing key sharing between, for example, phones and centralised terminals such as bank ATMs.

These technologies are being tested on the UK's first Quantum Network, currently connecting sites across Cambridge - with additional nodes being added at Bristol and BT Adastral Park. This national facility will be used for device and system trials, integration of quantum and conventional communications, and stakeholder demonstrations.

The Hub is **funded by the Engineering and Physical Sciences Research Council** as part of the UK National Quantum Technologies Programme.

Source: The University of York

6 The social and cultural impact of the University of York



6.1 Methodological approach

In addition to the many economic impacts associated with skills and qualification acquisition, there are a multitude of **non-economic or societal benefits** associated with higher education qualification attainment. These wider benefits include **improvements in health and wellbeing outcomes; social capital and cohesion; intergenerational transmission of skills and improved social mobility; the subsequent acquisition of further learning and qualifications; and improved communication and autonomy**. Although it is clear that these outcomes have significant value, it is almost impossible to assign a monetary value in any robust way. As such, we do not attempt to monetise these wider impacts, but rather demonstrate the depth of the impact of learning at the University of York on graduates' jobs, lives and prospects.

To assess the wider economic and social impact of the University of York on its students and society at large, the University of York conducted an **online survey among a large group of its alumni**, undertaken over the course of July and August 2018. The survey achieved a total of **4,298 complete responses**, and this section summarises the main survey results in terms of the impacts on alumni's **job-related outcomes, general and job-related skills, personal development, and well-being**.

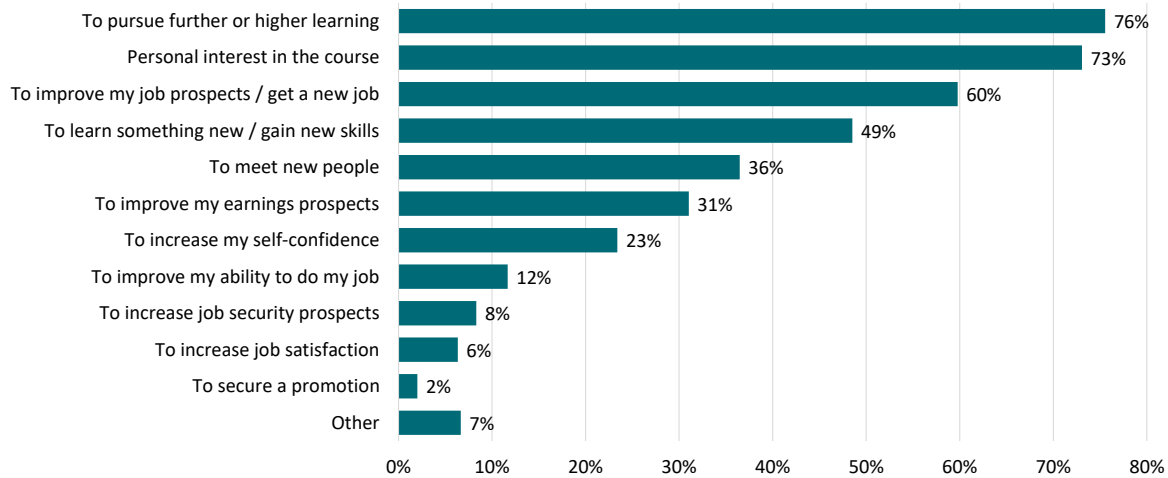
6.2 Assessing the wider economic and social benefits

6.2.1 Understanding students' motivations

Student motivation provides an important insight into how higher education qualifications at the University of York may have supported graduates' personal and career development. Figure 28 presents the reasons provided by University of York alumni for **choosing their programme of study**.

The main reasons provided by respondents for choosing their degree programme were to pursue further or higher learning (**76%** of respondents) and having a personal interest in the course (**73%**). Underlining the **economic benefits** associated with higher education learning, **60%** of respondents said that improving their job prospects/getting a new job was one of the main reasons for choosing their degree programme, and **49%** reported learning new skills as a key motivation. In terms of **personal development**, **36%** of respondents indicated that they wanted to meet new people, and **23%** reported having chosen the programme to increase their self-confidence.

Figure 28 ‘Thinking about your qualification from the University of York, what was / were your main reason(s) for choosing this degree programme?’



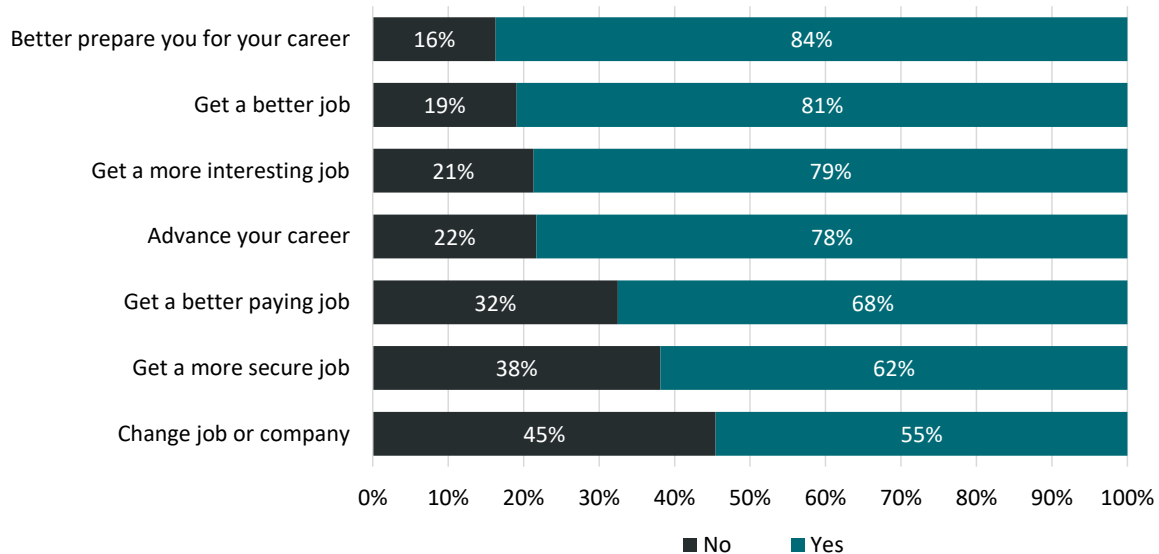
Note: Based on 4,298 responses.

Source: London Economics' analysis of University of York survey data

6.2.2 Impact on economic (job-related) outcomes

To assess the impact of University of York qualifications on graduates' economic outcomes, the survey asked respondents a number of questions in relation to whether certain aspects of their career prospects had changed following their degree at the University. As presented in Figure 29, approximately **84%** of respondents believed that their degree had better prepared them for their career; **81%** of respondents believed that they were able to get a better job (with **79%** indicating that they had obtained a more interesting job, **68%** reporting that they had obtained a better paying job, and **62%** indicating that they had obtained a more sector job); and **78%** believed that the course had helped them advance their career.

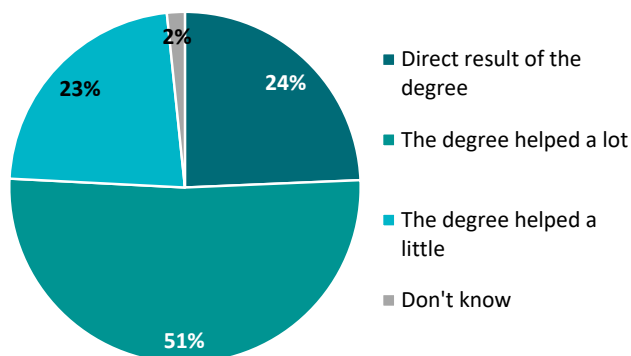
Figure 29 ‘Overall, would you say that your degree from the University of York helped you...?’



Note: Based on 3,997 responses. Between 333 and 1,801 respondents selected either 'Don't know' or 'Not applicable'.

Source: London Economics' analysis of University of York survey data

Figure 30 ‘To what extent do you think this improvement was / these improvements were linked to your degree from the University of York?’



Note: Based on 3,633 responses, who answered yes to at least one of the questions in Figure 29.

Source: London Economics' analysis of University of York survey data

As presented in Figure 30, of those alumni that believed that their degree helped them improve their working lives in any the above-described ways (Figure 29), **24%** indicated that the improvements in their circumstances were a direct result of the qualification from the University of York, with a further **51%** stating that the learning had helped a lot. These results demonstrate the very high degree of **additionality** associated with attaining qualifications at the University of York.

