



**QUEEN'S
UNIVERSITY
BELFAST**

The economic and social impact of Queen's University Belfast



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Executive Summary







The aggregate economic impact of Queen's University Belfast

The total economic impact on the UK economy associated with Queen's University Belfast's activities in 2020-21 was estimated at approximately **£3.041 billion** (see Table 1). The effect on the rest of the world is likely to be in excess of this figure, such that the global economic value of Queen's University Belfast would be significant. Furthermore, given the geographic closeness and cultural links between Northern Ireland and the Republic of Ireland, it is likely that there would be substantial impact from the activities of Queen's University Belfast on the Republic of Ireland's economy.

Compared to Queen's University Belfast's total operational costs of approximately **£373 million** in 2020-21¹, this corresponds to a **benefit to cost ratio of 8.2:1**. This compares to an average benefit-to-cost ratio among Russell Group institutions of approximately **5.5:1** and corresponds to a **12%** increase in Queen's University Belfast's impact since 2015-16 (on a comparable basis, in real terms²). In terms of the components of this impact:

- Queen's University Belfast's **research and knowledge exchange activities** accounted for **£1,186 million (39%)** of this impact;
- The value of Queen's University Belfast's teaching and learning activities stood at **£1,068 million (35%)**;
- The impact of Queen's University Belfast's **educational exports** was estimated at **£305 million (10%)**; and
- The impact generated by the **operating and capital spending** of Queen's University Belfast stood at **£482 million (16%)**.

Table 1 Total economic impact of Queen's University Belfast's activities in the UK in 2020-21 (£m and % of total)

Type of impact	£m	%
 Impact of research and knowledge exchange	£1,186m	39%
Research activities	£488m	16%
Knowledge exchange activities	£698m	23%
 Impact of teaching and learning	£1,068m	35%
Students	£550m	18%
Exchequer	£518m	17%
 Impact of exports	£305m	10%
Tuition fee income	£140m	5%
Non-tuition fee income	£165m	5%
 Impact of expenditure	£482m	16%
Direct impact	£370m	12%
Indirect and induced impacts	£112m	4%
Total economic impact	£3,041m	100%

Note: Presented in 2020-21 prices (rounded to nearest £1m). Totals may not add up due to rounding. *Source: London Economics.*

¹ The **£370 million** of direct impact of Queen's University Belfast expenditures includes the **£373 million** of operating expenditure here *excludes* capital expenditure (**£29 million**) but *includes* depreciation costs (**£23 million**) and movements in pension provisions (**£9 million**).

² The 2015-16 impact of Queen's University Belfast amounted to **£2.1 billion** (in 2020-21 prices).





The impact of Queen’s University Belfast’s research and knowledge exchange activities

To estimate the **direct** economic impact associated with Queen’s University Belfast’s research, we used information on the total research-related income accrued by the University in 2020-21. The total research-related income accrued by Queen’s University Belfast in 2020-21 stood at **£121 million**. To arrive at the net impact of the University’s research activities, we deducted the public costs of funding the University’s research. Together, these public costs amounted to **£88 million** in 2020-21, resulting in a **net direct research impact** of **£33 million**.

Existing academic literature³ suggests strong evidence of the existence of **productivity spillovers** from public investment in university research. Applying estimates from the literature, our analysis implies a spillover multiplier of approximately **3.8** associated with Queen’s University Belfast’s research income in 2020-21. Combining the **net direct impact** of the University’s research activities (**£33 million**) with the resulting **productivity spillovers** accrued by other organisations across the UK (**£454 million**), the total impact of research conducted by the University in 2020-21 was estimated at **£488 million**.

In addition to Queen’s University Belfast’s research, the analysis estimated the impact associated with **knowledge exchange activities** (the activities of Queen’s University Belfast’s **spinout companies**). The analysis considers the direct, indirect, and induced economic impacts associated with these activities. The **direct** impact of these activities was based on the turnover of Queen’s University Belfast’s active spinout companies. The **total direct, indirect, and induced impacts** of these activities was then estimated using relevant **economic multipliers** derived from a (multi-regional) Input-Output model. Using this approach, the analysis estimates that Queen’s University Belfast’s spinout activities generated a total of **£269 million** of impact across the UK economy in 2020-21⁴.

The total economic impact associated with Queen’s University Belfast’s research and knowledge exchange activities in 2020-21 was estimated at **£1,186 million** (see Figure 1).

The impact of Queen’s University Belfast’s research and knowledge exchange activities in 2020-21 stood at £1,186 million.

Figure 1 Total impact of Queen’s University Belfast’s research activities in 2020-21, £m



Note: All values are presented in economic output in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. *Source: London Economics’ analysis*

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

⁴ These figures are largely driven by a single spinout, which accounts for around 90% of the total revenue associated with Queen’s University Belfast’s spinout companies. Nonetheless, this simply reflects the life cycle of spinout companies, which can turn into large successful companies, as illustrated in this case.





The impact of Queen's University Belfast's teaching and learning activities

The analysis of the impact of Queen's University Belfast's teaching and learning activities estimates the **enhanced employment and earnings benefits to graduates**, and, separately, the **additional taxation receipts to the Exchequer** associated with higher education qualification attainment at the University⁵. The analysis is adjusted for the characteristics of the **8,605** UK domiciled students who started a qualification at Queen's University Belfast in the 2020-21 academic year.

Incorporating both the expected costs associated with qualification attainment and the labour market benefits expected to be accrued by students/graduates over their working lives, the analysis suggests that the **net graduate premium** achieved by representative Northern Irish-domiciled students in the 2020-21 cohort completing a **full-time first degree** (with GCE 'A' Levels as highest level of prior attainment) stands at approximately **£104,000** (in 2020-21 money terms). Separately, taking account of the benefits and costs to the public purse, the analysis indicates that the corresponding **net Exchequer benefit** associated with these students stands at **£93,000**.⁶

The total economic impact of Queen's University Belfast's teaching and learning stands at £1,068 million.

The net graduate premiums and net Exchequer benefits were combined with information on the number of students starting qualifications in 2020-21 and expected completion rates. The aggregate economic impact generated by teaching and learning activities associated with the 2020-21 cohort stood at approximately **£1,068 million** (see Section 3). This is split approximately equally between students and the Exchequer, with **£550 million (51%)** of the economic benefit

generated accrued by students undertaking qualifications at Queen's University Belfast, and the remaining **£518 million (49%)** accrued by the Exchequer.

Table 2 Aggregate impact of Queen's University Belfast teaching and learning activities associated with the 2020-21 cohort (£m), by type of impact, domicile, and level of study

Beneficiary and study level	Domicile				
	England	Wales	Scotland	Northern Ireland	Total
Students	£33m	£2m	£2m	£513m	£550m
Undergraduate	£25m	£2m	£1m	£398m	£425m
Postgraduate	£8m	£1m	£1m	£115m	£125m
Exchequer	£35m	£2m	£3m	£478m	£518m
Undergraduate	£24m	£1m	£1m	£347m	£373m
Postgraduate	£11m	£1m	£2m	£131m	£145m
Total	£68m	£4m	£5m	£991m	£1,068m
Undergraduate	£49m	£3m	£2m	£745m	£799m
Postgraduate	£19m	£1m	£3m	£246m	£269m

Note: All estimates are presented in 2020-21 prices, discounted to reflect net present values, rounded to the nearest £1m, and may not add up precisely to the totals indicated. **Source: London Economics' analysis**

⁵ The estimation of the net graduate premiums and net Exchequer benefits is based on a detailed econometric analysis of the Labour Force Survey. The analysis considers the impact of higher education qualification attainment on earnings and employment outcomes; however, as no information is specifically available on the particular HEI attended, the analysis is not specific to Queen's University Belfast alumni. Rather, the findings from the analysis are adjusted to reflect the characteristics of the 2020-21 cohort of Queen's University Belfast students (e.g. in terms of mode of study, level of study, subject mix, domicile, gender, average age at enrolment, duration of qualification, and average completion rates).

⁶ The full set of net graduate premiums and net Exchequer benefits for all domiciles and characteristics is presented in Annex A2.1.5.





The impact of Queen’s University Belfast’s educational exports

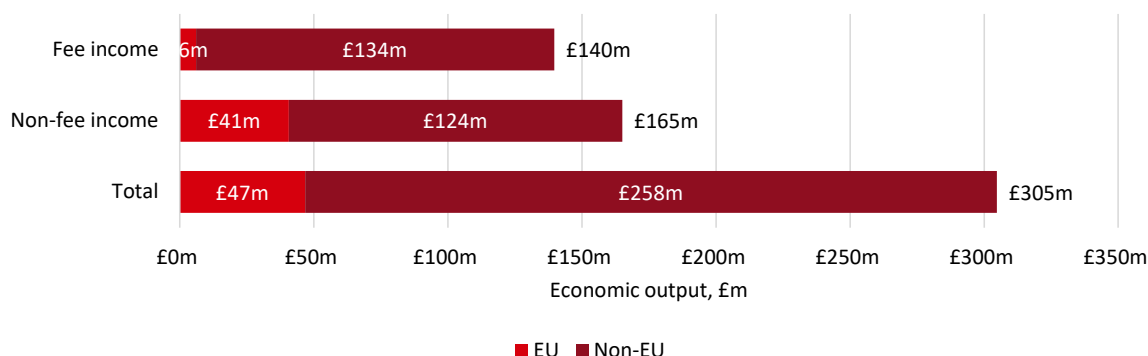
With the UK attracting many international students, the University’s higher education offer represents a tradeable activity with imports and exports like any other tradeable sector. The economic impact of Queen’s University Belfast’s contribution to educational exports is based on the **direct** injection of **tuition fee and non-tuition fee income** from international students. As with the University’s knowledge exchange activities, this income generates **indirect and induced impacts** throughout the UK economy, through supply chain and wage income effects. The analysis focuses on the cohort of **2,890** non-UK domiciled students who started qualifications at Queen’s University Belfast in the 2020-21 academic year. Of these students, **545 (19%)** were EU-domiciled, and **2,345 (81%)** were from non-EU countries.

Combining the estimates of tuition fee income (net of any Exchequer cost or Queen’s University Belfast’s cost of funding international students) and non-tuition fee income associated with international students in the 2020-21 cohort, the **total export income (i.e. direct impact)** generated by this cohort stood at **£129 million**. Approximately half of this income (**£60 million**) was generated from international students’ (net) tuition fee expenditure, while the other half (**£69 million**) was generated from international students’ non-tuition fees accrued by Queen’s University Belfast.

The total (direct, indirect, and induced) economic impact associated with this export income was again estimated using relevant economic multipliers, estimating the extent to which the direct export income generates additional activity throughout the UK economy. We thus estimate that the **total economic impact** on the UK generated by the (net) tuition fee income and non-tuition fee income associated with international students in the 2020-21 Queen’s University Belfast cohort amounts to **£305 million**. Of this total, **£140 million** of this impact was associated with international students’ (net) **tuition fees**, and **£165 million** was associated with these students’ **non-tuition fee expenditures** over the duration of their studies at Queen’s University Belfast.

The impact of the export income generated by the 2020-21 Queen’s University Belfast cohort stood at £305 million.

Figure 1 Impact of Queen’s University Belfast’s educational exports associated with international students in the 2020-21 cohort (£m), by domicile and type of income



Note: All estimates are presented in 2020-21 prices, discounted to reflect net present values, rounded to the nearest £1m, and may not add up precisely to the totals indicated.

Source: London Economics’ analysis





The impact of Queen's University Belfast's expenditure

Queen's University Belfast's physical footprint supports jobs and promotes economic growth throughout the UK. This is captured by the **direct, indirect, and induced impact** associated with the expenditures of the institution. The **direct impact** of Queen's University Belfast's physical footprint was based on the operating and capital expenditures of the University. In 2020-21, Queen's University Belfast incurred a total of **£370 million** of expenditure (including **£341 million** of operating expenses and **£29 million** of capital expenditure)⁷.

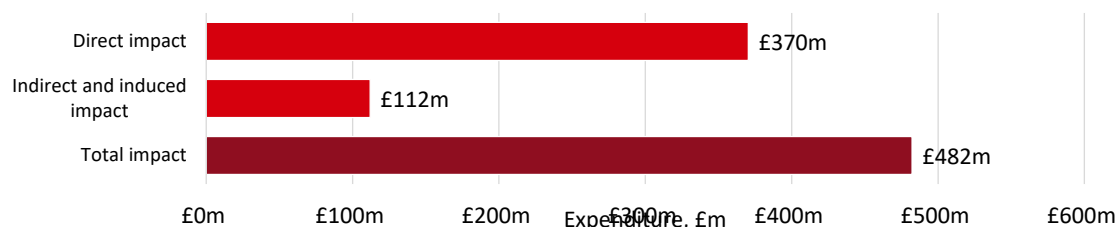
The impact of Queen's University Belfast's expenditure on the UK economy in 2020-21 stood at £482 million.

Again, the direct increase in economic activity resulting from the expenditures of Queen's University Belfast generates additional rounds of spending throughout the economy (through the University's supply chains, and the spending of staff). Applying the relevant economic multipliers, the **total direct, indirect, and induced impact** associated with Queen's University Belfast's expenditures in 2020-21 was estimated at **£482 million** (see Section 5).

In terms of **region**, just over two-thirds of this impact (**£323 million, 67%**) occurred in **Northern Ireland**, while the remainder (**£159 million, 33%**) was spent across the rest of the UK.

In relation to the **sector of impact**, in addition to the impacts occurring in the government, health, and education sector itself (**£256 million, 53%**), there are also large impacts felt within other sectors, e.g. including the distribution, transport, hotel, and restaurant sector (**£56 million, 12%**), the production sector (**£52 million, 11%**), and the real estate sector (**£41 million, 9%**).

Figure 2 Impact associated with Queen's University Belfast's expenditure in 2020-21 (£m)



Note: All estimates are presented in 2020-21 prices, rounded to the nearest £1m, and may not add up precisely to the totals indicated.

Source: London Economics' analysis

In terms of the number of FTE jobs supported, Queen's University Belfast's spending supported a total of **4,420** FTE jobs across the UK economy in 2020-21 of which **3,410 (77%)** were located within Northern Ireland. The remaining **1,010** jobs supported by the activities of Queen's University Belfast are located across the rest of the UK.

⁷ The total operational expenditure (excluding capital expenditure) of Queen's University Belfast in 2020-21 stood at **£373 million**. From this, for the purpose of the analysis, we excluded **£23 million** in depreciation costs (from non-staff expenditure) and **£9 million** in movements in pension provisions (from staff expenditure), 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).



1 Introduction

London Economics were commissioned to assess the **economic and social impact of Queen's University Belfast in the United Kingdom**, focusing on the 2020-21 academic year. Queen's University Belfast contributes to the UK's national prosperity through a range of activities and channels, and the analysis is split into:

- The impact of **research and knowledge exchange activities**;
- The impact of **teaching and learning**;
- The impact of **educational exports**; and
- The impact of **operating and capital expenditures**;

Reflecting these channels of impact, the remainder of this report is structured as follows.

In **Section 2**, we outline our estimates of the impact of Queen's University Belfast's research and knowledge exchange activities. To estimate the impact of the world-leading research undertaken at Queen's University Belfast, we combine information on the research-related income accrued by Queen's University Belfast in 2020-21 with estimates from the wider economic literature on the extent to which public investment in research activity results in additional private sector productivity (i.e. positive 'productivity spillovers'). Additionally, we explore the economic impact of Queen's University Belfast's spinout companies, to estimate the effect of knowledge exchange activities on the UK economy.

In **Section 3**, we assess the improved labour market earnings and employment outcomes associated with higher education attainment at Queen's University Belfast. Through an assessment of the lifetime benefits and costs associated with educational attainment, we estimate the net economic benefits of Queen's University Belfast's teaching and learning activity to the University's students and the public purse (through enhanced taxation receipts), focusing on the cohort of **8,605** UK domiciled students who started higher education qualifications at Queen's University Belfast in 2020-21.

In addition to these UK domiciled students, there were a further **2,890** international students in the 2020-21 cohort of Queen's University Belfast students, contributing to the value of UK educational exports through their tuition fees as well as their non-fee (i.e. living cost) expenditures during their studies. **Section 4** assesses the direct, indirect, and induced economic impacts generated by this fee and non-fee income associated with Queen's University Belfast's 2020-21 cohort of international students.

Given that Queen's University Belfast is a major employer and supports its core activities through significant expenditures, the University's substantial physical footprint also supports jobs and promotes economic growth throughout the UK economy. **Section 5** presents our estimates of the direct, indirect, and induced economic impacts associated with the operating and capital expenditures incurred by Queen's University Belfast in 2020-21.

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. Throughout the report, case studies highlight these social benefits that cannot easily be captured in an economic sense or distilled into a monetary value but which represent a large social impact.



2 The impact of Queen's University Belfast's research and knowledge exchange activities

In this section, we outline our analysis of the **economic impact of Queen's University Belfast's research and knowledge exchange activities**. The impact of Queen's University Belfast's research accounts for both the **direct effects** of this research (captured by the research income accrued by Queen's University Belfast, net of any public funding), as well as the **productivity spillover effects** from Queen's University Belfast's research activities to the rest of the UK economy. The analysis of knowledge exchange activities then estimates the economic impacts associated with the activities of Queen's University Belfast's **spinout companies**.

2.1 Impact of Queen's University Belfast's research

2.1.1 Direct research impact

To estimate the **direct impact** generated by Queen's University Belfast's research activities, we used information on the total research-related income accrued by Queen's University Belfast in the 2020-21 academic year, including:

- Income from **research grants and contracts** provided by:
 - **UK sources**, including the UK Research Councils; UK-based charities; central government bodies, local authorities, and health and hospital authorities; industry and commerce; and other UK sources;
 - **EU sources**, including government bodies, charities, industry and commerce, and other sources; and
 - **Non-EU sources**, including charities, industry and commerce, and other sources; and
- **Recurrent research funding** allocated to Queen's University Belfast by the Department for the Economy (DfE)⁸.

Aggregating across these sources, the total research-related income accrued by Queen's University Belfast in the 2020-21 academic year stood at **£120.9 million** (see Figure 3). As a result, the research income received by Queen's University Belfast accounted for a significant proportion (**13%**) of the total expenditure on research and development (R&D) in Northern Ireland in 2020 (**£912.6 million**)⁹.

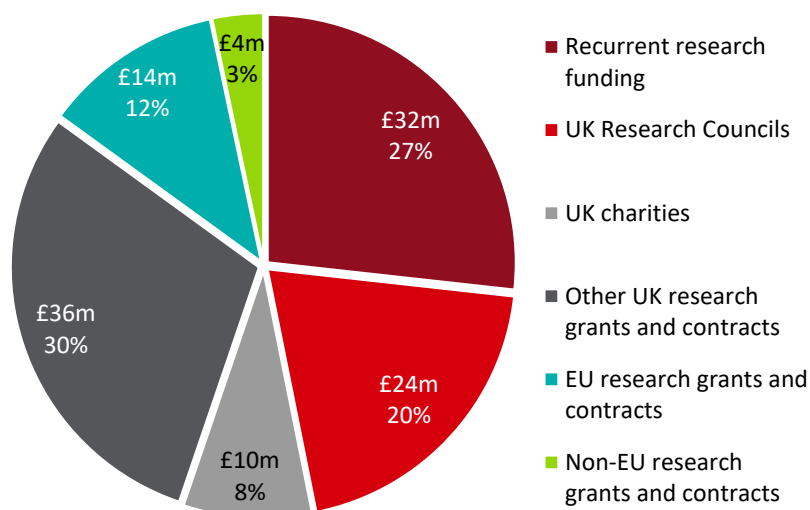
Queen's University Belfast received its research-related income from a variety of different sources both nationally and internationally. Approximately **27% (£32 million)** of this income was received through recurrent research grant funding from the Department for the Economy, with an additional **20% (£24 million)** received from the UK Research Councils, **8% (£10 million)** from UK charities, and **30% (£36 million)** from other UK sources¹⁰. In addition, in terms of funding from international sources, **12% (£14 million)** of Queen's University Belfast's research-related income was derived from EU research grants and contracts, and the remaining **3% (£4 million)** was from non-EU sources.

⁸ This constitutes funding from DfE through its quality-related research funding.

⁹ See Northern Ireland Statistics and Research Agency (2021). Expenditure on R&D refers to R&D activity undertaken by the business enterprise, higher education, and government. R&D expenditure covers all R&D performed in Northern Ireland, irrespective of who pays for it, including funding from abroad; however, it excludes R&D performed outside of Northern Ireland, even if it is funded from Northern Ireland.

¹⁰ This income from 'other UK sources' includes **£31 million** from UK central government bodies, local authorities, and health and hospital authorities; **£5 million** from UK industry, commerce and public corporations; and **£0.2 million** from other sources.



Figure 3 Research income received by Queen's University Belfast in 2020-21, £m by source

Note: All values are presented in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated.

Source: London Economics' analysis based on data provided by Queen's University Belfast

To arrive at the **net direct impact** of Queen's University Belfast's research activities on the UK economy, we deducted the costs to the public purse of funding Queen's University Belfast's research activities in 2020-21 from the above total research income. These public costs include the funding for recurrent research grants provided by the Department for the Economy (**£32 million**), funding provided by UK Research Councils (**£24 million**), and other research income from UK central government bodies, local authorities, and health and hospital authorities (**£31 million**). Deducting these total public purse costs (**£88 million**) from the above total research-related income (**£121 million**), we estimate that the **net direct impact** associated with Queen's University Belfast's research activity in the 2020-21 academic year stood at **£33 million**.

2.1.2 Productivity spillovers

In addition to the direct impact of research, the wider academic literature indicates that investments in research and development (R&D) and other intangible assets may induce **positive externalities**. The term 'externality' describes situations in which the activities of one 'agent' in the market induces (positive or negative) external effects on other agents in that market (which are not reflected in the price mechanism). In the context of the economic impact of research activities, existing academic literature assesses the existence and size of 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 sector¹¹. For example, spillovers are enabled through direct R&D collaborations between universities and firms (such as Knowledge Transfer Partnerships), the publication and dissemination of research, or through university graduates entering the labour market and passing on their knowledge to their employers.

¹¹ Note that there are clearly also 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.



Transforming Supportive Cancer Care for Patients and Families

Led by Dr Olinda Santin and Dr Gillian Prue, researchers at the School of Nursery and Midwifery at Queen's University Belfast have transformed supportive care for cancer survivors and their families through the development of a new model for follow up care termed 'The Recovery Package.'



Unmet Needs of Cancer Survivors

In 2007, there were UK-wide concerns within the NHS regarding an unmet healthcare need of cancer survivors, and that the traditional model of cancer follow-up was inadequate. These concerns led to a call for research to explore the impacts of this on cancer survivors and to look at ways that their experiences could be improved.

In response to this, researchers at Queen's University Belfast conducted a study of cancer survivors. They found that, compared to the general population, **cancer survivors have a lower quality of life, more unmet needs (such as mental health and financial needs) and significantly poorer health in a number of areas (including physical functioning, emotional functioning and general health perception).** Informal carers of cancer survivors also reported poorer physical and mental health than carers of other chronic conditions.

'A Recovery Package'

A **£1.3 million project** funded by Macmillan Cancer Care for Northern Irish patients responded to the issues found in this research. Termed 'a recovery package', this included holistic assessment, a treatment summary record, an individualised pathway and rapid entry back into the system.

An independent impact evaluation of this found that **direct improvements had been made in the care of at least 1,000 cancer survivors in Northern Ireland every year.** The changes to follow-up care in cancer treatment meant patients were better informed, felt empowered to self-manage, saw reduced anxiety and had to spend less time travelling or waiting at clinics. These improvements led to the team at Queen's University Belfast co-designing an online support system which is now integrated into services across Northern Ireland. This system supports **10,000 families per year** and has been adapted to support families affected by cancer in Australia and Vietnam.

Queen's University Belfast responded to widespread concerns about the unmet needs of cancer survivors across the UK by conducting research into the causes and impacts of these inadequacies. **Due to the university's research, the situation in Northern Ireland regarding cancer follow-up care has been greatly improved, and the solutions implemented in the nation have been adapted to support families around the world.**



Of particular interest in the context of research conducted by universities, a study by Haskel and Wallis (2010)¹² investigates **spillovers from publicly funded R&D activities**. The authors analyse productivity spillovers to the private sector from public spending on R&D by the UK Research Councils and public spending on civil and defence-related R&D^{13, 14}, and the relative effectiveness of these channels of public spending in terms of their impact on the 'market sector'. They find strong evidence of the existence of market sector productivity spillovers from public R&D expenditure originating from the UK Research Councils¹⁵. Their findings imply that, while there is no spillover effect associated with publicly funded civil and defence R&D, the marginal spillover effect of public spending on research through the Research Councils stands at **12.7 (i.e. every £1 spent on research through the Research Councils results in an additional annual output of £12.70 within the UK private sector)**.

Another study by Haskel et al. (2014) provides additional insights 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 industries. 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), interacted with measures of industry research activity, and total factor productivity within the different market sectors. 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)**.

It should be noted that much of the existing literature does not assume a rate of depreciation on publicly funded R&D investments. A standard assumption of the depreciation rate from the literature is around 20-25% per year, which still implies a significant estimate of the productivity spillover.

How do these estimates compare to the wider literature?

Whilst these research spillovers are quantitatively large; they are in line with related findings from the (relatively limited) economic literature. A report for the (former) Department for Business, Innovation and Skills (2014) replicates the Haskel and Wallis (2010) approach, using a different (publicly available) dataset and a slightly different methodology to explore variation in types of research council R&D investments in terms of their impact on private sector productivity. Despite the difference in data and approach, they find qualitatively similar findings: research council R&D investments yield large returns through their impact on private sector productivity.¹⁶ The comparable research multiplier is estimated at 10.71. Moreover, the report finds much higher returns, depending on the precise approach and sample used. Additionally, research from Australia finds a similar research spillover to Haskel and Wallis (2010), albeit with a slightly lower research

¹² Also see Imperial College London (2010) for a summary of Haskel and Wallis's findings.

¹³ 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.

¹⁴ This is undertaken by regressing total factor productivity growth in the UK on various measures of public sector R&D spending.

¹⁵ Note that the authors' regressions only test for correlation, so that their results could be subject to reverse causation (i.e. it might be 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 produce 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 Wallis argue that their results appear robust in relation to reverse causation.

¹⁶ The coefficient on research council spending is 10.71 in the sample up to 2008, although this is not statistically significant given the limited number of observations employed in their sample.



multiplier of 9.76, which may be expected given the different country studied (Elnasri and Fox, 2017)¹⁷.

There is more limited research associated with general R&D multipliers (for other research income) although a report published for the Department for Business, Innovation and Skills, looking into the international benchmarking of the UK science and innovation system, notes a rate of return in the range of 20 to 50% (Department for Business, Innovation and Skills, 2014).¹⁸

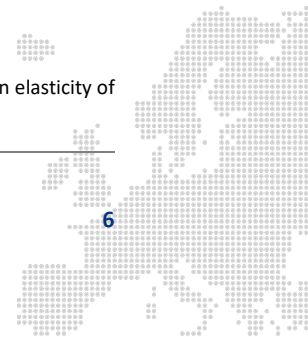
This demonstrates that researchers using different methods and datasets find similar results with regards to estimates of research spillovers.

What are the estimates of the productivity spillovers?

To estimate the productivity spillovers associated with Queen's University Belfast's research activities, we apply these productivity spillover multipliers from the existing literature to the different types of research-related income received by Queen's University Belfast in 2020-21 (again see Figure 3). More specifically, we assign the multiplier of 12.7 to the research funding that Queen's University Belfast received from UK Research Councils and UK charities in 2020-21 (equal to **£34 million**), and the multiplier of 0.2 to all other research funding received by Queen's University Belfast in that academic year (**£87 million**). We thus infer a weighted average spillover multiplier associated with Queen's University Belfast's research activities of approximately **3.8** – i.e. every **£1 million** invested in Queen's University Belfast's research activities generates an additional annual economic output of **£3.8 million** across the UK economy. We thus estimate that the research conducted by Queen's University Belfast in 2020-21 resulted in total market sector productivity spillovers of **£454 million**.

¹⁷ See London Economics (2018), *The economic impact of the Group of Eight in Australia* (Section 2.2.1). The authors find an elasticity of 0.175, which converted to a research spillover, equals 9.76.

¹⁸ See also Salter and Martin (2001).



Zero Emission Public Buses



Led by Professor Juliana Early, Dr Geoff Cunningham and Professor Ray Douglas, researchers at the School of Mechanical and Aerospace Engineering at Queen's University Belfast have played a key role in decarbonising public transport. Decades of work has led to the university gaining **expertise in powertrain simulation**, which was used **in partnership with Wrightbus to develop low emissions buses that are currently in use across the UK.**

Reaching Net Zero

The UK government has set a legally binding target of reaching net zero by 2050. Buses, especially low or zero emissions buses, are a great way to encourage a substantial number of people to reduce their carbon emissions to help meet this target, as one double-decker bus can replace 75 cars. Reducing the number of cars on the road also positively impacts air quality and improves public health, particularly in urban areas.

Powertrain Modelling

Since the mid-1990s, Queen's University Belfast has been researching and developing advanced hybrid powertrain modelling technologies. Powertrain modelling utilises mathematical methods to understand how the different components of a buses engine work together to drive the bus forward. Developing and advancing these models brings opportunities for improving the performance and reducing the emissions of buses. The efforts made over the last few decades, alongside a culture of rigorous experimental validation, have meant **the university can now model a complete powertrain system.**

Low Emissions Buses

The modelling architecture developed by Queen's University Belfast has, according to the Director of Engineering at Wrightbus, *"been integral to the development of [their] flagship hybrid electric vehicles, the StreetLite and StreetDeck Next Generation Hybrid buses, supporting the design of the overall system configuration, component sizing, as well as the on-vehicle control system."*

Over 1,000 of these buses are now in operation across the UK, using technologies based upon the techniques and models developed at Queen's University Belfast. The modelling at the university has also played an integral role in the **£66 million investment** by Translink, Northern Ireland's public transport provider, for 100 low emission battery electric and hydrogen vehicles. It has also been used to support tender processes further afield, including in Chile and Australia.

Collaborating with those outside of the university has resulted in research which has made real change in the UK and across the world. **This research undertaken at Queen's University Belfast has been integral to reducing the emissions of buses, playing a key role in decarbonising public transport and contributing to reaching the goal of net zero.**

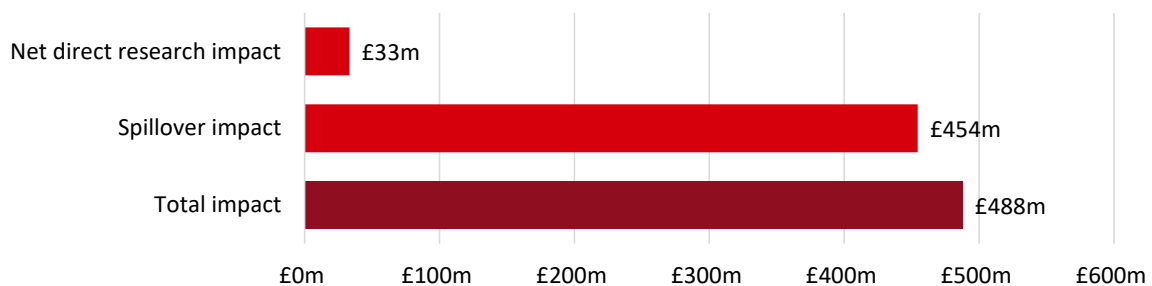


2.1.3 Aggregate impact of Queen’s University Belfast’s research

Combining the direct economic impact of Queen’s University Belfast’s research (£33 million) with the estimated productivity spillovers associated with this research (£454 million), we estimate that the total economic impact associated with Queen’s University Belfast’s research activities in 2020-21 stood at approximately £488 million (see Figure 4).

