The economic impact of the University of Oxford

Final Report for the University of Oxford

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Head Office: Somerset House, New Wing, Strand, London, WC2R 1LA, United Kingdom.

w: londoneconomics.co.uk e: info@londoneconomics.co.uk 𝕏: @LE_Education
t: +44 (0)20 3701 7700 @LondonEconomics

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Authors

Jack Booth, Senior Economic Consultant, jbooth@londecon.co.uk
Moritz Profanter, Economic Consultant, mprofanter@londecon.co.uk
Calum Kennedy, Economic Consultant
Marina Symington, Economic Consultant, msymington@londecon.co.uk
Dr Gavan Conlon, Partner, gconlon@londecon.co.uk
Maike Halterbeck, Partner, mhalterbeck@londecon.co.uk

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Table of Contents

Foreword

As Vice-Chancellor of the University of Oxford, I am immensely proud to present this report assessing our economic impact on the United Kingdom for the academic year 2021–22. While Oxford's global reputation rests on centuries of scholarly excellence, world-leading research, and transformative education, this analysis powerfully demonstrates the breadth and depth of our contribution to the UK economy today.

In a single year, Oxford's activities supported an estimated £16.9 billion in economic output and over 90,000 jobs across the country. These are striking figures, but behind them lies a deeper story—of a university working in partnership with government, business, and civil society to drive inclusive innovation, foster opportunity, and improve lives.

Few examples better illustrate this than the Oxford-AstraZeneca Covid-19 vaccine. Developed in partnership with AstraZeneca during the pandemic, this vaccine is estimated to have saved more than six million lives worldwide in its first year of deployment, with an indicative and staggering global economic impact of over £2 trillion. Here in the UK, it played a pivotal role in enabling a safer and earlier reopening of society, supporting public health and economic recovery alike.

From the groundbreaking science that led to the Oxford-AstraZeneca vaccine, to the knowledge and skills imparted to students from all walks of life, to the thriving ecosystem of spinouts and enterprises rooted in our research—we are proud to contribute not only to economic growth, but to national wellbeing and resilience. Our social enterprise work is another area we are particularly proud of, alongside our leading position in developing women founders, with 39% of spinouts having female CEOs. Our impact is particularly concentrated in Oxfordshire and the wider South East, yet it radiates across the whole UK and far beyond. We are developing exciting new partnerships with other regions in the UK to fast-track our ability to work in collaboration and bring benefit to the entire UK. This report is a timely reminder that our mission as a university is not only academic, but civic. As we face the challenges of the coming decades—from public health to climate change to technological transformation—Oxford remains committed to being a force for public good.

Professor Irene Tracey, CBE, FRS, FMedSci

Vice-Chancellor, University of Oxford

Executive Summary

The aggregate economic impact of the University of Oxford

The total economic impact associated with the University of Oxford's activities in 2021-22 stood at £16.9 billion.

The total economic impact on the UK economy associated with the University of Oxford's activities in 2021-22 was estimated at approximately **£16.9 billion** (see Table 1)[1]. In terms of the components of this impact, the value of the University's **research and knowledge exchange activities** stood at **£9.9 billion** (**59%** of the total), while the impact associated with the University's **teaching and learning activities** accounted for **£557 million** (**3%**). The impact generated by the **operating and capital expenditures of the University and its colleges** was estimated to be **£5.0 billion** (**30%**), and the impact of the University's **international students** accounted for **£926 million** (**5%**). The remaining **3%** of economic impact (**£445 million**) was from the **tourism** activities associated with the University.

Table 1 Total economic impact of the University of Oxford's activities in the UK in 2021-22 (£m and % of total)

Type of impact		£m	%
	Impact of research and knowledge exchange	**£9,923m**	**59%**
	Research activities	£3,939m	23%
	Knowledge exchange activities	£5,984m	35%
	Impact of teaching and learning	**£557m**	**3%**
	Students	£254m	2%
	Exchequer	£304m	2%
	Impact of international students	**£926m**	**5%**
	Tuition fee income	£553m	3%
	Non-tuition fee income	£373m	2%
	Impact of the University's and its colleges' spending	**£5,035m**	**30%**
	Direct impact	£1,907m	11%
	Indirect and induced impact	£3,128m	19%
	Impact of tourism	**£445m**	**3%**
	Direct impact	£165m	1%
	Indirect and induced impact	£281m	2%
Total economic impact		**£16,887m**	**100%**

Note: All estimates are presented in 2021-22 prices, rounded to the nearest £1m, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

[1] All estimates here are presented in terms of economic output (equivalent to income/turnover). The impact of the University's research and knowledge exchange activities, educational exports, institutional expenditures, and tourism effects can also be converted into gross value added (GVA) and full-time (FTE) employment, and these additional findings are provided within the relevant sections throughout this report.

In terms of the number of full-time equivalent (FTE) jobs supported, the analysis indicates that the total impact generated by the University's activities supported a total of **90,400** FTE jobs across the UK economy in 2021-22, of which **56,715** were located in the **South East**.

Compared to the University's relevant operational costs of approximately **£2.9 billion** in 2021-22[2], the total impact of the University of Oxford's activities on the UK economy was estimated at **£16.9 billion**, which corresponds to a **benefit to cost ratio of 5.9:1**.

In addition to assessing the total impact of **£16.9 billion** on the UK economy as a whole, it is also possible to estimate the economic impact of a number of strands of analysis on a regional basis, including the economic impact of the University on the South East. Specifically, we estimated the direct, indirect, and induced economic impacts associated with the University's research and knowledge exchange activities, of the spending of the University's international students, of the University's and its colleges' institutional expenditures, and of the tourism activities associated with the University.[3] Following this approach, the analysis identified that approximately **£13.3 billion** (**79%**) of the University of Oxford's total impact of **£16.9 billion** can be disaggregated geographically (see Section 7.1 for more information), of which approximately **£8.4 billion** (**63%**) occurred in the South East.

The analysis presented in this report only considers the impact of the University of Oxford's activities on the UK. However, the University has a substantial impact on the **global stage**, especially through the development of the **Oxford-AstraZeneca Covid-19 vaccine**. Wider evidence finds that the vaccine saved over **six million lives** in its first year of use, which indicative estimates suggest is associated with a worldwide economic impact of over **£2 trillion** (see Box 2 for more details). However, as these estimates are purely indicative, they (and other worldwide impacts) are not considered within the main analysis presented above and throughout the report.

The impact of the University of Oxford's research and knowledge exchange activities

To estimate the economic impact associated with the University of Oxford's **research activity**, we used information on the total research-related income received by the University from Research England and other sources of research grants and contract income (e.g. UK Research Councils, central and local government, charities etc.) in 2021-22, which stood at **£888 million**. This is the **largest amount of research-related income received by any UK higher education institution in that year**.

[2] This relates to the University's and its colleges' total operating expenditure, excluding capital expenditure, depreciation, amortisation, and movements in pension provisions.

[3] It is not possible to attribute the impact of the other strands of economic impact to any specific UK region (i.e. there is no regional breakdown available for the estimated productivity spillovers associated with the University's research, for the wider economic health benefits associated with the University's development of the Oxford-AstraZeneca Covid-19 vaccine, or for the impact of the University's teaching and learning activities).

We assessed the direct, indirect, and induced economic impacts associated with the University's research activity using economic multipliers derived from a (multi-regional) Input-Output model. After accounting for a total of **£467 million** of **Exchequer costs**, the net direct, indirect, and induced research impact in 2021-22 is estimated at **£1.1 billion**.

The estimated impact of the University of Oxford's research and knowledge exchange activities in 2021-22 stood at £9.9 billion.

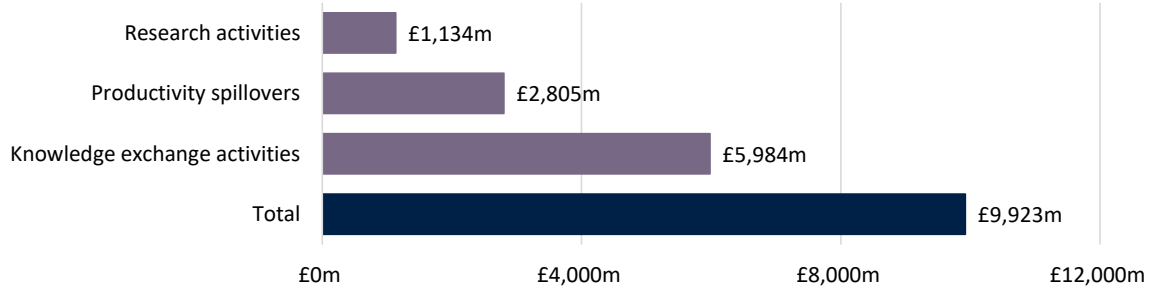
In addition, existing academic literature[4] finds strong evidence of **productivity spillovers** from public investment in university research. Applying estimates from the academic literature, our analysis estimates an average spillover multiplier of **4.62**, suggesting that **every £1 invested in the University's research activities generates an additional annual economic output of £4.62 across the UK economy in terms of positive productivity spillovers** to the UK private sector. This results in total estimated productivity spillovers associated with the University's research in 2021-22 of **£2.8 billion**.

In addition to the University of Oxford's research, we estimate the impact associated with **knowledge exchange activities** at the University, including the activities of associated **spinout companies**; companies based at the University's **Science Parks**; **contract research** and **consultancy services** provided by the University; **business and community courses**; **facilities and equipment hire**; **licensing of the University's IP** to other organisations; and the wider health impacts associated with the University's development of the **Oxford-AstraZeneca Covid-19 vaccine**. The analysis estimates that the University of Oxford's knowledge exchange activities generated a total of **£6.0 billion** of impact across the UK economy in 2021-22.

The combined economic impact associated with the University of Oxford's research and knowledge exchange activities in 2021-22 was therefore estimated at **£9.9 billion** (see Figure 1). In terms of **gross value added** (GVA) and **full-time equivalent** (FTE) employment measures, the analysis estimates that the University of Oxford's R&D activities generated **£3.5 billion** in GVA and supported approximately **53,750** FTE jobs, of which **31,975** are located in the **South East**.

[4] See Haskel and Wallis (2010), and Haskel et al. (2014).

Figure 1 Total economic impact of the University of Oxford's research and knowledge exchange activities in 2021-22, £m



Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

In addition to the 2021-22 academic year, the analysis relating to the research and knowledge exchange strand was also conducted for the six previous academic years (2015-16 to 2020-21), to allow for an assessment of the change in this impact over time. The total economic impact of the University's research and knowledge exchange activities increased by **30%** (in real terms) between 2015-16 and 2021-22, from approximately **£7.6 billion** to **£9.9 billion**, and grew steadily in every year across the period.

A separate analysis considers the impact of the **University of Oxford's** activities during the **Covid-19 pandemic**. The figures presented below should be seen as **indicative estimates** and are therefore not included within the main analysis.

Firstly, evidence from Public Health England shows that the UK vaccination programme had prevented **123,100 deaths** by September 2021. Utilising the standard value of one quality-adjusted life year (QALY), which is **£70,000** in 2020-21 prices, and assuming that each death prevented results in an average increased lifetime of **5 years**, the wider health benefits associated with the entire UK vaccination programme are approximately **£43 billion**. Although this also considers the impact of vaccines produced by other manufacturers, the **Oxford-AstraZeneca Covid-19 vaccine** was the **most widely used** in the UK during the period, therefore accounting for a substantial proportion of this economic impact. Further, the Oxford-AstraZeneca vaccine was easier to distribute than others and therefore was prioritised for care homes, focussing on those most at risk, meaning that the vaccine may have had a disproportionate effect on lives saved compared to other vaccines.