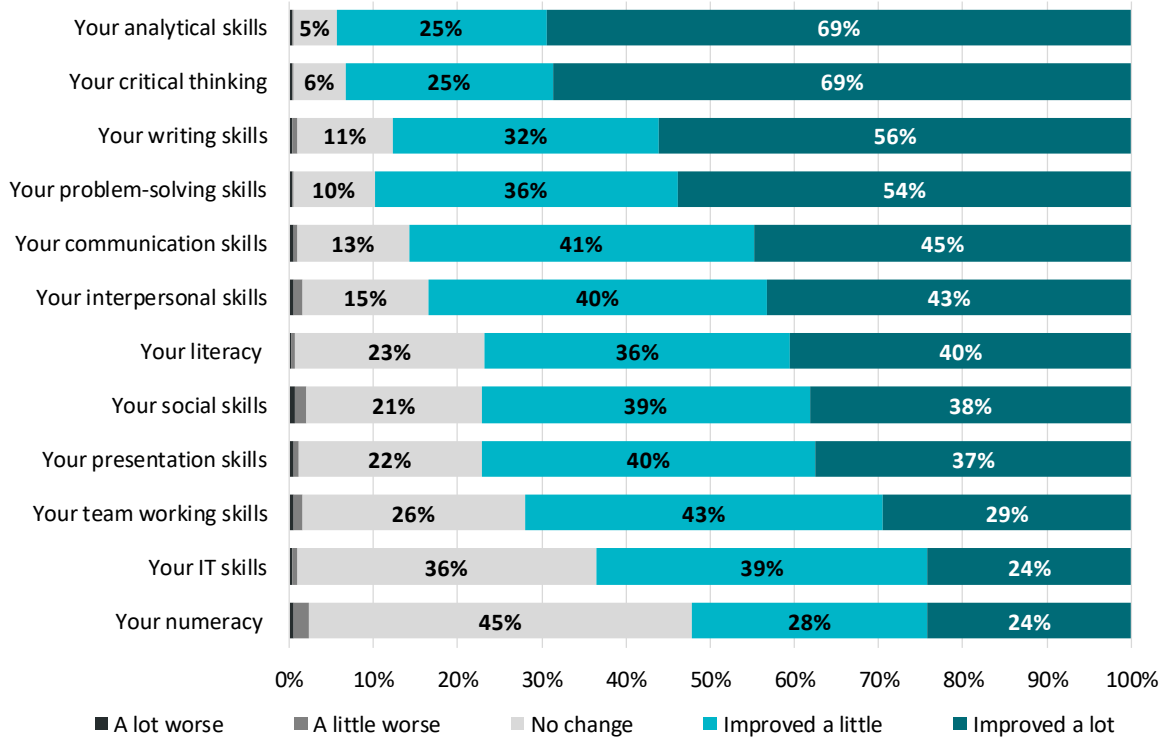
6.2.3 Impact on skills

Figure 31 presents the impact of obtaining a degree from the University of York on individuals' **general skills and proficiencies**. Specifically, respondents were asked to comment on the extent to which their skill-set had improved following their learning experience at the University of York. Respondents reported improvements (either by 'a lot' or 'a little') on a wide array of skills, including their **analytical** skills (**94%**); **critical thinking** skills (**94%**); **writing** skills (**88%**); **problem-solving** skills (**90%**); **communication** skills (**86%**); and **interpersonal** skills (**83%**). In addition, respondents also reported improvements in their **literacy** (**76%**), **social** (**77%**), **presentation** (**77%**), **team working** (**72%**), **IT** (**63%**) and **numeracy** (**52%**) skills.

Within any economic analysis, it is important to understand the **counterfactual**; in other words, what might have happened in the absence of the learning experience with the University of York. The responses are highly informative, and demonstrate the causal impact of learning at the University of York.

As presented in Figure 30, of those alumni that believed that their degree helped them improve their working lives in any the above-described ways (Figure 29), **24%** indicated that the improvements in their circumstances were a

Figure 31 ‘Following completion of your degree from the University of York, what impact did this have on your general set of skills?’

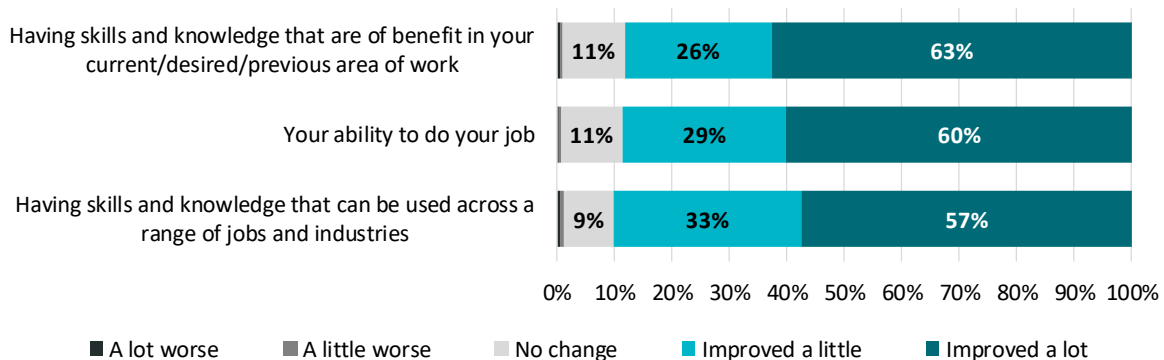


Note: Based on 4,298 responses. Between 42 and 489 respondents selected either ‘Don’t know’ or ‘Not applicable’.

Source: London Economics’ analysis of University of York survey data

Figure 32 presents the responses of alumni in relation to whether they felt that their **job-related skills** had improved as a result of their degree. Evidencing the impact which the University of York qualification has had on their employability, the vast majority of respondents (**89%**) reported that their level of competency or ability to do their job increased either by a ‘lot’ or a ‘little’ as a result of their degree; **89%** reported that the skills and knowledge they use in their current job improved by ‘lot’ or a ‘little’; and **90%** reported that their general transferable skills improved by ‘lot’ or a ‘little’.

Figure 32 ‘What impact did your degree from the University of York have on your job-related set of skills?’



Note: Based on 3,997 responses. Between 240 and 314 respondents selected either ‘Don’t know’ or ‘Not applicable’.

Source: London Economics’ analysis of University of York survey data

Box 12 Restoring a medieval masterpiece

International experts from the University of York's Department of History of Art played a key role in the **restoration of York Minster's magnificent Great East Window**, Britain's largest expanse of medieval stained glass. The Great East Window was created between 1405 and 1408 by master glazier John Thornton, who was paid £56 by the Chapter of York, the governing body of the Minster. It depicts the beginning and end of all things, from the book of Genesis to the book of Revelation, known in the Middle Ages as the Apocalypse.

Professor Tim Ayers and Professor Christopher Norton were part of the Minster's **East Window Advisory Group** throughout the ten-year project to conserve and protect the 15th century masterpiece. The final panel of the 311 removed from the window in an £5m restoration project was replaced in early 2018.

As Director of the York Glaziers Trust, Sarah Brown, who is also Director of the University's Master of Arts in Stained Glass Conservation and Heritage Management, oversaw the painstaking process to remove centuries of grime and pollution from the precious panels. Conservators also installed UV-resistant environmental protective glazing. Sarah described the restoration as a once-in-a-lifetime project: *"The Great East Window is one of the great artistic achievements of the Middle Ages. It's been a huge privilege to be part of this milestone in the Minster's history."*

Researchers at the University's Department of Archaeology also contributed to the **York Minster Revealed project** by providing archaeological insight to inform the conservation of the intricate stone carvings around the window and on the buttresses surrounding it.



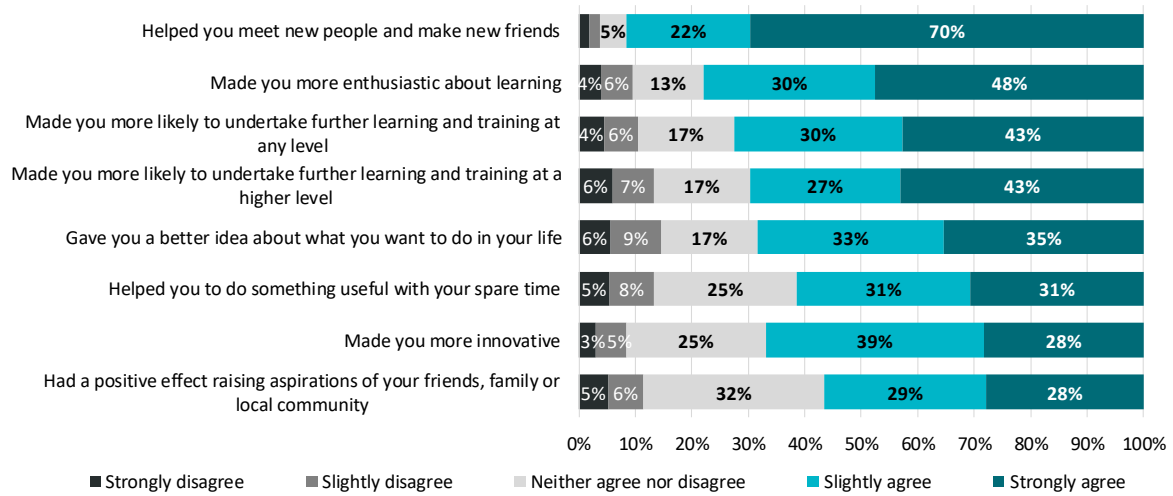
Source: The University of York

6.2.4 Impact on personal development and well-being

In addition to the above-discussed impact of learning on respondents' working lives and skills, the survey also sought to measure the extent to which learning experiences at the University of York had an impact on respondents' **personal development, community engagement and well-being**.

Figure 34 explores to what extent alumni agreed with a number of statements relating to **personal interests and aspirations**, indicating that **92%** of respondents believed that their experience at the university helped them meet new and make new friends; **78%** felt that they had become more enthusiastic about learning; **73%** reported that their time at the university made them more likely to undertake further learning and training at *any level* (with **70%** reporting that they were more likely to undertake further learning and training at a *higher level*); **68%** felt that they had a better idea about what they wanted to do in their life; **67%** reported that they had become more innovative; **62%** indicated that learning had provided them with something useful to do in their spare time; and **57%** reported that their time at the university had a positive effect on raising the aspirations of their friends, family, and local community.

Figure 33 ‘In terms of your personal development, to what extent do you agree or disagree that your experience at the University of York..?’ – Personal interests and aspirations

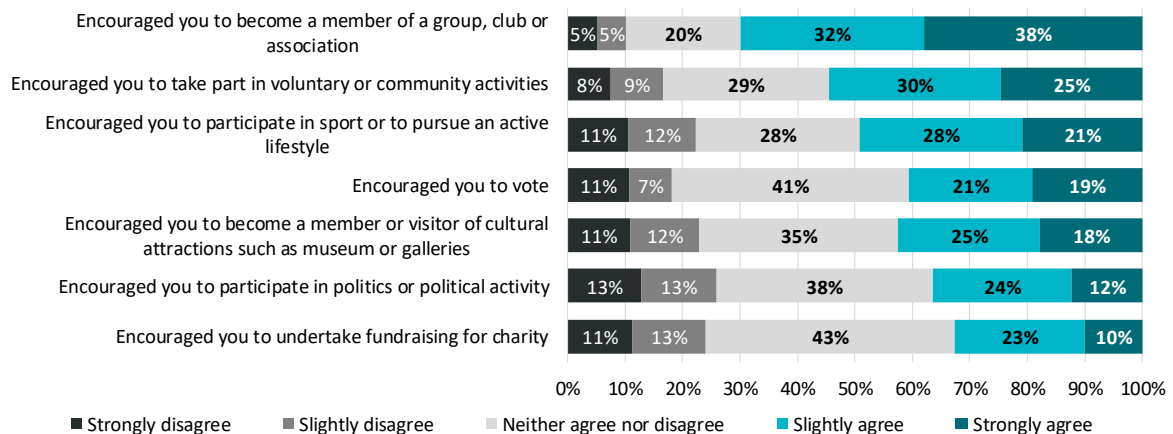


Note: Based on 4,298 responses. Between 34 and 337 respondents selected either ‘Don’t know’ or ‘Not applicable’.