Comparing this total impact to the £121 million of total research income received by Queen’s University Belfast in 2020-21, this suggests that **for every £1 million of its research income, Queen’s University Belfast’s research activities generated a total of £4 million in economic impact across the UK.**

Figure 4 Total impact of Queen’s University Belfast’s research activities in 2020-21, £m



All values are presented in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the total indicated.

Source: London Economics’ analysis

2.2 Impact of Queen’s University Belfast’s knowledge exchange activities

In addition to its research activities, Queen’s University Belfast generates significant economic impacts through its knowledge exchange activities. Here, we assess the impacts associated with the operations of spinout companies whose activities are based on Queen’s University Belfast’s intellectual property to assess the impact of the university’s knowledge exchange activities.

Specifically, the analysis captures the direct, indirect, and induced economic impacts associated with the operations of spinout companies, defined as follows:

- **Direct effect:** This measures the direct economic activity generated by Queen’s University Belfast’s spinout companies, which is measured by their turnover.
- **Indirect effect (‘supply chain impacts’):** Queen’s University Belfast’s spinout companies spend their income on purchases of goods and services from their suppliers, which in turn spend this revenue to purchase inputs to meet companies’ demands. This results in a chain reaction of subsequent rounds of spending across industries, often referred to as a ‘ripple effect’.
- **Induced effect (‘wage spending impacts’):** The employees of Queen’s University Belfast’s spinouts use their wages to buy consumer goods and services within the economy. This in turn generates wage income for employees within the industries producing these goods and services, again leading to subsequent rounds of 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 Queen's University Belfast's knowledge exchange activities. An analysis of the *net* economic impact ideally needs to account of 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; and
- **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 region¹⁹.

The direct, indirect, and induced impacts are measured in terms of monetary economic output²⁰, gross value added (GVA)²¹, and full-time equivalent (FTE) employment supported. In addition to measuring these impacts on the UK economy as a whole, the analysis is broken down by geographic region and sector.

These impacts of Queen's University Belfast's knowledge exchange activities were estimated using **economic multipliers** derived from Input-Output tables, which measure the total production output of each industry in the UK economy, and the inter-industry (and intra-industry) flows of goods and services consumed and produced by each sector²². In other words, these tables capture the degree to which different sectors within the UK economy are connected, i.e. the extent to which changes in the demand for the output of any one sector impact on all other sectors of the economy. To be able to achieve a breakdown of the analysis by region, we developed a **multi-regional Input-Output model**, combining UK-level Input-Output tables (for 2016²³) with a range of regional-level data²⁴ to achieve a granular breakdown by sector²⁵ and region²⁶.

In addition to the impacts associated with Queen's University Belfast's knowledge exchange activities described in this section, a similar methodology is applied to estimate the direct, indirect, and induced economic effects arising from the tuition fee and non-tuition fee income associated

¹⁹ It is important to note that, while the analysis takes account of *leakage* (e.g. adjusting for the extent to which any additional income for supplying industries might be spent on imports of goods and services from outside the UK), the estimated impacts here are *not* adjusted for *displacement* or *additionality* (e.g. the extent to which the income received by Queen's University Belfast's spinouts might otherwise have been used for other purposes by the organisations from which the income is received). Hence, our analysis effectively estimates the direct, indirect, and induced impacts associated with Queen's University Belfast's knowledge exchange activities in *gross* terms.

²⁰ Here, economic output is equivalent to income/turnover (i.e., the direct economic output associated with Queen's University Belfast's spinout companies is captured by the turnover of these firms in 2020-21).

²¹ Gross value added is used in National Accounting to measure the economic contribution of different industries or sectors, and is defined as economic output minus intermediate consumption (i.e. the cost of goods and services used in the production process).

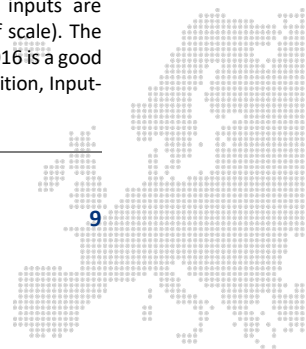
²² Specifically, the analysis makes use of *Type II* multipliers, defined as $[\text{Direct} + \text{indirect} + \text{induced impact}]/[\text{Direct impact}]$.

²³ See Office for National Statistics (2020a).

²⁴ The fundamental idea of the multi-regional Input-Output analysis is that region *i*'s demand for region *j*'s output is related to the friction involved in shipments from one region to another (which we proxy by the distance between the two regions), and that cross-regional trade can be explained by the relative gross value added of the sector in all regions. The multi-regional Input-Output model was derived by combining UK-level Input-Output tables with data on geographical distances between regions; GVA and compensation of employees by sector and region (Office for National Statistics, 2019); employment by sector and region (Office for National Statistics, 2020b); gross disposable household income by region (Office for National Statistics, 2020c); population by region (Office for National Statistics, 2020d); and UK imports into each region and exports by each region, by commodity (Office for National Statistics, 2018).

²⁵ In terms of sector breakdown, the original UK Input-Output tables are broken down into 64 (relatively granular) sectors. However, the (wide range of) regional-level data required to generate the multi-regional Input-Output model is not available for such a granular sector breakdown. Instead, the multi-regional Input-Output model is broken down into 10 more high-level sector groups (see Table 19 in Annex A2.2.1 for more information).

²⁶ While Input-Output analyses are a useful tool to assess the total economic impacts generated by a wide range of activities, it is important to note several key limitations associated with this type of analysis. Input-Output analyses assume that inputs are complements, and that there are constant returns to scale in the production function (i.e. that there are no economies of scale). The interpretation of these assumptions is that the prevailing breakdown of inputs from all sectors (employees, and imports) in 2016 is a good approximation of the breakdown that would prevail if total demand (and therefore output) were marginally different. In addition, Input-Output analyses do not account for any price effects resulting from a change in demand for a given industry/output.



with Queen's University Belfast's international students (see Section 4), and from the operational and capital expenditures of Queen's University Belfast (see Section 5).

2.2.1 Impact of Queen's University Belfast's spinout companies

To assess the direct impact associated with Queen's University Belfast's spinout companies, we made use of information on the turnover (as a measure of economic output), FTE employment, and GVA associated with a total of **38** UK-based Queen's University Belfast spinout companies that were active in 2020-21 (where available)²⁷. The information on each company's turnover and employment was based on data provided by Queen's University Belfast, supplemented with information from Bureau van Dijk's FAME database (based on Companies House information) to fill any gaps where possible²⁸. The direct gross value added generated was estimated by multiplying the turnover of each firm by the average ratio of GVA to output among organisations within the given company's industry and region^{29, 30}. Based on this approach, the direct impact associated with the activities of Queen's University Belfast's spinout activities in 2020-21 was thus estimated at **£269 million** in economic output (i.e. turnover) terms, **2,250 FTE staff**, and **£130 million** of gross value added³¹.

We then applied relevant economic multipliers (derived from our above-described Input-Output analysis) to estimate the total direct, indirect, and induced economic impacts associated with Queen's University Belfast's spinout companies. Specifically, we assigned relevant economic multipliers to each active spinout company in 2020-21, based on each firm's industry classification and the region of its main registered office address. The resulting average multiplier across all spinout companies (weighted by the underlying (direct) turnover, employment, and GVA associated with each firm) on the UK economy as a whole is **2.60** in terms of economic output, **2.67** in terms of GVA and **3.57** in terms of FTE employment³². Based on these estimates, in terms of economic output, we assume that every **£1 million** of turnover directly accrued by Queen's University Belfast's spinout companies generates an additional **£1.60 million** of impact throughout the UK economy. In terms of employment, we assume that, for every **1,000** (FTE) staff employed by these spinout companies, an additional **2,570** staff are supported throughout the UK³³.

²⁷ The analysis includes spinouts with some Queen's University Belfast ownership but excludes those where there is no formal ownership. We exclude companies that were dissolved prior to 2020-21, or those that are primarily non-UK based. Further note that the information is based on each company's 2020-21 financial year, which does not necessarily coincide with the 2020-21 academic year and varies across companies.

²⁸ Note that, in spite of using FAME data to fill gaps, it is likely that the combined Queen's University Belfast and FAME data still provide an incomplete estimate of the total turnover, GVA, or employment of Queen's University Belfast's spinout companies. This particularly applies to relatively small companies falling below the reporting thresholds required by Companies House (implying that their financials would not be included in the FAME data).

²⁹ Again, these ratios were derived based on the above-described multi-regional Input-Output model. Each firm's main industry classification was based on information provided by Queen's University Belfast, with any gaps again filled using information from FAME. Each firm's main regional location was based on the region of the main registered address of the company recorded in FAME.

³⁰ The analysis made use of any resulting turnover, employment, or GVA information available for a given company, irrespective of whether complete data (i.e. in terms of turnover, GVA and employment) was available for that firm. The direct impact is therefore based on a total of 24 firms (out of the 38 active companies) for which turnover information was available or greater than zero, and 27 firms for which employment information was available or greater than zero.

³¹ These figures are largely driven by a single spinout, which accounts for around 90% of the total revenue associated with Queen's University Belfast's spinout companies. Nonetheless, this simply reflects the life cycle of spinout companies, which can turn into large successful companies, as illustrated in this case.

³² The table provides multipliers for the impact on the UK economy as a whole and is weighted based on the turnover of each spinout company. These multipliers constitute Type II multipliers, defined as $[\text{Direct} + \text{indirect} + \text{induced impact}]/[\text{Direct impact}]$.

³³ The employment multiplier provided is significantly higher than in the multiplier tables provided elsewhere in the report as it relates to the multipliers associated with the sector and region of Queen's University Belfast's spinouts, rather than sector and region of the university itself. The higher employment multiplier associated with Queen's University Belfast's spinout activities (compared to other activities in later sections of this report) are due to the majority of spinout turnover being in the information and communication sector within London.



Applying these multipliers to the above direct impacts, the total economic impact associated with the activities of Queen's University Belfast's spinout companies in the 2020-21 academic year was estimated to be **£698 million** across the UK economy, of which **£450 million (64%)** was generated in London and **£50 million (7%)** was generated in Northern Ireland (see Table 3). The estimated total number of FTE jobs supported stood at **8,015** (of which **4,020** were located in London and **580** in Northern Ireland). The estimate in terms of GVA stood at **£348 million** (of which **£200 million** occurred in London and **£36 million** in Northern Ireland). The large impact in London, as opposed to Northern Ireland, reflects the base of the largest Queen's University Belfast spinout.

Table 3 Economic impact associated with Queen's University Belfast's spinout companies in 2020-21

Location of impact	Output, £m	GVA, £m	# of FTE employees
North East	£8m	£6m	£0m
North West	£20m	£11m	£0m
Yorkshire & the Humber	£17m	£9m	315
East Midlands	£17m	£10m	335
West Midlands	£19m	£11m	330
East of England	£27m	£16m	475
London	£450m	£200m	4,020
South East	£48m	£25m	650
South West	£18m	£11m	325
Wales	£9m	£6m	210
Scotland	£16m	£9m	260
Northern Ireland	£50m	£36m	580
Total UK	£698m	£348m	8,015

Note: All monetary values are presented in 2020-21 prices and rounded to the nearest £1 million. The employment figures are rounded to the nearest 5.

Source: London Economics' analysis

In terms of sector, the impact of Queen's University Belfast's spinout companies in the 2020-21 academic year was particularly large within the **information and communication sector (£295 million, 42%)**, **professional and support activities sector (£106 million, 15%)**, the **distribution, transport, hotel, and restaurant sector (£81 million, 12%)**, and the **production sector (£67 million, 10%)**.³⁴

Box 1 Queen's University Belfast's external investment in spinouts

Whilst in this section we have focused on economic output, gross value added and FTE jobs created by Queen's University Belfast's spinouts, it is also the case, that these spinouts are responsible for a large volume of external investment received. In 2020-21, the combined **external investment received** by the University's spinouts and start-ups totalled **£60.9 million**. Whilst it is not possible to disaggregate the domestic versus non-domestic investment (and hence attribute additionality), it is likely that a large proportion of this amount comes from international sources and would not have occurred without the research activities of Queen's University Belfast.

³⁴ For more detail on which industries are included in this high-level sector classification, please refer to Table 19 in Annex A2.2.1.

Transforming the Lives of People with Cystic Fibrosis



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The Queen's University Belfast Cystic Fibrosis (CF) team, situated in the School of Medicine, Dentistry and Biomedical Sciences, is recognised as world leading. Led by Professor Stuart Elborn, Professor Julie Bradley and Dr Damian Downey, researchers have worked for over 12 years supporting the development of transformative drugs that have increased the lung function and quality of life of thousands of those who live with CF.

What is Cystic Fibrosis?

Cystic Fibrosis is a progressive, life-limiting genetic disease caused by a mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) gene, which is responsible for the regulation of salt and water levels in the body. These mutations can cause persistent chest infections, lung damage and potentially an early death due to respiratory failure. **CF is the most common life limiting condition effecting children and young adults in Northwest Europe.** 10,500 people live with CF in the UK, accounting for 9,500 hospital admissions and over 100,000 bed days per year.

Targeting the Underlying Genetic Deficit

Professor Stuart Elborn at Queen's University Belfast helped establish an international programme looking at the underlying genetic deficit which causes CF, which now covers **58 research centres across 17 countries** and two out of three of patients in Europe with CF. **Recently, the university has been at the forefront of major advancements in drugs targeting the mutation.** The main challenge in these advancements was the delivery of clinical trials. The university's multi-disciplinary team worked with industry, clinical trial networks and contract research organisations to deliver early- and late-stage trials of both single and multiple combination therapies.

Queen's University Belfast worked alongside Vertex Pharmaceuticals, who commented that the university's expertise *"in Cystic Fibrosis, and with respect to clinical trials has hugely contributed to the outstanding progress in treating this severe, life shortening disease across more than a decade of dedicated help and knowledge."*

Triple Therapy

The most recent trials have looked at a 'triple therapy', which uses a combination of three different drugs. The therapy was approved in both the EU and the US in 2020. Dr Francis Collins, one of those who discovered the CFTR mutation originally in 1989 describes the success of this research: *"...it has been 30 years that we've been hoping and dreaming for a day like this, where you could look at data and just absolutely - your jaw drops because it is so impressive and so good. Now we are at the point with this triple therapy where 90% of people with cystic fibrosis are going to have substantial and amazing benefit from the drug therapy that looks as if it will convert what has been otherwise a very threatening and potentially fatal disease into a chronic illness that's going to require treatment but which should allow people to live much more normal lives."*

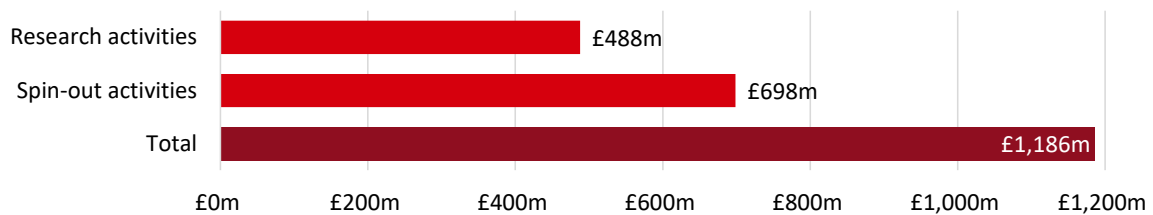
Researchers at Queen's University Belfast have led on the clinical development of treatments for Cystic Fibrosis that address the underlying genetic disorder. The treatments have transformed thousands of lives by improving the lung function and reducing the frequency of chest infections for those with CF.

2.3 Total impact of Queen’s University Belfast’s research and knowledge exchange activities

Finally, as presented in Figure 5, the total economic impact associated with Queen’s University Belfast’s research and knowledge exchange activities in 2020-21 was estimated at **£1,186 million**. **£488 million** was associated with Queen’s University Belfast’s research and productivity spillovers to the rest of the UK economy, while the remaining **£698 million** was associated with Queen’s University Belfast’s spinout companies.

The impact of Queen’s University Belfast’s research and knowledge exchange activities in 2020-21 stood at £1.2 billion.

Figure 5 Total impact of Queen’s University Belfast’s research and knowledge exchange activities in 2020-21, £m



Note: All values are presented in economic output in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated.

Source: London Economics’ analysis



3 The impact of Queen's University Belfast's teaching and learning activities

Economic impact analyses of higher education institutions typically only consider the direct, indirect, and induced economic effects of a university's expenditures (through the institution's extensive supply chains, and the expenditures on its staff), as well as the economic impacts associated with the expenditures of students attending the institution. However, given that one of universities' primary activities is to provide teaching and learning, a simple study of this nature would significantly underestimate the impact of any higher education institution's activities on the UK economy.

In terms of measuring the impact of universities' teaching and learning activities, 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**. Based on this approach, in this section of the report, we detail our estimates of the economic impact of the teaching and learning activities undertaken at Queen's University Belfast, by considering the labour market benefits associated with enhanced qualification attainment and skills acquisition – to **both the individual and the public purse**.

3.1 The 2020-21 cohort of UK domiciled Queen's University Belfast students

The analysis of the economic impact of Queen's University Belfast's teaching and learning activities is based on the **2020-21 cohort of UK domiciled students**. In other words, instead of Queen's University Belfast's entire student body of **25,365** students in 2020-21 (*irrespective* of when these individuals may have started their studies), the analysis in this section focuses on the **8,605** UK domiciled³⁵ students **starting higher education qualifications (or standalone modules/credits) in the 2020-21 academic year**³⁶.

In terms of **level of study** (Figure 6), **55% (4,755)** students in this cohort of UK-domiciled students were undertaking **first degrees**, with a further **1,520** students (**18%**) undertaking **postgraduate taught degrees**, and **280** students (**3%**) enrolled in **postgraduate research degrees**. An additional **700** students (**8%**) were enrolled in **other undergraduate qualifications**, and the remaining **1,345** (**16%**) were undertaking **other postgraduate qualifications**³⁷.

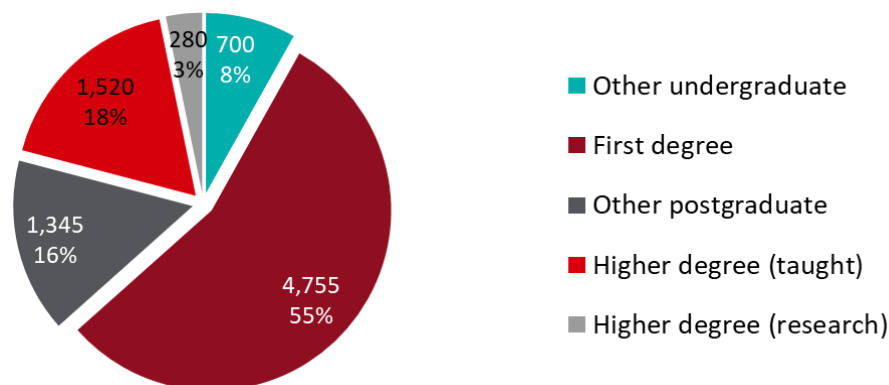
³⁵ It is likely that a proportion of EU and non-EU domiciled students undertaking their studies at Queen's University Belfast will remain in the UK to work following completion of their studies; similarly, UK domiciled students might decide to leave the UK to pursue their careers in other countries. Given the uncertainty in predicting the extent to which this is the case, and the difficulty in assessing the net labour market returns for students not resident in the UK post-graduation, the analysis of teaching and learning focuses on UK domiciled students only. In other words, we assume that all UK domiciled students will enter the UK labour market upon graduation, and that non-UK students will leave the UK upon completing their qualifications at Queen's University Belfast.

³⁶ We received HESA data on a total of **11,490** first-year students from Queen's University Belfast. Of these, we excluded **2,885** non-UK domiciled students (who are instead considered as part of the analysis of **educational exports** (Section 4)).

³⁷ 'Other undergraduate' learning includes Certificates of Higher Education, Foundation Degrees, other undergraduate-level diplomas and certificates, and undergraduate-level credits. 'Other postgraduate learning' includes Postgraduate Certificates or Professional Graduate Diplomas in Education, taught work for credit at postgraduate level, and other certificates, diplomas, and qualifications at postgraduate level.



Figure 6 UK domiciled students in the 2020-21 cohort of Queen’s University Belfast students, by level of study

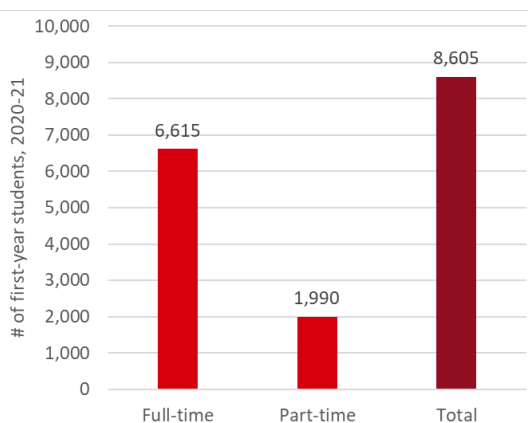


Note: All numbers are rounded to the nearest 5, and the total values may not add up due to this rounding. ‘Other undergraduate’ learning includes Certificates of Higher Education, Foundation Degrees, other undergraduate-level diplomas and certificates, and undergraduate-level credits. ‘Other postgraduate learning’ includes Postgraduate Certificates or Professional Graduate Diplomas in Education, taught work for credit at postgraduate level, and other certificates, diplomas, and qualifications at postgraduate level.

Source: London Economics’ analysis based on Queen’s University Belfast HESA data

In relation to **mode of study** (Figure 7), **6,615 (77%)** students in the cohort were undertaking their studies with Queen’s University Belfast on a full-time basis, while the remaining **1,990 (23%)** were enrolled on a part-time basis. As shown in Table 4, the majority of full-time students were undertaking first degrees (**72%**) or postgraduate taught degrees (**18%**). The majority of part-time students in the cohort were enrolled in postgraduate degrees with **18%** undertaking postgraduate taught degrees and **45%** undertaking other postgraduate learning. **35%** of part-time students were undertaking other undergraduate qualifications.

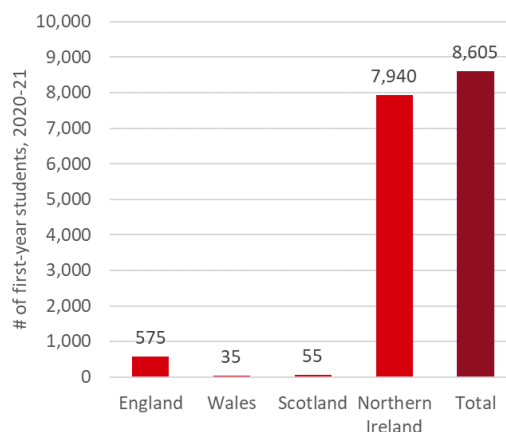
Figure 7 UK domiciled students in the 2020-21 cohort of Queen’s University Belfast students, by mode of study



Note: All numbers are rounded to the nearest 5, and the total values may not add up due to this rounding.

Source: London Economics’ analysis based on Queen’s University Belfast HESA data

Figure 8 UK domiciled students in the 2020-21 cohort of Queen’s University Belfast students, by domicile



Note: All numbers are rounded to the nearest 5, and the total values may not add up due to this rounding.

Source: London Economics’ analysis based on Queen’s University Belfast HESA data

In terms of **domicile** (Figure 8), the majority (**7,940, 92%**) of UK domiciled students in the cohort were from Northern Ireland, with the remaining **665 (8%)** students domiciled outside of Northern Ireland (including **575** students from England, **55** from Scotland, and **35** from Wales).

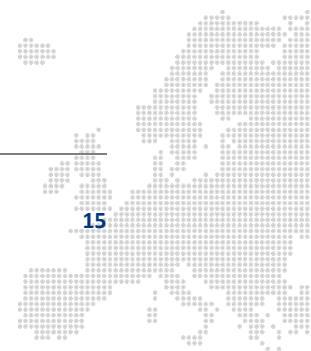


Table 4 UK domiciled students in the 2020-21 cohort of Queen’s University Belfast students, by level of study, mode, and domicile

Level and mode of study	Domicile				
	England	Wales	Scotland	Northern Ireland	Total
Full-time					
Other undergraduate	0	0	0	0	0
First degree	305	20	10	4,400	4,740
Other postgraduate	5	0	0	445	455
Higher degree (taught)	125	5	15	1,010	1,160
Higher degree (research)	45	0	10	205	260
Total	480	30	40	6,065	6,615
Part-time					
Other undergraduate	0	0	0	700	700
First degree	0	0	0	20	20
Other postgraduate	65	5	10	815	890
Higher degree (taught)	30	0	5	325	360
Higher degree (research)	0	0	0	20	20
Total	95	5	15	1,875	1,990
Total					
Other undergraduate	0	0	0	700	700
First degree	305	20	10	4,420	4,755
Other postgraduate	70	5	10	1,260	1,345
Higher degree (taught)	155	10	20	1,335	1,520
Higher degree (research)	45	0	10	225	280
Total	575	35	55	7,940	8,605

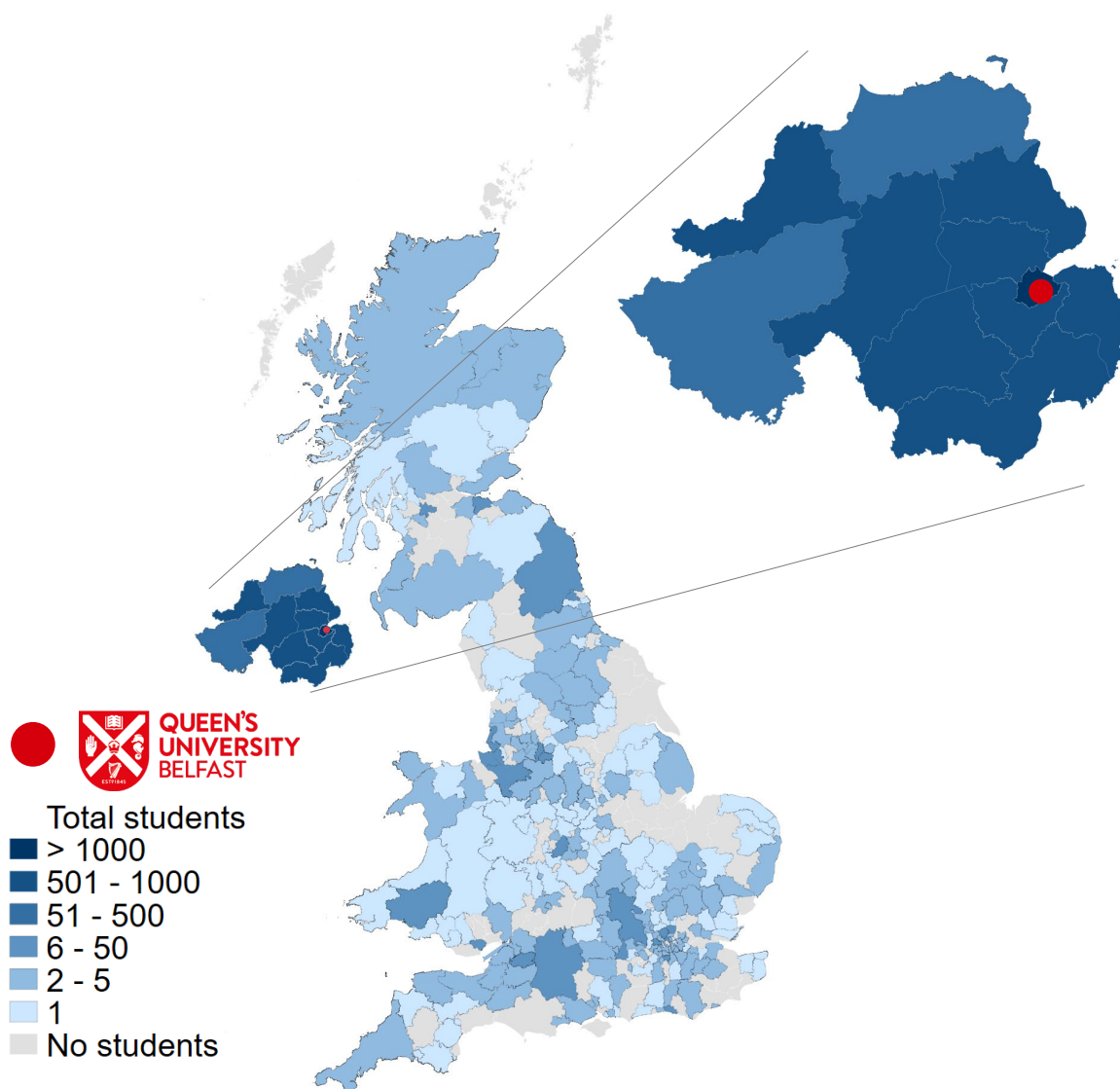
Note: All numbers are rounded to the nearest 5, and the total values may not add up due to this rounding.

‘Other undergraduate’ learning includes Certificates of Higher Education, Foundation Degrees, other undergraduate-level diplomas and certificates, and undergraduate-level credits. ‘Other postgraduate learning’ includes Postgraduate Certificates or Professional Graduate Diplomas in Education, taught work for credit at postgraduate level, and other certificates, diplomas, and qualifications at postgraduate level.

Source: London Economics’ analysis based on Queen’s University Belfast HESA data



Figure 9 UK domiciled students in the 2020-21 Queen's University Belfast cohort, by Local Authority domicile



Note: We received HESA data on a total of **8,612** UK-domiciled students from Queen's University Belfast. From those, we excluded **12** students from Guernsey, Jersey and the Isle of Man or with an unspecified unknown domicile in the UK. **Source: London Economics' analysis based on Queen's University Belfast's data and Office for National Statistics data. Contains National Statistics, OS, Royal Mail, Gridlink, ONS, NISRA, NRS and Ordnance Survey data © Crown copyright and database right 2022.**

3.2 Adjusting for completion rates

The previous section provided an overview of the number of UK-domiciled students *starting* qualifications or modules at Queen's University Belfast in the 2020-21 academic year. However, to aggregate individual-level impacts of Queen's University Belfast's teaching and learning activity, it is necessary to adjust the number of 'starters' to account for **completion rates**.