Wider evidence shows that the Oxford-AstraZeneca Covid-19 vaccine saved **more than six million lives** worldwide in its first year of use (Airfinity, 2022). Using the **UK-based assumptions** regarding the value of a **QALY** outlined above, and again assuming that each death prevented results in an average increased lifetime of **5 years**, we estimate a worldwide economic impact of over **£2 trillion** resulting from the **health benefits** of the **Oxford-AstraZeneca Covid-19 vaccine** alone.

Lastly, researchers at the University initiated trials to evaluate **dexamethasone** as a potential treatment for Covid-19, which went onto save **1 million lives worldwide** by March

2021. Again following the assumptions outlined above, we find a worldwide economic impact associated with the use of **dexamethasone** against Covid-19 of **£350 billion.**

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

The analysis of the impact of the University's teaching and learning activities estimates the **enhanced employment and earnings benefits to graduates** and the **additional taxation receipts to the public purse** associated with higher education qualification attainment at the University[5]. The analysis focuses on the **8,220** UK domiciled students who started a higher education qualification (or standalone module/credit) at the University of Oxford in the 2021-22 academic year, and is adjusted for the specific characteristics of these students.

Incorporating both the expected costs associated with qualification attainment as well as 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 a representative UK domiciled student in the 2021-22 cohort completing a **full-time first degree** (with GCE 'A' Levels as their highest level of prior attainment) stands at approximately **£77,000** (in 2021-22 money terms). Similarly, taking account of the benefits and costs to the public purse, the corresponding **net Exchequer benefit** associated with these students was also estimated at **£77,000**.[6]

The total economic impact of teaching and learning generated by the 2021-22 cohort of University of Oxford students stands at £557 million.

The net graduate premiums and net Exchequer benefits (by gender, study mode, study level, domicile, and prior attainment, and adjusted for the subject mix of the cohort) were combined with information on the number of UK domiciled students in the 2021-22 University of Oxford cohort, as well as expected completion rates. The resulting aggregate economic impact generated by the University's teaching and learning activities associated with the 2021-22 cohort stood at approximately **£557 million** (see Table 2). This is split roughly evenly between the Exchequer and students/graduates, with **£304 million** (**54%**) of economic benefit accrued by the Exchequer, and the remaining **£254 million** (**46%**) accrued by students.

[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 higher education institution attended, the analysis is not specific to University of Oxford graduates. Rather, the analysis is adjusted to reflect the characteristics of the 2021-22 cohort of University of Oxford students to the greatest extent possible (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 characteristics is presented in Annex A2.3.8.

Table 2 Aggregate impact of the University of Oxford's teaching and learning activities associated with the 2021-22 cohort (£m), by type of impact, domicile, and level of study

Beneficiary and study level	Domicile				
	England	Wales	Scotland	Northern Ireland	Total
Students	**£240m**	**£6m**	**£6m**	**£2m**	**£254m**
Undergraduate	£201m	£5m	£4m	£1m	**£211m**
Postgraduate	£39m	£1m	£2m	£0m	**£42m**
Exchequer	**£287m**	**£7m**	**£7m**	**£2m**	**£304m**
Undergraduate	£195m	£5m	£4m	£1m	**£205m**
Postgraduate	£91m	£3m	£3m	£1m	**£98m**
Total	**£527m**	**£13m**	**£13m**	**£4m**	**£557m**
Undergraduate	£396m	£9m	£8m	£3m	**£417m**
Postgraduate	£131m	£4m	£5m	£1m	**£141m**

Note: All estimates are presented in 2021-22 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 the University of Oxford's educational exports

With the University of Oxford being an attractive destination for 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 the University of Oxford'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 research and 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 **4,520** non-UK domiciled students who started qualifications at the University of Oxford in the 2021-22 academic year. Of these students, **870** (**19%**) were EU domiciled, and **3,650** (**81%**) were from non-EU jurisdictions.

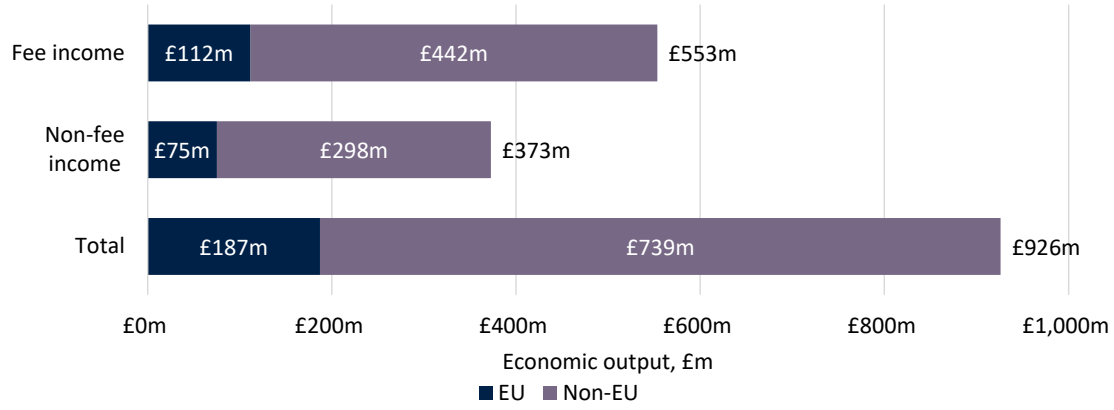
Combining the estimates of tuition fee income (net of the University of Oxford's cost of fee waivers and bursaries for international students) and non-tuition fee income associated with international students in the 2021-22 cohort, the **total export income** (**i.e. direct impact**) generated by this cohort stood at **£331 million**. Over half of this income (**£193 million**) was generated from international students' (net) tuition fee expenditure accrued by the University of Oxford, while the remaining **£137 million** was generated from these students' non-tuition fee expenditure (e.g. including costs related to accommodation, subsistence, course-related purchases, and travel).

The impact of the export income generated by the 2021-22 University of Oxford cohort of international students stood at £926 million.

The total (direct, indirect, and induced) economic impact associated with this income was again estimated using relevant economic multipliers, identifying 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 and non-fee income associated with international students in the 2021-22 University of Oxford cohort amounts to **£926 million**. Of this total, **£553 million** was associated with international students' (net) **tuition fees**, and **£373 million** was associated with these students' non-tuition fee expenditures over the duration of their studies at the University of Oxford (see Figure 2).

These **educational exports** supported an estimated **7,075 full-time equivalent jobs** across the UK as a whole, of which **4,650 jobs** were located in the South East.

Figure 2 Impact of the University of Oxford's educational exports associated with international students in the 2021-22 cohort (£m), by domicile and type of income



Note: All estimates are presented in 2021-22 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 the University of Oxford's expenditure

The University of Oxford'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 University itself, as well as the expenditures incurred by the University's 39 colleges and 6 permanent Private Halls.[7]

[7] The accounts of 3 of the University's colleges (including Kellogg College, St Cross College, and Reuben College) and 6 permanent Private Halls are consolidated into the University's finances (i.e. are included in the level of expenditure of the University itself), as they are

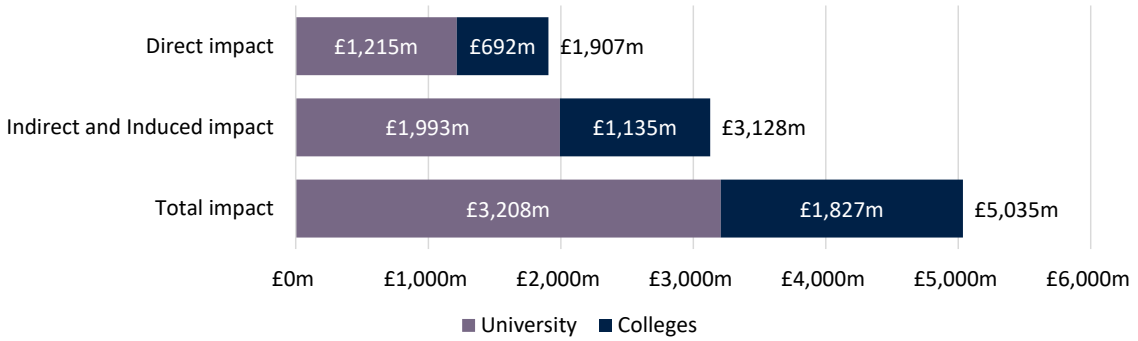
The **direct impact** of the University's physical footprint was based on the operating and capital expenditures of the University and its colleges. In the 2021-22 academic year, the University of Oxford incurred a total of **£2.5 billion** of expenditure (including **£2.3 billion** of operating expenditure and **£176 million** of capital expenditure). Additionally, the University's colleges incurred **£692 million** of expenditure, consisting of **£559 million** of operating expenditure and **£133 million** of capital expenditure[8]. From this total of **£3.2 billion**, we deducted **£1.3 billion** to avoid double-counting across other strands of impact, which resulted in a net direct impact of **£1.9 billion**.

The impact of the University's and its colleges' expenditure on the UK economy in the 2021-22 academic year stood at £5.0 billion.

Again, the direct increase in economic activity resulting from the expenditures of the University of Oxford and its colleges generates additional rounds of spending throughout the economy (through the University's and its colleges' supply chains, and the spending of staff). Applying the relevant economic multipliers, the **total direct, indirect, and induced impact** associated with the University's expenditures in the 2021-22 academic year was estimated at **£5.0 billion** (see Figure 3). The majority of this impact (**£3.2 billion, 64%**) occurred in the **South East**, while the remainder (**£1.8 billion**, **36%**) was accrued across the rest of the UK.

In terms of the number of FTE jobs supported, the expenditure of the University and its colleges supported a total of **26,350** FTE jobs across the UK economy in the 2021-22 academic year, of which **18,020** (**68%**) were based in the South East.

Figure 3 Impact associated with the University of Oxford's and its colleges' expenditures in the 2021-22 academic year (£m)



Note: All estimates are presented in 2021-22 prices, rounded to the nearest £1m, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

departments of the University. In contrast, the University's financial statements exclude the accounts of 36 colleges that are separate and independent legal entities.

[8] The total operational expenditure (excluding capital expenditure) of the University of Oxford and its colleges in 2021-22 stood at **£3.5 billion**. From the University's total operating expenditure, for the purpose of the analysis, we excluded **£125 million** in depreciation and amortisation and **£369 million** in movement in pension provisions (as it is assumed that these costs are not relevant from a procurement perspective (i.e. these costs are not accounted for as income by other organisations)), as well as a further **£106 million** in payments to colleges to avoid double-counting. From the aggregated college operating expenditure of **£630 million**, we excluded **£45 million** in depreciation and amortisation and **£25 million** in movement in pension provisions. This results in a total operational expenditure across the University and its colleges of **£2.9 billion** in 2021-22. Totals may not add up precisely due to rounding.

The impact of the University of Oxford's contribution to tourism

As a final strand of impact, the University attracts a range of visitors to Oxford, including tourists visiting the University's unique cultural and heritage sites, business visitors, friends and family visiting the University's staff and students, and participants in study trips to the University.