Source: London Economics’ analysis of University of York survey data

In relation to wider **community engagement and community cohesion** (see Figure 34), the analysis further indicates that approximately **70%** of respondents felt that their degree at the University of York had encouraged them to become a member of a group, club, or association; **55%** had been encouraged to take part in voluntary or community activities; **49%** had become encouraged to participate in sport or to pursue an active lifestyle; **43%** had become encouraged to become a member or visitor of cultural attractions; **40%** had been encouraged to vote (with **36%** reporting that they had become encouraged to participate in politics or political activities); and **33%** had become encouraged to undertake fundraising for charity.

Figure 34 ‘In terms of your personal development, to what extent do you agree or disagree that your experience at the University of York..?’ – Community cohesion and engagement



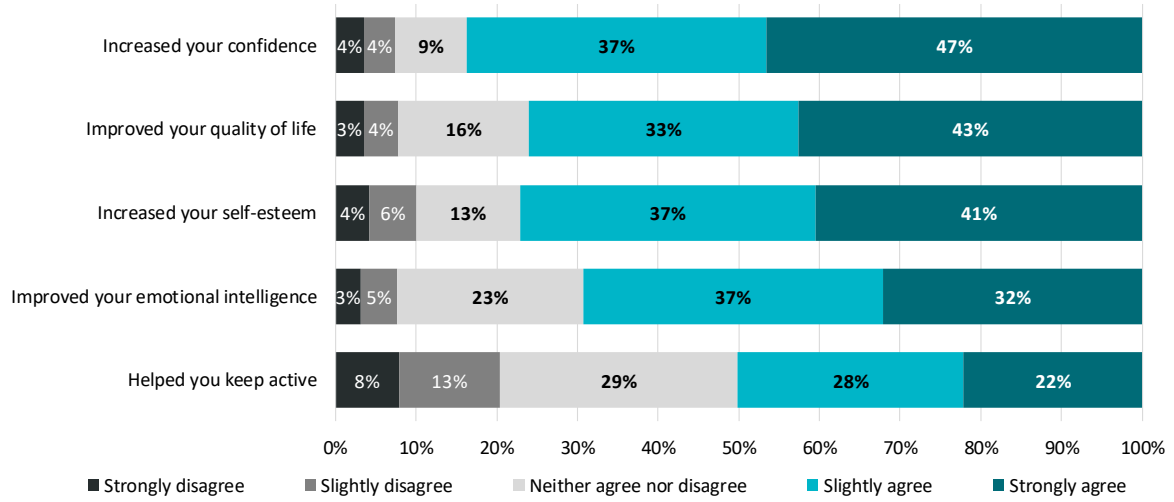
Note: Based on 4,298 responses. Between 34 and 383 respondents selected either ‘Don’t know’ or ‘Not applicable’.

Source: London Economics’ analysis of University of York survey data

Finally, in terms of measures of **well-being** and enjoyment, Figure 35 shows that **84%** of respondents agreed (either ‘strongly’ or ‘slightly’) that they had become more confident as a result of their degree; **78%** felt that their degree helped increase their self-esteem; **76%** agreed that their degree

had improved the quality of their life; **69%** believed that their emotional intelligence had increased as a result of their degree; and **50%** felt that their degree had helped them keep active.

Figure 35 ‘In terms of your well-being, to what extent do you agree or disagree that the degree which you completed at the University of York...?’



Note: Based on 4,298 responses. Between 38 and 146 respondents selected either ‘Don’t know’ or ‘Not applicable’.

Source: London Economics' analysis of University of York survey data

Box 13 **The University of York's widening participation activities**

The University of York's **Widening Participation team** is engaged in outreach activity **locally, regionally and nationally**, collaborating with schools, HEIs and other organisations. The University works with young people at school or college through a **structured series of interventions at three critical stages:**



1. Programmes aimed broadly at **Years 6 - 8** are designed to raise aspiration in disadvantaged populations.
2. Programmes targeted broadly at **Years 6 – 11** aim to demystify higher education, raise awareness of subjects and routes and the variety of provision, increase the self-confidence and self-esteem of students involved, and raise aspirations for lifelong learning. They also lay the groundwork for progression to higher education by encouraging appropriate subject choices.
3. Programmes for students in **Years 12 and 13** concentrate on the transition to higher education, with a particular emphasis on building confidence in applying to research-intensive, selective universities. Other areas of work focus on mature learners and those returning to study, and the University continues to develop support for care leavers and young carers.

In 2016-17, the University of York directly worked with **more than 9,000 participants** in on-campus events, and also worked with **more than 15,000 pupils** by attending external events and activities in schools and colleges. The University's more intensive programmes (targeted at schools/colleges and pupils who are under-represented in higher education and those from disadvantaged backgrounds) involved **over 4,000 pupils from 127 schools**. These targeted programmes include:

- **Green Apples:** A local collaborative programme for Years 6-11 aiming to raise awareness of the routes and the variety of provision within further and higher education, and raise aspirations for lifelong learning. Activities include campus visits to local further and higher education institutions; mentoring; and a visit to the University of York or York St John University.
- **Shine:** A regional programme aimed at students in Years 6 -11, consisting of a mix of sessions in schools and on the University campus, including residential provision on the University campus and subject-based taster sessions at the University. There is a focus on general aspiration-raising and supporting achievement, but the programme also introduces pupils to the opportunities the University provides both academically and socially. There is an emphasis on information and advice – for example in choosing subjects at GCSE and post-16 programmes.
- **Next Step York:** This (mainly regional) programme works with students in Years 12 and 13 and focuses on progression to Higher Education, providing a mix of visits, information and advice, study skills, master classes, mentoring, a residential visit to the University, support for the transition to higher education, as well as an academic assignment working with York tutors.
- **Realising Opportunities:** The University is a member of the Realising Opportunities programme, a collaborative partnership of 14 research intensive universities developing and delivering a national fair access scheme to Year 12 and 13 students. The programme specifically promotes social and geographic mobility for students from under-represented groups.
- **The Excellence Hub:** The Excellence Hub is a regional partnership between the Universities of Leeds, Sheffield and York, targeting high achieving students from currently under-represented groups from across the region to encourage and facilitate progression of the 'most able, least likely' group of students to selective HEIs. The Hub involves subject specific taster events and Information, Advice and Guidance events, workshops, and conferences. The collaboration continues to focus on raising aspirations and encouraging applications to research intensive universities.
- **The Big Deal:** An enterprise competition for regional schools where small teams of Year 9/10 pupils develop a business and product with the support of business mentors over a thirteen-week period. Teams then pitch their ideas to a 'Dragons' Den' at the final held at the University of York.

Source: The University of York

7 Aggregate economic impact of the University of York







Aggregating across all of the above strands of impact, the total economic impact associated with the University of York's educational activities across the UK in 2016-17 was estimated to be **£1,820.5 million** (see Table 12). In terms of the components of this economic impact, the value of the University's **teaching and learning** activities stood at approximately **£487.9 million (27%** of total), while **research** activity contributed a further **£537.1 million (30%)**. Approximately **£93.1 million (5%)** was associated with the University's contribution to **educational exports**. Finally, the **direct, indirect and induced economic impact** associated with the University's expenditure and the expenditure of its students was estimated to be **£702.2 million (39%** of total).

The total economic impact associated with the University of York's activities in 2016-17 was estimated to be approximately £1,820.5 million.

To place these estimates into context, compared to the University of York's total operational costs of approximately **£332.5 million** in 2016-17⁶⁸, the total economic contribution of the University to the UK in 2016-17 was estimated to be approximately **£1,820.5 million**, which corresponds to a benefit to cost ratio of approximately **5½:1**.

Table 12 Aggregate economic impact of the University of York in the UK (£m and % of total)

Type of impact (£m in 2016-17)	£m	%
 Impact of teaching and learning	£487.9m	27%
Students	£232.3m	13%
Exchequer	£255.6m	14%
 Impact of research	£537.1m	30%
Net direct research income	£35.5m	2%
Spillover impact	£501.6m	28%
 Impact of exports	£93.1m	5%
Net tuition fee income	£41.9m	2%
Non-tuition fee income	£51.3m	3%
 Direct, indirect and induced impacts	£702.2m	39%
Impact of university expenditure	£555.5m	31%
Impact of student expenditure	£146.7m	8%
Total economic impact	£1,820.5m	100%

Note: All estimates are presented in 2016-17 prices, and rounded to the nearest £0.1m. *Source: London Economics' analysis*

⁶⁸ This includes **£30.5 million** in depreciation costs, which were excluded from the direct, indirect and induced impact of the University's expenditures (see Section 5.1).

Index of Tables, Figures and Boxes

Tables

Table 1	Total impact of the University of York’s teaching and learning activities (£m), by type of impact, domicile and study mode	iv
Table 2	Aggregate economic impact of the University of York in the UK (£m and % of total)	vii
Table 3	Completion rates of University of York students by level of intended attainment	14
Table 4	Estimated net graduate premium and net Exchequer benefit associated with University of York qualifications - full-time students from England only	20
Table 5	Estimated internal rate of return (%) to students and the Exchequer associated with University of York first degrees (relative to GCE ‘A’ Levels) - full-time students from England only	21
Table 6	Aggregate impact of the University of York’s teaching and learning activities (£m), by type of impact, domicile and study mode	22
Table 7	Net tuition fee income associated with international students in the 2016-17 cohort, by domicile and mode of study (£m)	36
Table 8	Non-tuition fee income associated with international students in the 2016-17 cohort, by domicile and mode of study (£m)	38
Table 9	Economic multipliers applied to the University of York’s expenditure and employment	46
Table 10	Total University of York student expenditure (£m), by domicile and study mode	48
Table 11	Economic multipliers applied to students’ expenditures	48
Table 12	Aggregate economic impact of the University of York in the UK (£m and % of total)	60
Table 13	Treatment and comparison groups – marginal returns	68
Table 14	Marginal earnings returns to higher education qualifications (in all subjects), in percentage (following exponentiation), by gender and age band	71
Table 15	Marginal employment returns to higher education qualifications (in all subjects), in percentage points, by gender and age band	72
Table 16	Average age at enrolment, study duration, and age at completion for students in the 2016-17 University of York cohort	73
Table 17	Assumed age decay adjustment factors for students in the 2016-17 University of York cohort	75
Table 18	Gross graduate premiums and Exchequer benefits associated with HE qualification attainment, by study mode, level, gender and prior attainment	78