To achieve this, we used information provided by Queen's University Belfast on the completion outcomes of Queen's University Belfast students - broken down by study mode, study intention,

and study completion³⁸. In other words, these completion data include the number of students who completed their intended qualification (or module); completed a different (usually lower) qualification; or discontinued their studies without being awarded a qualification (modelled as completion at ‘other undergraduate’ level (for students who originally enrolled in first degrees or other undergraduate qualifications) or ‘other postgraduate’ level (for students who originally intended to complete higher degrees or other postgraduate qualifications)).³⁹

Table 5 presents the resulting completion rates applied throughout the analysis. We assume that, of those students starting a full-time first degree at Queen’s University Belfast in 2020-21, **92%** complete the first degree as intended, while the remaining **8%** undertake one or more of the credits/modules associated with their degree before discontinuing their studies (modelled as completion at ‘other undergraduate’ level). At postgraduate level, we assume that of those individuals starting a full-time postgraduate taught degree, **92%** complete the qualification as intended, while the remaining **8%** undertake one or more of the credits/modules associated with the intended degree before dropping out (in this case, modelled as completion at ‘other postgraduate’ level). For those individuals starting a full-time postgraduate research degree, approximately **86%** complete the qualification as intended, with the remaining **14%** completing at ‘other’ postgraduate level. In all of these cases, **the analysis of the impact of teaching and learning calculates the estimated returns associated with the completed qualification/standalone module(s).**

Table 5 Assumed completion rates of Queen’s University Belfast students

Completion outcome	Study intention				
	Other undergraduate	First degree	Other postgraduate	Higher degree (taught)	Higher degree (research)
Full-time students					
Other undergraduate	100%	8%	-	-	-
First degree	-	92%	-	-	-
Other postgraduate	-	-	100%	8%	14%
Higher degree (taught)	-	-	-	92%	-
Higher degree (research)	-	-	-	-	86%
Total	100%	100%	100%	100%	100%
Part-time students					
Other undergraduate	100%	8%	-	-	-
First degree	-	92%	-	-	-
Other postgraduate	-	-	100%	8%	14%
Higher degree (taught)	-	-	-	92%	-
Higher degree (research)	-	-	-	-	86%
Total	100%	100%	100%	100%	100%

Note: Totals may not sum due to rounding.

Source: London Economics’ analysis based on information on the completion outcomes of the cohorts of students provided by Queen’s University Belfast

³⁸ Note that, for consistency with our above definition of ‘other undergraduate’ students, we combined the original separate data for undergraduate-level credits and other undergraduate learning into a single category (and proceeded similarly for postgraduate-level credits and other postgraduate learning).

³⁹ In other words, we assume that students who discontinued their studies were assumed to at least complete one or several standalone modules associated with their intended qualification, so that these students’ completion outcomes were modelled as either completion at ‘other undergraduate’ or ‘other postgraduate’ level. As a result, the total assumed completion rates sum up to 100%.

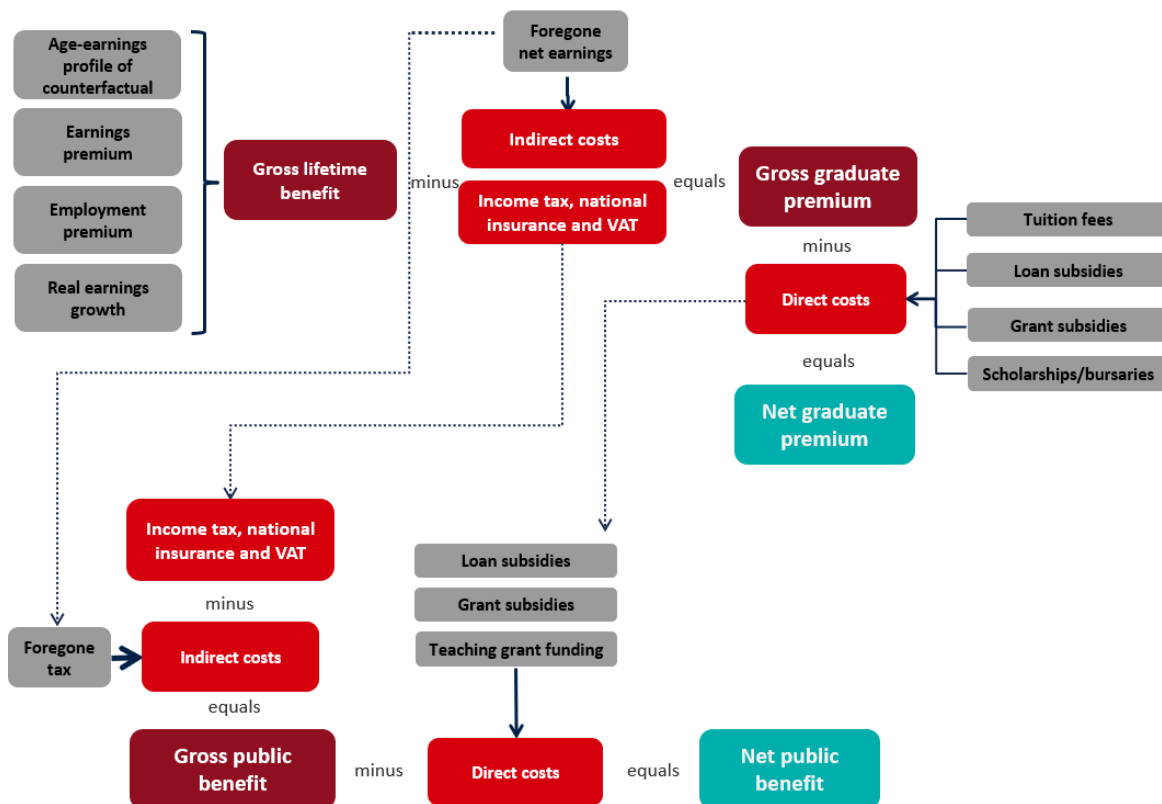


3.3 Defining the returns to higher education qualifications

The fundamental objective of the analysis of the impact of Queen's University Belfast's teaching and learning activities is to estimate the **gross and net graduate premium** to the individual and the **gross and net public purse benefit** to the Exchequer associated with higher education qualification attainment, defined as follows (and presented in Figure 10):

- 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 during study) relative to an individual in possession of the counterfactual qualification;
- The **gross benefit to the public purse** 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 during study) 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; and
- Similarly, the **net benefit to the public purse** is defined as the gross public purse benefit *minus* the direct Exchequer costs of provision during the period of attainment.

Figure 10 Overview of gross and net graduate premium, and gross and net Exchequer benefit



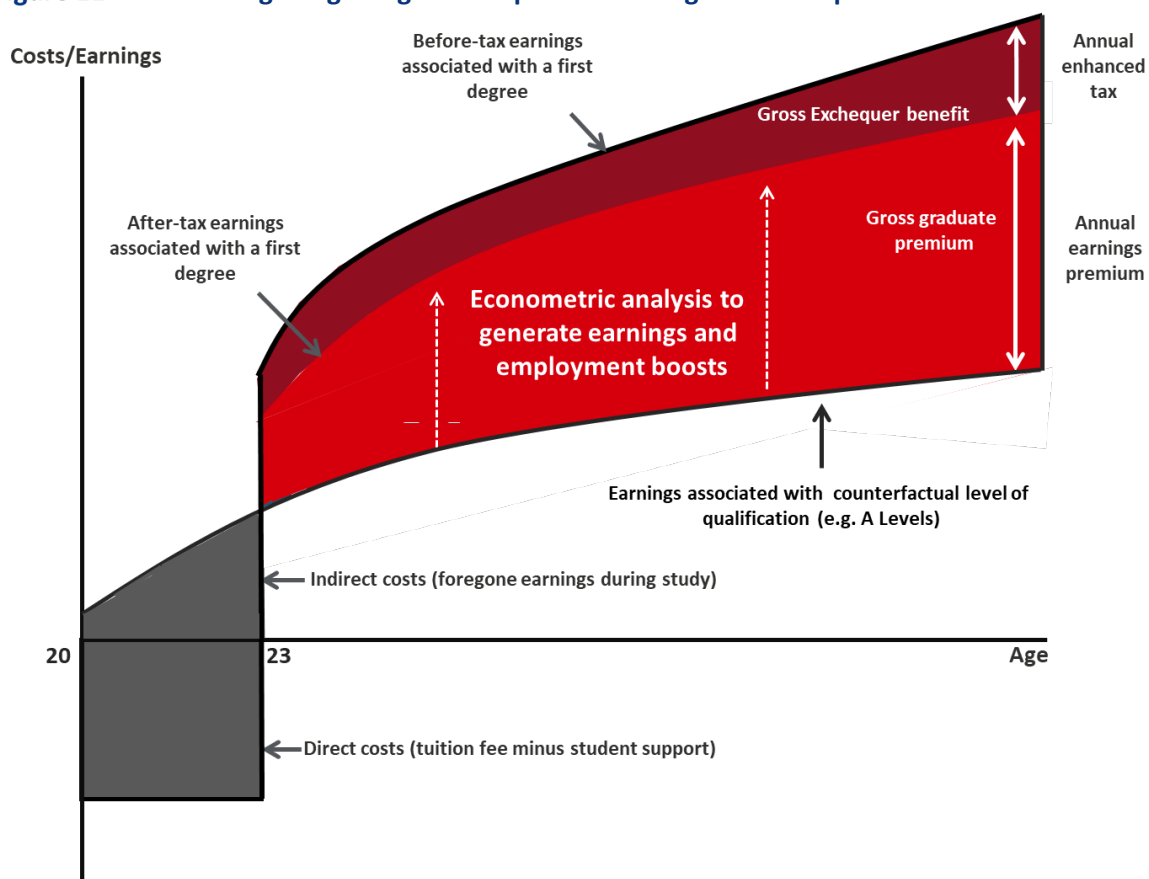
Source: London Economics' analysis based on Department for Business, Innovation and Skills (2011a)

3.4 Estimating the returns to higher education qualifications

3.4.1 Estimating the gross graduate premium and gross public purse benefit

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. The standard approach to estimating this labour market value 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, age, or sector of employment), leaving just the labour market gains attributable to the qualification itself (see Figure 11 for an illustration of this). The treatment and counterfactual groups, and details of the econometric approach, are presented in Annex A2.1.1 and Annex A2.1.2, respectively.

Figure 11 Estimating the gross graduate premium and gross Exchequer benefit



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 Queen's University Belfast's student cohort data for 2020-21, where the mean age at enrolment for full-time first degree students stands at 20, 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** to illustrate the fact that there is significant variation in post-graduation labour market outcomes depending on the subject of study, but also to reflect the specific subject composition of students studying at Queen's University Belfast. In addition, given the fact that part-time students generally undertake and complete higher education qualifications later in life than full-time students, the analysis for part-time students applies a '**decay function**' to the returns associated with qualification attainment, to reflect the shorter period of time in the labour market⁴⁰.

To estimate the **gross graduate premium**, based on the econometric results, we then estimate the **present value of the enhanced post-tax earnings** of individuals in possession of different higher education qualifications (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 (see Annex A2.1.4 for more detail⁴¹).

The **gross benefits 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). Again, please refer to Annex A2.1.4 for more detailed information on the calculation of the gross Exchequer benefit.

3.4.2 Estimating the net graduate premium and net public purse benefit

The difference between the gross and net graduate premium relates to **students' direct costs** of qualification acquisition⁴². These direct costs refer to the **proportion of the tuition fee paid by the student**⁴³ net of any **tuition fee support** or **maintenance support** provided by the Student Loans Company (SLC, for students from Northern Ireland, Wales and England) or the Students Awards Agency for Scotland (SAAS, for students from Scotland)⁴⁴ and minus any **fee waivers or bursaries**

⁴⁰ See Annex Table 13 for more information.

⁴¹ In terms of prior attainment, for 25 students in the 2020-21 cohort of UK domiciled students, previous attainment levels were specified as either 'Mature student admitted on basis of previous experience and/or admissions test' or 'Other qualification level not known'. For these students, we imputed their prior attainment level using a group-wise imputation approach based on the most common prior attainment among students undertaking qualifications at the same level, separately by study mode.

⁴² 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 deducted from the gross graduate premium.

⁴³ We made use of information provided by Queen's University Belfast on the average **tuition fees** charged to students at Queen's University Belfast in the 2020-21 academic year, separately by domicile, study mode, and study level (with data provided for all undergraduate students combined, postgraduate (taught) students, and postgraduate (research) students (and we assume that students undertaking learning at 'other postgraduate' level are included in the postgraduate (taught) category)). To ensure that the estimated fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2020-21 cohort, the fees per part-time student were calculated by multiplying the respective full-time rates by the ratio of the average study intensity amongst part-time students relative to full-time students in the cohort.

⁴⁴ The analysis makes use of *average* levels of support paid per student, separately by study mode, study level (i.e. undergraduate, higher degree (taught) and higher degree (research) (and we assume that no funding is available for students undertaking qualifications at 'other postgraduate' level)), and domicile. Our estimates are based on publications by the SLC on student support for higher education in England, Wales, and Northern Ireland in 2020-21 (see Student Loans Company 2021a, 2021b and 2021c, respectively) and a publication by the Student Awards Agency for Scotland on student support for higher education in Scotland (see Student Awards Agency for Scotland, 2021). 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



provided by Queen's University Belfast itself⁴⁵. In this respect, the student benefit associated with tuition fee loan or maintenance loan support equals the **Resource Accounting and Budgeting charge (RAB charge)**⁴⁶, capturing the proportion of the loan that is not repaid. Given the differing approach to public support funding for 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 Ireland⁴⁷.

The **direct costs**⁴⁸ to the public purse include the **teaching grant funding** administered by the Department for the Economy⁴⁹, the **student support** provided in the form of maintenance/fee grants (where applicable), and the **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.

These direct costs associated with qualification attainment to both students and the Exchequer (by qualification level, study mode and Home Nation domicile) are calculated from start to completion of a student's learning aim. Throughout the analysis, to ensure that the economic impacts are computed in **present value** terms (i.e. in 2020-21 money terms), all benefits and costs occurring at points in the future were **discounted** using the standard HM Treasury Green Book real discount rate of **3.5%** (see HM Treasury, 2022).

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

cohorts possible, split by domicile (i.e. 'Home' vs. EU). Furthermore, and again wherever possible, we adjusted the average levels of fee and maintenance loans for average loan take-up rates available from the same sources. In addition, the assumed average fee loan per student is capped at the level of tuition fee charged per Queen's University Belfast student in 2020-21 (see Footnote 43).

⁴⁵ Average fee waivers and other bursaries per student were calculated based on information provided by Queen's University Belfast on the total amount of scholarships, fee waivers and other bursaries provided to students by Queen's University Belfast in 2020-21, by level of study. This information also included COVID-19 payments provided by the Department for the Economy. The information on total funding was then combined with HESA data provided by Queen's University Belfast in terms of the total number of full-time students enrolled with Queen's University Belfast in 2020-21 (again by domicile and level), to arrive at an estimate of the average fee waiver/bursary funding per student per year, by level and domicile.

⁴⁶ For **undergraduate full-time** students, we have assumed a RAB charge of **26%** for Northern Irish students (assumed to be the same as the RAB charge for Welsh domiciled students given the similar loan balance – based on information provided by the Welsh Government), **31%** associated with tuition fee and maintenance loans for English domiciled students (based on data published by the Department for Education (2022)), and **31%** for Scottish domiciled students, and **26%** for EU students (assumed to be the same as for Northern Irish domiciled students). For **undergraduate part-time students**, based on the same sources, we have assumed a RAB charge of **0%** for Northern Irish domiciled students (given that these students have a very small loan balance), **33%** for English domiciled students, **36%** for Welsh domiciled students, and **0%** for EU domiciled students (again, assumed to be the same as for Northern Irish domiciled students). There is currently no student loan funding provided to Scottish domiciled undergraduate part-time students (so no RAB charge assumptions are required).

For the (relatively recently introduced) loans for **postgraduate taught students** from Northern Ireland and England (and for EU students studying in Northern Ireland), we have assumed a RAB charge of **0%** for both full-time and part-time students (based on the Department for Education's (2022) student loan forecasts for Master's loans for English students). For Welsh students, we have assumed a RAB charge of approximately **0%**. There were no postgraduate loans available for Scottish students studying outside Scotland.

Finally, for (full-time and part-time) **postgraduate research students**, there were no Doctorate loans available for Scottish domiciled or Northern Irish domiciled students. For students from England and Wales, we assumed a RAB charge of **19%** (again based on based on Department for Education (2022)).

⁴⁷ Note that, in some instances, the total financial support provided to students (through tuition fee loans and grants, maintenance loans and grants, and fee waivers/other bursaries (where applicable)) may *exceed* the costs of their Queen's University Belfast tuition fees – i.e. the net graduate premium *exceeds* the gross graduate premium per student (see the results presented in Table 16 and 0 in Annex A2.1.4).

⁴⁸ Again, any 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.

⁴⁹ This is calculated as the total teaching grant funding divided by the total number of students enrolled with Queen's University Belfast in 2020-21 (excluding any non-EU-domiciled students and higher degree (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 among full-time and part-time students, to arrive at separate rates of teaching grant funding by study mode.



Handy Helpers



Handy Helpers is a volunteering initiative coordinated by Volunteer SU, which is the volunteering department of Queen's University Belfast's Students' Union. **It aims to respond to the immediate needs of the local community through a diverse range of one-off volunteering activities.**

The initiative is a great way

for students to make new friends, gain new skills (such as communication, problem solving and adaptability skills) and have fun whilst creating a positive community impact. The variety of one-off and short-term volunteering projects offered by the scheme means that it works for both the community and students, as it can fit around volunteers' interests and availability.

As of 2021/22, 348 Queen's University Belfast students have registered to become Handy Helpers, five community support activities have been delivered and 17 charitable organisation activities have been supported. **The Handy Helpers have also been supported by the university, receiving £3,000 from Queen's Annual Fund to support a 'Mural Map Alleyway Project' and the 'Eglantine Community Garden Project'.**

Below are a few examples of the range of volunteering activities that the Handy Helpers can get involved in:

- **Raising funds for charity** - Handy Helpers support charitable organisations with their activities, such as by assisting at winter heritage events at Ulster Folk Museum or undertaking fundraising activities for charities such as Nexus NI, Guide Dogs for the Blind and Action on Hearing Loss.
- **Charity shops** – Handy Helpers can also support charitable organisations by working in Belfast charity shops for charities such as Oxfam, Cancer Research UK, British Red Cross and Marie Curie amongst others.
- **Keeping the community tidy** - Volunteers can conduct litter picks or campus clean-ups, keeping the university tidy and maintaining a positive relationship between students and the wider community.
- **Conservation** – There are opportunities to take part in conservation programmes with Belfast City Council, the National Trust or local charities and organisations such as The Conservation Volunteers and San Souci Residents Association. Activities have included seed harvesting, weeding and wildflower planting.
- **Student development** – Handy Helpers have assisted in the organisation of training sessions to aid student development. Themes of these sessions include Waste Awareness, Cultural Diversity and Dementia Awareness among others.
- **Helping the elderly** – Participants work with charities such as Parkinson's UK, Age UK, Houseglass NI and The Alzheimer's Society providing specific support to the elderly. Roles at these charities can range from assisting as a helpline operator to just being there for a chat.

3.5 Estimated net graduate premium and net Exchequer benefit

Table 6 presents the net graduate premiums and net Exchequer benefits achieved by Northern Irish-domiciled students⁵⁰ undertaking qualifications at Queen's University Belfast in the 2020-21 cohort (by study mode, on average across men and women⁵¹).

The analysis indicates that the **net graduate premium** achieved by a representative⁵² Northern Irish-domiciled undergraduate student in the 2020-21 cohort completing a **full-time first degree** at Queen's University Belfast (with GCE 'A' Levels or equivalent as their highest level of prior attainment) is approximately **£104,000** in today's money terms. Similarly, the net graduate premium for other undergraduate is approximately **£24,000**. At postgraduate level, the net (post)graduate premiums for a representative⁵³ student completing a full-time postgraduate taught or postgraduate research degree at Queen's University Belfast (relative to a first degree) stand at approximately **£56,000** and **£34,000**, respectively. The associated net (post)graduate premium for other postgraduate is **£65,000**.

The net graduate premium for a representative full-time first degree Northern Irish-domiciled student stands at £104,000.

Table 6 Net graduate premium and net Exchequer benefit per Northern Irish-domiciled student at Queen's University Belfast, by study level and mode

Level of study	Net graduate premium		Net public purse benefit	
	Full-time students	Part-time students	Full-time students	Part-time students
Other undergraduate ¹	£24,000	£33,000	£22,000	£14,000
First degree ¹	£104,000		£93,000	
Other postgraduate ²	£65,000	£50,000	£67,000	£45,000
Higher degree (taught) ²	£56,000	£57,000	£64,000	£56,000
Higher degree (research) ²	£34,000	£56,000	£85,000	£58,000

Note: All estimates constitute weighted averages across men and women (weighted by the estimated number of student completers in the 2020-21 cohort) and are presented in 2020-21 prices, discounted to reflect net present values and rounded to the nearest £1,000. Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (of the given characteristics).

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 first degrees.

Source: London Economics' analysis

There are also substantial **net graduate premiums** for **part-time** students. For instance, the estimate for a representative student completing a part-time postgraduate taught degree (again relative to a first degree) stands at approximately **£57,000** (equal to **£56,000** for full-time students), while the estimate for part-time postgraduate research degrees stands at **£56,000** (compared to **£34,000** for full-time students). For other undergraduates, this figure stands at **£33,000** and for other

⁵⁰ The full set of net graduate premiums and net Exchequer benefits for all domiciles (as well as study levels, study modes, and prior attainment levels) is presented in Annex A2.1.5A2.1.5.

⁵¹ For a breakdown of the results by gender, again see Annex A2.1.5.

⁵² The analysis is based on an average age at graduation of 23 for students undertaking full-time first degrees at Queen's University Belfast in the 2020-21 cohort (also see Annex Table 13 for further information).

⁵³ This is based on an average age at graduation in the 2020-21 cohort of 26 for full-time higher degree (taught) students and 32 for full-time higher degree (research) students.



postgraduates at **£50,000**. The fact that part-time students tend to complete their studies later in life⁵⁴ (resulting in fewer years spent in the labour market post-graduation) results in a reduction in the net graduate premiums for part-time students compared to full-time students. However, it is assumed that part-time students are able to combine work with their academic studies and thus do not incur any *opportunity costs* in the form of foregone earnings, which results in increased net graduate premiums relative to full-time students. Depending on which of these effects dominates, the net graduate premiums for part-time students can be either lower or higher than the net graduate premiums achieved by full-time students.

The net public purse benefit associated with a representative full-time first degree Northern Irish-domiciled student stands at £93,000.

In terms of the benefits to the public purse, the **net Exchequer benefit** for a representative Northern Irish-domiciled **full-time** first degree student (again with GCE 'A' levels or equivalent as their highest level of prior attainment) stands at approximately **£93,000** in 2020-21 money terms. The net Exchequer benefits for a representative student completing a full-time postgraduate taught or postgraduate research degree (relative to a first degree) were estimated at approximately **£64,000** and **£85,000**⁵⁵, respectively. For other undergraduate, the figure

stands at **£22,000** and for other postgraduate the figure is **£67,000**.

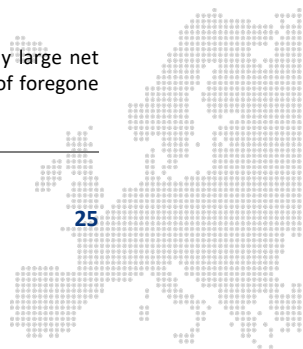
Again, there are also substantial net Exchequer benefits associated with **part-time students**. For instance, the net Exchequer benefits for a representative part-time student from Northern Ireland undertaking a postgraduate taught degree or postgraduate research degree (relative to a first degree) stand at approximately **£56,000** and **£58,000** (respectively). For other undergraduate and other postgraduate these figures stand at **£14,000** and **£45,000** (respectively).

3.6 Total impact of Queen's University Belfast's teaching and learning activities

Combining the information on the number of UK domiciled students in the 2020-21 Queen's University Belfast cohort, expected completion rates, 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 Queen's University Belfast's teaching and learning activities** associated with the 2020-21 cohort in the UK stands at approximately **£1,068 million**.

⁵⁴ Again, see Annex Table 13 for more information.

⁵⁵ Compared to corresponding net graduate premium for postgraduate research degree students (**£34,000**), the relatively large net Exchequer benefit (**£85,000**) reflects the limited direct costs (in terms of public funding) and low indirect costs (in terms of foregone taxation during study) associated with these qualifications.



The total economic impact of teaching and learning generated by the 2020-21 cohort of Queen's University Belfast students stands at £1,068 million.

This total impact is split approximately equally between students and the Exchequer, with **£550 million (51%)** of the economic benefit accrued by students undertaking qualifications at Queen's University Belfast, and the remaining **£518 million (49%)** accrued by the Exchequer. In terms of study level, **75% (£799 million)** of the estimated economic impact is generated by Queen's University Belfast's undergraduate students, with the other **25% (£269 million)** generated by Queen's University Belfast's postgraduate students. In terms of domicile, **93% (£991 million)** of the estimated economic benefit is associated

with students from Northern Ireland, while the remaining **7% (£77 million)** is generated by students from other Home Nations, including **6% (£68m)** by students from England.

Table 7 Aggregate impact of Queen's University Belfast's teaching and learning activities associated with the 2020-21 cohort (£m), by type of impact, domicile, and level of study

Beneficiary and study level	Domicile				Total
	England	Wales	Scotland	Northern Ireland	
Students	£33m	£2m	£2m	£513m	£550m
Undergraduate	£25m	£2m	£1m	£398m	£425m
Postgraduate	£8m	£1m	£1m	£115m	£125m
Exchequer	£35m	£2m	£3m	£478m	£518m
Undergraduate	£24m	£1m	£1m	£347m	£373m
Postgraduate	£11m	£1m	£2m	£131m	£145m
Total	£68m	£4m	£5m	£991m	£1,068m
Undergraduate	£49m	£3m	£2m	£745m	£799m
Postgraduate	£19m	£1m	£3m	£246m	£269m

Note: All estimates are presented in 2020-21 prices, discounted to reflect net present values, rounded to the nearest £1m, and may not add up precisely to the totals indicated.

Source: London Economics' analysis

It is important to emphasise that these impacts are associated with the 2020-21 cohort of students only. Depending on the size and composition of subsequent cohorts of Queen's University Belfast students, a comparable estimate of the economic impact associated with teaching and learning activities would be associated with each successive cohort of starters (depending on the prevailing labour market conditions at the time).



Changes to the landscape of higher education in Northern Ireland

The evolution of funding for full-time first degree students

Higher education providers in Northern Ireland are at a significant financial disadvantage compared to higher education institutions in the rest of the United Kingdom, particularly those in England. In 2020-21, the average value of the Teaching Grant made available to Queen's University Belfast stood at approximately **£2,979** per student per annum which, when combined with the maximum tuition fee charged to full-time first degree students (of **£4,395** per annum), resulted in a gross unit of resource available to deliver first degree undergraduate teaching of approximately **£7,374** per student per annum. This compares to approximately **£10,489** per student per annum accrued by a comparable higher education institution in England (made up of **£9,250** in gross tuition fee income and approximately **£1,239** in Teaching Grant income). As a result, in 2020-21, Queen's University Belfast suffered a **£3,115 (30%)** funding shortfall per student per annum compared to comparable (Russell Group) institutions in England.

Furthermore, there has been relatively little change in the level of funding available to Northern Irish higher education institutions. In 2015-16, the average level of the Teaching Grant made available by the Department for the Economy in Northern Ireland to teach a full-time first degree student was estimated to be **£2,813** per student per annum (inflated by 8.8% to be comparable to 2020-21 prices) and the average tuition fee charged stood at approximately **£4,139** per student per annum (again updated by inflation to 2020-21 prices). Therefore, the total level of funding received in 2015-16 to teach a full-time Northern Irish domiciled undergraduate student was estimated to be **£6,953** per annum (in 2020-21 prices) compared to **£7,374** per student per annum in 2020-21. This represents a real terms increase in funding of just **1%** per annum over the period.

Population dynamics

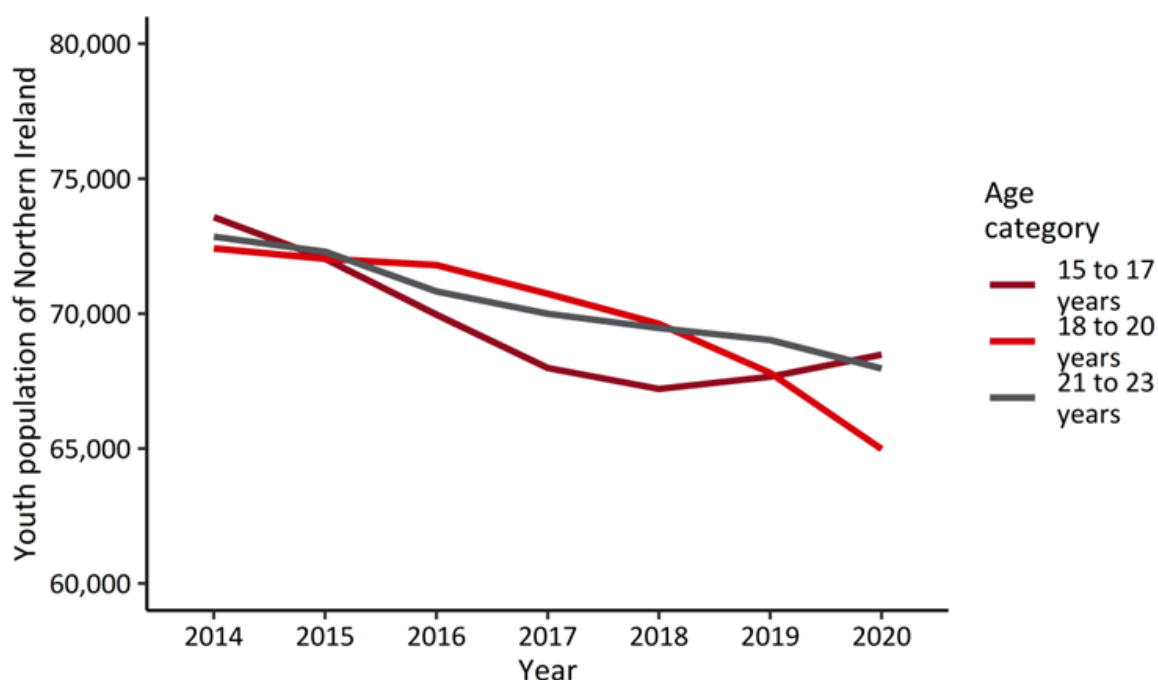
Alongside the minimal changes to the level of funding available to Northern Irish institutions, there has been a gradual decline in the size of the youth population since 2014. As shown below, the number of 18 to 20-year-olds has decreased from approximately **72,400** in 2014 to less than **65,000** in 2020 (representing a **10.3%** decline), while the number of 15 to 17-year-olds has also seen a **6.9%** decline over the same period (from approximately **73,600** in 2014 to less than **68,500** in 2020).⁵⁶

⁵⁶ According to the ONS, in England, from 2014 to 2020, the number of 18- to 20-year-olds has fallen from 2,004,219 to 1,890,222 (representing a 5.7% decline).