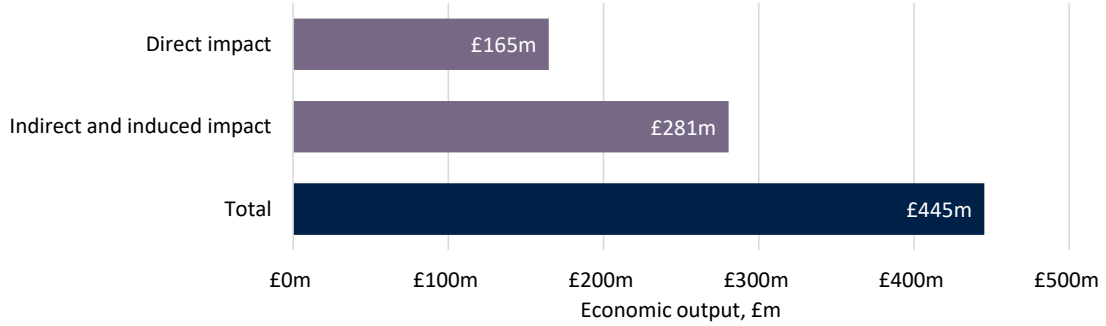
To understand the economic impact associated with the University's contribution to tourism, we estimated the number of visitors to Oxford in 2021-22 that were associated with the University's presence. The analysis focuses only on visits to Oxford that involved overnight stays by visitors from overseas, as it is assumed that any domestic (day or overnight) visits to Oxford would have displaced activity from other regions of the UK (and should not be considered 'additional' to the UK economy). Out of a total of **425,000** overnight visits from overseas visitors to Oxford, we estimate that approximately **211,000** (**50%**) resulted from the University's activities. Combined with information on the average trip expenditure per visitor, the **direct impact** of the University's contribution to tourism was estimated at **£165 million**.

The impact of the University's contribution to tourism in 2021-22 stood at £445 million.

As with the University's research and knowledge exchange activities, educational exports, and the spending of the University and its colleges, this visitor expenditure results in subsequent rounds of expenditure throughout the UK economy. Again, this is measured by the **indirect, and induced impacts** associated with these expenditures, estimated by applying relevant economic multipliers to the direct impact. Using this approach, the analysis indicates that the **total direct, indirect, and induced impact** of the visitor expenditure generated by the University of Oxford stood at approximately **£445 million** (see Figure 4).

The University's contribution to tourism activities supported an estimated **3,225 full-time equivalent jobs** across the UK as a whole, with **2,070** of these jobs supported in the South East.

Figure 4 Impact associated with the University of Oxford's contribution to tourism in 2021-22 (£m)



Note: All estimates are presented in 2021-22 prices, rounded to the nearest £1m, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

1 Introduction

Following our previous analysis of the economic impact of the University of Oxford (for the 2018-19 academic year[9]), London Economics were commissioned to (re-)assess the **economic impact of the University to the United Kingdom**, focusing on the 2021-22 academic year. The University of Oxford contributes to the UK's national prosperity through a range of activities and channels, and the analysis is split into:

- The impact of the University of Oxford's **research and knowledge exchange activities**;
- The economic contribution of the University of Oxford's provision of **teaching and learning**;
- The impact of the University of Oxford's contribution to **educational exports**;
- The impact of the University of Oxford's and its colleges' **operating and capital expenditures**;
- The impact of the **tourism** activity associated with the University of Oxford.

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 the University of Oxford's **research and knowledge exchange activities**. To estimate the impact of the research undertaken at the University, we combine information on the research-related income accrued in the 2021-22 academic year 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'). In addition, the analysis estimates the direct, indirect, and induced impact associated with the University's research, as well as its knowledge exchange activities -including the commercialisation activities of associated spinout companies and of companies based at the University's Science Parks; contract research provided by the University; consultancy services provided by the University; business and community courses; facility and equipment hire; and licensing of the University's intellectual property (IP) to other organisations. Further, we also monetise the wider health benefits associated with the University's development of the Oxford-AstraZeneca Covid-19 vaccine. In addition to estimating these impacts for the 2021-22 academic year itself, the analysis is also presented for previous years (between 2015-16 and 2021-22), with the last three years showing a breakdown by academic division.

In **Section 3**, we assess the improved labour market earnings and employment outcomes associated with higher education attainment at the University of Oxford. Through an assessment of the expected lifetime benefits and costs associated with educational attainment, we estimate the net **economic benefits of the University's teaching and learning activity to its graduates and the public purse** (through enhanced taxation

[9] See London Economics (2021).

receipts), focusing on the cohort of **8,220** UK domiciled students who started higher education qualifications at the University in the 2021-22 academic year.

In addition to these UK domiciled students, there were a further **4,520** international students commencing their studies in the 2021-22 cohort of University of Oxford students. These students contribute 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 the University's 2021-22 cohort of international students.

Given that the University of Oxford and its colleges are major employers and support their core activities through significant expenditures, the University's substantial physical footprint supports jobs and promotes economic growth throughout the South East and the wider UK economy. **Section 5** presents our estimates of the direct, indirect, and induced economic impacts associated with the **operating and capital expenditures incurred by the University of Oxford and its colleges** in the 2021-22 academic year.

The University also attracts a range of visitors to Oxford, including tourists, business visitors, friends and family visiting the University's staff and students, and participants in study trips to the University. The impact of these tourism expenditures from **visitors** on the UK economy is estimated in **Section 6**.

Finally, **Section 7** of this report **summarises** our main findings.

2 The impact of the University of Oxford's research and knowledge exchange activities

Box 1 Key findings: Research and knowledge exchange

The total research-related income accrued by the University in 2021-22 stood at **£888 million**. This is the **highest research income received by any UK higher education institution in 2021-22.**

To calculate the total direct, indirect, and induced impacts of the University's research activities, we used relevant **economic multipliers** derived from a (multi-regional) Input-Output model. After deducting the public costs of funding (**£467 million**) and the University's income from contract research (**£282 million**) to avoid double-counting, it is estimated that the **direct, indirect and induced impact** of the University's research activities stood at **£1.1 billion** in 2021-22.

There is extensive evidence from the wider academic literature of the existence of **productivity spillovers** from public investment in university research. Our analysis estimates a spillover multiplier of approximately **4.6** associated with the University of Oxford's research income in 2021-22. In other words, **every £1 million invested in research at the University results in an additional economic output of £4.6 million across the UK economy**. The total **productivity spillovers** from the University's research to other organisations across the UK were thus estimated at **£2.8 billion**.

Combining the **direct, indirect and induced impact** of the University's research (**£1.1 billion**) with these **productivity spillovers** (**£2.8 billion**), the total impact of research conducted by the University in 2021-22 was estimated at **£3.9 billion**.

In addition to the University's research, the analysis estimated the impact associated with the University's **knowledge exchange activities**. This includes the activities of **spinout companies** that are based on the University's IP; companies based at University **Science Parks**; **wider knowledge exchange activities**[10]; and the wider health impacts associated with the University's development of the **Oxford-AstraZeneca Covid-19 vaccine**. The analysis estimates that these knowledge exchange activities generated a total of **£6.0 billion** of impact across the UK economy in 2021-22. This represents a **47%** increase since 2018-19, which includes a **41%** increase in the impact of the University's spinout companies over the same period.

The total economic impact associated with the University of Oxford's research and knowledge exchange activities in 2021-22 was thus estimated at **£9.9 billion**, representing a **13%** increase since 2018-19. Compared to the **£888 million** of research income received by the University in 2021-22, this suggests that **for every £1 million of its research income, the University's research and knowledge exchange activities generated a total of £11.2 million in economic impact across the UK.**

[10] These wider knowledge exchange activities include the University's **contract research**, **consultancy services**, **business and community courses**, **facilities and equipment hire**, and **licensing of the University's IP** to other organisations.

A separate analysis considers the impact of the **University of Oxford's** activities during the **Covid-19 pandemic**. The figures presented below should be seen as **indicative estimates** and are therefore not included within the main analysis.

Firstly, evidence from Public Health England shows that the UK vaccination programme had prevented **123,100 deaths** by September 2021. Utilising the standard value of one quality-adjusted life year (QALY), which is **£70,000** in 2020-21 prices, and assuming that each death prevented results in an average increased lifetime of **5 years**, the wider health benefits associated with the entire UK vaccination programme are approximately **£43 billion**. Although this also considers the impact of vaccines produced by other manufacturers, the **Oxford-AstraZeneca Covid-19 vaccine** was the **most widely used** in the UK during the period, therefore accounting for a substantial proportion of this economic impact.

Wider evidence shows that the Oxford-AstraZeneca Covid-19 vaccine saved **more than six million lives** worldwide in its first year of use. Using the **UK-based assumptions** regarding the value of a **QALY** outlined above, and again assuming that each death prevented results in an average increased lifetime of **5 years**, we estimate a worldwide economic impact of over **£2 trillion** resulting from the **health benefits** of the **Oxford-AstraZeneca Covid-19 vaccine** alone.

Lastly, researchers at the University initiated trials to evaluate **dexamethasone** as a potential treatment for Covid-19, which went onto save **1 million lives worldwide** by March 2021. Again following the assumptions outlined above, we find a worldwide economic impact associated with the use of **dexamethasone** against Covid-19 of **£350 billion.**

In this section, we outline our estimates of the economic impact of the University of Oxford's **research and wider knowledge exchange activities**. To achieve this, we first consider the impact of the University's expenditure on research and wider knowledge exchange activities through the direct, indirect and induced effects of that spending. Secondly, we consider the wider productivity spillovers that are generated through the University's research activities, as well as the economic value of the wider health benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine. Thirdly, we estimate the economic impact generated by spinout companies that are based on the University's IP, and of companies that are located at the University's Science Parks.[11, 12]

In addition to the core estimates for 2021-22, we present a time series across seven academic years (2015-16 to 2021-22), with a breakdown by academic division[13] available for the final three academic years of analysis (2019-20 to 2021-22)[14].

[11] This includes The Oxford Science Park, Begbroke Science Park, and the BioEscalator.
[12] For a schematic overview of our approach, please refer to Figure 35 in Annex A2.2.1.
[13] For the purposes of this report, the University's economic impact is split across the following academic divisions: Humanities; Maths, Physical and Life Sciences; Medical Sciences; Social Sciences; Oxford University Gardens, Libraries & Museums (GLAM); and 'Other'.
[14] Note that this breakdown by academic division was available for all elements of research and knowledge exchange activities *except for* the activities of companies located at the University's Science Parks (as it was not possible to assign a division to each company in this instance).

2.1 Economic impact of the University of Oxford's research

In this section, we outline our analysis of the **economic impact of the University of Oxford's research activities**. We estimate both the **direct, indirect, and induced effects** of the University's research (captured by the research income accrued by the University of Oxford and the subsequent rounds of spending this income generates across the economy), as well as the **productivity spillover effects** from the University's research activities.