Table 19	Net graduate premiums associated with higher education qualification attainment, by domicile, study mode, level, gender and prior attainment	80
Table 20	Net Exchequer benefits associated with higher education qualification attainment, by domicile, study mode, level, gender and prior attainment	82
Table 21	UK-domiciled students in the 2016-17 University of York cohort (headcount), by study mode, level of study, gender and prior attainment	85
Table 22	Non-UK-domiciled students in the 2016-17 University of York cohort (headcount), by domicile, study mode and level of study	86
Table 23	Net tuition fee income (present value over total study duration) per non-UK student in the 2016-17 cohort, by study level, domicile and study mode	86
Table 24	Assumed average stay durations (in weeks) for non-UK domiciled students, by domicile and level of study	87
Table 25	Non-tuition fee income (present value over total study duration) per non-UK student in the 2016-17 cohort, by study level, domicile and study mode	87

Figures

Figure 1	Total impact of the University of York’s research activities in 2016-17, in £m	v
Figure 2	Total contribution of the University of York to exports by type of impact (£m)	v
Figure 3	Direct, indirect and induced impact associated with the University’s institutional and student expenditures - £m and # of full-time equivalent jobs supported	vi
Figure 4	UK-domiciled students in the 2016-17 cohort by level of study	13
Figure 5	UK-domiciled students in 2016-17 cohort, by study mode	13
Figure 6	UK-domiciled students in 2016-17 cohort, by study level	13
Figure 7	Overview of gross and net graduate premium, and gross and net Exchequer benefit	15
Figure 8	Estimating the gross graduate premium	16
Figure 9	University of York research income by type, £m in 2016-17	25
Figure 10	Productivity spillovers associated with University of York research, by income type, £m in 2016-17	28
Figure 11	Total impact of the University of York’s research activities in 2016-17, in £m	29
Figure 12	Contract value of business and community services provided by the University of York in 2016-17, £m	29
Figure 13	Number of intellectual property licenses granted by the University of York in 2016-17	30

Figure 14	Income from intellectual property licenses granted by the University of York in 2016-17, £m	30
Figure 15	Number of disclosures and patents filed by or on behalf of the University of York in 2016-17	31
Figure 16	University of York spin-offs and start-ups in 2016-17	32
Figure 17	Non-UK-domiciled students in the 2016-17 cohort by domicile	33
Figure 18	Non-UK-domiciled students in the 2016-17 cohort by study mode	33
Figure 19	Non-UK-domiciled students in the 2016-17 University of York cohort by qualification level	34
Figure 20	Net tuition fee income per international full-time student (present value over total study duration), by qualification level and domicile	36
Figure 21	Non-fee income per international full-time student (present value over total study duration), by qualification level and domicile	38
Figure 22	Aggregate economic impact on exports associated with non-UK students in the 2016-17 cohort, by domicile	40
Figure 23	Direct economic impact associated with the University of York's expenditure in 2016-17	42
Figure 24	Direct employment by the University of York in the UK in 2016-17	42
Figure 25	Distribution of University of York staff in 2016-17, by Local Authority (of home address)	44
Figure 26	Distribution of University of York procurement expenditure in 2016-17, by Local Authority (invoice destination)	45
Figure 27	Direct, indirect and induced impact (£m and # of FTE jobs supported) associated with the University's institutional and student expenditures in 2016-17	50
Figure 28	'Thinking about your qualification from the University of York, what was / were your main reason(s) for choosing this degree programme?'	53
Figure 29	'Overall, would you say that your degree from the University of York helped you...?'	53
Figure 30	'To what extent do you think this improvement was / these improvements were linked to your degree from the University of York?'	54
Figure 31	'Following completion of your degree from the University of York, what impact did this have on your general set of skills?'	55
Figure 32	'What impact did your degree from the University of York have on your job-related set of skills?'	55
Figure 33	'In terms of your personal development, to what extent do you agree or disagree that your experience at the University of York..?' – Personal interests and aspirations	57

Figure 34	‘In terms of your personal development, to what extent do you agree or disagree that your experience at the University of York..?’ – Community cohesion and engagement	57
Figure 35	‘In terms of your well-being, to what extent do you agree or disagree that the degree which you completed at the University of York...?’	58

Boxes

Box 1	Developing the next generation of filmmakers and gamers	11
Box 2	Definition of gross and net graduate premiums and benefits to the public purse	14
Box 3	The York Festival of Ideas	17
Box 4	Student volunteering	23
Box 5	Assuring the safety of autonomous systems	24
Box 6	New bioeconomy initiative launched in York	27
Box 7	Developing next generation cancer treatments	32
Box 8	Building a Brexit evidence base	35
Box 9	Supporting health for all in Malawi and Uganda	39
Box 10	Where the sea meets the sky	40
Box 11	Quantum technology: The key to secure communication	51
Box 12	Restoring a medieval masterpiece	56
Box 13	The University of York’s widening participation activities	59

ANNEXES

Annex 1 References

Atkinson, B. (2005). 'Atkinson Review: Final Report. Measurement of Government output and productivity for national accounts'. <http://eprints.lse.ac.uk/33553/>.

Callender, C., Wilkinson, D., Gibson, A., and Perkins, C. (2011). 'The impact of higher education for part-time students'. <http://webarchive.nationalarchives.gov.uk/20140108090250/http://www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-36-impact-of-he-for-pt-students.pdf>

Department for Business, Innovation and Skills (2011a). *The returns to Higher Education Qualifications*, BIS Research Report 45, June 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32419/11-973-returns-to-higher-education-qualifications.pdf

Department for Business, Innovation and Skills (2011b). 'Estimating the value to the United Kingdom of Education Exports', BIS Research Report 46, June 2011. <http://www.bis.gov.uk/assets/biscore/higher-education/docs/e/11-980-estimating-value-of-education-exports.pdf>

Haskel, J., & Wallis, G. (2010). 'Public support for innovation, intangible investment and productivity growth in the UK market sector'. <http://ftp.iza.org/dp4772.pdf>

Haskel, J., Hughes, A., & Bascavusoglu-Moreau, E. (2014). 'The economic significance of the UK science base: a report for the Campaign for Science and Engineering'. <http://sciencecampaign.org.uk/UKScienceBase.pdf>

Higher Education Statistics Agency (2018a). 'How do HE providers engage with business and communities?'. <https://www.hesa.ac.uk/data-and-analysis/providers/business-community>

Higher Education Statistics Agency (2018b). 'Finances of Higher Education Providers 2016/17'. <https://www.hesa.ac.uk/data-and-analysis/publications/finances-2016-17>

Higher Education Statistics Agency (2018c). 'Staff in Higher Education 2016/17'. <https://www.hesa.ac.uk/data-and-analysis/publications/staff-2016-17>

HM Treasury (2011). 'The Green Book. Appraisal and Evaluation in Central Government'. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf.

Imperial College London (2010). 'University research contributes £45 billion a year to the UK economy, according to new impact study'. http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_16-3-2010-13-6-57

Institute for Employment Studies & National Centre for Social Research (2018). 'Student income and expenditure survey 2014 to 2015.'. <https://www.gov.uk/government/publications/student-income-and-expenditure-survey-2014-to-2015>

Institute for Public Policy Research (2014), 'Reaching Higher: Reforming Student Loans to broaden access to postgraduate study', October 2014 https://www.ippr.org/files/publications/pdf/reaching-higher_Oct2014.pdf

Kelly, U., McNicoll, I., & White, J. (2014). 'The economic impact of the Yorkshire and Humberside Higher Education Sector'.

<https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Pages/economic-impact-higher-education-institutions-in-yorkshire-humberside.aspx>

London Economics (2017). 'Estimating the costs associated with the student support offer'.

<https://londoneconomics.co.uk/blog/publication/estimating-costs-associated-student-support-offer-december-2017/>

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

Office for Budget Responsibility (no date). 'Tax by tax, spend by spend. VAT'.

<http://obr.uk/forecasts-in-depth/tax-by-tax-spend-by-spend/vat/>

Office for Budget Responsibility (2018). 'Economic and fiscal outlook – March 2018'.

<http://obr.uk/efo/economic-fiscal-outlook-march-2018/>

Office for Fair Access (2017). 'Outcomes of access agreement monitoring for 2015-16'.

<https://www.offa.org.uk/wp-content/uploads/2017/06/OFFA-Monitoring-Outcomes-Report-2015-16-Final.pdf>

Office for National Statistics (2018). 'CPI All Items Index: Estimated pre-97 2015 = 100'.

<https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7bt/mm23>

Student Awards Agency for Scotland (2017). 'Higher Education Student Support in Scotland 2016-17'.

http://www.saas.gov.uk/_forms/statistics_1617.pdf

Student Loans Company (2017a). 'Student Support for Higher Education in England 2017: 2016/17 payments, 2017/18 awards'.

<https://www.slc.co.uk/media/9579/slcsfr052017.pdf>

Student Loans Company (2017b). 'Student Support for Higher Education in Wales 2017: 2016/17 payments, 2017/18 awards'.

<https://www.slc.co.uk/media/9586/slcsfr062017.pdf>

Student Loans Company (2017c). 'Student Support for Higher Education in Northern Ireland, Academic Year 2016/17 (FINAL)'.

<https://www.slc.co.uk/media/9583/slcsfr072017.pdf>

Times Higher Education (2018). 'World University Rankings 2019'.

https://www.timeshighereducation.com/world-university-rankings/2019/world-ranking#!/page/0/length/25/name/university%20of%20york/sort_by/rank/sort_order/asc/cols/stats

Walker, I., and Zhu, Y. (2013), 'The impact of university degrees on the lifecycle of earnings: Some further analysis', Department for Business Innovation and Skills Research Report 112.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229498/bis-13-899-the-impact-of-university-degrees-on-the-lifecycle-of-earnings-further-analysis.pdf

Welsh Government (2016). 'The Review of Higher Education Funding and Student Finance Arrangements in Wales'.

<http://gov.wales/docs/dcells/publications/160927-he-review-final-rreport-en.pdf>

Annex 2 Technical Annex

A2.1 Impact of the University of York's teaching and learning activities

A2.1.1 Qualifications and counterfactuals considered in the econometric analysis

Our econometric analyses of the earnings and employment returns to higher education qualifications (described in more detail in Annex A2.1.2) considered five different higher education qualification groups (i.e. five **'treatment' groups**) within the National Qualifications Framework: three at postgraduate level (higher degree (research), higher degree (taught) and 'other' postgraduate degrees⁶⁹) and two at undergraduate level (first degrees and 'other' undergraduate qualifications⁷⁰).