Changes to the landscape of higher education in Northern Ireland

Figure 12 Youth population trends in Northern Ireland, 2014-2020



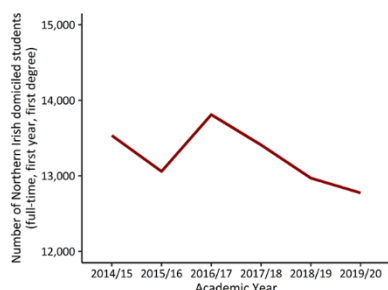
Source: London Economics' analysis of Northern Ireland Research and Statistics Agency (NIRSA)

Implications for the enrolment of Northern Irish domiciled students and the subsequent impact on the economy in Northern Ireland

What has happened to student enrolments?

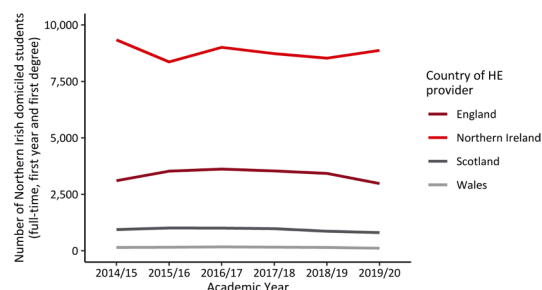
In part reflecting this decline in the domestic youth population, but also the relatively limited funding associated with undergraduate teaching, the number of Northern Irish domiciled students at university has declined. This is likely to limit the productive capacity of the Northern Irish economy going forward.

Figure 13 Number of Northern Irish domiciled first year first degree students entering higher education, 2014-15 to 2019-20



Note: Only includes full-time, first-year, first degree Northern Irish domiciled students. Source: London Economics' analysis of HESA data

Figure 14 Northern Irish domiciled students in higher education, by country of provider, 2014-14 to 2019-20



Note: Only includes full-time, first-year, first degree Northern Irish domiciled students. Source: London Economics' analysis of HESA data

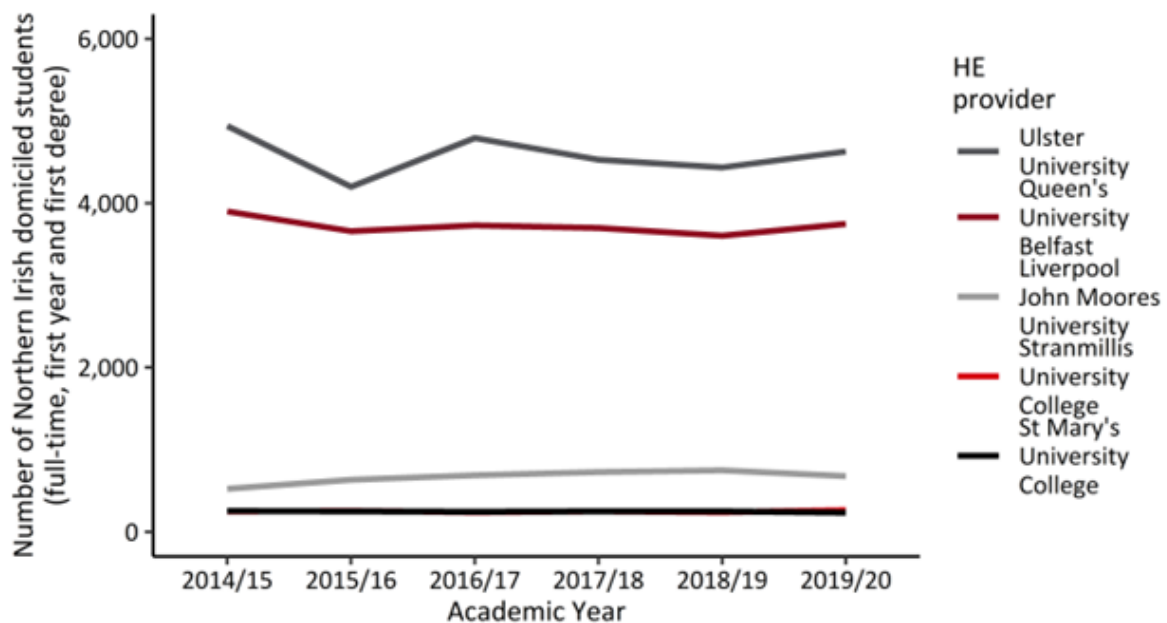
Changes to the landscape of higher education in Northern Ireland

The figure shows that between 2014-15 and 2019-20 the number of full-time, first-year, first degree Northern Irish domiciled students at higher education institutions across the entire United Kingdom has fallen from approximately **13,535** to **12,775**. This represents a decline of **5.6%** over the period.

In comparison, from 2014-15 to 2019-20, the number of full-time, first-year, first degree English domiciled students increased from **343,610** to **378,185** (representing an increase of approximately 10%).

As shown in the figure, this fall in the number of Northern Irish domiciled students appears to be relatively equally distributed across higher education institutions in each of the Home Nations of the UK. Between 2014-15 and 2019-20, the number of students studying at a higher education institution in Northern Ireland fell by approximately **5.0%** (from **9,340** to **8,875**), while the number of first-year first degree Northern Irish domiciled students studying at a higher education institution in England decreased by **4.0%** (from **3,105** to **2,980**).

Figure 15 Northern Irish domiciled students in higher education, by top 5 higher education providers, 2014-15 to 2019-20

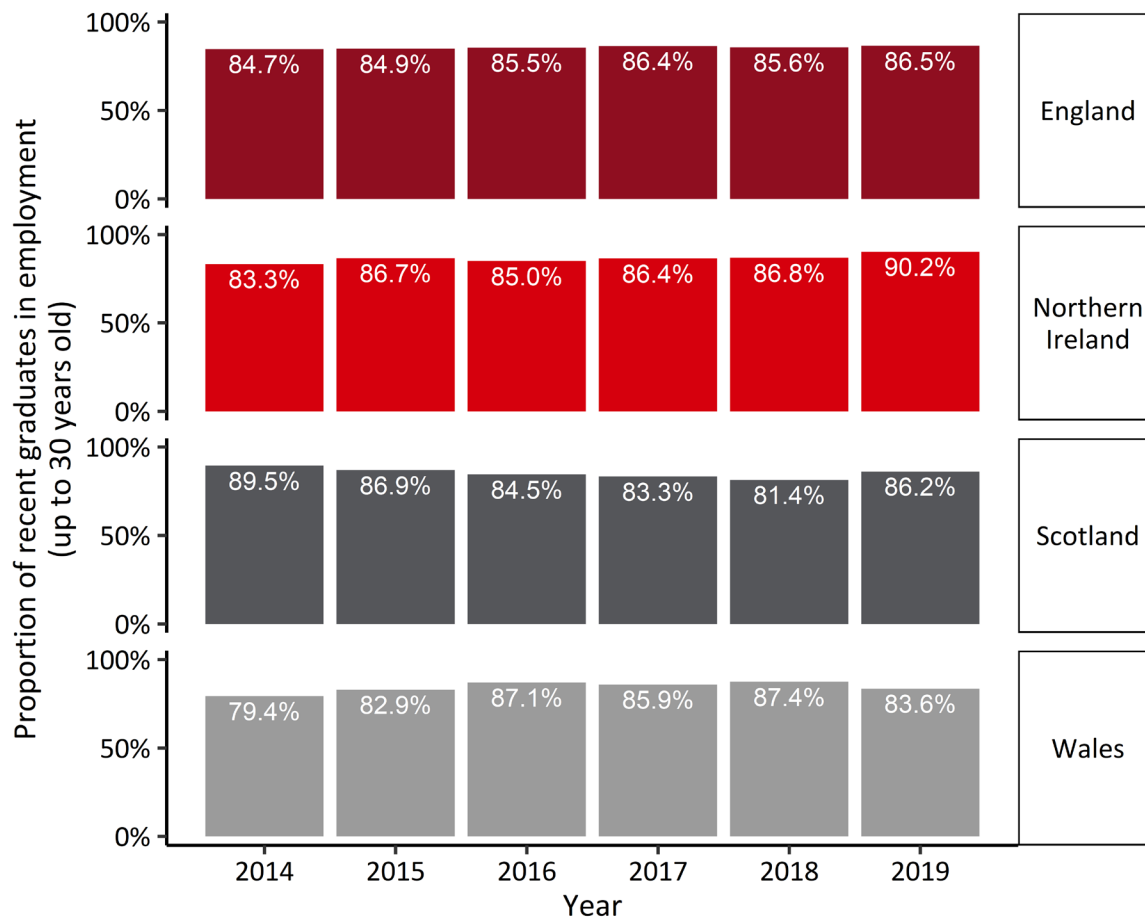


Note: Only includes full-time, first-year, first degree Northern Irish domiciled students. Top 5 higher education providers are defined as the 5 providers with the greatest average number of full-time, first-year, first degree Northern Irish domiciled students each year from 2014-15 to 2019-20. *Source: London Economics' analysis of HESA data*

Changes to the landscape of higher education in Northern Ireland

What is the impact of the decline in the number of full-time Northern Irish domiciled graduates studying in Northern Ireland on the Northern Irish economy?

Figure 16 Employment rate of recent graduates by region of residence, 2014-2019



Note: A recent graduate is defined as an individual with an undergraduate or postgraduate who is younger than 30 years old.

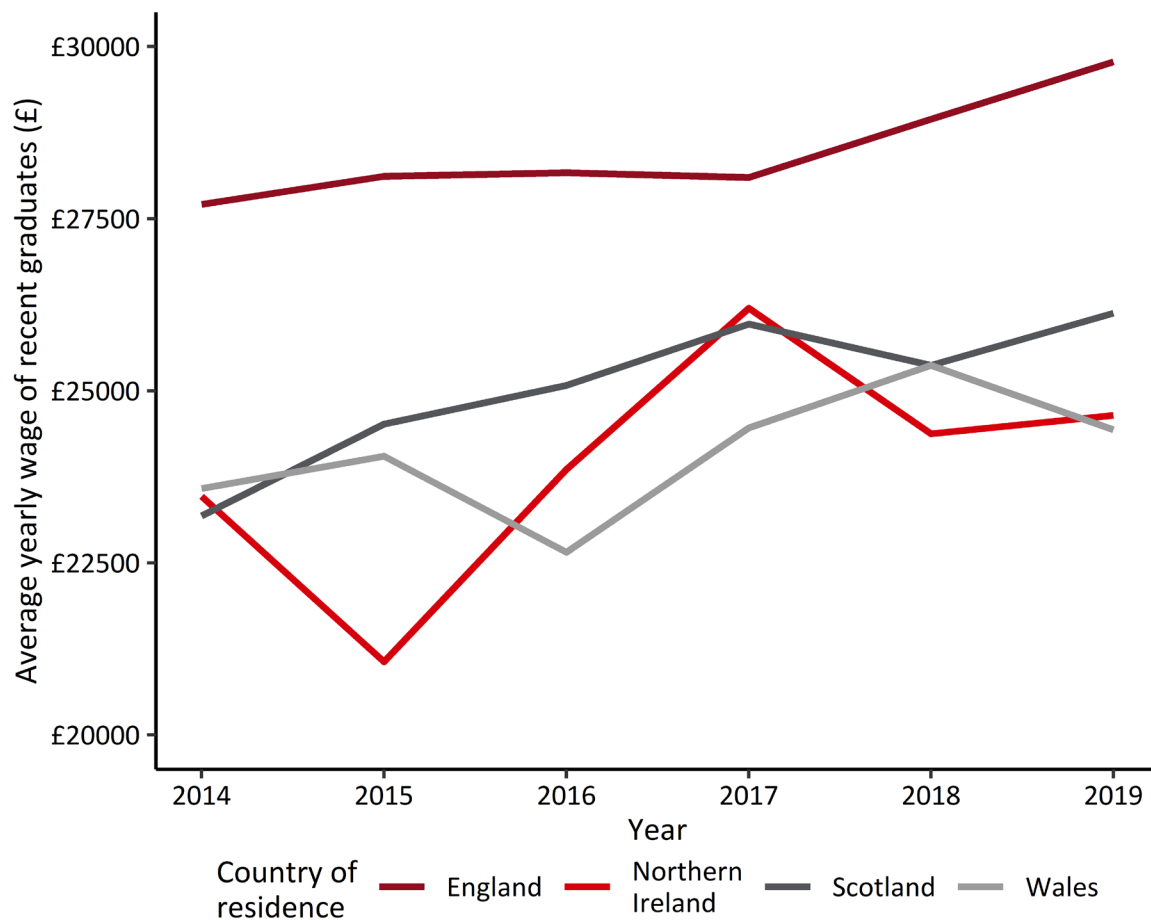
Source: London Economics' analysis of the Labour Force Survey

The decline in the number of Northern Irish domiciled graduates attending Northern Irish higher education institutions will **adversely impact the supply high skilled individuals in the domestic labour market**. In economic terms, the contraction in supply, combined with continued demand for highly qualified graduates should increase the 'price' of labour. As shown in the figure, reflecting the strong demand for highly qualified graduates, the employment rate amongst recent graduates⁵⁷ in Northern Ireland had increased from **83.3%** in 2014 to a high of **90.2%** in 2019. This **6.9 percentage point** increase in the graduate employment rates exceeded those changes in recent graduate employment in Scotland (**-3.3 percentage points**), Wales (**+4.2 percentage points**) and England (**+1.8 percentage points**).

⁵⁷ A recent graduate is defined as an individual with an undergraduate or postgraduate degree under the age of 30.

Changes to the landscape of higher education in Northern Ireland

Figure 17 Mean annual earnings of recent graduates living, by region of residence, 2014 to 2019



Note: A recent graduate is defined as an individual with an undergraduate or postgraduate who is younger than 30 years old.
Source: London Economics' analysis of the Labour Force Survey

With the level of employment among recent graduates in Northern Ireland being **4 percentage points** higher than Scotland, **6.6 percentage points** higher than Wales and **3.7 percentage points** higher than England, the evolution of graduate employment suggests that there has been – and continues to be - much less spare capacity in the Northern Irish graduate labour market than in the other home nations.

The increasing demand for graduates has also resulted in an increase in graduate earnings in Northern Ireland (shown in the figure). More specifically, between 2015 to 2021, the average annual earnings of recent graduates increased by approximately **21%** in Northern Ireland from approximately **£21,050** to **£25,550**. This compares to a **7%** increase in recent graduate salaries England over the same period, a **14%** increase in Scotland and a **6%** increase in Wales.

Increasing salaries, is this not a good thing?

It is undoubtedly the case that increasing salaries are a positive outcome for those in possession of the qualification. However, for both domestic firms requiring a highly skilled workforce, as well as international firms aiming to locate in Northern Ireland and access relatively cheaper skilled labour, this relative increase in earnings will significantly reduce the attractiveness of Northern Ireland as a business location. By increasing the cost of relocating or expanding business activity, the rise in earnings is likely to adversely impact the Northern Irish economy.

Changes to the landscape of higher education in Northern Ireland

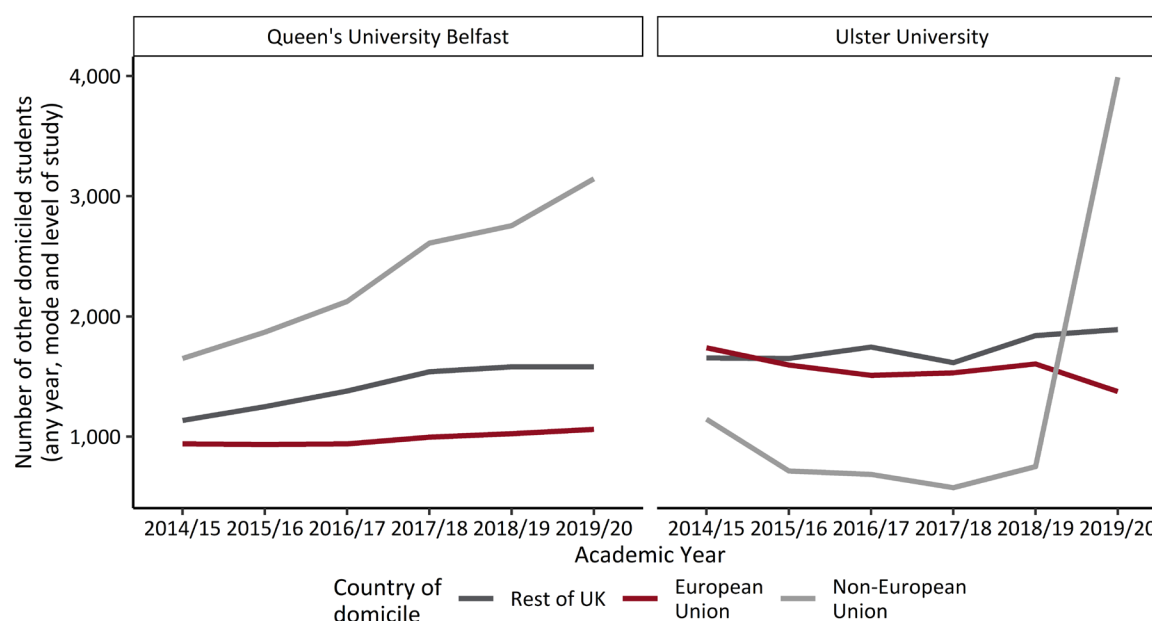
Impact on higher education institutions

How have universities responded to the lack of funding?

In response to the relatively unchanged funding associated with domestic students, universities in Northern Ireland have focused on increasing the number of international student enrolments and using the additional fee income associated with those students to subsidise the costs of both the teaching of domestic students and delivering world class research⁵⁸. This is a common phenomenon across the entire United Kingdom, even in those jurisdictions where the average unit of resource is significantly higher than in Northern Ireland.

More specifically, in parallel with the decline in the number of full-time first degree Northern Irish domiciled students between 2014-15 to 2019-20, there has been a significant increase in the number of non-EU international students studying in Northern Ireland. For instance, at Queen's University Belfast, between 2014-15 to 2019-20, the number of non-EU internationally domiciled students has increased gradually from approximately **1,650** to **3,145** (left panel below), while at Ulster University, between 2018-19 to 2019-20, the number of non-EU students at Ulster University has risen sharply from **750** to **3,990** (right panel below).⁵⁹

Figure 18 Non-Northern Irish domiciled students at higher education institutions in Northern Ireland, by domicile of student, 2014-15 to 2019-20



Note: Students of any year, mode and level of study. Source: London Economics' analysis of HESA data

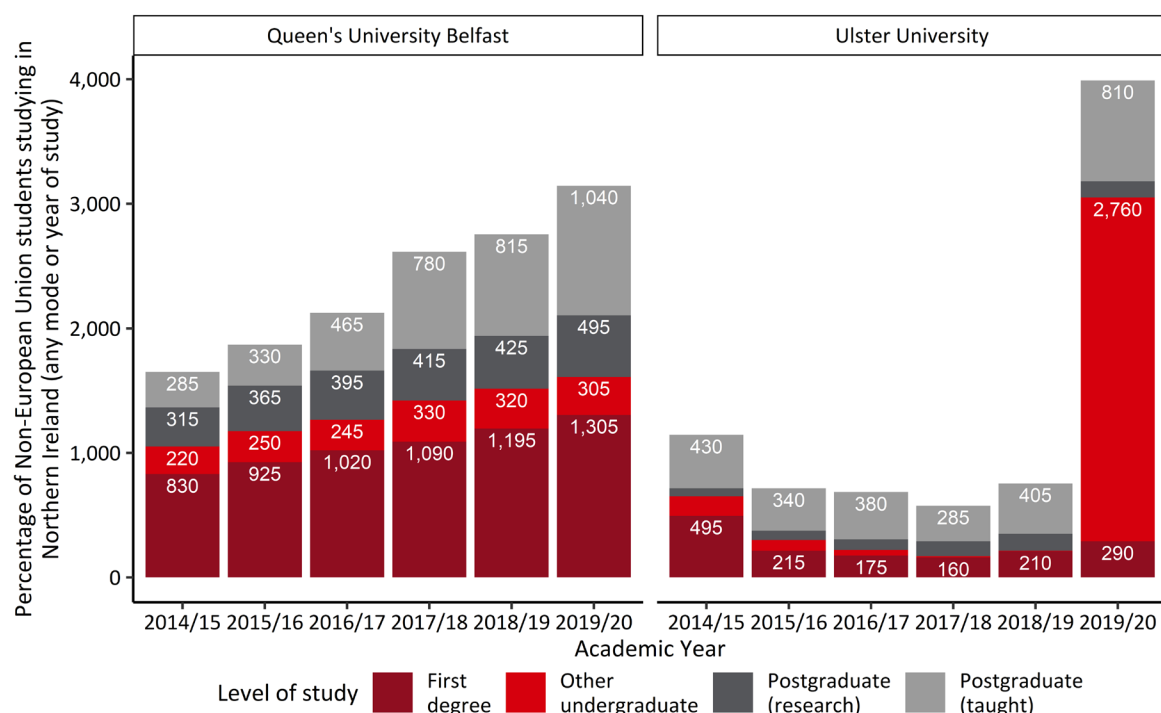
⁵⁸ Note that according to the most recent data provided by the Office for Students (2021, [link](#)), amongst research intensive institutions (Group A institutions), the recovery rate associated with publicly funded teaching was estimated to be approximately **97.6%**. This suggests that there was a very small deficit generated associated with the provision of (predominantly) undergraduate students, but this in part reflects the income associated with English-domiciled students. Clearly, given the lower tuition fees charged to Northern Irish domiciled students studying in Northern Ireland, the recovery rates associated with this group of students is likely to be significantly lower. In respect of non-publicly funded teaching activity (relating to both postgraduate teaching provision and the activity associated with international students), the average recovery rate was estimated to be **185.2%**. The significant surplus associated with teaching provision for non-publicly funded students thus cross subsidises the loss making research activity undertaken by higher education institutions (**76.6%** recovery rate) and the break-even publicly funded teaching activity.

⁵⁹ The sharp increase in the number of non-EU students at Ulster University is largely attributable to the expansion of provision at branch campuses in England

Changes to the landscape of higher education in Northern Ireland

At Queen's University Belfast, the number of non-EU international students has increased across all study levels, although the most significant increase has been among those on taught Postgraduate courses. As shown in the figure, between 2014-15 to 2019-20, the number of non-EU international students on taught postgraduate courses at Queen's University Belfast rose by **72.6%** (from **285** to **1,040**), while the number on research postgraduate courses increased by **57%** (from **315** to **495**). Similarly, the number of international students commencing other undergraduate courses rose by **38.6%** (from **220** to **305**) and the number on first degree courses increased by **57.2%** (from **830** to **1,305**). In comparison, the significant rise in the number of non-EU international students at Ulster University has been largely driven by an increase in the number of non-EU international students on other undergraduate courses (by **432%** between 2018-19 and 2019-20).

Figure 19 Non-EU domiciled students in higher education at higher education institutions in Northern Ireland, by level of study



Note: Non-EU domiciled students of any year and mode of study.

Source: London Economics' analysis of HESA data

What's on the horizon?

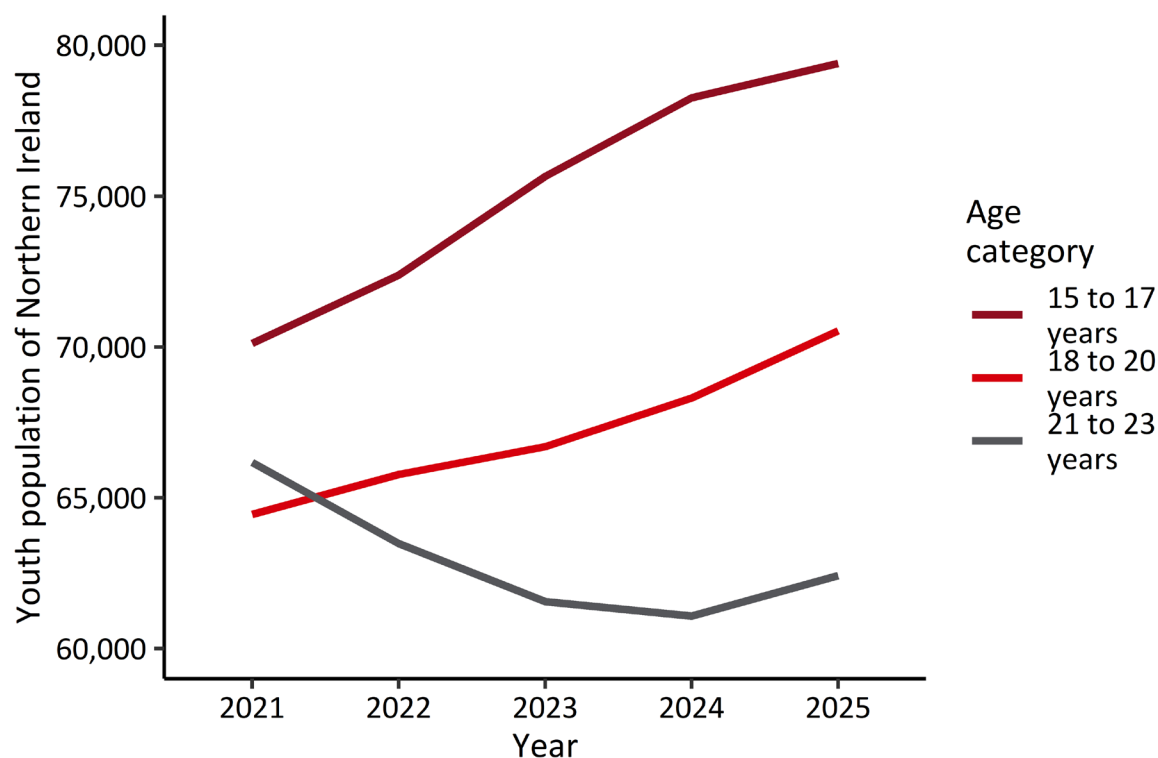
The analysis has illustrated both the declining number of Northern Irish-domiciled students undertaking higher education at home, but also the wider economic consequences of the lack of graduate supply. However, due to the predicted increase in the population of young people growing up in Northern Ireland in the next 5 years, many of the structural issues (relating to core teaching funding and ensuring Northern Irish universities are adequately funded to accommodate the demographic changes on the horizon) need to be urgently addressed.

As illustrated in the figure, the Northern Ireland Research and Statistics Agency (NIRSA) expects that the youth population in Northern Ireland will rise significantly in the next 5 years. More specifically, from 2021 to 2025, the number of 15- to 17-year-olds will increase from approximately **92,000** to **106,000** (**15%**), while the number of 18- to 20-year-olds will increase from approximately **88,000** to **92,000** (**5%**). This rise in the number of young people in Northern Ireland at the typical age of entry

Changes to the landscape of higher education in Northern Ireland

into higher education (particularly for full-time undergraduate degrees) is likely to significantly increase the latent demand for higher education.

Figure 20 Projected youth population of Northern Ireland, 2021 to 2025



Source: London Economics' analysis of Northern Ireland Research and Statistics Agency (NIRSA)

The current funding system in Northern Ireland prevents the expansion of capacity to provide for these additional Northern Irish domiciled students. Universities have been forced to limit the number of home students studying in Northern Ireland and have focused on enrolling international students to cover the funding shortfall associated with Northern Irish students.

If there is no change in capacity at higher education institutions in Northern Ireland, the additional Northern Irish domiciled students demanding higher education will be forced to study at higher education institutions elsewhere in the UK.

Given the propensity of recent graduates to remain in the nation of their higher education provider,⁶⁰ the increasing number of Northern Irish students studying elsewhere in the UK will drain the number of recent graduates in Northern Ireland. This will exacerbate the current issues within the graduate labour market in Northern Ireland, further pushing up graduate wages, increasing business costs and reducing the attractiveness of the Northern Irish economy for foreign investment or domestic expansion.

Ultimately, without significant increases in capacity at higher education institutions in Northern Ireland facilitated by greater funding, the current labour market problems will continue to worsen leading to a decade of lost opportunities in the Northern Irish economy.

⁶⁰ London Economics. (2018). 'The economic impact of Queen's University Belfast'.

4 The impact of Queen's University Belfast's educational exports

With the United Kingdom being an attractive destination for many overseas students, the higher education sector is a tradeable industry with imports and exports like any other tradeable sector.

In this part of the analysis, we focus on the impact of educational exports through the injection of overseas funding into the UK generated by Queen's University Belfast. In particular, we analyse overseas income in the form of tuition fee spending (net of any Exchequer costs) and non-tuition fee (off-campus) expenditures by international (EU and non-EU domiciled) students in the 2020-21 cohort of Queen's University Belfast students, over the entire course of their studies⁶¹. The analysis estimates the **direct, indirect, and induced economic impacts** associated with this export income, defined as follows:

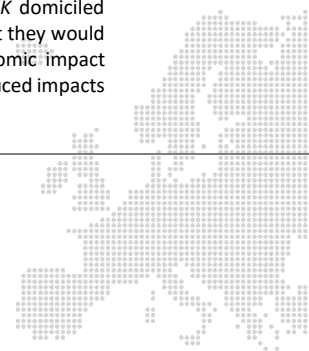
- **Direct effect:** This is captured by the level of (net) fee income (accrued by Queen's University Belfast itself) and non-fee income (accrued by other organisations providing goods and services to international students) associated with non-UK students in the 2020-21 cohort.
- **Indirect effect ('supply chain impacts'):** Queen's University Belfast and local businesses providing other goods and services to international students spend their income on purchases of goods and services from their suppliers, which in turn use this revenue to buy inputs (including labour) to meet these demands. This results in a chain reaction of subsequent rounds of spending across industries, often referred to as a 'ripple effect'.
- **Induced effect ('wage spending impacts'):** The employees of Queen's University Belfast (supported by its tuition fee income) and of companies providing goods and services to Queen's University Belfast's international students use their wages to buy consumer goods and services. This in turn generates wage income for employees within the industries producing these goods and services, again leading to subsequent rounds of spending, i.e. a 'ripple effect' throughout the economy as a whole⁶².

The total of the direct, indirect, and induced effects constitutes the *gross* economic impact of Queen's University Belfast's contribution to education exports. An analysis of the *net* economic impact ideally needs to account of 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; and

⁶¹ Note that other types of export income accrued directly by Queen's University Belfast (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 Queen's University Belfast's research activity (Section 2) and the impact of the expenditures of Queen's University Belfast (Section 5), and are thus excluded from the analysis of exports to avoid double-counting.

⁶² Our analysis excludes any similar direct, indirect, and induced effects associated with the non-fee expenditures of UK domiciled students. In this respect, we (conservatively) assume that these expenditures are *not* additional to the UK economy (i.e. that they would likely have occurred even if these students had not enrolled in programmes at Queen's University Belfast). The economic impact associated with UK students' tuition fee expenditures is instead (implicitly) included in the estimated direct, indirect, and induced impacts associated with Queen's University Belfast's own expenditures (see Section 5).



- **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 region⁶³.

The direct, indirect, and induced impacts are measured in terms of monetary economic output⁶⁴, gross value added (GVA)⁶⁵, and full-time equivalent (FTE) employment supported. In addition to measuring these impacts on the UK economy as a whole, the analysis is broken down by geographic region and sector.

The direct, indirect, and induced impacts were estimated using **economic multipliers** derived from Input-Output tables, which measure the total production output of each industry in the UK economy, and the inter-industry (and intra-industry) flows of goods and services consumed and produced by each sector⁶⁶. In other words, these tables capture the degree to which different sectors within the UK economy are connected, i.e. the extent to which changes in the demand for the output of any one sector impact on all other sectors of the economy. To be able to achieve a breakdown of the analysis by region, we developed a **multi-regional Input-Output model**, combining UK-level Input-Output tables (for 2016⁶⁷) with a range of regional-level data⁶⁸ to achieve a granular breakdown by sector⁶⁹ and region⁷⁰.