2.1.1 The University of Oxford's research income in 2021-22

To estimate the **direct impact** generated by the University of Oxford's research activities, we used information provided by the University on the total research-related income accrued by the University in the 2021-22 academic year. This includes:

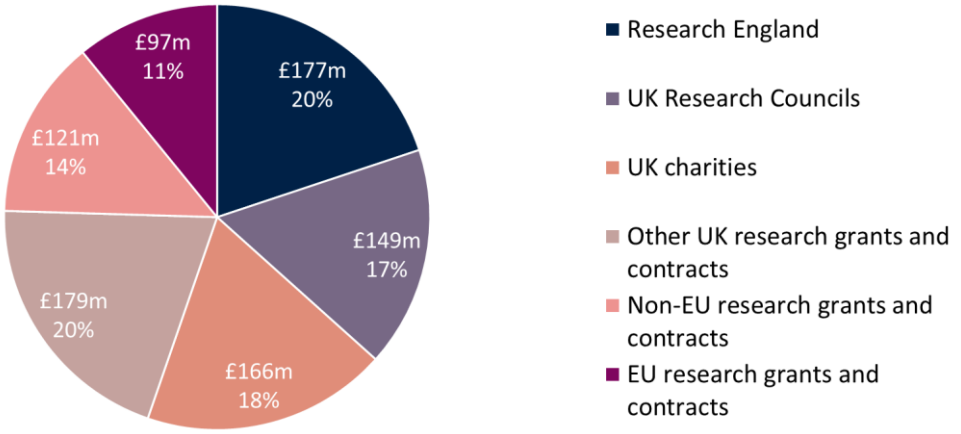
- Income from **research grants and contracts** provided by:
  - **UK sources**, including the UK Research Councils; UK-based charities; central government bodies, local authorities, and health and hospital authorities; industry and commerce; and other UK sources;
  - **EU sources**, including government 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 the University by Research England.

Aggregating across these sources, the total research-related income accrued by the University of Oxford in the 2021-22 academic year stood at **£888 million** (see Figure 5).[15] Approximately **20%** (**£177 million**) of this total was received through recurrent research grant funding from **Research England**, with an additional **17%** (**£149 million**) received from the **UK Research Councils**, **18%** (**£166 million**) from **UK charities**, and **20%** (**£179 million**) from **other UK sources.**[16] In addition, in terms of funding from international sources, **14%** (**£121 million**) of the University's research-related income was derived from **non-EU research grants and contracts**, and the remaining **11%** (**£97 million**) was from **EU sources**.

[15] Note that we further adjust the direct impact of research for double-counting with knowledge exchange activities and for public costs (see Sections 2.1.2 and 2.1.3).

[16] This income from 'other UK sources' includes **£141 million** from UK central government bodies, local authorities, and health and hospital authorities; **£34 million** from UK industry, commerce and public corporations; and **£4 million** from other sources.

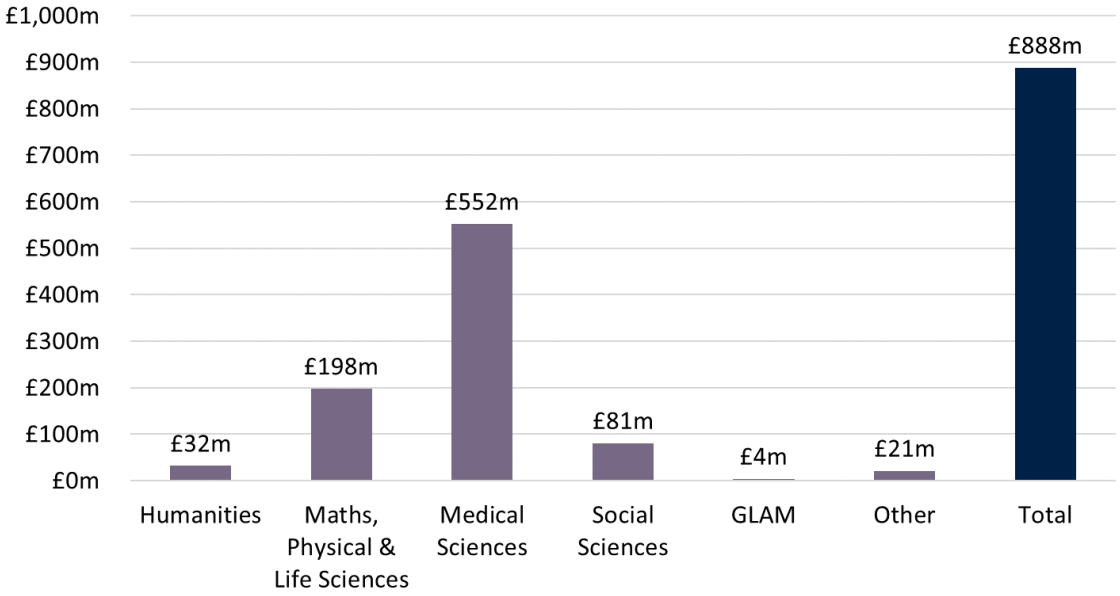
Figure 5 Research income received by the University of Oxford in 2021-22, £m by source of income



Note: All values are presented in 2021-22 prices and rounded to the nearest £1 million.
Source: London Economics' analysis based on data provided by the University of Oxford

In terms of the breakdown by academic division (see Figure 6), the total research income received by the **Medical Sciences** division stood at **£552 million**, accounting for approximately **62%** of all research income received by the University. The **Maths, Physical & Life Sciences** division accounted for a further **£198 million** (**22%**). An additional **£81 million** (**9%**) was received by the **Social Sciences** division, **£32 million** (**4%**) by the **Humanities** division, and **£4 million** by Oxford University Gardens, Libraries & Museums (**GLAM**). The remaining **£21 million** (**2%**) could not be assigned to a specific academic division, so is included within the '**Other**' category.

Figure 6 Research income received by the University of Oxford in 2021-22, £m by academic division



Note: All values are presented in 2021-22 prices and rounded to the nearest £1 million.
Source: London Economics' analysis based on data provided by the University of Oxford

2.1.2 Adjustment for double-counting with knowledge exchange activities

The **£888 million** of research income received by the University of Oxford in 2021-22 includes income associated with a whole range of research activities. In particular, the University's **collaborative research** and **contract research** activities are included within this aggregate total.[17] However, the income from these two activities is *also* recorded separately within the Higher Education Business and Community Interaction Survey (HE-BCI)[18] data, which we use to separately estimate the economic impact associated with the University's wider knowledge exchange activities (described in further detail in Section 2.2.3).

Given that the income from these sources is included in *both* the data on the University's research-related income as well as the HE-BCI data on the University's wider knowledge exchange activities, to avoid any double-counting between the estimated impact of the University of Oxford's research activity (described in this section) and wider knowledge exchange activities (described in Section 2.2.3), we made the following adjustments:

- In terms of the University's impact from **collaborative research**, we implicitly account for publicly funded and cash income from collaborative research within the **impact of the University's research**. We therefore do *not* take collaborative research income into account in the analysis of wider knowledge exchange activities. This income represents **£33 million** out of the **£888 million** of total research income received by the University of Oxford in 2021-22.[19]
- In terms of **contract research**, we account for this activity within the impact of the University of Oxford's wider knowledge exchange activities (see Section 2.2.3). Therefore, to avoid double-counting, the analysis of the impact of the University of Oxford's research activities here is adjusted to deduct the **£282 million** of contract research income from the above total research-related income (**£888 million**). We thus estimated that the gross **direct impact** (before deducting public costs) associated with the University of Oxford's research activity in the 2021-22 academic year stands at **£606 million**.

A schematic overview of the methodological approach adopted, including the adjustments for double-counting, is provided in Annex A2.2.1.

2.1.3 Total direct, indirect, and induced impact of the University of Oxford's research activity

The analysis then assesses the total **direct, indirect, and induced economic impacts** associated with the University of Oxford's research activity in 2021-22 on the UK economy. While the direct impact reflects the **research income** that the University of Oxford received

[17] Collaborative research involving public funding includes cash or in-kind contributions to research projects with material contributions from at least one external non-academic collaborator. Contract research meets specific research needs of external partners, excluding basic Research Council grants. The two activities are mutually exclusive.
[18] See Higher Education Statistics Agency (HESA, 2023e).
[19] The **£33 million** in collaborative research funding is made up of **£24 million** of public funding and **£3 million** of collaborative cash contributions. Note that any income in terms of in-kind contributions to collaborative research (**£5 million**) is excluded from the impact analysis since these contributions do not represent a cash transaction for which we can robustly apply economic multipliers.

in the 2021-22 academic year[20], the indirect and induced effects reflect the chain reaction of subsequent rounds of spending throughout the economy, often referred to as a **'ripple effect'**. These are defined as follows:

- **Indirect effect ('supply chain impacts')**: The University of Oxford spends its research income on purchases of goods and services from suppliers, who in turn spend this revenue purchasing inputs to meet the University's demand. 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 the University of Oxford (supported by the University's research income) use their wages to purchase 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 further 'ripple effect' throughout the economy as a whole.

The total of the direct, indirect, and induced effects constitutes the *gross* economic impact of the University of Oxford's research activities. An analysis of the *net* economic impact ideally needs to account for 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 (i.e. the United Kingdom); 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 region[21].

The direct, indirect, and induced impacts are measured in terms of monetary economic output[22], gross value added (GVA)[23], and full-time equivalent (FTE) employment supported[24]. 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 the University of Oxford's research activities were estimated using **economic multipliers** derived from Input-Output tables[25], which measure the total

[20] Net of contract research income, as discussed above.
[21] It is important to note that, while the analysis (wherever possible) 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 research income received by the University of Oxford 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 the University of Oxford's research activities in *gross* terms.
[22] In this analysis, economic output is equivalent to income or turnover (e.g. the direct research income that the University of Oxford accrued in 2021-22).
[23] 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).
[24] Full-time equivalent (FTE) jobs represent the total number of full-time jobs supported, accounting for part-time positions on an equivalent full-time basis.
[25] Input-Output tables quantify the interdependencies between different sectors and regions of an economy by detailing the origin and destination of resource flows between each sector and region.

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 sector. 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 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 (published by the Office for National Statistics[26]) with a range of regional-level data to achieve a granular breakdown by sector *and* region.[27]

To estimate the total direct, indirect, and induced impact, we apply the relevant economic multipliers[28] (derived from our above-described Input-Output analysis) associated with organisations in the **government, health, and education sector in the South East**.[29] These multipliers (for the impact on the South East and the UK economy as a whole) are presented in Table 3.

Based on these estimates, in terms of economic output, we assume that every **£1 million** of research income accrued by the University of Oxford generates a *total* of **£2.64 million** of impact throughout the UK economy on average, of which **£1.69 million** is accrued in the South East. In terms of employment, we assume that for every **1,000** FTE staff employed directly by the University of Oxford, a total of **2,010** staff are supported throughout the UK, of which **1,380** are supported in the South East.

Table 3 Economic multipliers associated with the University of Oxford's research activities

Location of impact	Output	GVA	FTE employment
South East	1.69	1.57	1.38
Total UK	2.64	2.41	2.01

Note: All multipliers constitute Type II multipliers, defined as [Direct + indirect + induced impact]/[Direct impact].
Source: London Economics' analysis

In addition to the impacts associated with the University of Oxford's research activity, a similar methodology is applied to estimate the direct, indirect, and induced economic effects associated with the University's knowledge exchange activities (see Section 2.2), export income (see Section 4), operational and capital expenditures (see Section 5), and contribution to tourism (see Section 6).