Table 13 presents these different postgraduate and undergraduate level qualifications (i.e. treatment groups) considered in the analysis, along with the associated **counterfactual group** used for the marginal returns analysis in each case. As outlined in Section 2.6.1, we compare the earnings of the group of individuals in possession of the qualification to the relevant counterfactual group, to ensure that we assess the economic benefit associated with the qualification itself, rather than the economic returns generated by the specific characteristics of the individual in possession of the qualification. This is a common approach in the literature and allows for the removal of other personal, regional or socioeconomic characteristics that might influence *both* the determinants of qualification attainment as well as earnings.

Table 13 Treatment and comparison groups – marginal returns

Treatment group – highest academic qualification	Comparison group - highest academic qualification	Treatment and comparison groups – highest possible vocational/professional qualification
Higher degree (research)	Undergraduate degree	Level 3 vocational
Higher degree (taught)	Undergraduate degree	Level 3 vocational
Other postgraduate	Undergraduate degree	Level 3 vocational
First degree	2 or more GCE 'A' Levels	Level 3 vocational
Other undergraduate	2 or more GCE 'A' Levels	Level 3 vocational
2 or more GCE 'A' Levels	5 or more GCSEs at A*-C	Level 3 vocational

Source: London Economics

For the analysis of marginal returns, postgraduate degree holders are compared to undergraduate degree holders, while for individuals holding first degree or sub-degree level higher education qualifications, the counterfactual group consists of individuals holding 2 or more GCE 'A' Levels as their highest qualification. For the purposes of estimating the returns to all higher education qualifications, the highest level of professional or vocational qualification that an individual may be in possession of is Level 3 (for both those in possession of higher education qualifications (the

⁶⁹ This relates to Labour Force Survey variables a) HIQUAL11 and HIQUAL15 value labels 'Level 7 Diploma' and 'Level 7 Certificate' b) HIQUAL4, HIQUAL5, HIQUAL8, HIQUAL11 and HIQUAL15 value labels 'Higher degree' (other than Masters or Doctorate degree).

⁷⁰ This relates to Labour Force Survey variables a) DEGREE4 and DEGREE7 value label 'Foundation Degree' as highest level of achievement b) QUAL2, QUAL4, QUAL6 and QULS10 value label 'Diploma in higher education obtained' as highest level of achievement c) HIQUAL4, HIQUAL8, HIQUAL11 and HIQUAL15 value label 'other higher education below degree'. Interviewers are instructed to use 'other higher education below degree' only if the respondent states that they have 'something from higher education but they do not know what it is'. It is therefore not possible to provide examples of typical qualifications that would normally fall under this category. The response option serves the purpose of confirming that higher education qualifications have been achieved but that the respondent is unaware of the actual qualification title itself.

treatment group) and those individuals not in possession of higher education qualifications (the control group)).

In addition to the analysis of higher education outcomes, we also included a separate specification comparing the earnings associated with GCE 'A' Levels to possession of 5 or more GCSEs at grades A*-C. This additional analysis was undertaken to provide an indication of the fact that the academic 'distance travelled' by a (small) proportion of University of York students is **greater** than might be the case compared to those in possession of levels of prior attainment 'traditionally' associated with higher education entry. Similarly, for other students within the 2016-17 cohort, the academic 'distance travelled' is **lower** than the traditional prior attainment level (e.g. a small proportion of students intending to undertake a first degree had previously already completed a sub-degree level qualification (categorised as 'other undergraduate' throughout the analysis).

In instances where the level of prior attainment for students undertaking qualifications at the University of York was higher or lower than the traditional counterfactual qualifications outlined in Table 13, the analysis used a **'stepwise' calculation of additional lifetime earnings**. For example, to calculate the earnings and employment returns for a student **in possession of an 'other undergraduate' qualification undertaking a first degree at the University of York**, we *deducted* the returns to undertaking a 'other undergraduate' qualification (relative to the possession of 2 or more GCE 'A' Levels) from the returns to undertaking a first degree (again relative to the possession of 2 or more GCE 'A' Levels). Similarly, to calculate the returns for a student **in possession of 5 or more GCSEs at grades A*-C undertaking a University of York undergraduate degree**, we *added* the returns to achieving 2 or more GCE 'A' Levels (relative to the possession of 5 or more GCSEs at grades A*-C) to the returns to undertaking a first degree (relative to the possession of 2 or more GCE 'A' Levels)⁷¹.

A2.1.2 Marginal earnings and employment returns to higher education qualifications

Marginal earnings returns

To estimate the impact of qualification attainment on earnings, using information from the Labour Force Survey, we estimated a standard **Ordinary Least Squares** linear regression model, where the dependent variable is the natural logarithm of hourly earnings, and the independent variables include the full range of qualifications held alongside a range of personal, regional and job-related characteristics that might be expected to influence earnings. In this model specification, we included individuals who were employed on either a full-time or a part-time basis. This approach has been used widely in the academic literature.

The basic specification of the model was as follows:

$$\ln(\omega_i) = \alpha + \beta' X_i + \varepsilon_i \quad \text{for } i = 1 \text{ to } n$$

where $\ln(\omega_i)$ represents the natural logarithm of hourly earnings, ε_i represents an error term, and X_i provides the independent variables included in the analysis as follows:

- Gender;

⁷¹ In some instances, this stepwise calculation would result in *negative* lifetime returns to achieving higher education qualifications. As this seems illogical and unlikely in reality, any negative returns in these instances were set to zero. Hence, the analysis implicitly assumes that all calculated gross returns (*before* the deduction of any foregone earnings or other costs) can only be greater than or equal to zero (i.e. there can be no wage or employment *penalty* associated with any higher education qualification attainment).

- Age;
- Age squared;
- Ethnic origin;
- Region of usual residence;
- Qualifications held;
- Marital Status;
- Number of dependent children under the age of 16;
- Full-time/ part-time employment;
- Temporary or permanent contract;
- Public or private sector employment;
- Workplace size;
- Interaction terms; and
- Yearly Dummies.

Using the above specification, we estimated earnings returns in aggregate and **for men and women separately**. Further, to analyse the benefits associated with different education qualifications over the lifetime of individuals holding these qualifications, the regressions were estimated separately across a range of specific age bands for the working age population, depending on the qualification considered. The analysis of earnings premiums was undertaken at a national (UK-wide) level. However, to adjust for differences across the Home Nations, these UK-wide earnings premiums were then combined with the relevant differential direct costs facing the individual and/or the public purse for students domiciled in the different Home Nations.

To estimate the impact of higher education qualifications on labour market outcomes using this methodology, we used information from **pooled Quarterly UK Labour Force Surveys between 2000 and 2017**. The selection of information over this period is the longest time for which information on education and earnings is available on a relatively consistent basis.

The resulting estimates of the marginal wage returns to higher education qualifications are presented in Table 14. In the earnings regressions, the coefficients relating to the higher education qualifications provide an indication of the additional effect on hourly earnings associated with possession of the respective qualification in addition to those in the reference (i.e. counterfactual) category. Taking an example, the analysis suggests that a male aged between 31 and 35 years old in possession of a first degree is estimated to achieve a **22.6%** hourly earnings premium compared to a comparable male holding only 2 or more GCE 'A' levels as his highest level of attainment. The comparable estimate for a woman aged between 31 and 35 stands at **26.9%**.

In addition to estimating marginal earnings returns on average across *all subjects* of study, we repeated the econometric analysis to estimate these returns *separately by subject*⁷². Combining these subject-level returns with the number of students in the 2016-17 cohort of University of York students by subject, we then calculated a **subject mix adjustment factor** (separately by gender and qualification level). These adjustment factors were then applied to the above average marginal wage

⁷² The HESA Joint Academic Coding System (JACS) was used to classify subject areas. The following subject groups were distinguished: (1) Medicine & dentistry, (2) Subjects allied to medicine, (3) Biological sciences, (4) Veterinary science, (5) Agriculture & related subjects, (6) Physical sciences, (7) Mathematical sciences, (8) Computer science, (9) Engineering & technology, (A) Architecture, building & planning, (B) Social studies, (C) Law, (D) Business & administrative studies, (E) Mass communications & documentation, (F) Languages, (G) Historical & philosophical studies, (H) Creative arts & design, (I) Education and (J) Combined.

returns (across all subjects), to adjust for the specific subject composition of the University's student cohort.

Table 14 Marginal earnings returns to higher education qualifications (in all subjects), in percentage (following exponentiation), by gender and age band

Qualification level	Age band									
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Male										
2 or more GCE A-levels ¹	8.4%	4.5%	10.1%	19.2%	26.0%	19.0%	25.5%	16.3%	16.5%	14.7%
Other undergraduate ²					5.3%	10.2%	9.7%	10.3%	12.3%	12.6%
First degree ²		11.1%	16.4%	22.6%	20.0%	26.0%	19.6%	24.6%	25.1%	24.1%
Other postgraduate ³		9.0%	13.2%	9.3%	4.4%	5.0%				
Higher degree (taught) ³		9.6%	12.0%	7.8%	10.2%	12.3%	13.4%	14.3%	10.1%	10.6%
Higher degree (research) ³			18.2%	18.3%	18.6%	19.6%	22.0%	28.4%	23.6%	53.4%
Female										
2 or more GCE A-levels ¹	7.1%	5.4%	10.0%	13.1%	18.6%	19.1%	13.7%	13.1%	12.9%	9.9%
Other undergraduate ²			5.0%	6.4%	9.4%	13.4%	15.6%	19.0%	18.8%	26.0%
First degree ²		10.7%	18.5%	26.9%	35.3%	32.2%	34.0%	35.3%	28.5%	29.0%
Other postgraduate ³		9.6%	6.7%	10.2%	6.2%	6.8%	11.0%	16.5%	9.4%	
Higher degree (taught) ³		8.1%	5.3%	9.9%	11.5%	16.2%	21.8%	16.3%	28.9%	
Higher degree (research) ³		16.2%	17.7%	18.8%	30.9%	28.9%	36.9%	42.6%	34.9%	32.6%

Note: Regression coefficients have been exponentiated to reflect percentage wage returns. In cases where the estimated coefficients are not statistically significantly different from zero (at the 10% level), the coefficient is assumed to be zero; these are displayed as gaps in the table. ¹ Returns to holding 2 or more GCE 'A' levels compared to 5 or more GCSEs at A*-C. ² Returns to first degrees and 'other' undergraduate qualifications are estimated relative to individuals holding 2 or more GCE 'A' levels as their highest qualification. ³ Returns to higher degree (taught), higher degree (research) and other postgraduate qualifications are estimated relative to undergraduate degrees.