In addition to the impacts associated with Queen's University Belfast's educational exports described in the following sections, a similar methodology is applied to estimate the direct, indirect, and induced economic effects associated with the operational and capital expenditures of Queen's University Belfast (see Section 5).

⁶³ It is important to note that, while the analysis takes account of *leakage* (e.g. adjusting for the extent to which any additional income for supplying industries might be spent on imports of goods and services from outside the UK), the estimated impacts here are *not* adjusted for *displacement* or *additionality* (e.g. the extent to which the tuition fee and non-tuition fee income associated with Queen's University Belfast's international students might otherwise have been used for other purposes). Hence, our analysis effectively estimates the direct, indirect, and induced impacts associated with Queen's University Belfast's educational exports in *gross* terms.

⁶⁴ Here, economic output is equivalent to income/turnover (e.g. the direct economic output associated with international students' tuition fees is captured by the international fee income received by Queen's University Belfast).

⁶⁵ Gross value added is used in National Accounting to measure the economic contribution of different industries or sectors and is defined as economic output minus intermediate consumption (i.e. the cost of goods and services used in the production process).

⁶⁶ Specifically, the analysis makes use of *Type II* multipliers, defined as $[\text{Direct} + \text{indirect} + \text{induced impact}]/[\text{Direct impact}]$.

⁶⁷ See Office for National Statistics (2020a).

⁶⁸ The fundamental idea of the multi-regional Input-Output analysis is that region *i*'s demand for region *j*'s output is related to the friction involved in shipments from one region to another (which we proxy by the distance between the two regions), and that cross-regional trade can be explained by the relative gross value added of the sector in all regions. The multi-regional Input-Output model was derived by combining UK-level Input-Output tables with data on geographical distances between regions; GVA and compensation of employees by sector and region (Office for National Statistics, 2019); employment by sector and region (Office for National Statistics, 2020b); gross disposable household income by region (Office for National Statistics, 2020c); population by region (Office for National Statistics, 2020d); and UK imports into each region and exports by each region, by commodity (Office for National Statistics, 2018).

⁶⁹ In terms of sector breakdown, the original UK Input-Output tables are broken down into 64 (relatively granular) sectors. However, the (wide range of) regional-level data required to generate the multi-regional Input-Output model is not available for such a granular sector breakdown. Instead, the multi-regional Input-Output model is broken down into 10 more high-level sector groups (see Table 19 in Annex A2.2.1 for more information).

⁷⁰ While Input-Output analyses are a useful tool to assess the total economic impacts generated by a wide range of activities, it is important to note several key limitations associated with this type of analysis. Input-Output analyses assume that inputs are complements, and that there are constant returns to scale in the production function (i.e. that there are no economies of scale). The interpretation of these assumptions is that the prevailing breakdown of inputs from all sectors (employees, and imports) in 2016 is a good approximation of the breakdown that would prevail if total demand (and therefore output) were marginally different. In addition, Input-Output analyses do not account for any price effects resulting from a change in demand for a given industry/output.



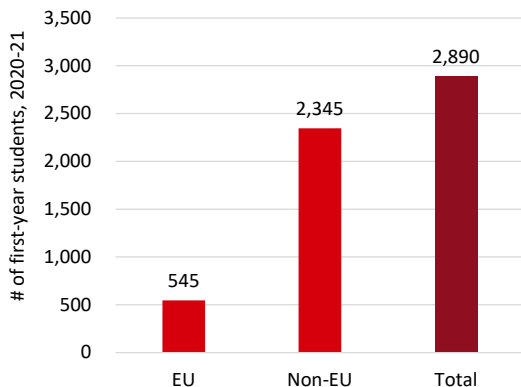
4.1 The 2020-21 cohort of international Queen's University Belfast students

Figure 21, Figure 22, and Figure 23 present information on the number of non-UK domiciled students included in the 2020-21 cohort of Queen's University Belfast students (by domicile, mode of study, and level of study, respectively).

In terms of domicile (Figure 21), of the total of **2,890** international students starting higher education qualifications at Queen's University Belfast in 2020-21, **545 (19%)** were domiciled within the European Union, while **2,345 (81%)** were from non-EU countries. In terms of study mode (Figure 22), the majority of international students in the cohort (**2,755, 95%**) were undertaking their qualifications on a full-time basis, with the remaining **135 (5%)** studying on a part-time basis.

In terms of study level (Figure 23), in contrast to UK domiciled students (see Section 3.1), the majority of non-UK domiciled students in the cohort were undertaking postgraduate qualifications (**1,850, 64%**), including **1,445 (50%)** enrolled in postgraduate taught degrees, **250** students (**9%**) undertaking postgraduate research degrees, and **155 (5%)** undertaking other postgraduate learning. At undergraduate level, there were **800 (28%)** students undertaking first degrees, while the remaining **240 (8%)** students were enrolled in other undergraduate learning⁷¹.

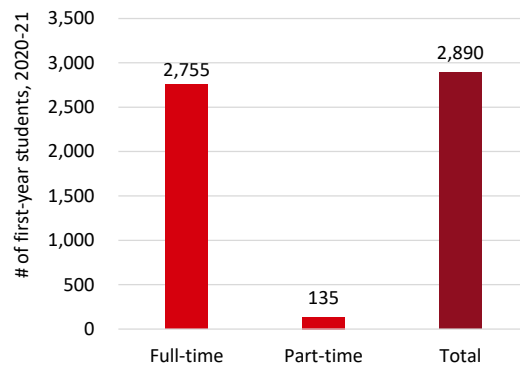
Figure 21 Non-UK domiciled students in the 2020-21 cohort of Queen's University Belfast, by domicile



Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding.

Source: London Economics' analysis based on Queen's University Belfast HESA data

Figure 22 Non-UK domiciled students in the 2020-21 cohort of Queen's University Belfast students, by study mode



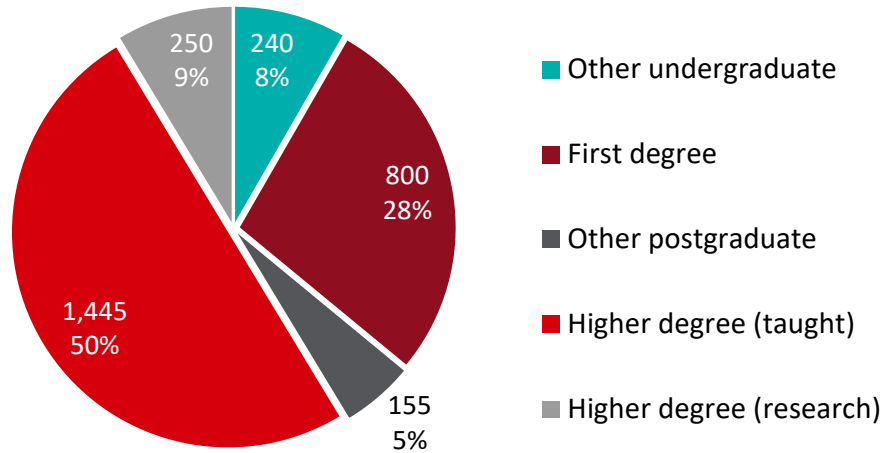
Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding.

Source: London Economics' analysis based on Queen's University Belfast HESA data

⁷¹ For more detailed information on Queen's University Belfast's 2020-21 cohort of non-UK domiciled students, please refer to Annex 0.



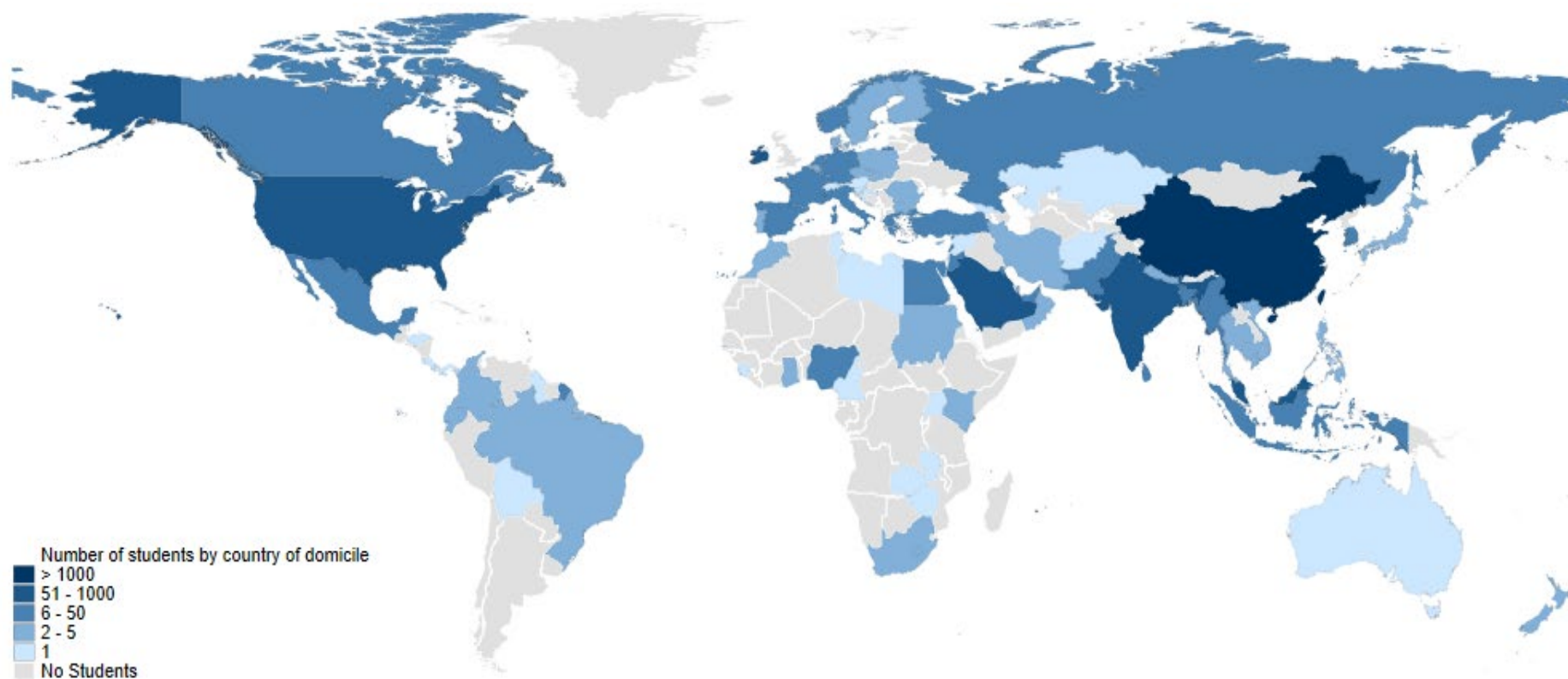
Figure 23 Non-UK domiciled students in the 2020-21 cohort of Queen's University Belfast students, by level of study



Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding.

Source: London Economics' analysis based on Queen's University Belfast HESA data



Figure 24 Origin of the 2020-21 cohort of non-UK domiciled students by country

We received HESA data on a total of **2,875** non-UK-domiciled students from Queen's University Belfast.

Source: London Economics' analysis based on Queen's University Belfast's HESA data. © EuroGeographics for the administrative boundaries and © 2009 Bjørn Sandvik

The Mainstreaming and Internationalising of Shared Education

Led by Professor Joanne Hughes and Professor Tony Gallagher, research by the School of Social Sciences, Education and Social Work at Queen's University Belfast has helped integrate education in Northern Ireland and other countries. The **Centre for Shared Education (CASE)** at the university, established in May 2012, **has promoted shared education to aid reconciliation and deliver educational benefits to all children.**



Segregated Education Systems

The vast majority of schools in Northern Ireland are segregated on religious grounds, resulting in de facto parallel systems for Catholics and Protestants. This is despite the 1998 Belfast Good Friday Agreement specifying integrated education as 'an essential aspect of the reconciliation process'. This integration is aimed at reducing cultural estrangement, overcoming negative stereotypes and fostering an understanding between the two dominant traditions.

The Shared Education Programme

Research by Queen's University Belfast provided the basis for a model of collaboration between Protestant and Catholic schools in Northern Ireland. The Shared Education programme began with just 12 schools in 2007, but now **includes 700 schools and accounts for over 60,000 pupils** who are involved in regular shared classes with schools from different denominations. This collaboration can have a real impact on society as a whole. Professor Joanne Hughes explains: *"The education system presents a huge opportunity for relationship building in divided societies. It is my hope that our work in shared education can make a real difference to the lives of beneficiaries and promote wider social cohesion in communities affected by conflict and division."*

Impact Around the World

Queen's University Belfast's research has led to the adoption of Shared Education as a statutory responsibility for both the Education Authority and the Department of Education. The work influenced both the Shared Education Signature Programme (SESP) and the CASE programme in Northern Ireland. The initiatives continue to evolve, including the development of the first shared education campus between Limavady High School and St. Mary's College which allow pupils from different backgrounds and traditions to share facilities and classes. Further afield, the model has been adapted for implementation in Israel, North Macedonia and Los Angeles. **Queen's University Belfast was awarded a Queen's Anniversary Prize for Higher and Further Education for the impact of this work in Northern Ireland and internationally.**

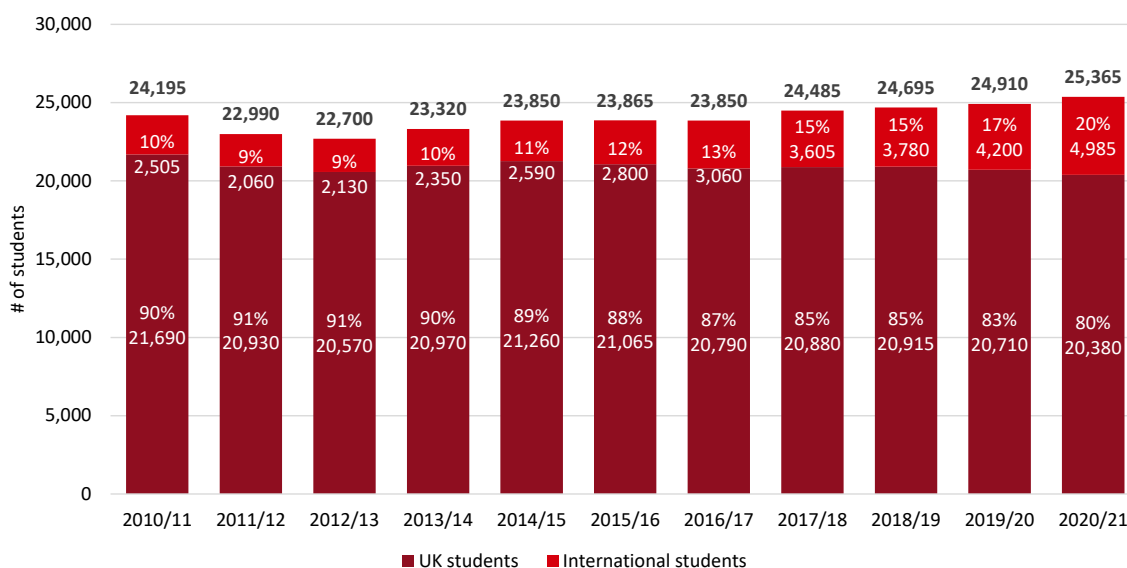
Research undertaken by the team at Queen's University Belfast has had a real impact on thousands of pupils in Northern Ireland, bringing educational benefits to children and improving reconciliation and integration across society. The success of the Shared Education programme has also resulted in its replication in other divided societies across the world.

4.2 Changes in the number of international students at Queen's University Belfast over time

Alongside the analysis of the 2020-21 cohort of non-UK domiciled *first-year* students, we have also examined the trends in Queen's University Belfast's *entire* non-UK student body over the past decade (i.e. academic years 2010-11 to 2020-21).

With Queen's University Belfast being an increasingly popular destination for international students, there has been a significant increase in the number of non-UK domiciled students enrolled at Queen's University Belfast over the last decade, increasing from **2,505** students in 2010-11 to **4,985** students in 2020-21 (a **99%** increase). With the number of UK domiciled students having fallen slightly, this has resulted in an increase in the proportion of Queen's University Belfast's students that are from non-UK domiciles over the period, from **10%** in 2010-11 to **20%** in 2020-21 (see Figure 25).

Figure 25 Total students at Queen's University Belfast, 2010-11 to 2020-21, by domicile

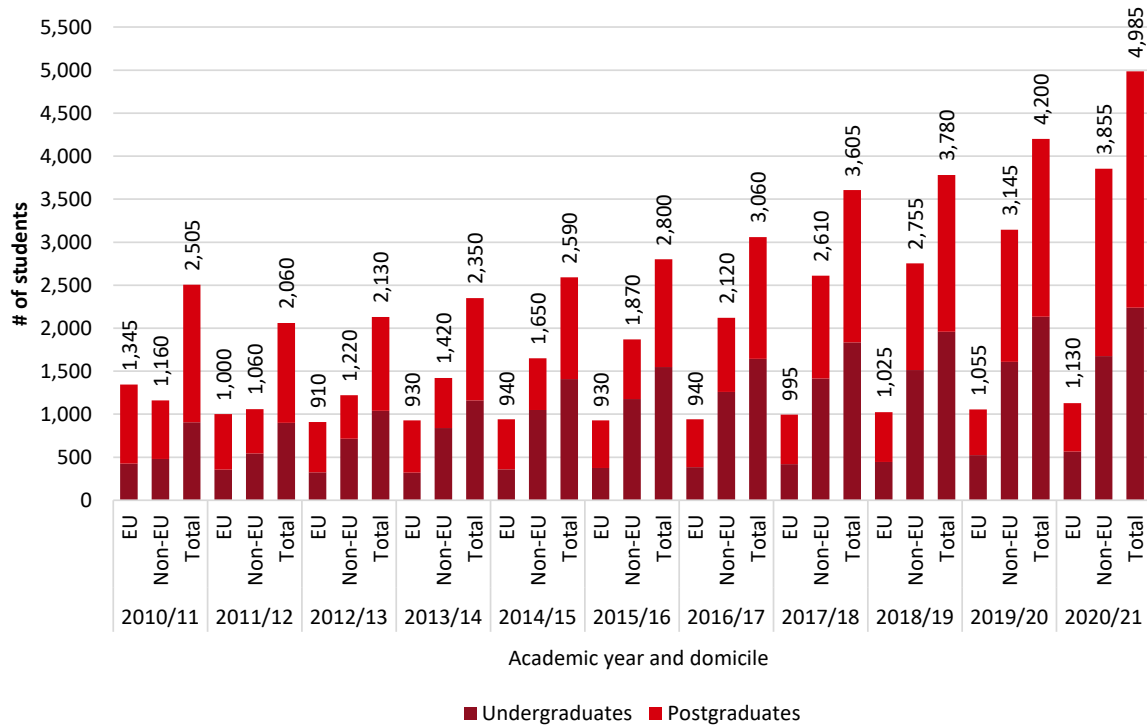


Source: London Economics' analysis based on HESA (2012, 2013, 2014, 2015 and 2022)

In terms of the breakdown of these non-UK students by domicile (Figure 13), the overall increase in international students was predominantly driven by an increase in students from non-EU countries (**1,160** in 2010-11 to **3,855** in 2020-21), with a small decrease in students from EU countries (**1,345** in 2010-11 to **1,130** in 2020-21). This has resulted in an increase in the number of non-EU students as a proportion of the total non-UK-domiciled student population, from **46%** in 2010-11 to **77%** in 2020-21.

The increase in the number of international students studying at Queen's University Belfast occurred across both undergraduate and postgraduate students (Figure 13), with the number of non-UK undergraduate students increasing from **905** in 2010-11 to **2,240** in 2020-21, and the number of non-UK postgraduate students rising from **1,600** in 2010-11 to **2,745** in 2020-21. With relatively stronger growth at undergraduate level, there has been an increase in the proportion of non-UK students undertaking undergraduate as compared to postgraduate qualifications, rising from **36%** in 2010-11 to **45%** in 2020-21.

Figure 26 Figure 14 Non-UK domiciled students at Queen’s University Belfast, 2010-11 to 2020-21, by level of study and domicile



Source: London Economics’ analysis based on HESA (2012, 2013, 2014, 2015 and 2022)

4.3 Direct impact

4.3.1 Net tuition fee income

To assess the level of **gross tuition fee income** associated with international students in the 2020-21 cohort, we used data on average tuition fees charged by Queen’s University Belfast in 2020-21 (by study level, mode, and domicile⁷²). Assuming the same average study durations as in the analysis of the impact of Queen’s University Belfast’s teaching and learning activities (see Section 3), 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 2020-21 prices and using the HM Treasury Green Book real discount rate of 3.5% (see HM Treasury, 2018), we arrived at an 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 costs to the UK Exchequer associated with funding higher education for EU domiciled students studying in Northern Ireland⁷³.

⁷² As in the analysis of Queen’s University Belfast’s teaching and learning activities (see Section 3), we used information provided by Queen’s University Belfast on average tuition fees per *full-time* student charged by Queen’s University Belfast in 2020-21 separately by domicile (i.e. Northern Ireland, rest of UK, EU, and non-EU students), study mode, and study level. To arrive at the fees per *part-time* student (ensuring that the estimated fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2020-21 cohort), we multiplied the respective full-time rates by the average study intensity amongst part-time students in the cohort. The average study intensity was estimated separately by qualification level and calculated by dividing the number of part-time students in the cohort in full-time equivalents by the number of students in terms of headcount (again based on HESA data provided by Queen’s University Belfast).

⁷³ Note that there is no such Exchequer funding associated with non-EU students.



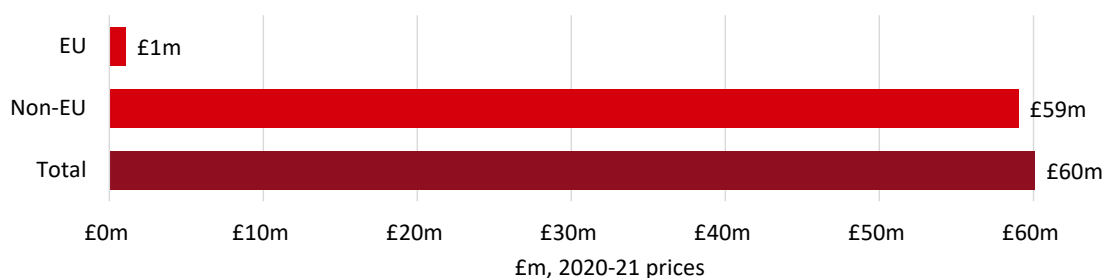
These Exchequer costs include public teaching grant funding as well as the subsidies associated with the tuition fee support provided by the Student Loans Company, in terms of:

- The tuition fee grant funding provided **to eligible EU domiciled full-time and part-time undergraduate students**;
- The RAB charge on **postgraduate tuition fee loans provided to eligible EU full-time and part-time postgraduate students**; and
- The **recurrent teaching grant funding** paid to Queen's University Belfast in relation to the provision of teaching to EU domiciled students (by the Department for the Economy Northern Ireland)⁷⁴.

In addition to these public purse costs, we also deducted any **fee waivers and bursaries** paid to international students by Queen's University Belfast itself⁷⁵. Again, all of these costs were calculated over students' total study duration and estimated in present value terms⁷⁶.

Combining the estimates per student with information on the number of non-UK students in the 2020-21 cohort, and using the same assumptions on completion rates as for UK domiciled students (as part of the analysis of the impact of teaching and learning (see Section 3.2)), we arrived at estimates of the total net tuition fee income associated with EU and non-EU students in the 2020-21 cohort of Queen's University Belfast students. As presented in Figure 27, the **total net tuition fee income** generated by international students in the cohort was estimated at **£60 million**. Most of this income was generated by **non-EU students (£59 million, 98%)**. The estimated net fee income associated with EU students is relatively low, at **£1 million**, which reflects the fact that EU students' tuition fees are funded through tuition fee grants (for undergraduate students) and loans (for postgraduate taught students) provided by SLC (so that, for these students, the cost of funding these students is nearly equivalent to the (gross) tuition fee income received by Queen's University Belfast).

Figure 27 Aggregate net tuition fee income associated with international students in the 2020-21 cohort, by domicile (£m)



Note: All estimates are presented in 2020-21 prices, discounted to reflect net present values, and rounded to the nearest £1m. Values may not add up precisely to the totals due to rounding.

Source: *London Economics' analysis*

⁷⁴ For more information on our assumptions in relation to public student support and recurrent teaching grants, please refer to Section 0.

⁷⁵ Again, see Section 0 for more information on our assumptions in relation to fee waivers and bursaries. Note that it was not possible to distinguish fee waivers from other types of bursaries/scholarships, so we model all of the bursaries provided by Queen's University Belfast as non-fee bursaries.

⁷⁶ For information on the estimated levels of net fee income per student, please refer to Annex 0.

4.3.2 Non-fee income

In addition to tuition fees, the UK economy benefits from export income from overseas students' **non-tuition fee (i.e. living cost) expenditures** incurred during their studies at Queen's University Belfast. These costs include:

- **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 their tuition fee expenditure⁷⁷, making these living cost expenditures a significant component of the UK's export income from international students coming to study at UK higher education institutions.

To analyse the level of non-tuition fee expenditure associated with the 2020-21 cohort of international students studying at Queen's University Belfast, we used estimates from the **2014-15 Student Income and Expenditure Survey (SIES)**⁷⁸. The survey provides estimates of the average expenditures of English domiciled undergraduate students (studying in England or Wales) 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 to the 2014-15 SIES estimates:

- We excluded estimates of **tuition fee expenditure** (to avoid double-counting with the analysis presented in Section 4.3.1).
- We deducted any **on-campus expenditure** that students might incur (to avoid double-counting with the analysis of the impacts of the expenditure of Queen's University Belfast itself (see Section 5))⁷⁹.
- The SIES estimates relate to English domiciled students studying in England or Wales only⁸⁰. To take account of differences in living costs between the Home Nations, we **adjusted the estimates for average price differences between England and Northern Ireland**, based on regional consumer price levels in Northern Ireland relative to England⁸¹.
- 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 international students. We do however adjust the SIES

⁷⁷ See Department for Business, Innovation and Skills (2011b).

⁷⁸ See Institute for Employment Studies & National Centre for Social Research (2018). At the time of writing, estimates for a more recent academic year were not available.

⁷⁹ Specifically, following the approach undertaken by Oxford Economics (2017) in analysing the collective economic impact of all UK higher education institutions in 2014-15, we assume that **10%** of students' non-tuition fee expenditures are spent on campus (i.e. are accrued as income by Queen's University Belfast itself).

⁸⁰ To the best of our knowledge, the most recent comparable SIES estimates for Northern Irish domiciled students relate to the 2004-05 academic year.

⁸¹ The Office for National Statistics (2018) provides figures for England (excluding London) and London separately. We therefore calculated an (unweighted) average of the price levels across English regions and London to obtain the English price level. The data are based on 2016 (which is the most recent year for which the information is currently available).



estimates for the longer **average stay durations** in the UK of non-EU students compared to EU students⁸².

- We further adjusted the estimates for any **foregone subsistence expenditures in the UK due to international students returning to their home countries during the Covid-19 pandemic** (and due to the suspension of in-person teaching across UK universities). Specifically, we assume that 50% of full-time students in the cohort returned home during the second and third terms of the 2020-21 academic year^{83,84}. We assume that, during this time, these students did not incur any subsistence expenditure in the UK (e.g. on food, entertainment, etc.), but still incurred all other types of non-fee spending in the UK listed above (e.g. we assume that these students were still liable to pay any accommodation costs in the UK).
- Finally, we **inflated** the estimates to 2020-21 prices⁸⁵.

Similar to tuition fees, we then 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-fee expenditure per student in 2020-21 prices, by level of study, mode, and domicile⁸⁶.

Again combining the estimated non-tuition fee income per student with the number of international students in the 2020-21 cohort expected to complete qualifications (or credits/modules) at Queen's University Belfast the **total (off-campus) non-tuition fee expenditure** associated with international students in the 2020-21 cohort was estimated at **£69 million** (Figure 28). Of this total, **£17 million** was associated with **EU students**, whereas **£52 million** was generated by **non-EU students** in the cohort.

Figure 28 Aggregate non-fee income associated with international students in the 2020-21 cohort, by domicile (£m)



Note: All estimates are presented in 2020-21 prices, discounted to reflect net present values, and rounded to the nearest £1m. Values may not add up precisely to the totals due to rounding.

Source: *London Economics' analysis*

⁸² 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 A2.2.4.

⁸³ In other words, we assume that due to the Covid-19 pandemic, the subsistence expenditures of full-time international students in the 2020-21 cohort were 33% lower in 2020-21 (i.e. 50% x 67%) than would otherwise have been the case.

⁸⁴ We assume that international part-time students in the cohort did *not* leave the UK due to the pandemic, given that part-time students typically combine their studies with work in the labour market.

⁸⁵ Inflation estimates are based on Consumer Price Index inflation estimates provided by the Office for National Statistics (2022).

⁸⁶ For information on the estimated levels of non-tuition fee income per student, please refer to Annex A2.2.5.

Food Fortress



After the 2008 dioxin crisis on the island of Ireland, Queen's University Belfast was approached to prevent a similar catastrophe happening again. The **Institute for Global Food Security** at the university developed the Food Fortress scheme, led by Professor Chris Elliott, Professor Mark Mooney and Dr Simon Haughey, which is now recognised internationally as a world-leading risk management and feed quality assurance scheme.

The 2008 Dioxin Crisis

The global food supply system is one of the most complex systems in existence, and this complexity creates a potential for accidental or intentional contamination. This happened on the island of Ireland in 2008 when Irish pork was contaminated with dioxin, a highly toxic chemical. This resulted in a global recall of pig meat from the island, and over 170,000 pigs and 5,700 cattle were culled on a precautionary basis. **The fallout from the crisis caused the loss of an estimated 1,800 jobs and cost the economy €250 million.** Professor Chris Elliott and his team at Queen's University Belfast were approached by the feed sector to help prevent such a catastrophic feed-related contamination from happening again.

The Food Fortress Scheme

The team within the Institute of Global Food Security began an intensive research programme to develop, validate and implement innovative techniques to detect a broad spectrum of feed-related contaminants. This research enabled the low-cost detection of contaminants and toxins, which were incorporated within a risk-based sampling approach to provide a supply chain-wide quality assurance scheme. This scheme, **Food Fortress**, was launched in 2014 with initially 19 large animal feed companies.

Impact of the Scheme

Under the scheme, testing for contaminants increased by over 500% without any additional industry costs. By 2019, 5 million tonnes (with an associated value of £1.25 billion) of animal feed were tested, and there is yet to be an incident of possible contamination since the 2008 dioxin crisis. **The Food Fortress scheme is now recognised internationally as world-leading and is used as a major marketing tool by the UK and Republic of Ireland food industries.** The scheme directly led to additional sales of £50 million in the Northern Irish dairy sector across 20 Middle Eastern and Asian countries. **Due to the success of the Food Fortress scheme, Professor Chris Elliott and his team at Queen's University Belfast are now regularly invited to participate in investigations around the world.**

The Food Fortress scheme has turned the 2008 dioxin crisis into an opportunity. As a result of the scheme's success, **Northern Ireland has developed a reputation as one of the safest supply chains in world food production and as world-leading in risk management.** Researchers at Queen's University Belfast are now consulted by those around the world looking to prevent contamination of their foodstuffs.