Adjusting for public costs

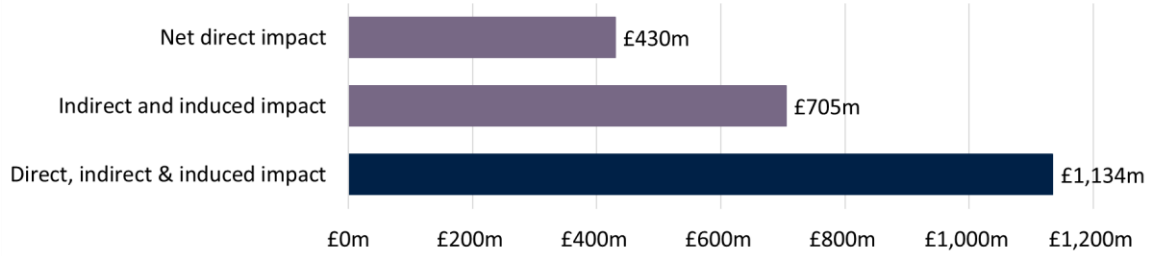
To arrive at the ***net* total impact** of the University of Oxford's research activities on the UK economy in 2021-22 (**net of public costs**), we deducted the **costs to the public purse** of funding the University of Oxford's research activities. These public costs include the funding

[26] See Office for National Statistics (2023).
[27] See Annex A2.1.1 for more details.
[28] Specifically, the analysis makes use of *Type II* multipliers, defined as [Direct + indirect + induced impact]/[Direct impact].
[29] i.e. we assume that the expenditure patterns of the University of Oxford are the same as for other institutions operating in the South East's government, health, and education sector.

provided by the UK Research Councils (**£149 million**), recurrent research grants provided by Research England (**£177 million**), and other research income from UK central government bodies, local authorities, and health and hospital authorities (**£141 million**). These total public purse costs (**£467 million**) are deducted from the direct, indirect, and induced impacts of research activity estimated using the multipliers outlined above. We thus estimated that the **direct, indirect, and induced impact** (net of public costs) associated with the University of Oxford's research activity in the 2021-22 academic year stood at **£1.1 billion**, with a (net) direct research impact of **£430 million** (see Figure 7).

In terms of GVA and FTE employment, the total direct, indirect, and induced impact associated with the University's research in 2021-22 was estimated at **£625 million** and **9,345** FTE jobs, respectively.

Figure 7 Net direct, indirect, and induced impacts associated with University of Oxford research income in 2021-22, £m



Note: Monetary estimates are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

2.1.4 Productivity spillovers

In addition to the direct, indirect, and induced impact of research, the wider academic literature indicates that investments in research & development (R&D) and other intangible assets may induce positive **externalities**. Economists refer to the term 'externality' to describe situations in which the activities of one 'agent' in the market induce (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 sector[30]. For example, spillovers are enabled through direct R&D collaborations between universities and firms (such as Knowledge Transfer

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

Partnerships), the publication and dissemination of research findings, or through university graduates entering the labour market and passing on their knowledge to their employers.

In order to estimate the productivity spillovers associated with the University of Oxford's research activities, we apply productivity spillover multipliers from the existing literature to the different types of research-related income received by the University in 2021-22 (again see Figure 5). Specifically, we assign a multiplier of **12.7**[31] to the research funding that the University of Oxford received from **UK Research Councils and UK charities**[32] in 2021-22 (amounting to **£314 million**), and a multiplier of **0.2**[33] to **all other research funding** received by the University in that academic year (amounting to **£574 million**)[34]. A more detailed summary of the key relevant literature on this topic is presented in Annex A2.2.2.

Using this approach, we infer a weighted average spillover multiplier associated with the University of Oxford's research activities in 2021-22 of approximately **4.62** – i.e. **every £1 invested in the University's research activities generates additional annual economic output of £4.62 across the UK economy**. This captures the impact of the research undertaken by the University in 2021-22 within that same academic year (but excludes any additional (and likely substantial) impacts in subsequent years).[35]

Applying this weighted average multiplier to the direct impact of research (i.e. excluding contract research, which was **£282 million**)[36], we estimate that the research conducted by the University of Oxford in 2021-22 resulted in **total market sector productivity spillovers** of **£2.8 billion**.

2.1.5 Aggregate impact of the University of Oxford's research

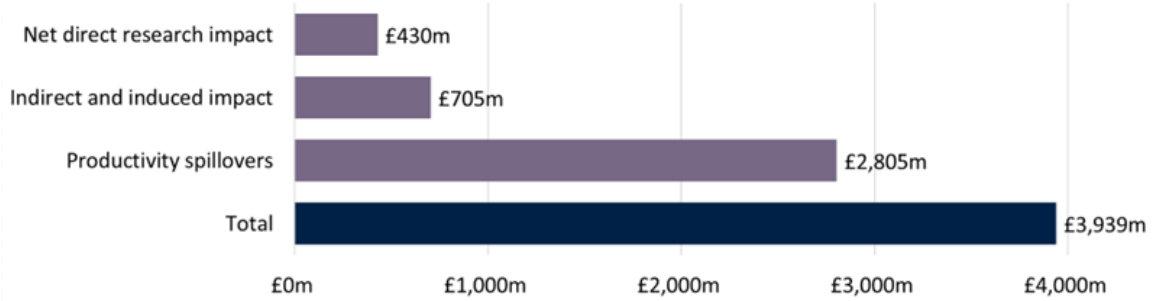
The estimated impact of the University of Oxford's research activities in 2021-22 stood at £3.9 billion.

Combining the **direct, indirect, and induced economic impact** of the University of Oxford's research (**£1.1 billion**) with the estimated **productivity spillovers** associated with this research (**£2.8 billion**), we estimate that the total economic impact associated with the University's research activities in 2021-22 stood at approximately **£3.9 billion** (see Figure 8).

[31] This is based on a study by Haskel and Wallis (2010). For more detail, see Annex A2.2.2.
[32] Where the vast majority of funding provided by UK charities relates to projects commissioned through an open competitive process.
[33] This is based on a study by Haskel et al. (2014). Again, see Annex A2.2.2 for more detail.
[34] In terms of the large difference in magnitude between these multipliers, explaining the size of the 12.7 multiplier in particular, Haskel and Wallis (2010) argue that they would expect the productivity spillovers from Research Council funding to be large, 'given that the support provided by Research Councils is freely available and likely to be basic science'. To the best knowledge of the authors, there exists no further and recent empirical evidence to support this. As a result, we apply the separate multipliers to the different income strands.
[35] Note however that, following Haskel and Wallis (2010), we take a flow approach rather than a stock measure of R&D, which implicitly assumes a 0% depreciation rate.
[36] Note that by applying this weighted average multiplier, we implicitly assume that the source of contract research income is representative of all other research income received by the University of Oxford, in the absence of information around the source of the contract research income. This assumption, as well as the underlying assumption that the University's contract research activities result in no productivity spillovers (due to the inclusion of contract research within wider knowledge exchange activities), may result in an underestimation of the total value of the productivity spillovers associated with the University of Oxford's research.

Comparing the **£467 million** of publicly funded research income received by the University of Oxford in 2021-22 to the **£3.9 billion** impact from research activities, this suggests that **for each £1 million of *publicly* funded research income, the University of Oxford's research activities generate an estimated total of £8.44 million in economic impact across the UK.**

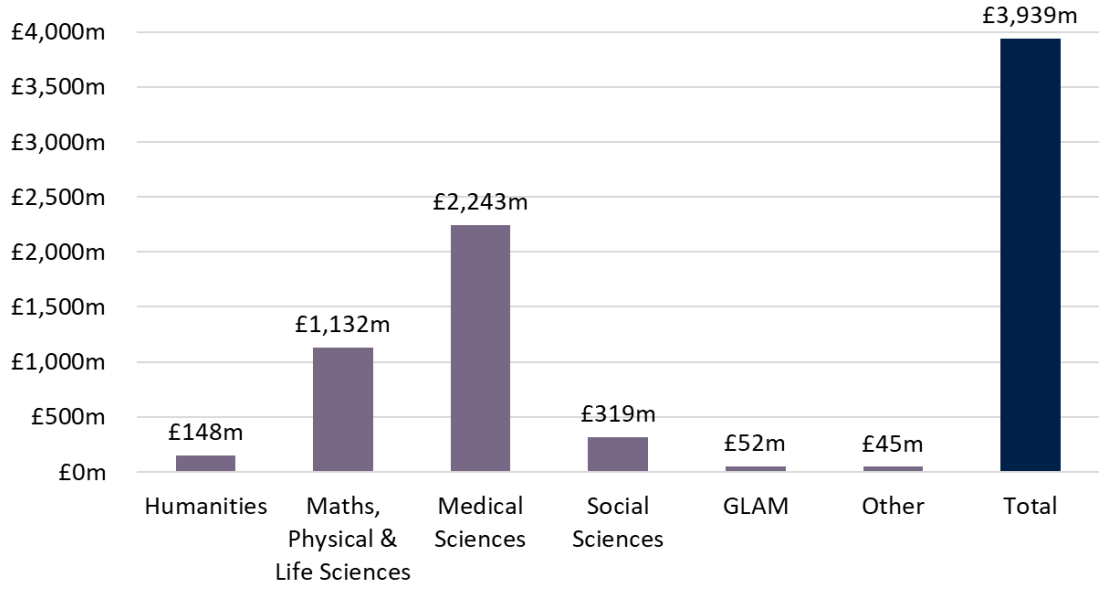
Figure 8 Total impact of the University of Oxford's research activities in 2021-22, £m



Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the total indicated.
Source: London Economics' analysis

In terms of the breakdown by academic division, the majority of the University's **£3.9 billion** research impact is associated with the **Medical Sciences** division (**£2.2 billion**, **57%**) (see Figure 9). The research activities of the **Maths, Physical & Life Sciences** division had an economic impact of **£1.1 billion** in 2021-22 (**29%**). Significant impacts are also generated by the **Social Sciences** (**£319 million**, **8%**) and **Humanities** (**£148 million**, **4%**) divisions, as well as **GLAM** (**£52 million**, **1%**).

Figure 9 Total impact of the University of Oxford's research activities in 2021-22 by academic division, £m

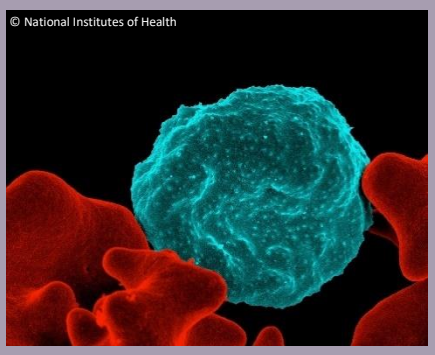


Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the total indicated.
Source: London Economics' analysis

Pioneering vaccine platform technologies

The University of Oxford has been at the forefront of vaccine development, leveraging cutting-edge platform technologies to address some of the world's most pressing infectious diseases. Three pioneering examples of Oxford's vaccine innovations are explored in more depth below, each of which represents a significant milestone in the field of immunology and public health and advances Oxford's commitment to commercialise its world class research to deliver societal and economic benefit to all.

Malaria



The University of Oxford's malaria vaccine, known as R21/Matrix-M, was developed by a team of researchers led by Professor Adrian Hill at the Jenner Institute[37]. The vaccine targets the sporozoite stage of the malaria parasite life cycle, which occurs once the parasite enters the body and before it spreads into the liver and the blood stream, generating an immune response that stops the parasite from developing and spreading. The R21 vaccine contains Novavax's Matrix-M adjuvant, which enhances immune system response to make the vaccine more potent and durable.

The vaccine has undergone clinical trials in the UK, Thailand, and several African countries, including a Phase III trial in Burkina Faso, Kenya, Mali, and Tanzania that enrolled 4,800 children. These trials have tested dosage, booster effectiveness, and how the vaccine works against different seasonal patterns of malaria. The vaccine's Phase III trials achieved high efficacy in infants and young children, resulting in countries such as Ghana, Nigeria, and Burkina Faso approving the vaccine in 2023. In October 2023, the R21 vaccine received WHO recommendation for use in countries around the world. The vaccine is now being rolled out as of July 2024[38], with a license agreement negotiated by Oxford University Innovation with the Serum Institute of India establishing production capacity for 100 million doses per year.