Source: London Economics' analysis of pooled Quarterly Labour Force Survey data for 2000-2017

Marginal employment returns

To estimate the impact of qualification attainment on employment, we adopted a **probit model** to estimate the likelihood of different qualification holders being in employment or otherwise. The basic specification defines an individual's labour market outcome to be either in employment (working for payment or profit for more than 1 hour in the reference week (using the standard International Labour Organisation definition) or not in employment (being either unemployed or economically inactive)). The specification of the probit model was as follows:

$$\text{probit}(EMPNOT_i) = \alpha + \gamma'Z_i + \varepsilon_i \quad \text{for } i = 1 \text{ to } n$$

The dependent variable adopted represents the binary variable *EMPNOT*, which is coded 1 if the individual is in employment and 0 otherwise. We specified the model to contain a constant term as well as a number of standard independent variables including the qualifications held by an individual (represented by Z_i in the above equation) as follows:

- Gender;
- Age;
- Age squared;
- Ethnic origin;
- Region of usual residence;

- Qualifications;
- Marital Status;
- Number of dependent children under the age of 16; and
- Yearly Dummies.

Again, ε_i represents an error term. Similar to the methodology for estimating earnings returns, the described probit model was estimated in aggregate and **separately for men and women**, with the analysis further split by respective **age bands**, and adjusted for the specific **subject mix** of students attending the University of York. Further, and again similar to the analysis of earnings returns, employment returns were estimated at the national (i.e. UK-wide) level.

The resulting estimates of marginal employment returns to higher education qualifications (on average across *all subjects* of study (i.e. before adjusting for the University's specific subject mix)) are presented in Table 15. In the employment regressions, the relevant coefficients provide estimates of the impact of the qualification on the probability of being in employment (expressed in percentage points). Again taking an example, a man aged between 31 and 35 in possession of a first degree is **2.6 percentage points** more likely to be in employment than a man of similar age holding only 2 or more GCE 'A' levels as his highest level of education. The corresponding estimate for women stands at **4.0 percentage points**.

Table 15 Marginal employment returns to higher education qualifications (in all subjects), in percentage points, by gender and age band

Qualification level	Age band									
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Male										
2 or more GCE A-levels ¹	-2.9%		3.2%	1.4%	2.1%		2.2%			
Other undergraduate ²		-3.8%	-1.6%		-2.0%					
First degree ²			1.3%	2.6%	2.3%	2.0%	1.9%	3.2%	2.7%	
Other postgraduate ³		5.2%		1.1%		2.0%	1.4%	3.6%		
Higher degree (taught) ³									3.3%	3.9%
Higher degree (research) ³								5.2%	6.3%	9.7%
Female										
2 or more GCE A-levels ¹		3.7%	3.9%	2.9%			3.0%	3.9%		
Other undergraduate ²										
First degree ²		2.4%	3.5%	4.0%	6.3%	4.1%	4.6%	2.1%	3.2%	
Other postgraduate ³		4.2%				5.3%	3.9%	4.4%	3.5%	
Higher degree (taught) ³			-1.7%			4.2%	2.0%	3.5%	8.1%	
Higher degree (research) ³			-4.3%			7.7%	8.2%		13.9%	17.9%

Note: In cases where the estimated coefficients are not statistically significantly different from zero (at the 10% level), the coefficient is assumed to be zero; these are displayed as gaps in the table. ¹ Returns to holding 2 or more GCE 'A' levels compared to 5 or more GCSEs at A*-C. ² Returns to first degrees and 'other' undergraduate qualifications are estimated relative to individuals holding 2 or more GCE 'A' levels as their highest qualification. ³ Returns to higher degree (taught), higher degree (research) and other postgraduate qualifications are estimated relative to undergraduate degrees.

Source: London Economics' analysis of pooled Quarterly Labour Force Survey data for 2000-2017

A2.1.3 'Age-decay' function

Many of the economic analyses considering the lifetime benefits associated with higher education qualifications to date (e.g. Walker and Zhu (2013)) have focused on the returns associated with the

‘traditional path’ of higher education qualification attainment – namely progression directly from secondary level education and completion of a three or four year undergraduate degree from the age of 19 onwards (completing by the age of 21 or 22). These analyses assume that there are **direct costs** (tuition fees etc.), as well as an **opportunity cost** (the foregone earnings whilst undertaking the qualification full-time) associated with qualification attainment. More importantly, these analyses make the implicit assumption that any and all of the estimated earnings and/or employment benefit achieved accrues to the individual.

However, **the labour market outcomes associated with the attainment of higher education qualifications on a part-time basis are fundamentally different than those achieved by full-time students**. In particular, part-time students typically undertake higher education qualifications several years later than the ‘standard’ full-time undergraduate (e.g. the average age at enrolment amongst students completing first degrees with the University of York on a part-time basis is **43**, compared to **19** for corresponding full-time students); generally undertake their studies over an extended period of time; and often combine their studies with full-time employment. Similarly, some University of York full-time students also tend to complete their higher education qualifications later than ‘typical’ UK full-time students (for instance, the average age at enrolment amongst full-time higher research degree students in the 2016-17 cohort stands at approximately **27**). Table 16 presents the average age at enrolment and completion for students in the 2016-17 University of York cohort⁷³.

Table 16 Average age at enrolment, study duration, and age at completion for students in the 2016-17 University of York cohort

Qualification level	Full-time students			Part-time students		
	Age at enrolment	Duration (years)	Age at completion	Age at enrolment	Duration (years)	Age at completion
Other undergraduate	19	2	21	37	6	43
First degree	19	3	22	43	9	52
Other postgraduate	26	2	28	37	3	40
Higher degree (taught)	24	1	25	34	2	36
Higher degree (research)	27	3	30	37	6	43

Note: All values have been rounded to the nearest integer.

Source: London Economics' analysis based on University of York HESA data

Given these characteristics, significant adjustments to the methodology need to be made when estimating the returns to part-time (and late full-time) education attainment at the University. The key change relates to the introduction of an **‘age-decay’ function**. This approach assumes that possession of a particular higher education qualification is associated with a certain earnings or employment premium, and that this entire labour market benefit accrues to the individual *if* the qualification is attained before the age of 24 (for undergraduate qualifications) or 29 (for postgraduate qualifications).

⁷³ The assumed average age at enrolment is based on the number of individuals in the cohort assumed to *complete* a given qualification at the University of York (based on the assumption that some students might complete a different qualification than initially intended, or instead only attend several standalone modules associated with the intended qualification). In particular, the age at enrolment per qualification (based on the HESA data provided by the University of York) is calculated as the weighted average age at enrolment across students in the 2016-17 cohort expected to *complete* the given qualification (weighted by the number of students starting different qualification aims and completing each given qualification, separately by study mode).

The average duration of study (by qualification level and study mode) is based on separate information provided by the University of York. The average study durations for part-time students were calculated by adjusting the respective full-time study duration for the average study intensity among first-year part-time students in the 2016-17 University of York cohort.

However, as the age of attainment increases, it is expected that a declining proportion of the potential value of the estimated earnings and employment benefit accrues to the individual⁷⁴. This calibration ensures that those individuals completing qualifications at a relatively older age will see relatively low earnings and employment benefits associated with higher education qualification attainment (and perhaps reflect potentially different motivations amongst this group of learners). In contrast, those individuals attaining qualifications earlier in their working life will see a greater economic benefit (potentially reflecting the investment nature of qualification acquisition).

Table 17 presents the assumed age-decay adjustment factors which we apply to the marginal earnings and employment returns to full-time and part-time students undertaking qualifications at the University of York. To interpret the information in the table, to take an example, we have assumed that a student undertaking a postgraduate taught degree on a full-time basis achieves the full earnings and employment premium identified in the econometric analysis (for their entire working life). However, for a part-time taught postgraduate student, we assume that because of the late attainment (i.e. age 36), these students recoup only **77%** of the corresponding full-time earnings and employment premiums from that age (of attainment).

Note that the application of the 'age-decay' function implies that, for *all* qualification levels at the University, the estimated employment and earnings returns for part-time students are lower than the returns for comparable full-time students. These differences reflect the (relatively limited) wider economic literature on the returns to part-time study⁷⁵.

⁷⁴ Callender et al. (2011) suggest that the evidence points to decreasing employment returns with age at qualification: older graduates are less likely to be employed than younger graduates three and a half years after graduation; however, there are no differences in the likelihood of graduates undertaking part- and full-time study being employed according to their age or motivations to study.

⁷⁵ In general, these studies suggest that the economic returns to studying part-time are lower than the economic returns associated with studying full-time. This is in part because part-time students are often already employed when undertaking their studies, so the marginal (or additional) impact of the higher education qualification is lower. For instance, six months after graduation, graduates undertaking part-time study were three percentage points more likely to be employed than graduates undertaking full-time study, and less than half as likely (3% compared to 7%) to be unemployed. See Callender et al. (2011).

According to the same study, the salaries of graduates from part-time study grow at a slower pace compared with their full-time peers. Part-time graduates are less likely to see their salaries increase and are more likely to see their salaries stagnate between 6 months and 42 months after graduation: specifically, during this period, 78% of part-time graduates and 88% of full-time graduates saw their salaries rise, while 16% of part-time and 8% of full-time graduates experienced no change in salaries, and 6% of part-time and only 2% of former full-time students saw a drop in their salaries.