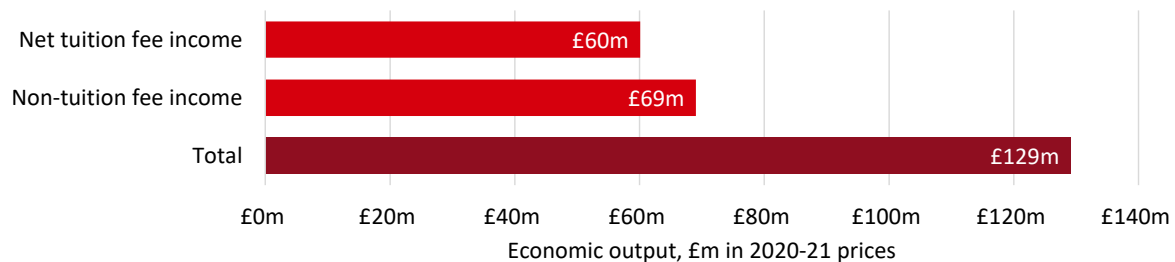
4.3.3 Total direct impact

Combining the above estimates of (net) fee and non-fee income, the total direct economic impact of the expenditures of international students in the 2020-21 Queen's University Belfast cohort (in economic output terms) was estimated at **£129 million** (Figure 29). Just over half (**53%**) of this total (**£69 million**) was generated from international students' non-tuition fee spending, while just under half (**£60 million, 47%**) was generated from international students' tuition fees accrued by Queen's University Belfast (net of any public costs of provision or fee waivers/bursaries provided by Queen's University Belfast). In terms of student domicile, three-quarters of this impact (**£52 million**) was generated by non-EU domiciled students, while one quarter of the impact (**£17 million**) was associated with EU students.

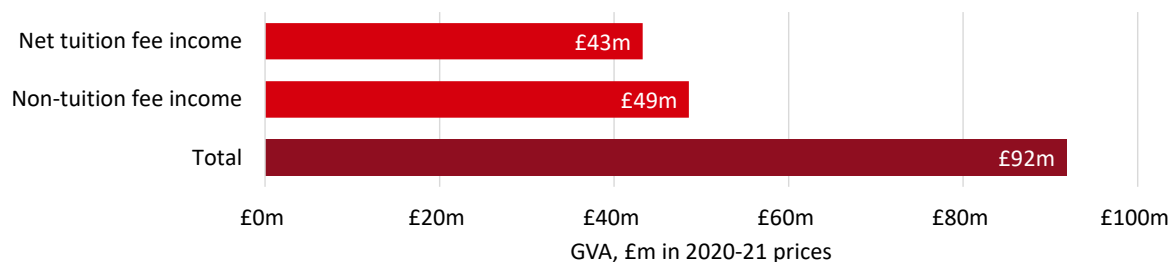
In addition to economic output (i.e. export income), it was possible to convert the above estimates into gross value added and the number of full-time equivalent jobs supported⁸⁷. We thus estimate that the export income generated by international students in the 2020-21 Queen's University Belfast cohort directly generates **£92 million** in GVA (**£43 million** from international (net) fee income and **£49 million** from non-fee income) and supports **1,520 full-time equivalent jobs** (**870** from (net) fees and **650** from non-tuition fee income⁸⁸).

Figure 29 Total direct impact associated with non-UK students in the 2020-21 Queen's University Belfast cohort, by type of impact

Output, £m



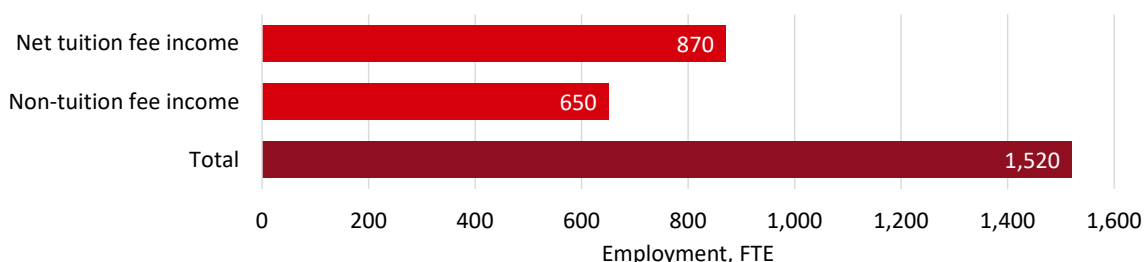
GVA, £m



⁸⁷ To estimate the direct GVA and employment associated with the (net) tuition fee income generated by Queen's University Belfast's international students, we multiplied this income by the average ratio of GVA to output and FTE employees to output within Northern Ireland's government, health, and education sector as a whole (again based on the above-described multi-regional Input-Output model). To estimate the direct GVA and employment associated with the non-tuition fee income generated by Queen's University Belfast's international students, we instead multiplied this income by the average ratio of GVA to output and FTE employees to output associated with the expenditure of households located in Northern Ireland (again based on the multi-regional Input-Output model). In other words, we assume that the non-tuition fee expenditures of Queen's University Belfast's international students support the same levels of GVA and employment (in relative/proportionate terms) as the expenditure of households located in Northern Ireland more generally.

⁸⁸ The difference in direct employment supported by international students' tuition fee vs. non-tuition fee income is driven by the fact that the underlying ratio of FTE employees to output within Northern Ireland's government, health, and education sector is considerably larger than the corresponding ratio for sectors producing consumer goods and services purchased by households located in Northern Ireland (e.g. including the real estate or production sectors).

FTE employment



Note: All monetary estimates are presented in 2020-21 prices, discounted to reflect net present values, and rounded to the nearest £1m. Values may not add up precisely to the totals due to rounding. The employment figures are rounded to the nearest 5.

Source: London Economics' analysis

4.4 Total economic impact associated with Queen's University Belfast's educational exports

To estimate the total (direct, indirect, and induced) economic impact associated with the export income generated by international students studying at Queen's University Belfast, we used economic multipliers derived from the above-described multi-regional Input-Output model, estimating the extent to which the direct export income generates additional activity throughout the UK economy. Specifically, we applied two types of multipliers to the above-described tuition fee and non-tuition fee income associated with international students in the 2020-21 cohort, including:

- **Multipliers relating to international tuition fee income (accrued by Queen's University Belfast itself):** The multipliers used to estimate the impact of Queen's University Belfast's international tuition fee income were calculated based on the inter- and intra-industry flows of goods and services for Northern Ireland's government, health, and education sector as a whole⁸⁹.
- **Multipliers relating to income from international students' (off-campus) non-tuition fee expenditures:** These were calculated based on the final consumption expenditure patterns of households located in Northern Ireland⁹⁰, and subsequently applied to the estimated off-campus non-tuition fee expenditures of overseas students in the 2020-21 cohort of Queen's University Belfast students.

Again, these multipliers are expressed in terms of **economic output**, **gross value added**, and (full-time equivalent) **employment**, and are calculated as **total multipliers**, capturing the aggregate impact on all industries in the UK economy arising from an initial injection relative to that initial injection.

Table 8 presents the economic multipliers applied to the income generated by international students at Queen's University Belfast (in terms of the impact on Northern Ireland and the UK economy as a whole)⁹¹. In terms of economic output, the analysis assumes that every £1 million of

⁸⁹ This approach is based on the fact that the tuition fee income from international students is accrued by Queen's University Belfast itself. In other words, we assume that the expenditure patterns of Queen's University Belfast are the same as for other institutions operating in Northern Ireland's government, health, and education sector. Specifically, we apply these multipliers to the *gross* tuition fee income generated by international students in the 2020-21 Queen's University Belfast cohort, and then deduct the Exchequer/University cost of provision (i.e. public teaching grants, public student support, and Queen's University Belfast fee waivers and bursaries) to arrive at the *net* direct, indirect and induced impact associated with this income.

⁹⁰ In other words, for the purpose of applying relevant economic multipliers, we assume that international students studying at Queen's University Belfast have similar expenditure patterns as Northern Irish households more generally. To estimate these multipliers, we inserted a separate vector into the multi-regional Input-Output model, capturing the estimated final demand (again by industry and region) of households located in each region.

⁹¹ While the table presents the multipliers for the impacts on Northern Ireland and the UK as a whole, a full breakdown of the total impacts across all regions (as well as by sector) is provided in Figure 30.



tuition fee expenditure incurred by international students generates an *additional* **£1.11 million** of impact throughout the UK economy, of which **£0.41 million** is generated in Northern Ireland. In addition, we assume that every £1 million of **non-fee expenditure** incurred by international students generates an additional **£1.39 million** of impact throughout the UK, of which **£0.52 million** is located in Northern Ireland.

Table 8 Economic multipliers associated with the income from international students in the 2020-21 cohort of Queen's University Belfast students

Location of impact and type of income	Output	GVA	FTE employment
Tuition fee income			
Northern Ireland	1.41	1.42	1.33
Total UK	2.11	1.96	1.72
Non-fee income			
Northern Ireland	1.52	1.56	1.61
Total UK	2.39	2.26	2.34

Note: All multipliers constitute Type II multipliers, defined as [Direct + indirect + induced impact]/[Direct impact].

Source: London Economics' analysis

Applying these multipliers to the above direct economic impacts⁹², we estimate that the total economic impact on the UK generated by the (net) tuition fee income and non-tuition fee income associated with international students in the 2020-21 Queen's University Belfast cohort amounts to **£305 million of economic output** (see top panel of Figure 30):

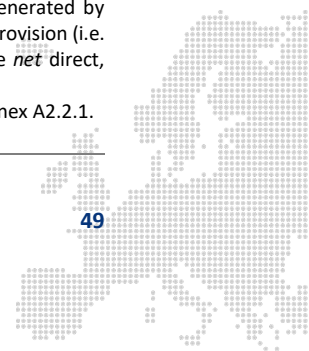
The impact of the export income generated by the 2020-21 Queen's University Belfast cohort stood at £305 million.

- In terms of the breakdown by type of income from international sources, **£140 million** of this impact was associated with international students' (net) **tuition fees**, and **£165 million** was associated with these students' **non-tuition fee expenditures** over the duration of their studies at Queen's University Belfast.
- In terms of the breakdown by region, the majority of this impact (**£199 million, 65%**) was generated in **Northern Ireland**, with the remaining **£106 million (35%)** occurring in **other regions** across the UK.
- In terms of sector, the tuition fee and non-tuition fee income generated from Queen's University Belfast's international students generated particularly large impacts within the **government, health, and education sector (£87 million (29%)**, given that the cohort's tuition fee income is accrued as income by Queen's University Belfast itself). In addition, there are relatively large impacts felt within the **distribution, transport, hotel, and restaurant sector (£56 million, 18%)**, the **real estate industry (£47 million, 15%)**, and the **production sector (£43 million, 14%)**.⁹³

The impact in terms of gross value added was estimated at **£203 million** across the UK economy as a whole (with **£143 million** generated within **Northern Ireland**), while the corresponding estimates

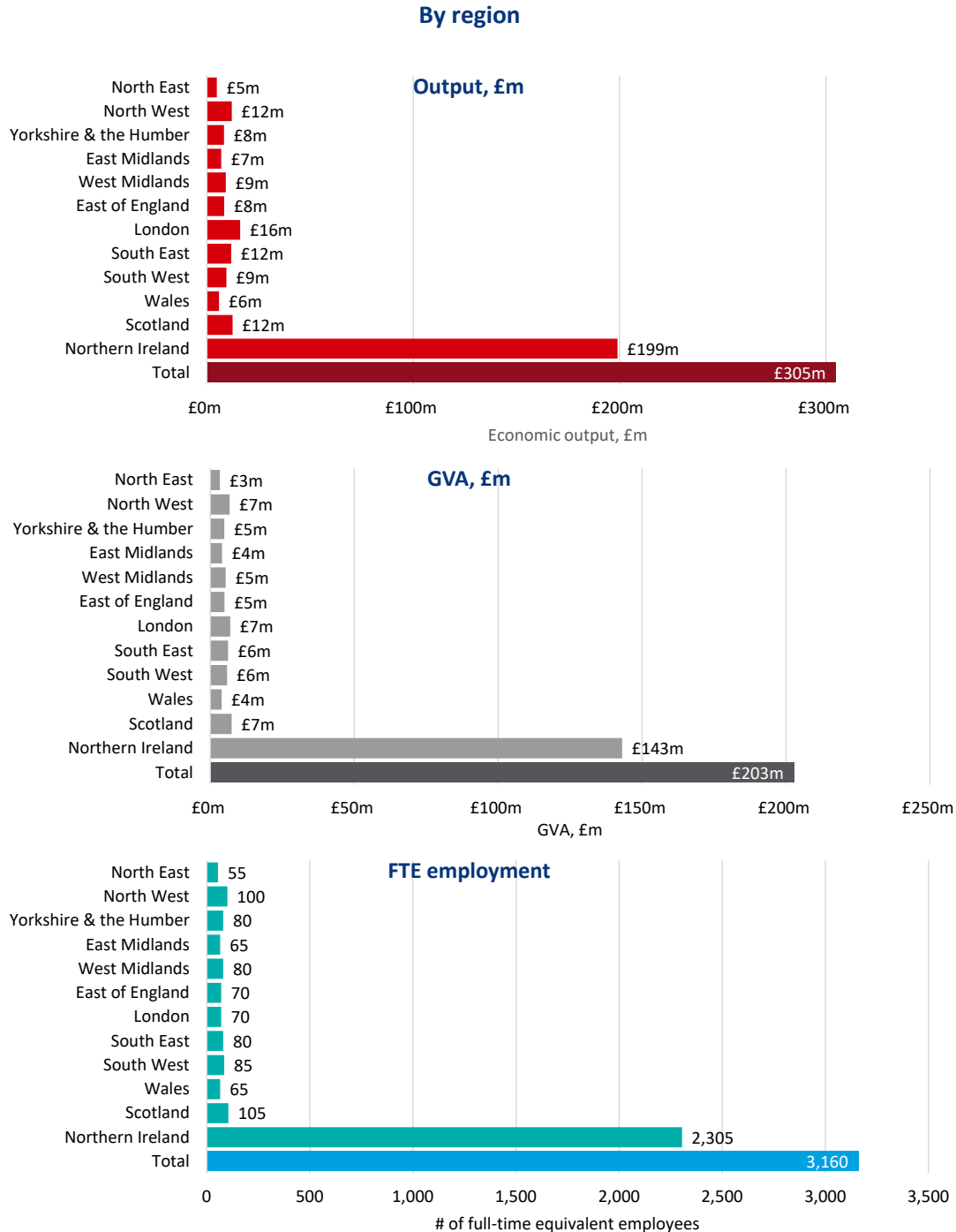
⁹² Again, in terms of tuition fee income, note that we apply the relevant multipliers to the *gross* tuition fee income generated by international students in the 2020-21 Queen's University Belfast cohort, and then deduct the Exchequer/University cost of provision (i.e. public teaching grants, public student support, and Queen's University Belfast fee waivers and bursaries) to arrive at the *net* direct, indirect and induced impact associated with this income.

⁹³ Again, for more detail on what industries are included in this high-level sector classification, please refer to Table 19 in Annex A2.2.1.



in terms of employment stood at **3,160 full-time equivalent jobs** across the UK as a whole, with **2,305 jobs** supported across **Northern Ireland**.

Figure 30 Total economic impact associated with international students in the 2020-21 Queen's University Belfast cohort, by region and sector

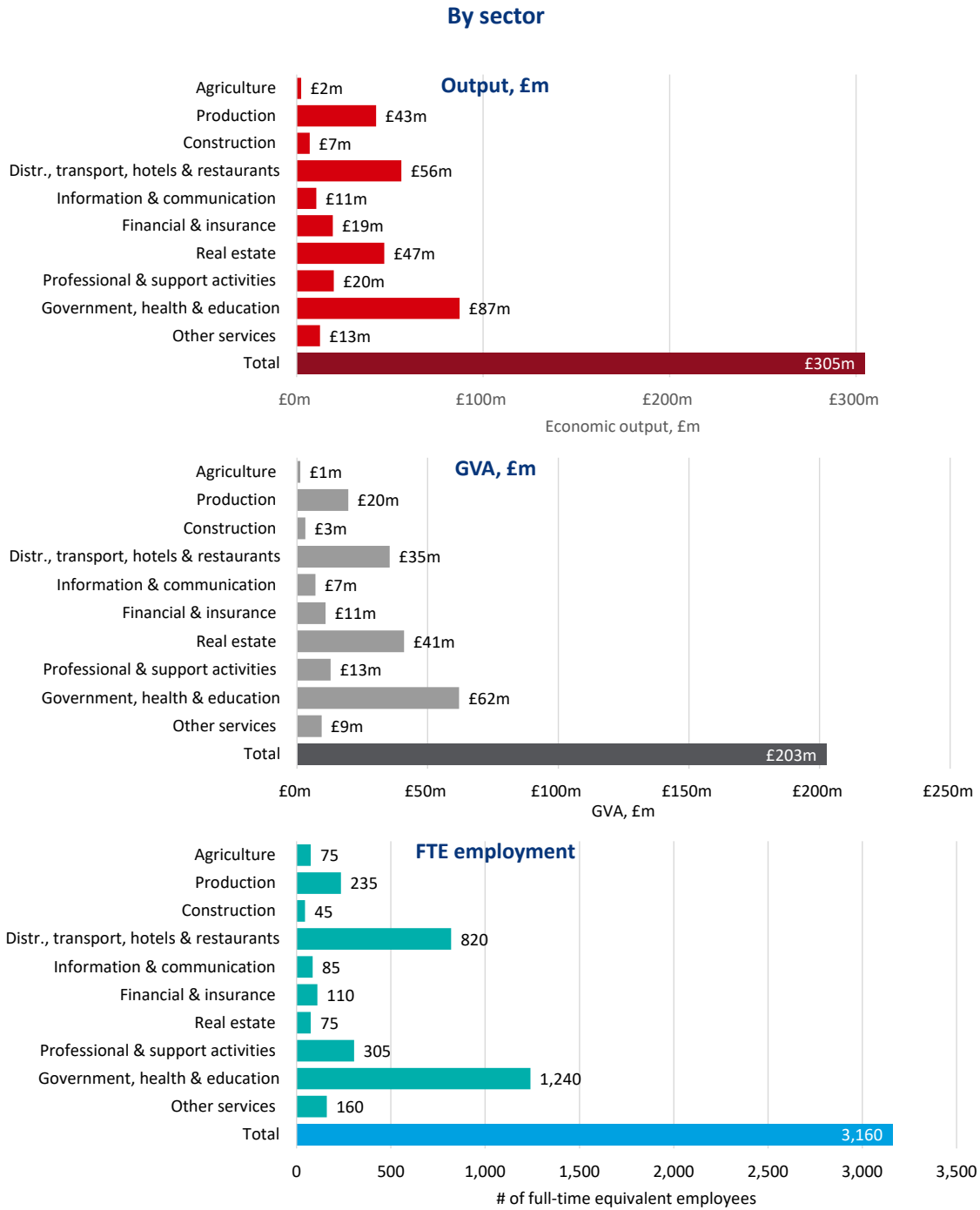


Note: Monetary estimates are presented in 2020-21 prices, discounted to reflect net present values, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Employment estimates are rounded to the nearest 5, and again may not add up precisely to the totals indicated.

Source: London Economics' analysis

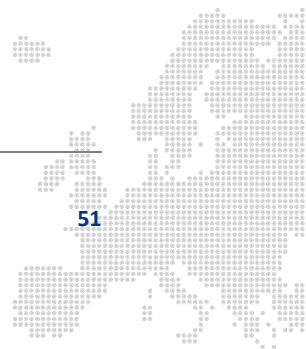


Figure 30 cont. Total economic impact associated with international students in the 2020-21 Queen's University Belfast cohort, by region and sector



Note: Monetary estimates are presented in 2020-21 prices, discounted to reflect net present values, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Employment estimates are rounded to the nearest 5, and again may not add up precisely to the totals indicated.

Source: London Economics' analysis



5 The impact of Queen's University Belfast's expenditures

Much of the existing literature on the economic impact of higher education institutions focuses (almost exclusively) on the **direct, indirect, and induced impact** of universities. Analyses of these impacts consider universities as economic units creating output within their local economies by purchasing products and services from their suppliers and hiring employees. Similar to the impact of Queen's University Belfast's educational exports (see Section 4), the direct, indirect, and induced economic impacts of a university's expenditures 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 again results in a chain reaction of subsequent rounds of spending across industries, i.e. a 'ripple effect'.
- **Induced effect:** The employees of the university and of businesses operating in the university's supply chain use their wages to buy consumer goods and services within the economy. This in turn generates wage income for employees within the industries producing these goods and services, who then spend their own income on goods and services – leading to a further 'ripple effect' throughout the economy as a whole.

In this section, we outline our estimates of the direct, indirect, and induced impacts associated with the operational and capital expenditures of Queen's University Belfast. In line with the other strands of impact, the analysis focuses on the 2020-21 academic year. As with the impact of Queen's University Belfast's educational exports, these impacts can be measured in terms of economic output, gross value added, and (full-time equivalent) employment.

5.1 Direct impact of Queen's University Belfast's expenditures

To measure the direct economic impact of the purchases of goods, services, and labour by Queen's University Belfast, we used information on Queen's University Belfast's operational expenditures (including staff and non-staff spending), capital expenditures, as well as the number of staff employed (in terms of full-time equivalent employees), for the 2020-21 academic year⁹⁴.

Based on this, in terms of monetary economic **output** (measured in terms of expenditure), **the direct economic impact** associated with Queen's University Belfast's expenditures stood at approximately **£370 million** in 2020-21 (see 0). This includes **£224 million** of staff costs, **£118 million** of other (non-staff) operating expenses⁹⁵, and **£29 million** of capital expenditure incurred in that academic year.

⁹⁴ Based on staff and financial data provided by Queen's University Belfast.

⁹⁵ The total operational expenditure (excluding capital expenditure) of Queen's University Belfast in 2020-21 stood at **£373 million**. From this, for the purpose of the analysis, we excluded **£23 million** in depreciation costs (from non-staff expenditure) and **£9 million** in movements in pension provisions (from staff expenditure), 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).



Dealing with the past in Northern Ireland

At the School of Law at Queen's University Belfast, researchers have had a profound, sustained and multi-layered impact upon the legal, policy and public understanding of dealing with the legacy of the Northern Ireland conflict.

The Past in Northern Ireland

The conflict in Northern Ireland claimed 3,600 lives across more than 40 years. 1,186 murders remain unresolved, meaning a substantial number of families are still seeking answers and information about the conflict. In 2017, the Northern Ireland Victims and Survivors Commission reported that 26% of the adult population identified as victims due to harms directly experienced or through bereavement. The legacy continues to impact Northern Irish society today. **Queen's University Belfast plays a critical role in helping Northern Ireland deal with the legacy of the conflict and in providing support to policymakers and other stakeholders.**

The Role of Queen's University Belfast



Led by Professor Kieran McEvoy, Dr Anna Bryson and Professor Louise Mallinder, Queen's University Belfast aims to provide stakeholders with clear information on the conflict to ensure they are better able to make informed decisions. The university has published a significant body of research in **transactional justice**, an interdisciplinary field that addresses how societies deal with legacies of violence and human rights abuses. This includes topics such as how to encourage effective truth recovery through amnesties, immunity and

sentence reduction, and the value added of oral history to reconciliation. They aim to find human rights compliant solutions to a range of Northern Ireland legacy matters.

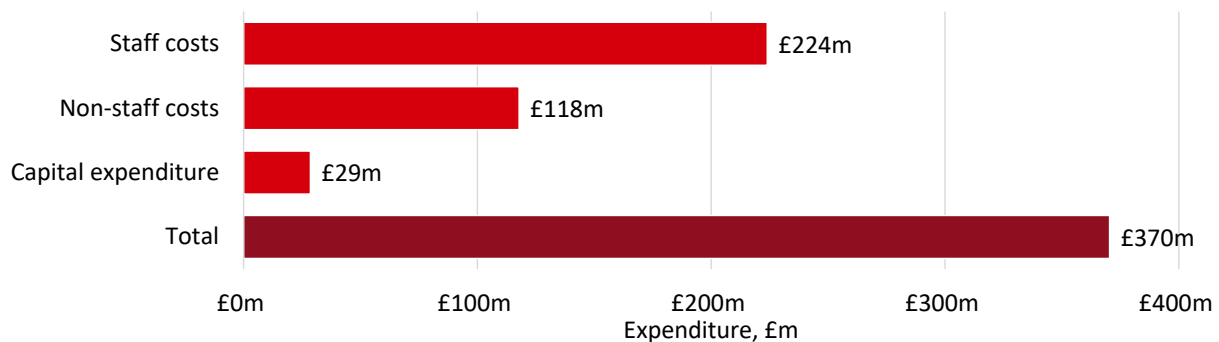
Direct Impact on Legacy

Research by Queen's University Belfast has been acknowledged by the UK and Irish governments, Northern Ireland political parties, civil society groups and the United Nations. The UN's Special Rapporteur on Transitional Justice explains: ***"Their research on trying to find human rights compliant solutions to NI legacy matters including truth recovery and national security considerations, justice, oral history and reconciliation was an invaluable resource for us... It is clear to me that their work has played a key role in anchoring the NI legacy conversations to the relevant international human rights standards."*** Queen's University Belfast's research has directly impacted on legislation, such as UK government's Draft Northern Ireland Stormont House Agreement Bill 2018.

Queen's University Belfast has conducted long standing research in the area of peace and conflict transformation. It has played a key role in helping Northern Ireland deal with the past, resulting in **researchers and other stakeholders around the world looking towards Queen's University Belfast for assistance in transforming their own societies out of conflict.**



Figure 31 Direct economic impact (in terms of output) of Queen's University Belfast's expenditure in 2020-21, by type of expenditure



Note: We exclude a total of **£23 million** of non-staff costs associated with depreciation, and **£9 million** of staff costs associated with movements in pension provisions, 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). All estimates are presented in 2020-21 prices and rounded to the nearest £1m.

Source: London Economics' analysis based on data provided by Queen's University Belfast.

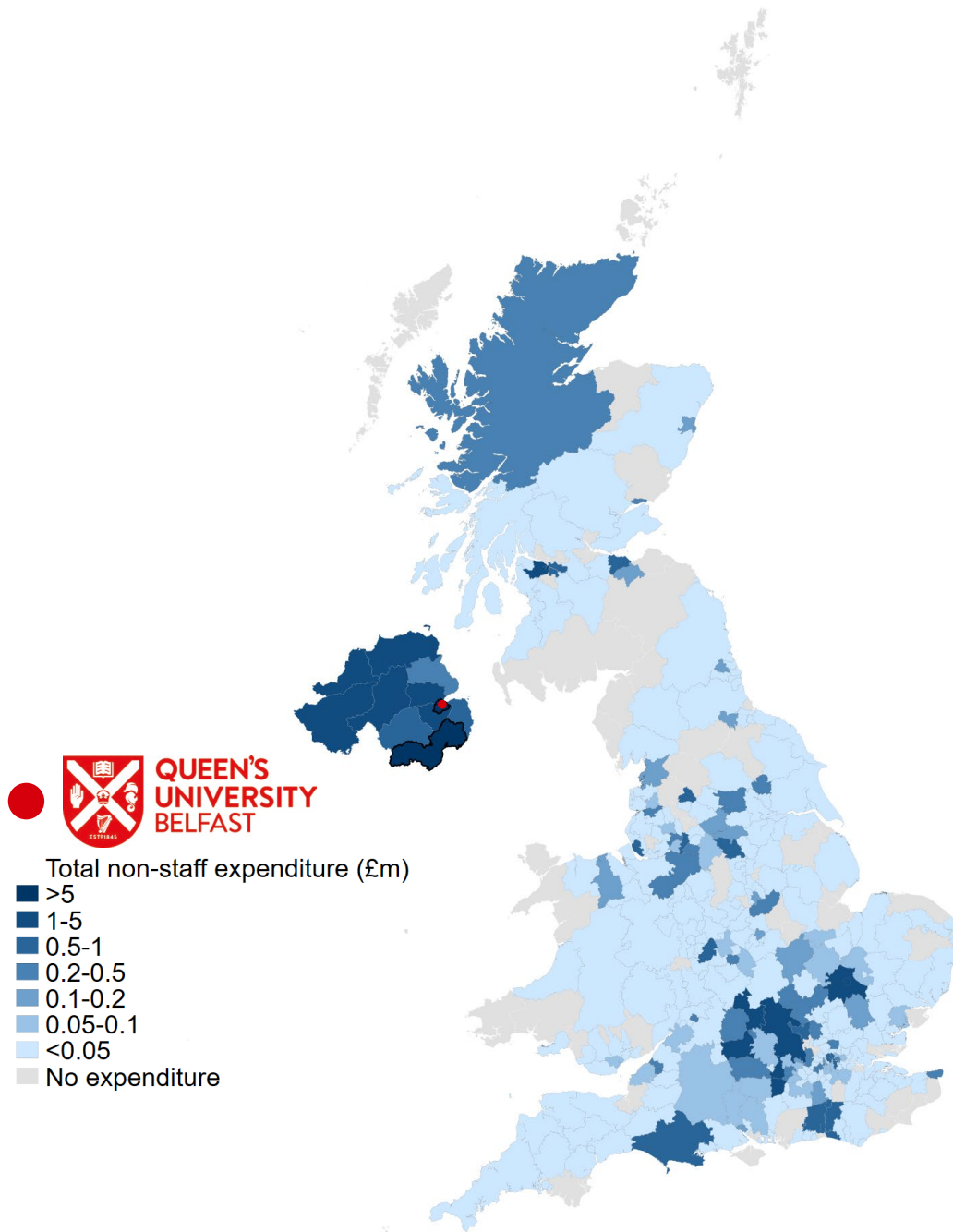
In addition to these total expenditures, we investigated the **geographical breakdown** of Queen's University Belfast's procurement expenditures, which shows the breadth of the institution's impact across Northern Ireland and the rest of the UK.

Figure 32 presents the distribution of Queen's University Belfast's procurement expenditures (based on invoice data for 2020-21) by Local Authority. The map illustrates a clear concentration of procurement expenditure in **Northern Ireland (63%**, with **Belfast** accounting for **28%** and **Newry, Mourne and Down** accounting for **18%**) and **South East England (13%**, in particular Hart, Vale of White Horse, and Cherwell). While these two regions account for approximately three-quarters of Queen's University Belfast's procurement expenditure, Queen's University Belfast also spends significant amounts on goods and services from suppliers in other regions, including **London (6%**, in particular the City of London),⁹⁶ the **East of England (4%**, in particular South Cambridgeshire), **North West England (4%**, particularly Manchester and Liverpool), and Scotland (**3%**, particularly Renfrewshire). Despite the concentration of expenditure in and around Belfast, this analysis illustrates the wider geographical reach of Queen's University Belfast's activities, with significant levels of expenditure occurring throughout Northern Ireland and the rest of the UK.