Covid-19

Before Covid-19 made headlines in early 2020, researchers at the Nuffield Department of Medicine's Jenner Institute were in the process of developing a vaccine candidate for another coronavirus, specifically Middle East Respiratory Syndrome (MERS)[39]. In response to the Covid-19 outbreak, the team designed the novel coronavirus antigen to add to the vaccine (known as the ChAdOx1 vaccine) in January 2020, as soon as the genetic code of Covid-19 was released[40]. Simultaneously, another team was developing a method to scale-up production capabilities at the Institute, specifically to run large-scale trials for a rabies

[37] https://oxford.shorthandstories.com/R21-malaria-the-big-shot/index.html
[38] https://www.ox.ac.uk/news/2024-07-15-c-te-d-ivoire-makes-history-first-nation-deploy-r21matrix-m-malaria-vaccine
[39] https://www.ox.ac.uk/news/2023-09-18-oxford-and-liverpool-scientists-launch-new-vaccine-trial-middle-east-respiratory
[40] https://oxford.shorthandstories.com/innovation-vaccine/index.html

vaccine. This groundwork proved timely when the focus shifted to Covid-19, allowing the Institute to work at pace to produce enough of the vaccine for it to enter clinical trials.

The team collaborated with the Oxford Vaccine Group (OVG) to quickly organise large-scale trials conducted in the UK, Brazil and South Africa, which was essential to show that the vaccine was safe in people from different ethnic backgrounds. The trials demonstrated the effectiveness of the Covid-19 vaccine, with Phase III trial data showing an overall vaccine efficacy of 70.4% which could increase through changes in the dosage. The next step was to license the vaccine and build a production network to ensure the vaccine could be manufactured at scale. The University worked with a network of commercial partners, including five manufacturing sites around the world, equipment and material providers, and the Vaccine Manufacturing and Innovation Centre, to ensure that the real-world impact could be maximised through greater manufacturing and distribution capabilities.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The University of Oxford insisted on partnering with a pharmaceutical company that agreed to a not-for-profit clause for its Covid-19 vaccine. AstraZeneca shared this vision, helping to navigate regulatory approvals and scaling up production from small batches to 2,000 litres at a time. The not-for-profit nature of the agreement was important as the vaccine was particularly suited to developing countries, as it could be stored at fridge temperature (2-8°C) and distributed using existing healthcare systems.

The Oxford-AstraZeneca Covid-19 vaccine was estimated to have saved more than six million lives during the first year of use, which is more than any other Covid-19 vaccine[41].

Ebola

Researchers at the University of Oxford conducted two trials of the Ad26.ZEBOV/MVA-BN-Filo combination vaccine for use against Ebola in 2015 and 2016. The vaccination protocol involves one dose of the Ad26.ZEBOV vaccine to prime the immune system, followed by a dose of MVA-BN-Filo which enhances the immune response to achieve long-term protection. The trials demonstrated that the two-dose vaccine was safe, caused few side effects, and gave long-lasting protection of up to one-year post-immunisation[42]. The vaccine was approved for use by the European Medicines Agency in 2020.

More recently, the University of Oxford has worked on a vaccine against the Zaire and Sudan species of Ebola, commencing Phase I trials in 2021[43]. These are the two species of Ebola that now cause nearly all Ebolavirus outbreaks and deaths. The newer vaccine, called ChAdOx1 biEBOV, is based on a weakened version of a common cold virus (adenovirus) which was genetically modified to be unable to replicate in humans, which had been previously used successfully in the Oxford-AstraZeneca Covid-19 vaccine. A trial to deploy the vaccine began in Uganda in late 2022, to fight an outbreak of the Sudan ebolavirus happening at a time when there were no licensed vaccines against this species of Ebola.

[41] https://www.airfinity.com/articles/astrazeneca-and-pfizer-biontech-saved-over-12-million-lives-in-the-first
[42] https://pubmed.ncbi.nlm.nih.gov/33217361/
[43] https://pubmed.ncbi.nlm.nih.gov/39922207/

2.2 Economic impact of the University of Oxford's knowledge exchange activities

In addition to its research activities, the University of Oxford generates significant economic impacts through a range of knowledge exchange activities. Specifically, here, we assess the impact of **spinout companies** associated with the University of Oxford, the impact of companies based at the University's **Science Parks**, and the impact of the **wider knowledge exchange activities** undertaken at the University, including:

- **Contract research** provided by the University of Oxford;
- **Consultancy services** provided by the University of Oxford;
- **Licensing of the University's IP** to other organisations (including the activities of Oxford University Press);
- **Business and community courses** provided by the University of Oxford; and
- **Facilities and equipment hire**, and related activities.

Specifically, the analysis captures the **direct, indirect, and induced economic impacts** associated with these knowledge exchange activities, again using **economic multipliers** derived from Input-Output tables (see Section 2.1.3 above for more detail). In addition, and separately, we estimate the economic impact of the **wider health benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine**.

2.2.1 Impact of the University of Oxford's spinout companies

To assess the **direct impact** associated with the University of Oxford's spinout companies, we made use of information on **turnover** and **FTE employment** associated with a total of **177** spinout companies that were active and based in the UK in 2021-22, where available.[44] The information on each company's turnover and employment was based on data provided by the University of Oxford, supplemented with data from Bureau van Dijk's FAME database (based on Companies House information) to fill any gaps where possible. The **direct GVA** 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[45,46].

It is important to note that the analysis presented in this section is likely to underestimate the total impact of the University of Oxford's spinout companies, since:

[44] The analysis includes spinouts with some University of Oxford ownership as well as formal spinouts that are no longer owner by the University. We exclude 6 spinout companies that were active in 2021-22 but that were non-UK based. We also exclude companies that were dissolved prior to 2021-22. Note also that the information is based on each company's 2021-22 financial year, which does not necessarily coincide with the 2021-22 academic year and varies across companies.

[45] Again, these ratios were derived based on the above-described multi-regional Input-Output model. Each firm's main industry classification and regional location was based on information from the University of Oxford where provided, or otherwise on information from FAME.

[46] The analysis made use of *any* resulting turnover or employment information available for a given company, irrespective of whether complete data (i.e. in terms of turnover *and* employment) was available for that firm. The direct impact is therefore based on a total of 57 spinout firms (out of the 177 active UK-based companies) for which turnover information was available and greater than 0, and 159 spinout firms for which employment information was available and greater than 0.

- In spite of using FAME data to fill gaps, the combined University of Oxford/FAME data are likely to provide an incomplete estimate of the total turnover, GVA, or employment of the University of Oxford'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); and
- Many spinout companies will be pre-revenue, meaning that they have no turnover, but may still have an economic impact through their expenditure. This expenditure would not be accounted for within the estimates presented here (in economic output terms). However, the activities of these companies would be *partially* captured through the employment data provided by the University and collected from FAME.

There will also be additional economic impacts associated with the University's student and staff start-up companies, which are not included here.

For the academic year 2021-22, the combined **direct impact** of the University of Oxford's spinout companies was estimated at **£1.5 billion** in economic output (i.e. turnover) terms, **10,440 FTE staff**, and **£647 million** of GVA. Of the University of Oxford's **177** UK-based spinout companies that were active in 2021-22, **68** (**38%**) were headquartered in Oxford. These companies had a turnover of **£390 million** in 2021-22 and employed **3,630** FTE staff. The broader Oxfordshire region[47] accounted for approximately two-thirds (**120**, **68%**) of the University's spinout companies, but for the vast majority of total turnover (**£1.4 billion**, **94%**) and employment (**9,495**, **91%**) associated with University of Oxford spinouts.

We again applied relevant **economic multipliers** (derived from our above-described Input-Output analysis) to estimate the **total direct, indirect, and induced** economic impacts of the University's spinout companies. Specifically, we assigned relevant economic multipliers to each active company in 2021-22 based on each firm's industry classification and the region of its main registered office address.

Table 4 Economic impact associated with the University of Oxford's spinout companies in 2021-22

Location of impact	Output, £m	GVA, £m	FTE employees
South East	£2,356m	£1,070m	17,270
Total UK	£3,789m	£1,814m	31,685

Note: All monetary values are presented in 2021-22 prices and rounded to the nearest £1 million. The employment figures are rounded to the nearest 5. ***Source: London Economics' analysis***

Applying the resulting multipliers to the above direct impacts, the total economic impact associated with the activities of the University's **spinout companies** in the 2021-22 academic year was estimated to be **£3.8 billion** across the UK economy, of which **£2.4 billion** (**62%**) occurred in the South East (see Table 4). The estimated total number of FTE jobs

[47] This includes Oxford itself as well as the local authorities of Cherwell, South Oxfordshire, West Oxfordshire, and the Vale of White Horse.

supported stood at **31,685** (of which **17,270** (or **55%**) were located in the South East). The corresponding estimate in terms of GVA stood at **£1.8 billion** (of which **£1.1 billion** (or **59%**) occurred in the South East).

2.2.2 Impact of the University's Science Parks

To assess the direct impacts generated by companies based at the University's Science Parks (including The Oxford Science Park, Begbroke Science Park, and the BioEscalator), we used a similar approach to that estimating the impact of the University's spinout companies (see Section 2.2.1). Here, we made use of data on the turnover and FTE employment associated with a total of **45** active companies that were resident at The Oxford Science Park, Begbroke Science Park, or the BioEscalator in 2021-22.[48]

The analysis relies primarily on FAME data (where available), although employee data provided by the University of Oxford (relating to companies based at The Oxford Science Park and Begbroke Science Park) was used to cross-check the FAME data where possible. Similar to the approach for spinout companies, direct GVA was then estimated by multiplying each firm's turnover by the average ratio of GVA to output within the given company's industry in the South East.[49]

Using this methodology, the analysis indicates that the direct impact associated with the activities of companies located at the University's Science Parks[50] stood at **£346 million** in output (i.e. turnover) terms, **1,240 FTE staff**, and **£184 million** in GVA terms.[51] Again, we then assigned relevant economic multipliers (based on the relevant industry's multiplier in the South East region[52]) to estimate the **total direct, indirect, and induced economic impacts** associated with each firm's activities.

Applying the resulting multipliers to the above direct impacts, the estimated total economic impact associated with companies located at The Oxford Science Park, Begbroke Science Park, and the BioEscalator in 2021-22 stood at **£887 million** across the UK, of which **£558 million** (**63%**) was generated in the South East (Table 5). The estimated total number of FTE jobs supported stood at **3,640** (of which **2,100** (**63%**) were located in the South East), and

[48] This excludes 34 companies that have subsidiary locations at the Science Parks but that are *headquartered* outside of Oxford, to ensure that companies are only considered where the Science Park is likely to have been integral to their development. The analysis also excludes an additional 27 University spinout companies that were located at the Science Parks in 2021-22 (to avoid double-counting with the above impacts associated with the University's spinouts; see Section 2.2.1). Note that we also exclude companies that were dissolved or had left the Park prior to 2021-22, and companies that are primarily non-UK based. The turnover and employment information used is based on each company's 2021-22 financial year, which does not necessarily coincide with the 2021-22 academic year and varies across companies.

[49] All companies located at the Science Parks were assigned to the South East region, i.e. each company was assigned a GVA conversion ratio (and economic multiplier) for the relevant industry based in the South East region.

[50] Again, excluding any spinout companies and those that are headquartered outside of Oxford.