Table 17 Assumed age decay adjustment factors for students in the 2016-17 University of York cohort

Age	Other undergraduate	First degree	Other postgraduate	Higher degree (taught)	Higher degree (research)
16	100%	100%	100%	100%	100%
17	100%	100%	100%	100%	100%
18	100%	100%	100%	100%	100%
19	100%	100%	100%	100%	100%
20	100%	100%	100%	100%	100%
21	100%	100%	100%	100%	100%
22	100%	100%	100%	100%	100%
23	100%	100%	100%	100%	100%
24	98%	98%	100%	100%	100%
25	95%	95%	100%	100%	100%
26	93%	93%	100%	100%	100%
27	90%	90%	100%	100%	100%
28	88%	88%	100%	100%	100%
29	85%	85%	97%	97%	97%
30	83%	83%	94%	94%	94%
31	80%	80%	91%	91%	91%
32	78%	78%	89%	89%	89%
33	75%	75%	86%	86%	86%
34	73%	73%	83%	83%	83%
35	70%	70%	80%	80%	80%
36	68%	68%	77%	77%	77%
37	65%	65%	74%	74%	74%
38	63%	63%	71%	71%	71%
39	60%	60%	69%	69%	69%
40	58%	58%	66%	66%	66%
41	55%	55%	63%	63%	63%
42	53%	53%	60%	60%	60%
43	50%	50%	57%	57%	57%
44	48%	48%	54%	54%	54%
45	45%	45%	51%	51%	51%
46	42%	42%	49%	49%	49%
47	40%	40%	46%	46%	46%
48	37%	37%	43%	43%	43%
49	35%	35%	40%	40%	40%
50	32%	32%	37%	37%	37%
51	30%	30%	34%	34%	34%
52	27%	27%	31%	31%	31%
53	25%	25%	29%	29%	29%
54	22%	22%	26%	26%	26%
55	20%	20%	23%	23%	23%
56	17%	17%	20%	20%	20%
57	15%	15%	17%	17%	17%
58	12%	12%	14%	14%	14%
59	10%	10%	11%	11%	11%
60	7%	7%	9%	9%	9%
61	5%	5%	6%	6%	6%
62	2%	2%	3%	3%	3%
63	0%	0%	0%	0%	0%
64	0%	0%	0%	0%	0%
65	0%	0%	0%	0%	0%

Note: Shaded areas indicate relevant average graduation age per full-time / part-time student at each level of study with the University of York:

■ Full-time students ■ Part-time students

Source: London Economics' analysis based on University of York HESA data

A2.1.4 Estimating the gross graduate premium and gross public benefit

The gross graduate premium associated with qualification attainment is defined as the **present value** of **enhanced post-tax earnings** (i.e. after income tax, National Insurance and VAT are removed, and following the deduction of foregone earnings) relative to an individual in possession of the counterfactual qualification. To estimate the value of gross graduate premium, it is necessary to extend the econometric analysis (presented in Annex A2.1.2) by undertaking the following elements of analysis (separately by gender and study mode):

1. We estimated the employment-adjusted **annual earnings** achieved by individuals in the counterfactual groups (i.e. 2 or more GCE 'A' Levels or an undergraduate degree).
2. We inflated these baseline or counterfactual earnings using the marginal earnings premiums and employment premiums (presented in Table 14 and Table 15), adjusted to reflect late attainment (as outlined in Annex A2.1.3), to produce **annual age-earnings** profiles associated with the possession of each particular qualification.
3. We adjusted these generated age-earnings profiles to account for the fact that earnings would be expected to increase in real terms over time (at an assumed rate of **1.1%** per annum (based on the long-term real earnings growth rate estimated by the Office for Budget Responsibility (2018)⁷⁶).
4. Based on the earnings profiles generated by qualification holders, and income tax and National Insurance rates and allowances for the relevant academic year⁷⁷, we computed the future stream of net earnings (i.e. post-tax)⁷⁸. Using similar assumptions, we further calculated the stream of (employment-adjusted) foregone earnings (based on earnings in the relevant counterfactual group⁷⁹) during the period of study, again net of tax, for full-time students only.
5. We calculated the **discounted** stream of additional (employment-adjusted) future earnings compared to the relevant counterfactual group (using a standard discount rate of **3.5%** as presented in HM Treasury Green Book (HM Treasury, 2011)), and the discounted stream of foregone earnings during qualification attainment (for full-time students), to generate a present value figure. We thus arrive at the **gross graduate premium** (or equivalent for other qualifications).
6. The **discounted** stream of enhanced taxation revenues minus the tax income foregone during students' qualification attainment (where relevant) derived in element 4 provides an estimate of the **gross public benefit** associated with higher education qualification attainment.

Note that the gross graduate premium and gross public benefit for students undertaking qualifications at a level equivalent to or lower than the highest qualification that they are already in

⁷⁶ This captures the average forecasted long-term real earnings growth rate (calculated by adjusting the nominal earnings growth rate for (Retail Price Index) inflation) between 2023-24 and 2067-68.

⁷⁷ I.e. 2016-17. Note that the analysis assumes fiscal neutrality, i.e. it is asserted that the earnings tax and National Insurance income bands grow at the same rate of annual earnings growth of **1.1%**.

⁷⁸ The tax adjustment also takes account of increased VAT revenues for HMG, by assuming that individuals consume 94% of their annual income, and that 50% of their consumption is subject to VAT at a rate of **20%**. The assumed proportion of income consumed is based on forecasts of the long-term savings rate published by the Office for Budget Responsibility (2018), while the proportion of consumption subject to VAT is based on VAT estimates provided by the Office for Budget Responsibility (no date).

⁷⁹ The foregone earnings calculations are based on the baseline or counterfactual earnings associated with either 2 or more GCE 'A' Levels or an undergraduate degree. However, as outlined in Annex A2.1.1, some students in the 2016-17 cohort were in possession of other levels of prior attainment.

To accommodate this, as a simplifying assumption, the foregone earnings for students previously in possession of HE qualifications other than undergraduate degrees are based on the level of foregone earnings associated with 2 or more GCE 'A' Levels (adjusted for the age at enrolment and completion associated with the relevant qualification obtained). Similarly, the estimated foregone earnings for students previously in possession of postgraduate qualifications are based on the level of foregone earnings associated with an undergraduate degree.

possession of was assumed to be zero. For example, it is assumed that a student in possession of a taught postgraduate degree undertaking an additional postgraduate qualification at the University of York will not incur any wage or employment benefits from this additional qualification attainment (while still incurring the costs of foregone earnings during the period of study).

Further note that the analysis of gross graduate premiums and public purse benefits was undertaken at a **national** (UK-wide) level. To adjust for differences across the Home Nations, these UK-wide premiums were then combined with the relevant differential student support costs facing the individual and/or the Exchequer for students domiciled in the different Home Nations.

The resulting gross graduate premiums and gross public purse benefits per student (by study mode, level of study, gender and prior attainment) are presented in Table 18.

Table 18 Gross graduate premiums and Exchequer benefits associated with HE qualification attainment, by study mode, level, gender and prior attainment

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Gross graduate premiums										
Full-time students										
Other undergraduate	£114,000	£77,000	£35,000	£43,000	£-17,000	£-15,000	£-21,000	£-13,000		
First degree	£161,000	£98,000	£84,000	£64,000	£32,000	£7,000	£-29,000	£-22,000		
Other postgraduate							£-25,000	£14,000	£-40,000	£-35,000
Higher degree (taught)							£18,000	£26,000	£-16,000	£-15,000
Higher degree (research)							£56,000	£53,000	£-65,000	£-55,000
Part-time students										
Other undergraduate		£34,000		£23,000	£0	£0	£0	£0	£0	£0
First degree						£1,000				
Other postgraduate					£22,000	£40,000	£1,000	£29,000	£0	£0
Higher degree (taught)							£26,000	£38,000	£0	£0
Higher degree (research)							£61,000		£0	£0
Gross Exchequer benefits										
Full-time students										
Other undergraduate	£116,000	£74,000	£48,000	£45,000	£-3,000	£-2,000	£-5,000	£-1,000		
First degree	£171,000	£99,000	£104,000	£70,000	£53,000	£24,000	£-6,000	£-3,000		
Other postgraduate							£-5,000	£25,000	£-21,000	£-17,000
Higher degree (taught)							£28,000	£29,000	£-7,000	£-7,000
Higher degree (research)							£95,000	£62,000	£-37,000	£-28,000
Part-time students										
Other undergraduate		£27,000		£18,000	£0	£0	£0	£0	£0	£0
First degree						£1,000				
Other postgraduate					£24,000	£35,000	£1,000	£24,000	£0	£0
Higher degree (taught)							£29,000	£33,000	£0	£0
Higher degree (research)							£65,000		£0	£0

Note: All values are rounded to the nearest £000. Gaps may arise where there are no students in the 2016-17 University of York cohort expected to complete the given qualification (of the given characteristics). Grey shading indicates instances where the level of study at the University of York is equal to or lower than the level of previous attainment. In these instances, the analysis implicitly assumes that all calculated gross returns (*before* the deduction of any foregone earnings or other costs) can only be larger or equal to zero (i.e. there can be no wage or employment penalty associated with any higher education qualification attainment). Hence, each grey-shaded cell displays only the assumed underlying foregone earnings.

¹ 'GCSE' refers to qualifications at Level 2 and below, or no qualifications. ² 'A-level' refers to any qualification at Level 3 ((including A-levels and Highers). ³ 'Postgraduate' includes all postgraduate qualifications (including Postgraduate Certificates of Education).

Source: London Economics' analysis

A2.1.5 Net graduate premium and net public benefit

Table 19 and Table 20 provide detailed information on the net graduate premiums and net public benefits for students associated with all higher education qualifications offered by the University of York, based on the 2016-17 cohort. Each table provides detailed information on the net graduate premiums/net Exchequer benefits by student domicile, study mode, study level, prior attainment, and gender.