In addition to the analysis of Queen's University Belfast's procurement expenditure, Figure 33 illustrates the distribution of the University's staff numbers and staff expenditure (from August 2020 to July 2021) by Local Authority (based on employees' home address). All university staff (for whom data was provided for) were located in Northern Ireland. The map shows that Queen's University Belfast's staff are concentrated in areas surrounding the university. **51%** of staff numbers and **50%** of staff expenditure was located in **Belfast**, with **14%** of staff numbers and **16%** of staff expenditure in **Lisburn and Castlereagh**, and **9%** of staff and **10%** of staff expenditure in **Ards and North Down**.

⁹⁶ It is likely that the data overestimates the level of procurement expenditure occurring in London as compared to other regions, since the invoice data would reflect suppliers' head office locations, rather than reflecting the location where these activities took place.

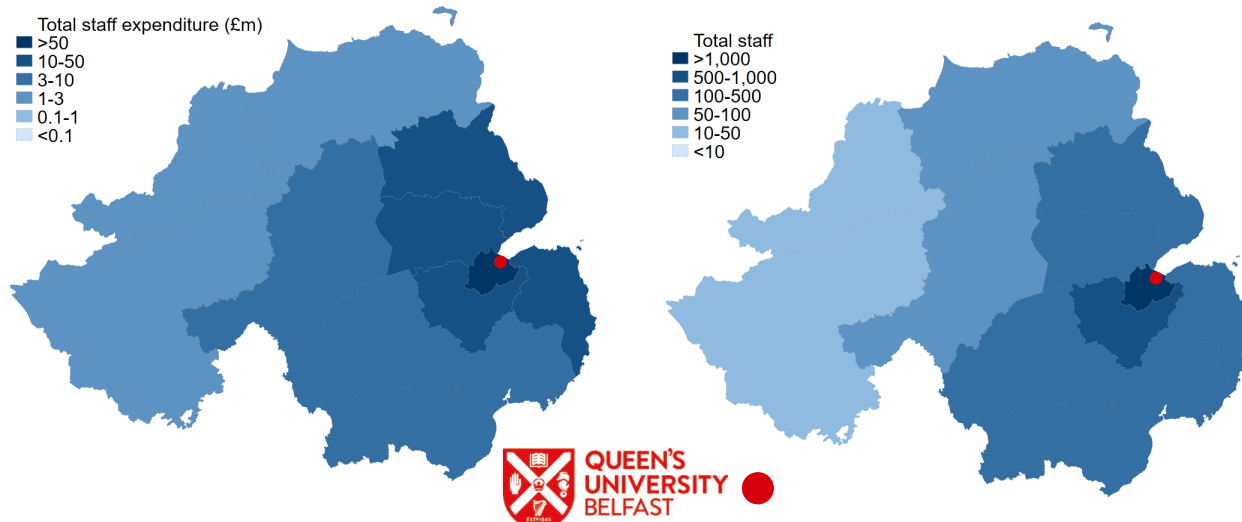
Figure 32 Distribution of Queen's University Belfast's procurement expenditure in 2020-21, by Local Authority (of invoice address)



Note: We received data on the invoice postcodes associated with £225 million of procurement expenditure by Queen's University Belfast in 2020-21. Of this total, we excluded expenditure records with negative or zero expenditure (587 records), HMRC, business rates and Universities Superannuation Scheme payments (5 records), non-UK suppliers (303 records), payments listed as being to recipients within Queen's University Belfast (5 records), missing postcodes that could not be mapped to correct postcodes (3 records). As a result of these exclusions, the figure is based on a total of £101.5 million of procurement expenditure. We used the February 2022 ONS Postcode Directory to determine the Local Authority for each postcode included in the dataset. The data was then matched with the ONS digital vector boundaries for Local Authorities as of May 2021 to generate the map. There were 4 postcodes that could not be matched to the ONS database with the full postcode, so the postcode district was used instead for those records.

Source: London Economics' analysis based on Queen's University Belfast data and Office for National Statistics data. Contains National Statistics data, OS data, Royal Mail, Gridlink, LPS (Northern Ireland), ONS, NISRA data, NRS data and Ordnance Survey data © Crown copyright and database right 2022

Figure 33 Distribution of Queen’s University Belfast’s staff numbers and staff expenditure in 2020-21, by Local Authority (of home address)



Note: We received data on staff numbers and staff expenditure, by postcode sector, for Queen’s University Belfast’s 4,930 staff with a total of £217 million of staff expenditure, which related to the period August 2020 to July 2021. Staff expenditure related to total gross pay, plus employer National Insurance contributions and employer pension costs. We used the February 2022 ONS Postcode Directory to determine the Local Authority for each postcode sector included in the dataset. The data was then matched with the ONS digital vector boundaries for Local Authorities as of May 2021 to generate the map. There were 220 staff members with missing postcode sectors and a further 10 postcode sectors that did not match with the ONS database. As a result of these exclusions, the maps are based on 4,700 staff members and total of £206 million of staff expenditure. No staff for whom postcode sectors were provided lived outside Northern Ireland.

Source: London Economics’ analysis based on Queen’s University Belfast data and Office for National Statistics data. Contains National Statistics data, OS data, Royal Mail, Gridlink, LPS (Northern Ireland), ONS, NISRA data, NRS data and Ordnance Survey data © Crown copyright and database right 2022

5.2 Indirect and induced impacts of Queen’s University Belfast’s expenditures

As with the economic impact of Queen’s University Belfast’s educational exports (see Section 4), the assessment of the indirect and induced economic impacts associated with the expenditures of Queen’s University Belfast is again based on economic multipliers derived from the above-discussed multi-regional Input-Output model⁹⁷. In particular, we applied the estimated average economic multipliers associated with organisations in Northern Ireland’s government, health, and education sector. This mirrors the approach used to assess the impact of Queen’s University Belfast’s international tuition fee income, since this income was accrued (and subsequently spent) by Queen’s University Belfast itself. Again, this approach asserts that the spending patterns of Queen’s University Belfast reflect the average spending patterns across organisations operating in Northern Ireland’s government, health, and education sector.

These multipliers (for Northern Ireland and the UK as a whole⁹⁸) are presented in Table 9, indicating that every £1 million of operational or capital expenditure incurred by Queen’s University Belfast generates an **additional £1.11 million** of impact throughout the UK economy, of which **£0.41 million** is generated in Northern Ireland⁹⁹. In terms of employment, we assume that, for every **1,000** (FTE) staff employed directly

⁹⁷ See Section 4 for more information.

⁹⁸ Again, in addition to the impacts on Northern Ireland and the UK as whole, the analysis estimates a full breakdown across all regions, as well as by sector. These detailed results are presented in Section 5.4.

⁹⁹ This exactly matches the assumed multipliers associated with Queen’s University Belfast’s international tuition fee income (see Table 8 in Section 4.4).

by Queen's University Belfast, an additional **720** staff are supported throughout the UK, of which **330** are located in Northern Ireland.

Table 9 Economic multipliers associated with the expenditures of Queen's University Belfast

Location of impact	Output	GVA	FTE employment
Northern Ireland	1.41	1.42	1.33
Total UK	2.11	1.96	1.72

Note: All multipliers constitute Type II multipliers, defined as [Direct + indirect + induced impact]/[Direct impact]. The figures match the assumed multipliers associated with Queen's University Belfast's international tuition fee income (see Table 8 in Section 4.4).

Source: London Economics' analysis

5.3 Adjustments for double-counting and transfers

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

- The total research income received by Queen's University Belfast in 2020-21 (**£121 million**), to avoid double-counting with the estimated impact of Queen's University Belfast's research activities (Section 2);
- **£25 million** in Queen's University Belfast fee waivers and other bursary spending for UK domiciled students¹⁰⁰, as this was included (as a benefit) in the analysis of Queen's University Belfast's teaching and learning activities (Section 3); and
- The direct, indirect, and induced impacts generated by Queen's University Belfast's (gross) international fee income associated with the 2020-21 cohort of non-UK students (**£152 million**¹⁰¹), to avoid double-counting with the impact of Queen's University Belfast's educational exports (Section 4).

5.4 Aggregate impact of Queen's University Belfast's spending

Figure 34 presents the estimated total direct, indirect, and induced impacts associated with expenditures incurred by Queen's University Belfast in 2020-21 (after the above-described adjustments have been made). The aggregate impact of these expenditures was estimated at approximately **£482 million** in economic output terms (see top panel of Figure 34):

- In terms of region, as with the impact of exports (Section 4), the majority of this impact (**£323 million, 67%**) was

The impact of Queen's University Belfast's expenditure on the UK economy in 2020-21 stood at £482 million.

¹⁰⁰ Queen's University Belfast'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 (see Section 3). It was therefore necessary to deduct these bursaries from the direct impact of Queen's University Belfast's spending to correctly take account of the fact that these bursaries are a transfer from Queen's University Belfast to its students, and not an additional benefit to the UK economy.

¹⁰¹ This is slightly larger than the above impact of the *net* tuition fee income associated with international students in the 2020-21 cohort (**£140 million**; see Section 4.4), as the value deducted here relates to the impact of Queen's University Belfast's *gross* international fee income *before* the deduction of the Exchequer/University funding costs associated with these students (since these costs are already deducted when estimating the impact of Queen's University Belfast's educational exports).

generated in **Northern Ireland**, with **£159 million (33%)** occurring in **other regions** across the UK.

- In terms of sector, in addition to the impacts occurring in the **government, health, and education sector** itself (**£256 million, 53%**¹⁰²), there are also large impacts felt within other sectors, e.g. including the **distribution, transport, hotel, and restaurant sector** (**£56 million, 12%**)¹⁰³, the **production sector** (**£52 million, 11%**), and the **real estate sector** (**£41 million, 9%**)

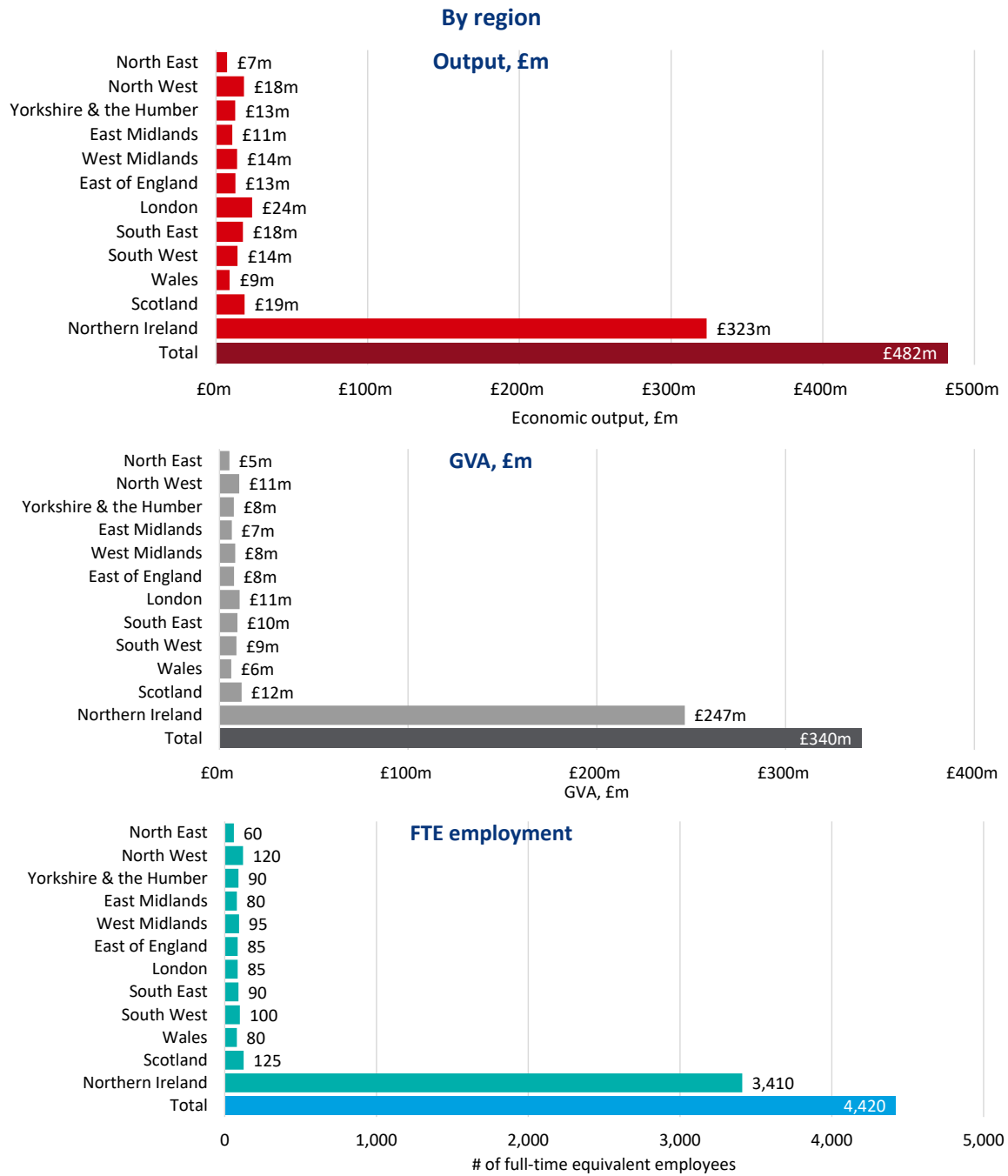
In terms of the number of jobs supported (in FTE), the results indicate that Queen's University Belfast's spending supported a total of **4,420** FTE jobs across the UK economy in 2020-21 (of which **3,410** are located in Northern Ireland). In addition, the impact in terms of gross value added was estimated at **£340 million** across the UK economy as a whole (with **£247 million** generated within Northern Ireland).

¹⁰² The size of this impact is driven by the fact that, along with the indirect and induced impacts, it includes the *direct* level of expenditure of Queen's University Belfast (net of the above adjustments to avoid any double counting).

¹⁰³ Again, for more detail on what industries are included in this high-level sector classification, please refer to Table 19 in Annex A2.2.1.



Figure 34 Total economic impact associated with Queen's University Belfast's expenditure in 2020-21, by region and sector



Note: Monetary estimates are presented in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Employment estimates are rounded to the nearest 5, and again may not add up precisely to the totals indicated.

Source: London Economics' analysis

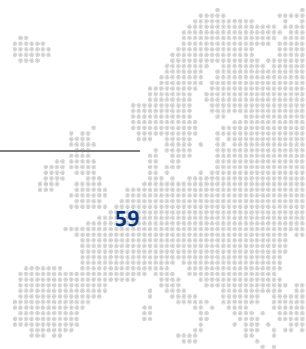
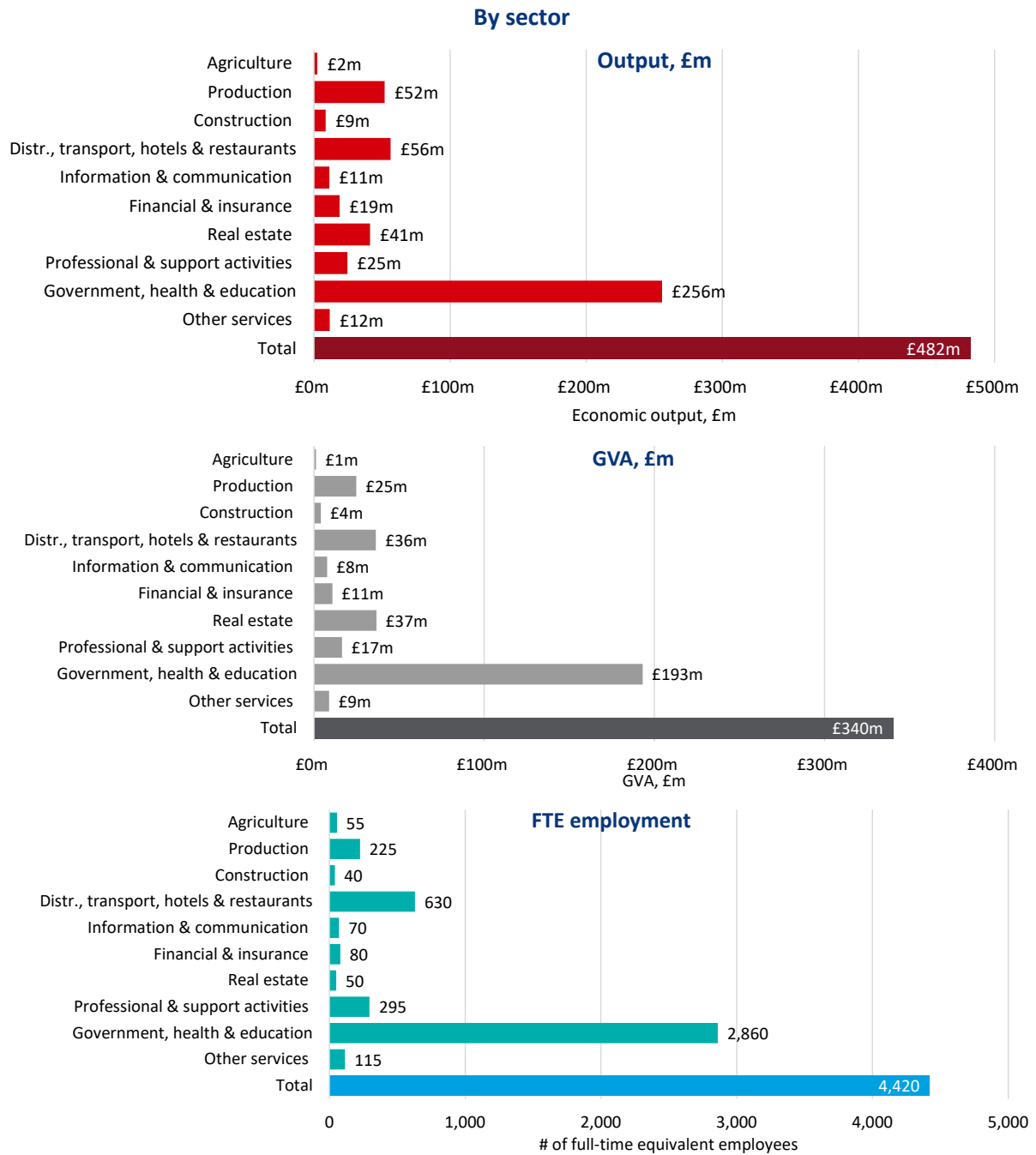


Figure 34 cont. Total economic impact associated with Queen’s University Belfast’s expenditure in 2020-21, by region and sector



Note: Monetary estimates are presented in 2020-21 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Employment estimates are rounded to the nearest 5, and again may not add up precisely to the totals indicated.

Source: London Economics’ analysis







6 Total economic impact of Queen's University Belfast

The total economic impact on the UK economy associated with Queen's University Belfast's activities in 2020-21 was estimated to be approximately **£3.041 billion** (Table 10). In terms of the components of this impact:

- Queen's University Belfast's **research and knowledge exchange activities** accounted for **£1,186 million (39%)** of this impact;
- The value of Queen's University Belfast's teaching and learning activities stood at **£1,068 million (35%)**;
- The impact of Queen's University Belfast's **educational exports** was estimated at **£305 million (10%)**; and
- The impact generated by the **operating and capital spending** of Queen's University Belfast stood at **£482 million (16%)**.

Table 10 Total economic impact of Queen's University Belfast's activities in the UK in 2020-21 (£m and % of total)

Type of impact		£m	%
	Impact of research and knowledge exchange	£1,186m	39%
	Research activities	£488m	16%
	Knowledge exchange activities	£698m	23%
	Impact of teaching and learning	£1,068m	35%
	Students	£550m	18%
	Exchequer	£518m	17%
	Impact of exports	£305m	10%
	Tuition fee income	£140m	5%
	Non-tuition fee income	£165m	5%
	Impact of expenditure	£482m	16%
	Direct impact	£370m	12%
	Indirect and induced impacts	£112m	4%
Total economic impact		£3,041m	100%

Note: All estimates are presented in 2020-21 prices and rounded to the nearest £1m. Totals may not add up precisely due to rounding.

Source: London Economics' analysis

Compared to Queen's University Belfast's total operational costs of approximately **£373 million** in 2020-21¹⁰⁴, the total impact of Queen's University Belfast's activities on the UK economy was estimated at **£3.041 billion**¹⁰⁵, which corresponds to a **benefit to cost ratio of 8.2:1**. This compares to an average benefit-to-cost ratio among Russell Group institutions of approximately **5.5:1** and corresponds to a **12%** increase in Queen's University Belfast's impact of since 2015-16 (on a comparable basis, in real terms¹⁰⁶).

¹⁰⁴ Compared to the **£370 million** of direct impact of Queen's University Belfast expenditures included in Section 5, in this section the **£373 million** of operating expenditure here *excludes* capital expenditure (**£29 million**) but *includes* depreciation costs (**£23 million**) and movements in pension provisions (**£9 million**).

¹⁰⁵ In addition to this total impact on the UK economy as a whole, *some* of the strands of impact considered in the analysis can be disaggregated by sector and region (and can be measured in economic output as well as GVA and (FTE) employment). In aggregate, approximately **£787 million (26%)** of Queen's University Belfast total impact can be disaggregated in this way. For more information, see Annex 3.

¹⁰⁶ The 2015-16 impact of Queen's University Belfast amounted to **£2.1 billion** (in 2020-21 prices).

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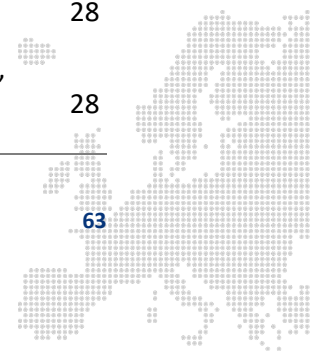
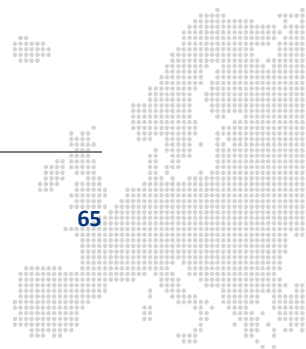


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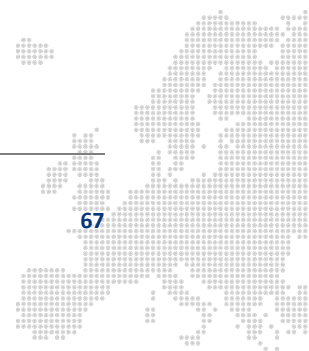


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Annex 2 Technical Annex

A2.1 Impact of Queen’s University Belfast’s teaching and learning activities

A2.1.1 Qualifications and counterfactuals considered in the econometric analysis

Our econometric analysis 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 qualifications¹⁰⁷) and two at undergraduate level (first degrees and ‘other’ undergraduate qualifications¹⁰⁸).

Table 11 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 3.4.1, we compare the earnings of the group of individuals in possession of the higher education 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/employment.

For the analysis of marginal returns, postgraduate degree holders are compared to first degree holders, while for individuals holding first degrees or ‘other undergraduate’ level 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 treatment group) and those individuals not in possession of higher education qualifications (the control group)).

¹⁰⁷ This relates to Labour Force Survey variables a) HIQUAL11 and HIQUAL15 value labels ‘Level 7 Certificate’ and b) HIQUAL4, HIQUAL5, HIQUAL8, HIQUAL11 and HIQUAL15 value labels ‘Postgraduate Certificate in Education’, ‘Other postgraduate degree or professional qualification’ and ‘Don’t know’, for individuals who selected ‘Higher degree’ (other than Masters or Doctorate degree).

¹⁰⁸ This relates to Labour Force Survey variables HIQUAL4, HIQUAL5, HIQUAL8, HIQUAL11 and HIQUAL15 value label ‘other higher education below degree’. Additionally, Diplomas of Higher Education, Level 4 Certificates, Level 6 Diplomas and Level 6 Certificates are included. 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.



Table 11 Treatment and comparison groups used to assess the marginal earnings and employment returns to higher education qualifications

Treatment group – highest academic qualification	Comparison group - highest academic qualification	Treatment and comparison groups – highest possible vocational/professional qualification
Higher degree (research)	First degree	Level 3 vocational
Higher degree (taught)	First degree	Level 3 vocational
Other postgraduate	First 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*

In addition to the analysis of higher education qualifications, 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 students in the 2020-21 Queen's University Belfast cohort 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 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 (i.e. 'other undergraduate') qualification).

In instances where the level of prior attainment for students at Queen's University Belfast was higher or lower than the 'traditional' counterfactual qualifications outlined in Table 11, 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 Queen's University Belfast**, we *deducted* the returns to undertaking an '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 first degree at Queen's University Belfast**, 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)¹⁰⁹.

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

¹⁰⁹ 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, irrespective of the level of prior education attainment).



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:

$$\ln(\omega_i) = \alpha + \beta X_i + \epsilon_i \quad \text{for } i = 1 \text{ to } n^{110}$$

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

- Gender;
- 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.

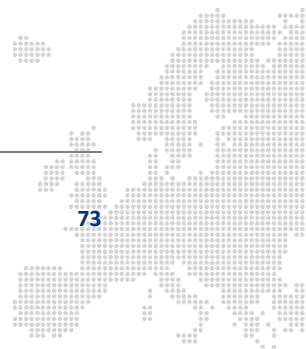
Using the above specification, we estimated earnings returns in aggregate and **for men and women separately**. Further, to analyse the benefits associated with different education qualifications over the lifetime of individuals holding these qualifications, the regressions were **estimated separately across a range of specific age bands** for the working age population, depending on the qualification considered. Further note that 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 and studying in Northern Ireland.

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 2004 and 2021**¹¹¹. 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 12. In the earnings regressions, the coefficients relating to the different higher education qualifications provide an indication of the additional effect on hourly earnings associated with possession of the respective higher education qualification relative to the counterfactual level

¹¹⁰ Where i is an individual LFS respondent.

¹¹¹ 2021 Q4 is the most recent quarter included in the LFS dataset.



of qualification. To take an example, the analysis suggests that men aged between 31 and 35 in possession of a first degree achieve a **22.4%** hourly earnings premium compared to comparable men holding only 2 or more GCE 'A' levels as their highest level of attainment. The comparable estimate for women aged between 31 and 35 stands at **25.6%**.

Table 12 Marginal earnings returns to higher education qualifications (in all subjects), in % (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
Men										
2 or more GCE A-levels ¹	8.9%	5.1%	9.9%	17.4%	24.1%	17.8%	24.9%	16.2%	19.2%	14.6%
Other undergraduate ²			-3.9%		7.5%	11.6%	16.6%	8.4%	7.7%	
First degree ²		9.9%	16.0%	22.4%	20.9%	26.4%	18.4%	24.2%	22.9%	22.6%
Other postgraduate ³		10.2%	12.1%	9.3%	4.4%	4.9%				
Higher degree (taught) ³		9.6%	11.3%	8.1%	9.4%	11.7%	13.2%	13.3%	13.8%	14.8%
Higher degree (research) ³			17.8%	17.7%	21.0%	20.9%	25.6%	28.8%	27.9%	47.1%
Women										
2 or more GCE A-levels ¹	8.3%	5.1%	10.3%	13.0%	17.8%	19.0%	13.8%	14.9%	13.8%	12.4%
Other undergraduate ²			5.5%	10.6%	12.2%	14.3%	17.2%	23.1%	19.0%	17.4%
First degree ²		9.9%	17.2%	25.6%	32.3%	30.2%	31.8%	31.9%	25.7%	20.3%
Other postgraduate ³		8.7%	8.3%	11.5%	9.9%	9.5%	10.3%	13.4%	11.4%	11.6%
Higher degree (taught) ³		8.0%	5.8%	9.4%	12.2%	16.5%	20.3%	15.5%	28.4%	17.7%
Higher degree (research) ³		15.5%	19.2%	20.7%	31.3%	27.6%	39.1%	39.8%	38.3%	38.5%

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 2004-2021Q4

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*¹¹². Combining these subject-level returns with the number of students in the 2020-21 Queen's University Belfast cohort by subject, we then calculated **subject mix adjustment factors** (separately by gender and qualification level). These adjustment factors were then applied to the above average marginal wage returns (across all subjects) to **adjust for the specific subject composition of Queen's University Belfast's student cohort**.

¹¹² The HESA Common Aggregation Hierarchy (CAH) was used to classify subject areas. The following subject groups were distinguished: (1) Medicine & dentistry, (2) Subjects allied to medicine, (3) Biological and sports sciences, (4) Psychology, (5) Veterinary sciences, (6) Agriculture, food & related subjects, (7) Physical sciences, (8) General and other sciences, (9) Mathematical sciences, (10) Engineering & technology, (11) Computing, (12) Geographical and environmental studies, (13) Architecture, building & planning, (14) Humanities and liberal arts (nonspecific), (15) Social sciences, (16) Law, (17) Business and management, (18) Communications and media, (19) Language and area studies, (20) Historical, philosophical and religious studies, (21) Creative arts and design, (22) Education and teaching, (23) Combined and general studies.



Marginal employment returns

To estimate the impact of qualification attainment on employment, we adopted a **probit model** to assess 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:

$$\text{Probit}(EMPNOT_i) = \alpha + \gamma Z_i + \epsilon_i \quad \text{for } i = 1 \text{ to } n^{113}$$

The dependent variable adopted represents the binary variable $EMPNOT_i$, which is coded 1 if the individual is in employment and 0 otherwise¹¹⁴. We specified the model to contain a constant term (α) 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 held;
- 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 in the 2020-21 cohort of UK domiciled students attending Queen's University Belfast. Further, and again similar to the analysis of earnings returns, employment returns were estimated at the national (i.e. UK-wide) level.

The resulting estimated marginal employment returns to higher education qualifications (again on average across *all subjects* of study (i.e. before adjusting for Queen's University Belfast's specific subject mix)) are presented in Table 13. 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, to take an example, the analysis estimates that a man aged between 31 and 35 in possession of a first degree is **2.3 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 **4.4 percentage points**.

¹¹³ Where i is an individual LFS respondent.

¹¹⁴ The probit function reflects the cumulative distribution function of the standard normal distribution.

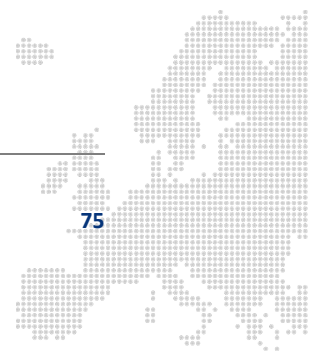


Table 13 Marginal employment returns to higher education qualifications (in all subjects), in percentage points, by gender and age band

Qualification level	Age band									
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Men										
2 or more GCE A-levels ¹	-2.3		2.8	1.5	1.7	1.4	1.5			
Other undergraduate ²			-2.7							
First degree ²		-1.6	1.4	2.3	2.2	1.9	1.5	3.7	2.4	
Other postgraduate ³		5.5		1.9		1.6	1.8	3.0		-5.8
Higher degree (taught) ³			-1.1						2.4	2.8
Higher degree (research) ³						2.1		4.3	7.9	8.9
Women										
2 or more GCE A-levels ¹		3.4	3.5	2.4		2.1	3.3	3.6		
Other undergraduate ²				2.4	4.0					
First degree ²		2.6	3.6	4.4	6.3	4.8	4.0	3.0	2.8	
Other postgraduate ³		5.3	1.3	3.0	2.5	5.6	4.7	3.6	3.4	
Higher degree (taught) ³			-1.8			3.7	2.1	3.3	5.7	4.1
Higher degree (research) ³			-2.8	3.5		4.9	6.9	6.9	10.3	12.5

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 2004-2021Q4

A2.1.3 'Age-decay' function

Many existing 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 – i.e. 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 estimated average age at enrolment amongst students in the 2020-21 cohort completing postgraduate taught degrees with Queen's University Belfast on a part-time basis is **32**, compared to **25** for corresponding full-time students); generally undertake their studies over an extended period of time; and often combine their studies with full-time employment. Table 14 presents the assumed average age at enrolment,



study duration, and age at completion for students in the 2020-21 Queen's University Belfast cohort¹¹⁵.