[51] This is based on 11 firms (out of the 45 active companies) for which turnover (and, therefore, GVA) information was available, and 38 firms for which employment information was available. As with the approach for spinout companies, we made use of any information available for a given firm, irrespective of whether complete data (i.e. in terms of turnover, GVA *and* employment) was available for that firm.

[52] i.e. again, all Science Park companies were assigned to the South East region, based on their residency at the Science Parks.

the corresponding estimate in GVA terms stood at **£462 million** (of which **£291 million** (**58%**) was generated in the South East).

Table 5 Economic impact associated with companies located at the University's Science Parks in 2021-22

Location of impact	Output, £m	GVA, £m	FTE employees
South East	£558m	£291m	2,100
Total UK	£887m	£462m	3,640

Note: All monetary values are presented in 2021-22 prices and rounded to the nearest £1 million. The employment figures are rounded to the nearest 5.
Source: London Economics' analysis

Note that the analysis presented in this section only considers three science parks that are under the University's control and does not include the impacts associated with the wider ecosystem of science parks related to the University. Other science parks based in or near Oxford (such as Milton Park, ARC Oxford, and Oxford Technology Park (among others)) are not included in the analysis but are likely to have economic impacts that are indirectly linked to the existence of the University. Therefore, the analysis here is likely to underestimate the true economic impact of the University of Oxford in terms of its beneficial effects on the wider innovation ecosystem in the Oxford area.

Oxford spinout companies catalyse economic growth and societal impact

The University of Oxford has a large and diverse ecosystem of spinout companies, many of which are contributing to solving some of the most substantial challenges facing society today. Four examples of companies which are leading on driving societal change and delivering economic impact are presented below.

OrganOx

OrganOx, a spinout from the Department of Engineering Science and the Nuffield Department of Surgical Sciences at the University of Oxford, is at the forefront of changing the way donor organs are preserved in the critical time between donation and transplantation. Peter Friend, Professor of Transplantation at the University of Oxford and founder of OrganOx, has transformed the field of transplantation through ground-breaking research, innovation, commercialisation and clinical translation of improvements in organ perfusion.

The company's leading product, the *metra*®, harnesses patented normothermic machine perfusion technology to preserve donor livers for up to 24 hours prior to transplant[53]. The OrganOx metra has supported over 2,000 liver transplants worldwide, increasing the utilisation of donor organs.

The metra is transforming donor liver preservation, aiding the identification of viable donor livers without compromising outcomes. In a European randomised clinical trial, preservation taking place with the metra resulted in 50% fewer discarded organs compared to static cold storage and 20% more transplanted livers.

Ultromics

Launched in 2017, Ultromics is a health technology company specialising in AI-powered cardiovascular diagnostic tools, which spun-out of the Radcliffe Department of Medicine with the support of Oxford University Innovation (OUI)[54]. The company uses AI to detect HFpEF (heart failure with preserved ejection fraction), a complex form of heart failure which typically goes undiagnosed until the patient needs emergency care. Roughly half of all heart failure patients have HFpEF, and up to 75% of HFpEF patients are a missed diagnosis, emphasising the need for tools which improve diagnosis of the condition.

Ultromics has developed EchoGo Heart Failure, which uses AI to improve diagnostic accuracy of HFpEF. The technology has been found to significantly reduce indeterminate cases, meaning that fewer cases are missed and HFpEF is caught earlier in more patients.

[53] https://www.organox.com/
[54] https://www.ultromics.com/

Wild Bioscience

Wild Bioscience, a University of Oxford spinout founded within the Department of Plant Sciences, is pioneering advancements in agriculture by developing crops with enhanced resilience and productivity[55].

The company integrates plant biology with computer algorithms to identify and activate specific genes in crops such as wheat and maize. Research has found that the boosts in photosynthetic efficiency associated with this technology have resulted in a 20% improvement in growth and seed production. The company hopes that, through improving crop yields and increasing the productivity of crop production, it can play a part in protecting long-term food production which is increasingly at risk due to the effects of climate change.

Brill Power

Brill Power, another spinout from the Department of Engineering Science, has created a battery management system which enables longer battery lifetimes and a fuller consumption of a battery's energy. The company's pioneering battery management system, BrillCore, utilises active loading technology, which exposes stronger cells to the higher current. This contrasts with conventional systems which rely on the performance of the weakest performing cell[56]. As a result, the technology leads to an increase of up to 60% in battery lifetimes and uses up to 46% more energy from aged batteries when compared to traditional battery management systems[57].

More sophisticated battery management systems, which maximise the performance and efficiency of batteries, help to promote sustainability and optimise energy usage so are essential for the journey to net zero.

[55] https://innovation.ox.ac.uk/news/wild-bioscience-transforming-agriculture-through-innovation/
[56] https://www.theengineer.co.uk/content/opinion/comment-unlocking-the-power-of-sustainable-battery-chemistries
[57] https://brillpower.com/technology/brillcore/

2.2.3 Impact of the University's wider knowledge exchange activities

In addition to spinouts and companies located at the University's Science Parks, we estimate the **economic impact of the University of Oxford's wider knowledge exchange activities** (which are captured separately in the HE-BCI data[58] (i.e. separately from spinouts)). These wider knowledge exchange activities include[59]:

- **Contract research**;
- **Consultancy services**;
- **Licensing of the University's IP** to other organisations (including the activities of Oxford University Press);
- **Business and community courses** offered by the University; and
- **Facilities and equipment hire**, and related activities.

Again, in addition to the **direct impact in economic output terms** associated with each of these activities, we estimate the impact in **GVA** and **FTE employment terms**, by multiplying the direct output by the average ratios of GVA to output and of FTE employees to output among organisations within the government, health, and education sector located in the South East.[60]

The **direct impact** of the University of Oxford's wider knowledge exchange activities in 2021-22 is made up of **£282 million** in income from contract research activities, **£88 million** of IP licensing income, **£33 million** of income from business and community courses, **£10 million** in revenues from consultancy services, and **£5 million** of income associated with the hire of the University of Oxford's research facilities. The total direct impact of these activities therefore stood at **£418 million** in the 2021-22 academic year. The associated impact in GVA terms stood at **£252 million**, supporting **4,510 FTE** jobs.

To estimate the **total direct, indirect, and induced impacts** associated with these activities, we then multiplied these direct impacts by the estimated average economic multipliers associated with organisations in the government, health, and education sector in the South East.[61] These multipliers are, therefore, the same as those presented in Table 3 in Section 2.1.3.

Table 6 presents the resulting **aggregate impact** associated with the University of Oxford's **wider knowledge exchange activities**. The analysis estimates that, in 2021-22, these

[58] Whilst published data on these activities is available for the University of Oxford as a whole, the analysis presented in this section relies on data provided by the University, in order to allow us to include a breakdown of the economic impact by academic division.
[59] Note again that the income from collaborative research is not included in this section but is implicitly accounted for in the impact of the University's research (see Section 2.1). Although this income is likely to contain funding related to wider knowledge exchange activities, it is difficult to attribute it with certainty to a specific knowledge exchange activity. As such, we retain collaborative research within the research impact category (again, see Section 2.1.2 for more details).
[60] This follows a similar approach as for the estimated impact of the University's research (see Section 2.1), and again assumes that the expenditure patterns of the University are the same as for other institutions operating in the South East's government, health, and education sector.
[61] i.e. we again assume that the expenditure patterns of the University of Oxford are the same as for other institutions operating in the South East's government, health, and education sector.

activities generated a total of **£1.1 billion** of economic output across the UK economy. The total GVA impact was estimated at **£608 million** with an estimated **9,080 FTE jobs** supported across the UK economy.

Table 6 Economic impact associated with the University of Oxford's wider knowledge exchange activities in 2021-22

Type of impact	Output, £m	GVA, £m	FTE employment
South East	£705m	£396m	6,210
Total UK	£1,103m	£608m	9,080

Note: All monetary values are presented in 2021-22 prices and rounded to the nearest £1 million. The employment figures are rounded to the nearest 5.
Source: London Economics' analysis

2.2.4 Impact of the Oxford-AstraZeneca Covid-19 vaccine

As a final element of the University's knowledge exchange activities, we estimated the **specific economic benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine**.

The University received **£7.9 million** in contract research income in 2021-22 for the development of the vaccine. In addition to the direct, indirect and induced impact associated with this income (which is implicitly included in Section 2.2.3), the development of the Covid-19 vaccine had substantial impacts on the wider economy through the resulting reduction in Covid-19 infections, hospitalisations, and deaths.

Based on a range of existing literature, we estimate that the **benefit to cost ratio** of the development of the Covid-19 vaccine in relation to its impacts in the UK is approximately **26.0**. In other words, this suggests that every **£1 million** spent on the vaccine's research (or manufacture) resulted in wider health benefits worth **£26.0 million** to the UK economy. In Annex A2.2.4, we provide further detail on the calculation of this benefit to cost ratio and resulting methodological approach.[62]

Applying this benefit to cost ratio to the **£7.9 million** of contract research income received by the University of Oxford in 2021-22 for the development of the vaccine, we estimate that there were a total of approximately **£206 million** of wider economic benefits resulting from the reduced number of and severity of Covid-19 infections.[63] However, this approach is likely to significantly underestimate the impact of the vaccine, which is discussed in more detail in Box 2.

[62] Note that this benefit to cost ratio only relates to economic benefits in terms of reduced Covid-19 infections, hospitalisations, and deaths. Therefore, the approach here likely underestimates the total impact associated with the University of Oxford's Covid-19 vaccine research, as it does not include any wider economic or social benefits associated with the development of the vaccine (e.g. in terms of the economic impact of social distancing restrictions ending sooner).
[63] Again, note that the direct, indirect, and induced economic impacts of this income (**£22 million**) were already included as part of the impact of the University's wider knowledge exchange activities described in Section 2.2.3 above.

Box 2 The Oxford-AstraZeneca Covid-19 vaccine is likely to have had economic impacts globally of at least £2 trillion

The analysis presented in this section, and throughout the report, considers only the impact of the University on the UK economy, and focusses mostly on the economic impact of the University of Oxford in monetary terms. However, the University has a substantial impact on the **global stage**. Further, whilst there is a considerable and important economic impact resulting from the University's activities (both in the UK and globally), there is also a **critical social impact** driven by the University and its research, contributing to advancements in knowledge in a wide range of areas and improving lives around the world.

Whilst these social impacts are considered qualitatively through the use of case studies throughout this report, this box emphasises the global impact of one of the University's most consequential research activities in recent years; the development of the Oxford-AstraZeneca Covid-19 vaccine. Although this impact is considered previously within this section, it is likely that the analysis presented **significantly understates** the economic impact of the vaccine. This box therefore sets out additional impacts of the vaccine which are not considered and explains why these impacts could not be included within the core economic impact estimates.

The analysis uses a **benefit-cost ratio**, allowing us to attribute the economic impact of the University's involvement in vaccine development to the University by considering the income received by the University. The **£206 million** of wider economic benefits associated with the University's role in the development of the vaccine in 2021-22 therefore relates to **income that is specific to the Covid-19 vaccine** received by the University **in that academic year**. It does not include impacts in 2021-22 that may have resulted from income received by the University in previous years, nor does it include any expenditure outside of this income by the University or by any other parties. On the former point, we can aggregate the economic impacts resulting from all contract research income received by the University in relation to the vaccine between 2019-20 and 2021-22. Multiplying this income (**£26 million**) by the benefit-cost ratio outlined above, we estimate wider health economic benefits of the University's Covid-19 vaccine-related activities of approximately **£676 million**.