Table 19 Net graduate premiums associated with higher education qualification attainment, by domicile, study mode, level, gender and prior attainment**A) Students from England**

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate	£110,000	£73,000	£31,000	£39,000	£26,000	£1,000	£12,000	£21,000	£47,000	£44,000
First degree	£156,000	£93,000	£78,000	£58,000	£26,000	£1,000	£12,000	£21,000	£47,000	£44,000
Other postgraduate							£1,000	£1,000	£1,000	£1,000
Higher degree (taught)							£12,000	£21,000	£12,000	£21,000
Higher degree (research)							£47,000	£44,000	£47,000	£44,000
Part-time students										
Other undergraduate		£27,000		£16,000	£11,000	£30,000	£19,000	£19,000	£19,000	£19,000
First degree						£10,000	£10,000	£10,000	£10,000	£10,000
Other postgraduate					£11,000	£30,000	£19,000	£19,000	£19,000	£19,000
Higher degree (taught)							£22,000	£34,000	£22,000	£34,000
Higher degree (research)							£53,000	£53,000	£53,000	£53,000

B) Students from Wales

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£35,000	£42,000						
First degree			£84,000	£64,000						
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

C) Students from Scotland

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£32,000	£40,000						
First degree			£80,000	£60,000						
Other postgraduate							-£38,000	£1,000		
Higher degree (taught)								£21,000		
Higher degree (research)							£47,000			
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

D) Students from Northern Ireland

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£33,000	£40,000						
First degree			£80,000	£60,000						
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

Note: All values are rounded to the nearest £000. Gaps may arise where there are no students in the 2016-17 University of York cohort expected to complete the given qualification (of the given characteristics). Grey shading indicates instances where the level of study at the University of York is equal to or lower than the level of previous attainment. In these instances, the analysis implicitly assumes that all calculated gross returns (*before* the deduction of any foregone earnings or other costs) can only be larger or equal to zero (i.e. there can be no wage or employment penalty associated with any higher education qualification attainment). Hence, each grey-shaded cell displays only the assumed underlying foregone earnings

¹ 'GCSE' refers to qualifications at Level 2 and below, or no qualifications. ² 'A-level' refers to any qualification at Level 3 ((including A-levels and Highers). ³ 'Postgraduate' includes all postgraduate qualifications (including Postgraduate Certificates of Education). *Source: London Economics' analysis*

Table 20 Net Exchequer benefits associated with higher education qualification attainment, by domicile, study mode, level, gender and prior attainment**A) Students from England**

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate	£103,000	£61,000	£35,000	£32,000	-£15,000	-£15,000	-£18,000	-£14,000		
First degree	£152,000	£80,000	£85,000	£51,000	£35,000	£5,000	-£25,000	-£21,000		
Other postgraduate							-£6,000	£23,000	-£23,000	-£19,000
Higher degree (taught)							£28,000	£28,000	-£8,000	-£7,000
Higher degree (research)							£95,000	£62,000	-£37,000	-£28,000
Part-time students										
Other undergraduate		£19,000		£10,000	-£8,000	-£8,000	-£8,000	-£8,000	-£8,000	-£8,000
First degree						-£10,000				
Other postgraduate					£23,000	£34,000	£1,000	£24,000	-£1,000	-£1,000
Higher degree (taught)							£28,000	£32,000	-£0,000	-£0,000
Higher degree (research)							£65,000		£0	£0

B) Students from Wales

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£32,000	£29,000						
First degree			£80,000	£46,000						
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

C) Students from Scotland

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£34,000	£31,000						
First degree			£84,000	£50,000						
Other postgraduate							-£6,000	£23,000		
Higher degree (taught)								£28,000		
Higher degree (research)							£95,000			
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

D) Students from Northern Ireland

Level of study	Previous qualification and gender									
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Full-time students										
Other undergraduate			£34,000	£31,000						
First degree			£83,000	£49,000						
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										
Part-time students										
Other undergraduate										
First degree										
Other postgraduate										
Higher degree (taught)										
Higher degree (research)										

Note: All values are rounded to the nearest £000. Gaps may arise where there are no students in the 2016-17 University of York cohort expected to complete the given qualification (of the given characteristics). Grey shading indicates instances where the level of study at the University of York is equal to or lower than the level of previous attainment. In these instances, the analysis implicitly assumes that all calculated gross returns (*before* the deduction of any foregone earnings or other costs) can only be larger or equal to zero (i.e. there can be no wage or employment penalty associated with any higher education qualification attainment). Hence, each grey-shaded cell displays only the assumed underlying foregone earnings

¹ 'GCSE' refers to qualifications at Level 2 and below, or no qualifications. ² 'A-level' refers to any qualification at Level 3 ((including A-levels and Highers). ³ 'Postgraduate' includes all postgraduate qualifications (including Postgraduate Certificates of Education). *Source: London Economics' analysis*

A2.1.6 Additional information on the 2016-17 UK-domiciled cohort of University of York students

In Table 21, we present a detailed breakdown of the 2016-17 UK-domiciled University of York cohort by level and mode of study, prior attainment and gender

Table 21 UK-domiciled students in the 2016-17 University of York cohort (headcount), by study mode, level of study, gender and prior attainment

Level and mode of study	Previous qualification										
	GCSE ¹		A-level ²		Other undergraduate		First degree		Postgraduate ³		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
Full-time students	20	20	1,610	2,095	10	30	475	505	85	110	4,960
Other undergraduate	0	15	0	10	0	5	0	0	0	0	30
First degree	20	5	1,610	2,085	10	25	10	15	0	0	3,780
Other postgraduate	0	0	0	0	0	0	80	150	15	40	285
Higher degree (taught)	0	0	0	0	0	0	315	310	15	20	660
Higher degree (research)	0	0	0	0	0	0	70	30	55	50	205
Part-time students	0	10	0	5	25	70	135	185	135	140	705
Other undergraduate	0	10	0	5	15	60	20	60	20	30	220
First degree	0	0	0	0	0	5	0	0	0	0	5
Other postgraduate	0	0	0	0	10	5	80	45	100	75	315
Higher degree (taught)	0	0	0	0	0	0	30	80	10	25	145
Higher degree (research)	0	0	0	0	0	0	5	0	5	10	20
Total	20	30	1,610	2,100	35	100	610	690	220	250	5,665
Other undergraduate	0	25	0	15	15	65	20	60	20	30	250
First degree	20	5	1,610	2,085	10	30	10	15	0	0	3,785
Other postgraduate	0	0	0	0	10	5	160	195	115	115	600
Higher degree (taught)	0	0	0	0	0	0	345	390	25	45	805
Higher degree (research)	0	0	0	0	0	0	75	30	60	60	225

Note: 'Other undergraduate' includes higher education qualifications at first degree level and below (e.g. Foundation Degrees). 'Other postgraduate' includes qualifications such as postgraduate diplomas, certificates, and professional training courses such as Postgraduate Certificate in Education and Masters of Public Administration.

¹ 'GCSE' refers to qualifications at Level 2 and below, or no qualifications. ² 'A-level' refers to any qualification at Level 3 ((including A-levels and Highers). ³ 'Postgraduate' includes all postgraduate qualifications (including Postgraduate Certificates of Education).

Source: London Economics' analysis based on University of York HESA data

A2.2 Impact on exports

A2.2.1 Additional information on the 2016-17 non-UK-domiciled cohort of University of York students

Table 21 presents a detailed breakdown of the 2016-17 non-UK-domiciled University of York cohort by domicile, level and mode of study.

Table 22 Non-UK-domiciled students in the 2016-17 University of York cohort (headcount), by domicile, study mode and level of study

Level and mode of study	Domicile		
	EU	Non-EU	Total
Full-time students	315	1,510	1,825
Other undergraduate	0	105	105
First degree	190	310	500
Other postgraduate	5	0	5
Higher degree (taught)	90	990	1,080
Higher degree (research)	30	105	135
Part-time students	0	120	120
Other undergraduate	0	100	100
First degree	0	0	0
Other postgraduate	0	20	20
Higher degree (taught)	0	0	0
Higher degree (research)	0	0	0
Total	315	1,630	1,945
Other undergraduate	0	205	205
First degree	190	310	500
Other postgraduate	5	20	25
Higher degree (taught)	90	990	1,080
Higher degree (research)	30	105	135

Note: 'Other undergraduate' includes higher education qualifications at first degree level and below (e.g. Foundation Degrees). 'Other postgraduate' includes qualifications such as postgraduate diplomas, certificates, and professional training courses such as Postgraduate Certificate in Education and Masters of Public Administration.

Source: London Economics' analysis based on University of York HESA data

A2.2.2 Net tuition fee income per international student

Table 23 Net tuition fee income (present value over total study duration) per non-UK student in the 2016-17 cohort, by study level, domicile and study mode

Level and mode of study	Domicile	
	EU	Non-EU
Full-time students		
Other undergraduate	£9,000	£18,000
First degree	£13,000	£47,000
Other postgraduate	£12,000	£17,000
Higher degree (taught)	£5,000	£17,000
Higher degree (research)	£9,000	£45,000
Part-time students		
Other undergraduate	-	£16,000
First degree	-	-
Other postgraduate	-	£13,000
Higher degree (taught)	-	-
Higher degree (research)	-	-

Note: Gaps may arise where there are no students in the 2016-17 University of York cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £1,000. Source: London Economics' analysis

A2.2.3 Assumptions on average stay duration for international students

As outlined in Section 4.3, to estimate the non-tuition fee income associated with EU and non-EU students in the 2016-17 cohort of University of York students, we adjusted the estimates of non-tuition fee expenditure per academic year from the Student Income and Expenditure Survey (based on English students) to reflect longer stay durations for EU and non-EU students.

In particular, following a similar approach as outlined by the Department for Business, Innovation and Skills (2011b), we assume that **EU-domiciled postgraduate** and **non-EU undergraduate and postgraduate students** spend a larger amount of time in the UK than prescribed by the duration of the academic year (39 weeks), on average⁸⁰. Hence, we assume that all postgraduate students (both EU- and non-EU-domiciled) spend **52 weeks** per year in the UK, as they write their dissertations during the summer. Further, we assume that non-EU-domiciled and EU-domiciled undergraduate students spend an average of **42** and **39 weeks** per year in the UK (respectively). The relatively small number for EU undergraduate students reflects the fact that these students, given the relative geographical proximity to their home countries and the resulting relative ease and low cost of transport, are more likely to return home during holidays.

These assumptions are summarised in Table 24.

Table 24 Assumed average stay durations (in weeks) for non-UK domiciled students, by domicile and level of study

Level of study	Domicile	
	EU (outside UK)	Non-EU
Undergraduate	39 weeks	42 weeks
Postgraduate	52 weeks	52 weeks

Source: London Economics' analysis based on Department for Business, Innovation and Skills (2011b)

A2.2.4 Non-tuition fee income per international student

Table 25 Non-tuition fee income (present value over total study duration) per non-UK student in the 2016-17 cohort, by study level, domicile and study mode

Level and mode of study	Domicile	
	EU	Non-EU
Full-time students		
Other undergraduate	£21,000	£23,000
First degree	£31,000	£34,000
Other postgraduate	£28,000	£28,000
Higher degree (taught)	£14,000	£14,000
Higher degree (research)	£42,000	£42,000
Part-time students		
Other undergraduate	-	£80,000
First degree	-	-
Other postgraduate	-	£51,000
Higher degree (taught)	-	-
Higher degree (research)	-	-

Note: Gaps may arise where there are no students in the 2016-17 University of York cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2016-17 prices, discounted to reflect net present values, and rounded to the nearest £1,000. Source: London Economics' analysis

⁸⁰ There may be significant variation around these assumed average stay durations depending on individual students' circumstances, such as country of origin, parental income etc.



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