Table 14 Average age at enrolment, study duration, and age at completion for students in the 2020-21 Queen's University Belfast 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	20	2	22	35	6	41
First degree	20	3	23	43	7	50
Other postgraduate	27	1	28	33	3	36
Higher degree (taught)	25	1	26	32	3	35
Higher degree (research)	28	4	32	34	9	43

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

Source: London Economics' analysis based on Queen's University Belfast HESA data

Given these characteristics, we adjust the methodology when estimating the returns to part-time (and later full-time) education attainment at Queen's University Belfast, namely through the use 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).

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 individual¹¹⁶. This calibration ensures that those individuals completing qualifications at a relatively older age will see relatively lower 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 15 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 Queen's University Belfast in the 2020-21 cohort. 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 postgraduate taught degree student, we assume that because of the late attainment (at age 35 (on average)), these students recoup only **80%** of the corresponding full-time earnings and employment premiums from that age (of attainment).

¹¹⁵ The assumed average age at enrolment is based on the number of individuals in the cohort assumed to *complete* a given qualification at Queen's University Belfast (based on the assumption that some students might complete a different qualification than initially intended, or instead only complete several standalone credits/modules associated with the intended qualification (see Section 3.2 for more information)). In particular, the age at enrolment per qualification (based on the HESA data provided by Queen's University Belfast) is calculated as the weighted average age at enrolment across students in the 2020-21 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 assumed average duration of study for both full-time and part-time students (by qualification level) is based on separate information provided by Queen's University Belfast.

¹¹⁶ E.g. 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-time and full-time study being employed according to their age or motivations to study.



Table 15 Assumed age decay adjustment factors for students in the 2020-21 Queen's University Belfast cohort

Age	Other undergraduate	First degree	Other postgraduate	Higher degree (taught)	Higher degree (research)
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 at Queen's University Belfast:

■ Full-time students ■ Part-time students

Source: London Economics' analysis based on Queen's University Belfast HESA data



Note that the application of the ‘age-decay’ function implies that, for *all* qualification levels at Queen’s University Belfast, 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 study¹¹⁷.

A2.1.4 Estimating the gross graduate premium and gross public purse 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 the gross graduate premium, it is necessary to extend the econometric analysis (presented above; see Annex A2.1.2) by undertaking the following elements of analysis (separately by qualification level, 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 a first degree).
2. We inflated these baseline or counterfactual earnings using the marginal earnings premiums and employment premiums (presented in Table 12 and Table 13 in Annex A2.1.2), adjusted to reflect late attainment (as outlined in Annex Table 13), to produce **annual age-earnings** profiles associated with the possession of each particular qualification.
3. We adjusted these 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 **0.8%** per annum (based on average earnings growth rate forecasts estimated by the Office for Budget Responsibility (2021)¹¹⁸).
4. Based on the earnings profiles generated by qualification holders, and income tax and National Insurance rates and allowances for the relevant academic year¹¹⁹, we computed the future stream of net earnings (i.e. post-tax)¹²⁰. Using similar assumptions, we further calculated the stream of (employment-adjusted) foregone earnings (based on earnings in the relevant counterfactual group¹²¹) during the period of study, again net of tax, for full-time students only.

¹¹⁷ 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).

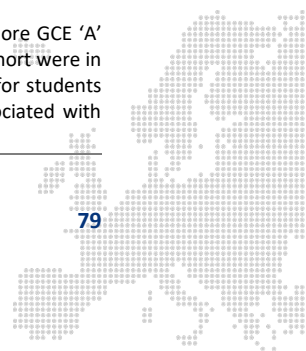
According to the same study, the salaries of graduates from part-time study grow at a slower pace compared with their full-time peers. Part-time graduates are less likely to see their salaries increase and are more likely to see their salaries stagnate between 6 months and 42 months after graduation: 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.

¹¹⁸ Specifically, we make use of the Office for Budget Responsibility’s most recent long-term forecasts (for 2020 to 2071; see Office for Budget Responsibility (2021). Long term forecasts were not available in the Office for Budget Responsibility 2022 update) of nominal average earnings growth. The assumed **0.8%** rate captures the average annual real earnings growth rate over the total period (adjusted from nominal to real terms based on projected (Retail Price Index) inflation over the same period (and based on the same sources).

¹¹⁹ i.e. 2020-21. Note that the analysis assumes fiscal neutrality, i.e. it is asserted that, in subsequent years, the earnings tax and National Insurance income bands grow at the same rate of annual earnings growth of **0.8%**.

¹²⁰ The tax adjustment also takes account of increased VAT revenues for HMG, by assuming that individuals consume **94.3%** 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 household savings rate published by the Office for Budget Responsibility (2022), while the proportion of consumption subject to VAT is based on VAT estimates provided by the Office for Budget Responsibility (no date).

¹²¹ The foregone earnings calculations are based on the baseline or counterfactual earnings associated with either 2 or more GCE ‘A’ Levels or first degrees. Specifically, as outlined in Annex A2.1.1, some students in the 2020-21 Queen’s University Belfast 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 other undergraduate qualifications (other than first degrees) are based on the earnings associated with



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, 2022)), 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 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 Queen's University Belfast will not accrue any wage or employment benefits from this additional qualification attainment (while still incurring the costs of foregone earnings during the period of study, if they studied on a full-time basis).

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 and studying in Northern Ireland.

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 16.

A2.1.5 Net graduate premium and net public benefit

Table 17 and Table 18 provide detailed information on the net graduate premiums and net public benefits for students associated with all higher education qualifications offered by Queen's University Belfast (respectively), based on the 2020-21 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.

possession of 2 or more GCE 'A' Levels as the highest qualification (adjusted for the age at enrolment and completion associated with the relevant qualification obtained). In addition, the estimated foregone earnings for students previously in possession of postgraduate qualifications are based on the level of earnings associated with first degrees.



Table 16 Gross graduate premiums and Exchequer benefits per student associated with HE qualification attainment at Queen's University Belfast, by study mode, level, gender, and prior attainment

Level of study	Previous qualification and gender													
	GCSE		A-level		Other undergraduate		First degree		Other postgraduate		Higher degree (taught)		Higher degree (research)	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Gross graduate premiums														
Full-time students														
Other undergraduate			£22,000	£59,000	£22,000	£21,000	£19,000	£18,000					£18,000	
First degree			£104,000	£98,000	£109,000	£19,000	£31,000	£29,000	£31,000	£29,000	£31,000	£29,000	£31,000	
Other postgraduate							£54,000	£76,000	£23,000	£20,000	£23,000	£20,000	£23,000	
Higher degree (taught)					£210,000	£117,000	£61,000	£63,000	£18,000	£18,000	£20,000	£18,000	£20,000	
Higher degree (research)							£46,000	£50,000		£25,000	£20,000	£20,000		£81,000
Part-time students														
Other undergraduate			£9,000	£34,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
First degree					£22,000	£4,000		£0		£0				
Other postgraduate			£131,000	£142,000	£120,000	£91,000	£39,000	£61,000	£0	£0	£0	£0	£0	£0
Higher degree (taught)					£147,000		£60,000	£65,000	£16,000	£0,000	£0	£0	£0	
Higher degree (research)							£74,000	£65,000		£33,000	£42,000	£29,000		
Gross Exchequer benefits														
Full-time students														
Other undergraduate			£5,000	£62,000	£5,000	£4,000	£3,000	£2,000					£2,000	
First degree			£121,000	£102,000	£125,000	£37,000	£6,000	£5,000	£6,000	£5,000	£6,000	£5,000	£6,000	
Other postgraduate							£69,000	£71,000	£12,000	£9,000	£12,000	£9,000	£12,000	
Higher degree (taught)					£212,000	£105,000	£75,000	£60,000	£8,000	£8,000	£10,000	£8,000	£10,000	
Higher degree (research)							£103,000	£69,000		£6,000	£32,000	£10,000		£41,000
Part-time students														
Other undergraduate			£8,000	£27,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
First degree					£18,000	£3,000		£0		£0				
Other postgraduate			£130,000	£117,000	£120,000	£76,000	£45,000	£51,000	£0	£0	£0	£0	£0	£0
Higher degree (taught)					£146,000		£65,000	£54,000	£16,000	£0	£0	£0	£0	
Higher degree (research)							£79,000	£53,000		£27,000	£45,000	£24,000		

Note: All values are rounded to the nearest £1,000. Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (with the given characteristics). Grey shading indicates instances where the level of study at Queen's University Belfast 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. **Source: London Economics' analysis**

Table 17 Net graduate premiums per student associated with HE qualification attainment at Queen's University Belfast, by study mode, level, gender, prior attainment, and domicile

Level of study	Previous qualification and gender													
	GCSE		A-level		Other undergraduate		First degree		Other postgraduate		Higher degree (taught)		Higher degree (research)	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Students from Northern Ireland														
Full-time students														
Other undergraduate			-£23,000	£59,000	-£23,000	-£21,000	-£20,000	-£19,000					-£19,000	
First degree			£108,000	£102,000	£113,000	£23,000	-£27,000	-£26,000	-£27,000	-£26,000	-£27,000	-£26,000	-£27,000	
Other postgraduate							£50,000	£72,000	-£27,000	-£24,000	-£27,000	-£24,000	-£27,000	
Higher degree (taught)					£204,000	£111,000	£55,000	£57,000	-£24,000	-£24,000	-£26,000	-£24,000	-£26,000	
Higher degree (research)							£32,000	£37,000		-£39,000	-£34,000	-£34,000		-£95,000
Other undergraduate			£10,000	£34,000	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000		£1,000
First degree					£29,000	£12,000		£8,000		£8,000				
Other postgraduate			£129,000	£139,000	£118,000	£88,000	£37,000	£59,000	-£3,000	-£3,000	-£3,000	-£3,000	-£3,000	-£3,000
Higher degree (taught)					£141,000		£54,000	£59,000	£10,000	-£6,000	-£6,000	-£6,000	-£6,000	
Higher degree (research)							£64,000	£54,000		£23,000	£32,000	£18,000		
Students from England														
Full-time students														
Other undergraduate			-£30,000	£52,000					-£26,000					
First degree			£98,000	£92,000	£103,000	£13,000	-£37,000	-£36,000				-£37,000		
Other postgraduate							£51,000	£73,000				-£26,000	-£23,000	
Higher degree (taught)							£54,000	£56,000	-£25,000	-£25,000	-£28,000	-£25,000		
Higher degree (research)							£32,000	£36,000				-£34,000	-£34,000	
Part-time students														
Other undergraduate														
First degree														
Other postgraduate							£33,000	£55,000	-£6,000	-£6,000	-£6,000	-£6,000		
Higher degree (taught)							£52,000	£58,000	£9,000	-£7,000	-£7,000	-£7,000		
Higher degree (research)												£18,000		

Students from Wales**Full-time students**

Other undergraduate			-£24,000	£58,000									
First degree			£107,000	£101,000			-£28,000	-£27,000					
Other postgraduate							£54,000	£76,000					
Higher degree (taught)							£58,000	£60,000					
Higher degree (research)													

Part-time students

Other undergraduate													
First degree													
Other postgraduate							£33,000	£55,000				-£6,000	
Higher degree (taught)												-£3,000	
Higher degree (research)													

Students from Scotland**Full-time students**

Other undergraduate													
First degree			£101,000	£96,000				-£32,000					
Other postgraduate							£50,000	£72,000				-£27,000	
Higher degree (taught)							£55,000	£57,000				-£24,000	
Higher degree (research)							£32,000	£37,000				-£33,000	-£34,000

Part-time students

Other undergraduate														
First degree														
Other postgraduate							£34,000	£56,000				-£6,000	-£6,000	-£6,000
Higher degree (taught)				£139,000			£52,000	£58,000				-£8,000		
Higher degree (research)														

Note: All values are rounded to the nearest £1,000. Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (with the given characteristics). Grey shading indicates instances where the level of study at Queen's University Belfast 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 direct or indirect costs associated with qualification attainment.

Source: London Economics' analysis

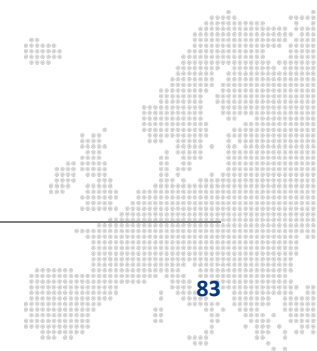


Table 18 Net Exchequer benefits per student associated with HE qualification attainment at Queen's University Belfast, by study mode, level, gender, prior attainment, and domicile

Level of study	Previous qualification and gender													
	GCSE		A-level		Other undergraduate		First degree		Other postgraduate		Higher degree (taught)		Higher degree (research)	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Students from Northern Ireland														
Full-time students														
Other undergraduate			-£16,000	£51,000	-£16,000	-£15,000	-£15,000	-£14,000					-£14,000	
First degree			£104,000	£85,000	£108,000	£20,000	-£23,000	-£22,000	-£23,000	-£22,000	-£23,000	-£22,000	-£23,000	
Other postgraduate							£66,000	£68,000	-£15,000	-£12,000	-£15,000	-£12,000	-£15,000	
Higher degree (taught)					£209,000	£102,000	£72,000	£57,000	-£11,000	-£11,000	-£13,000	-£11,000	-£13,000	
Higher degree (research)							£103,000	£69,000		£6,000	£32,000	£10,000		-£41,000
Part-time students														
Other undergraduate			-£3,000	£15,000	-£12,000	-£12,000	-£12,000	-£12,000	-£12,000	-£12,000	-£12,000	-£12,000		-£12,000
First degree					£5,000	-£10,000		-£13,000		-£13,000				
Other postgraduate			£127,000	£114,000	£117,000	£72,000	£42,000	£48,000	-£3,000	-£3,000	-£3,000	-£3,000	-£3,000	-£3,000
Higher degree (taught)					£143,000		£62,000	£51,000	£13,000	-£3,000	-£3,000	-£3,000	-£3,000	
Higher degree (research)							£79,000	£53,000		£27,000	£45,000	£24,000		
Students from England														
Full-time students														
Other undergraduate			-£19,000	£48,000				-£17,000						
First degree			£101,000	£81,000	£104,000	£16,000	-£27,000	-£26,000			-£27,000			
Other postgraduate							£66,000	£68,000			-£15,000	-£12,000		
Higher degree (taught)							£72,000	£57,000	-£11,000	-£11,000	-£13,000	-£11,000		
Higher degree (research)							£102,000	£67,000			£31,000	£9,000		
Part-time students														
Other undergraduate														
First degree														
Other postgraduate							£42,000	£48,000	-£3,000	-£3,000	-£3,000	-£3,000		
Higher degree (taught)							£62,000	£51,000	£13,000	-£3,000	-£3,000	-£3,000		
Higher degree (research)												£23,000		
Students from Wales														
Full-time students														

Other undergraduate			-£25,000	£42,000									
First degree			£91,000	£72,000			-£36,000	-£35,000					
Other postgraduate							£66,000	£68,000					
Higher degree (taught)							£69,000	£53,000					
Higher degree (research)													
Part-time students													
Other undergraduate													
First degree													
Other postgraduate							£42,000	£48,000				-£3,000	
Higher degree (taught)												-£6,000	
Higher degree (research)													

Students from Scotland**Full-time students**

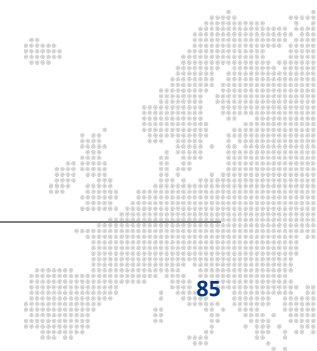
Other undergraduate													
First degree			£97,000	£78,000				-£30,000					
Other postgraduate							£66,000	£68,000			-£15,000		
Higher degree (taught)							£72,000	£57,000				-£11,000	
Higher degree (research)							£103,000	£69,000			£32,000	£10,000	

Part-time students

Other undergraduate													
First degree													
Other postgraduate							£42,000	£48,000			-£3,000	-£3,000	-£3,000
Higher degree (taught)				£143,000			£62,000	£51,000			-£3,000		
Higher degree (research)													

Note: All values are rounded to the nearest £1,000. Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (with the given characteristics). Grey shading indicates instances where the level of study at Queen's University Belfast 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 direct or indirect costs associated with qualification attainment.

Source: London Economics' analysis



A2.2 Impact of educational exports

A2.2.1 Industry breakdown

Table 19 provides an overview of the high-level industry classifications used throughout the multi-regional Input-Output analysis (described in greater detail in Section 4).

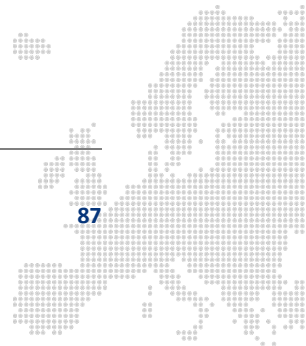
Table 19 Industry grouping used as part of the multi-regional Input-Output analysis

Industries included in original UK Input-Output table	High-level industry group [and UK SIC Codes]
Crop and animal production, hunting and related service activities	Agriculture [1-3]
Forestry and logging	
Fishing and aquaculture	
Mining and quarrying	Production [5-39]
Manufacture of food products, beverages, and tobacco products	
Manufacture of textiles, wearing apparel and leather products	
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	
Manufacture of paper and paper products	
Printing and reproduction of recorded media	
Manufacture of coke and refined petroleum products	
Manufacture of chemicals and chemical products	
Manufacture of basic pharmaceutical products and pharmaceutical preparations	
Manufacture of rubber and plastic products	
Manufacture of other non-metallic mineral products	
Manufacture of basic metals	
Manufacture of fabricated metal products, except machinery and equipment	
Manufacture of computer, electronic and optical products	
Manufacture of electrical equipment	
Manufacture of machinery and equipment n.e.c.	
Manufacture of motor vehicles, trailers and semi-trailers	
Manufacture of other transport equipment	
Manufacture of furniture; other manufacturing	
Repair and installation of machinery and equipment	
Electricity, gas, steam, and air conditioning supply	
Water collection, treatment and supply	
Sewerage; waste collection, treatment, and disposal activities; materials recovery; remediation activities and other waste management services	
Construction	Construction [41-43]
Wholesale and retail trade and repair of motor vehicles and motorcycles	Distribution, transport, hotels, and restaurants [45-56]
Wholesale trade, except of motor vehicles and motorcycles	
Retail trade, except of motor vehicles and motorcycles	
Land transport and transport via pipelines	
Water transport	
Air transport	
Warehousing and support activities for transportation	
Postal and courier activities	
Accommodation and food service activities	
Publishing activities	
Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	Information and communication [58-63]
Telecommunications	Financial and insurance [64-66]
Computer programming, consultancy and related activities; information service activities	
Financial service activities, except insurance and pension funding	
Insurance, reinsurance and pension funding, except compulsory social security	Real estate [68.1-2-68.3]
Activities auxiliary to financial services and insurance activities	
Real estate activities excluding imputed rents	Professional and support activities [69.1-82]
Imputed rents of owner-occupied dwellings	
Legal and accounting activities; activities of head offices; management consultancy activities	
Architectural and engineering activities; technical testing and analysis	
Scientific research and development	
Advertising and market research	



Other professional, scientific, and technical activities; veterinary activities	
Rental and leasing activities	
Employment activities	
Travel agency, tour operator reservation service and related activities	
Security and investigation activities; services to buildings and landscape activities; office administrative, office support and other business support activities	
Public administration and defence; compulsory social security	Government, health & education [84-88]
Education	
Human health activities	
Social work activities	Other services [90-97]
Creative, arts and entertainment activities; libraries, archives, museums, and other cultural activities; gambling and betting activities	
Sports activities and amusement and recreation activities	
Activities of membership organisations	
Repair of computers and personal and household goods	
Other personal service activities	
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	

Note: 'n.e.c.' = not elsewhere classified **Source: London Economics' analysis, based on Office for National Statistics (2020a) and UK SIC Codes (see Office for National Statistics, 2016)**



A2.2.2 Additional information on the 2020-21 cohort of international students studying at Queen's University Belfast

Table 20 presents a detailed breakdown of the 2020-21 non-UK domiciled Queen's University Belfast cohort, by domicile, level, and mode of study.

Table 20 Non-UK domiciled students in the 2020-21 cohort of Queen's University Belfast students, by level of study, mode of study and domicile

Level and mode of study	Domicile		
	EU	Non-EU	Total
Full-time			
Other undergraduate	0	223	225
First degree	213	587	800
Other postgraduate	30	40	70
Higher degree (taught)	159	1,253	1,410
Higher degree (research)	36	209	245
Total	438	2,312	2,750
Part-time			
Other undergraduate	15	0	15
First degree	0	0	0
Other postgraduate	61	25	85
Higher degree (taught)	23	3	25
Higher degree (research)	5	2	5
Total	104	30	135
Total			
Other undergraduate	15	223	240
First degree	213	587	800
Other postgraduate	91	65	155
Higher degree (taught)	182	1,256	1,440
Higher degree (research)	41	211	250
Total	542	2,342	2,885

Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding. 'Other undergraduate' learning includes Certificates of Higher Education, Foundation Degrees, other undergraduate-level diplomas and certificates, and undergraduate-level credits. 'Other postgraduate learning' includes Postgraduate Certificates or Professional Graduate Diplomas in Education, taught work for credit at postgraduate level, and other certificates, diplomas, and qualifications at postgraduate level.

Source: London Economics' analysis based on Queen's University Belfast's HESA data



A2.2.3 Net tuition fee income per international student

Table 21 presents estimates of the net tuition fee income per international student in the 2020-21 Queen's University Belfast cohort (over the entire study duration), by domicile, level of study, and mode of study.

Table 21 Net tuition fee income per international student in the 2020-21 cohort of Queen's University Belfast students, by level of study, mode, and domicile

Level	EU domiciled students		Non-EU domiciled students	
	Full-time	Part-time	Full-time	Part-time
Other undergraduate	£0	-£6,000	£30,000	
First degree	£0		£43,000	
Other postgraduate	-£1,000	£0	£8,000	£10,000
Higher degree (taught)	£4,000	£9,000	£13,000	£18,000
Higher degree (research)	£15,000	£15,000	£58,000	£43,000

Note: Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2020-21, discounted to reflect net present values, and rounded to the nearest £1,000. *Source: London Economics' analysis*

A2.2.4 Assumed average stay durations among international students

As outlined in Section 4 to estimate the non-tuition fee income associated with non-UK students in the 2020-21 Queen's University cohort, we adjusted the estimates of non-tuition fee expenditure per academic year from the Student Income and Expenditure Survey (based on English-domiciled students) to reflect longer stay durations in the UK for international students.

In particular, following a similar approach as a study for the (former) Department for Business, Innovation and Skills (2011b), we assume that **EU domiciled postgraduate** and **non-EU domiciled 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 average¹²². Hence, we assume that all international 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 lower stay duration for EU undergraduate students reflects the expectation 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 0.

¹²² There may be significant variation around these assumed average stay durations depending on individual students' circumstances, such as country of origin, parental income etc. Further note that we have made separate adjustments to the non-tuition fee expenditures of international students in the cohort during the 2020-21 academic years to account for the increased likelihood of students returning to their home countries during the Covid-19 pandemic (see Section 4.3.1).



Table 22 Assumed average stay durations (in weeks) for non-UK domiciled students, by study level and study mode

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)

A2.2.5 Non-fee income per international student

Table 23 presents estimates of the non-tuition fee income per international student in the 2020-21 Queen's University Belfast cohort (over the entire study duration), by domicile, level of study, and mode of study.

Table 23 Non-fee income per international student in the 2020-21 cohort of Queen's University Belfast students, by level of study, mode, and domicile

Level	EU domiciled students		Non-EU domiciled students	
	Full-time	Part-time	Full-time	Part-time
Other undergraduate	£20,000	£78,000	£22,000	
First degree	£31,000		£33,000	
Other postgraduate	£12,000	£54,000	£12,000	£54,000
Higher degree (taught)	£12,000	£54,000	£12,000	£54,000
Higher degree (research)	£56,000	£150,000	£56,000	£150,000

Note: Gaps may arise where there are no students in the 2020-21 Queen's University Belfast cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2020-21, discounted to reflect net present values, and rounded to the nearest £1,000.

Source: London Economics' analysis



Annex 3 Total impact by region and sector (where available)

In addition to the total impact on the UK economy as a whole (presented in Section 6) it was possible to disaggregate *some* strands of Queen's University Belfast's economic impact by sector and region (and estimate the impacts in terms of economic output *as well as* GVA and FTE employment), including:

- The impact of Queen's University Belfast's **educational exports (£305 million**, see Section 4); and
- The impact associated with the **operating and capital expenditure of Queen's University Belfast (£482 million**, see Section 5).

Hence, approximately **£787 million (26%)** of Queen's University Belfast's total impact of **£3,041 million** can be disaggregated in this way¹²³ (see Figure 1).

In terms of the breakdown by region, the analysis indicates that of this total of **£787 million, £522 million (66%)** was generated in **Northern Ireland**, with **£265 million (34%)** occurring in **other regions** across the UK.

In terms of sector, Queen's University Belfast's activities resulted in particularly large impacts within the government, health, and education sector (**£343 million, 44%**), the distribution, transport, hotel, and restaurant sector (**£112 million, 14%**), the production sector (**£94 million, 12%**), and the real estate sector (**£88 million, 11%**).

¹²³ The remaining **£2,254 million** of impact includes the impact of Queen's University Belfast's **research activities (£1,186 million**, where a breakdown by region or sector is not available as it was not possible to assign the geographic location or sectors of businesses benefiting from productivity spillovers generated by Queen's University Belfast's research); and the impact of **teaching and learning activities (£1,068 million**, where a breakdown by region or sector is not available due to graduate mobility (i.e. it is very difficult to determine the region/sector of employment that graduates end up in)).

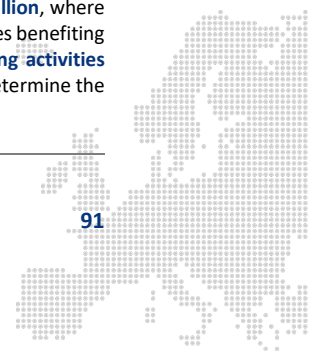
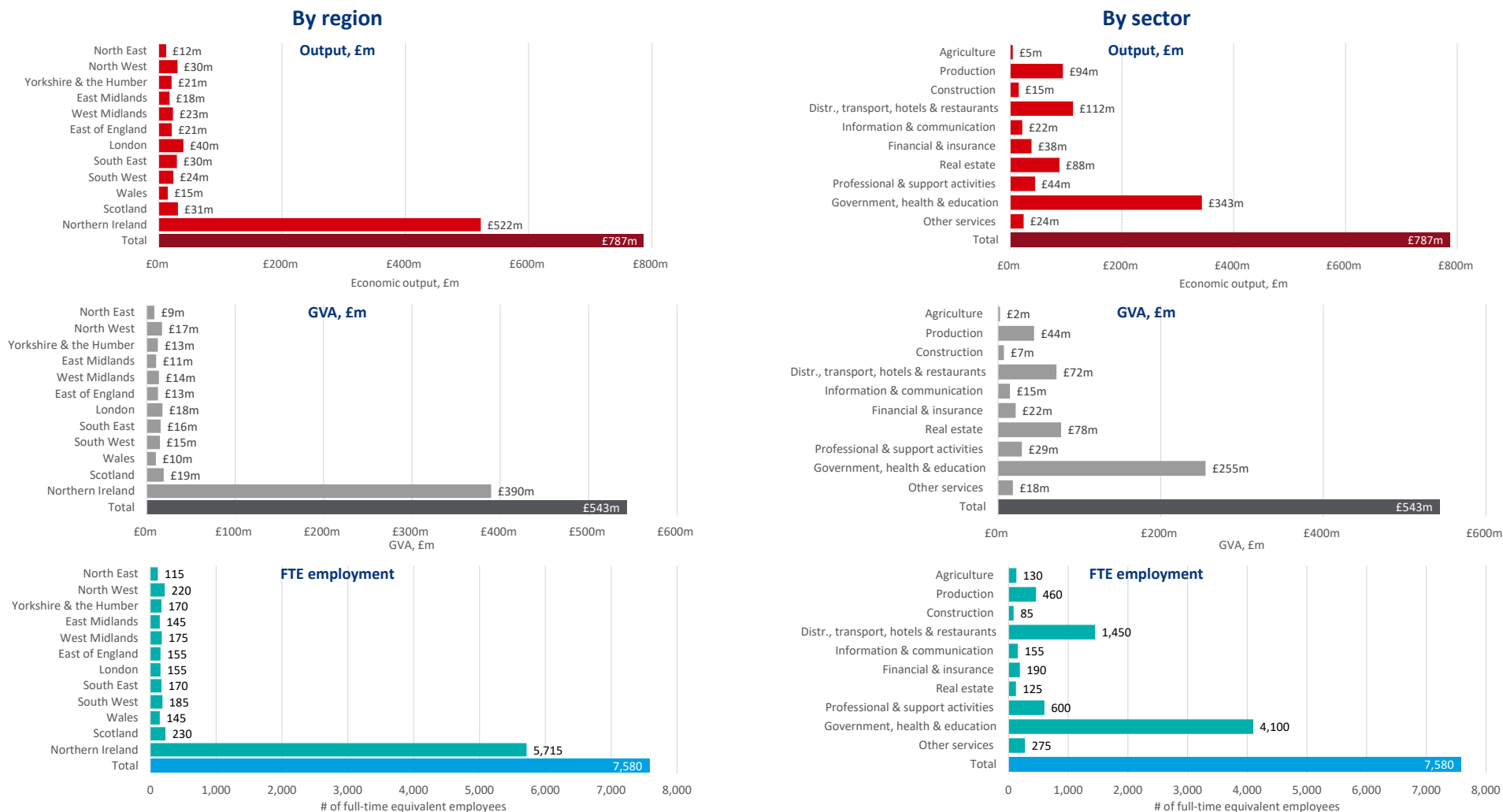


Figure 1 Total economic impact of Queen’s University Belfast activities in 2020-21, by region and sector (where possible)



Note: Monetary estimates are presented in 2020-21 prices, discounted to reflect net present values (where applicable), rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Employment estimates are rounded to the nearest 5, and again may not add up precisely to the totals indicated. **Source: London Economics’ analysis**





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