This means that the main estimate of the economic impact of the University's role in the development of the Oxford-AstraZeneca vaccine only contains a **small subset of the total impact of the vaccine**. We can illustrate this by considering the overall impact of Covid-19 vaccine deployment in the UK. According to Public Health England, the UK vaccination programme had prevented **123,100 deaths** by September 2021 (Public Health England, 2021). Utilising the standard value of one quality-adjusted life year (QALY), which is **£70,000** in 2020-21 prices (HM Treasury, 2022), and cautiously estimating that each death prevented results in an average increased lifetime of **5 years**, the wider health benefits associated with the entire UK vaccine programme are approximately **£43 billion**. Whilst this is an imprecise estimate, it illustrates the extent to which we are likely to be

underestimating the University of Oxford's impact through its role in the development of the Oxford-AstraZeneca Covid-19 vaccine.

Further, the development of vaccines against Covid-19 clearly had other economic impacts outside of their substantial health benefits, particularly through the **earlier removal of social distancing restrictions**. Lockdowns caused substantial damage to economies worldwide, with UK GDP approximately **10% lower** than it was before Covid during the lockdown of early 2021 (Brien et al., 2022). The earlier ending of restrictions, caused in part by the vaccine deployment programme, allowed the economic recovery to begin sooner and resulted in positive economic impacts.

Considering government spending, claims to the **Coronavirus Job Retention Scheme** (furlough) were worth **£4 billion** in **February 2021** (roughly equivalent to **£1 billion per week**), at the height of the third lockdown. This spending reduced throughout 2021 as social distancing restrictions were relaxed, reaching **£0.8 billion** by **August 2021** (Francis-Devine et al, 2021). Again, the earlier exiting of lockdown is associated with improved economic conditions, and therefore a reduction in the required support from government. The removal of lockdown restrictions one week earlier (for example) is estimated to save government **£1 billion in furlough costs alone**. Further, furlough was only one aspect of the support provided by government during the pandemic, meaning that the cost to government of lockdowns is likely to be substantially higher than this. However, whilst government spending is an important measure, these impacts would not be included in an economic impact analysis, as they represent a transfer from government to its citizens rather than genuine economic impact.

Next, the Oxford-AstraZeneca Covid-19 vaccine is known to have been particularly critical to fighting the pandemic in **developing countries**, in part because it could be stored at fridge temperature (2-8°C) and distributed using existing healthcare systems. Our economic analysis looks solely at the impact on the UK, so does not account for these extremely important impacts worldwide. The Oxford-AstraZeneca Covid-19 vaccine was estimated to have saved more than six million lives during the first year of use (Airfinity, 2022). Applying the same assumptions as above regarding the value of a QALY and the increased average lifetime associated with the vaccine, this would result in a worldwide economic impact of over **£2 trillion** resulting from health benefits alone. However, this should also be seen as an imprecise estimate, presented to illustrate the significant underestimation of the impacts associated with the vaccine presented in Section 2.2.4.

Lastly, the Oxford-AstraZeneca Covid-19 vaccine is part of a wider trend of the **University of Oxford's contribution to medicine**. During the Covid-19 pandemic, researchers at the University initiated trials to evaluate dexamethasone, which was found to reduce death rates among seriously unwell patients. The drug went onto save **1 million lives** worldwide by March 2021 (NHS England, 2021). Again following the assumptions outlined above relating to the value of a QALY and the increased average lifetime associated with the treatment, we find a worldwide economic impact associated with the use of dexamethasone against Covid-19 of **£350 billion**. More widely, the University has also

played a key role in the development of vaccines fighting Malaria and Ebola, which are discussed in more detail above.

2.2.5 Total economic impact of the University of Oxford's knowledge exchange activities

The impact of the University of Oxford's knowledge exchange activities in 2021-22 stood at £6.0 billion.

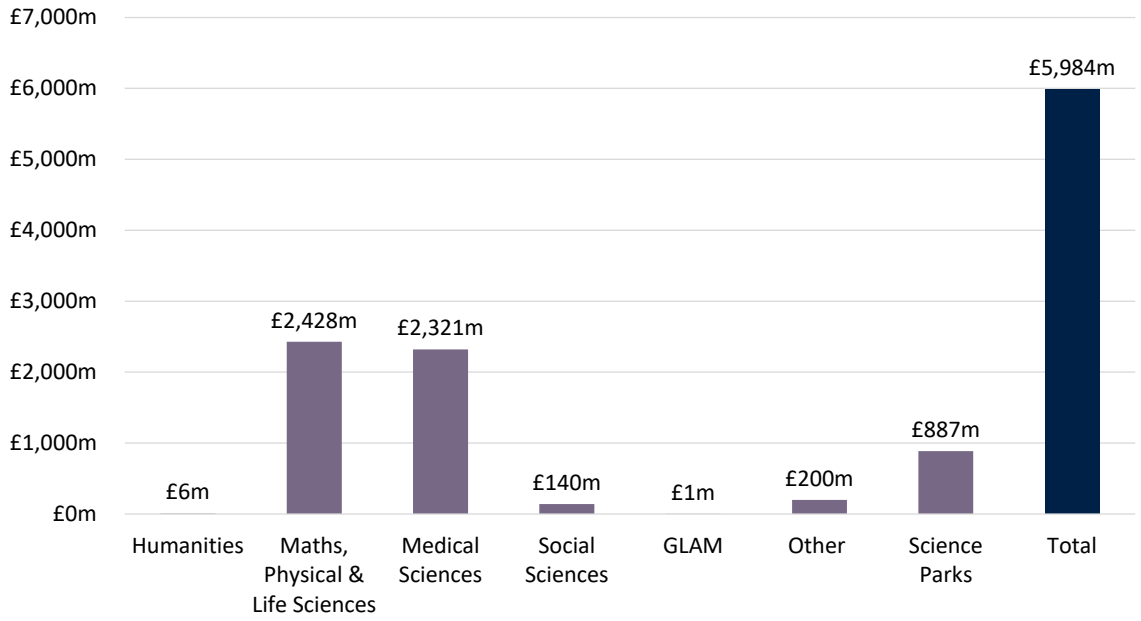
Combining all of the above activities, the knowledge exchange and commercialisation activities of the University of Oxford in 2021-22 *directly* generated an estimated total of **£2.2 billion** in terms of **economic output** across the UK economy. When accounting for the indirect and induced impacts of these knowledge exchange activities, as well as the wider health benefits of the Oxford-AstraZeneca Covid-19 vaccine, the total impact stood at **£6.0 billion** (see Figure 10). Of this total, the University's spinout companies contribute **£3.8 billion** (**63%**), followed by **£887 million** (**15%**) from companies based at the University's Science Parks, and **£743 million** (**12%**) from contract research activities. In addition, the University's licensing activities of its IP generated an estimated **£232 million** (**4%**) of impact, followed by the health benefits associated with the University's Covid-19 vaccine development (**£206 million**), the business and community courses offered by the University (**£87 million**), consultancy services (**£27 million**), and facilities and equipment hire and related activities (**£14 million**).

Figure 10 Total economic impact associated with the University of Oxford's knowledge exchange activities in 2021-22 by type of activity, £m

Note: Monetary estimates are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Circles are not to scale.
Source: London Economics' analysis

In terms of academic division (see Figure 11), the **Maths, Physical and Life Sciences** accounted for the largest share of this impact (**£2.4 billion**, **41%**), predominantly driven by the relatively large spinout impacts associated with this division.[64] In addition, the **Medical Sciences** division contributed **£2.3 billion** of impact here (**39%**), which is similarly driven by this division's spinouts, but also the relatively large scale of contract research in Medical Sciences undertaken by the University. Companies located at the University's **Science Parks** accounted for a further **£887 million** (**15%**) of impact[65], while the '**Other**' division category accounted for **£200 million** (**3%**), mostly related to the IP licensing income associated with Oxford University Press. The knowledge activities undertaken by the **Social Sciences** division had an economic impact of **£140 million** (**2%**), mostly from the division's business and community courses and contract research. The remaining impact is generated by the **Humanities** division (**£6 million**) and **GLAM** (**£1 million**).

Figure 11 Total economic impact associated with the University of Oxford's knowledge exchange activities in 2021-22 by academic division, £m



Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the total indicated.
Source: London Economics' analysis

[64] The breakdown for spinouts is based on the academic division assigned to each company by the University of Oxford. In instances where a spinout company was assigned to more than one division, the impact was split equally across those divisions. All companies were assigned to at least one academic division, meaning that there were no companies assigned to the 'Other' category within this element of the analysis.
[65] For the analysis of knowledge exchange activities, Science Parks have been included as a separate 'academic division' here.

2.3 Total impact of the University of Oxford's research and knowledge exchange activities

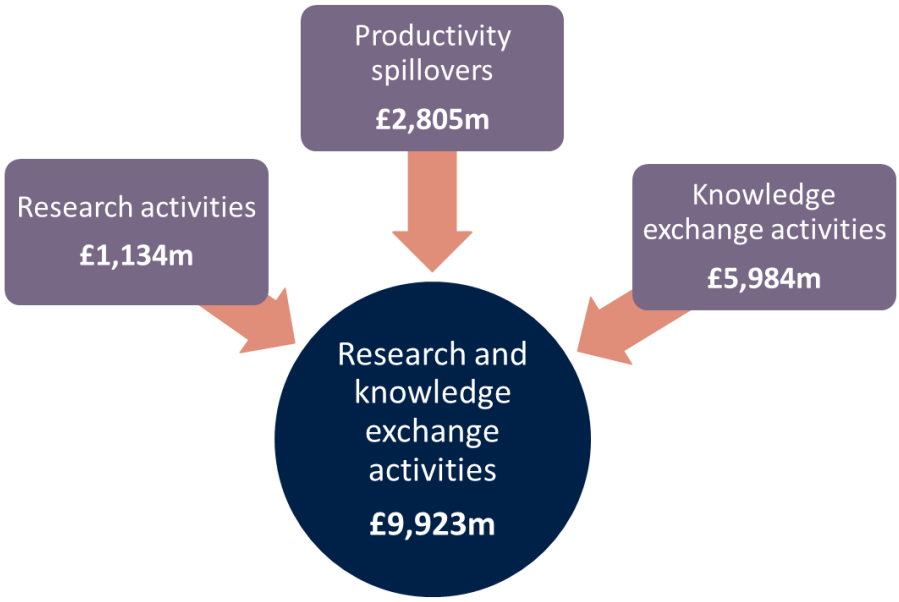
The total economic impact on the UK economy associated with the University of Oxford's research and knowledge exchange activities in 2021-22 was estimated to be approximately **£9.9 billion** (see Figure 12). In terms of the components of this impact:

The total impact of the University of Oxford's research and knowledge exchange activities in 2021-22 stood at £9.9 billion.

- The University of Oxford's **research activities** accounted for **£1.1 billion**;
- The associated **productivity spillovers** to the wider UK economy of this research stood at **£2.8 billion**; and,
- The impact associated with the University of Oxford's **knowledge exchange activities** is estimated to be **£6.0 billion**, including:
  - **Spinout companies** (**£3.8 billion**);
  - **Companies based at the University's Science Parks** (**£887 million**);
  - **Wider knowledge exchange activities** (**£1.1 billion**); and
  - The wider health benefits associated with the University's development of the **Oxford-AstraZeneca Covid-19 vaccine** (**£206 million**).

A breakdown of these impacts by academic division is included in Section 2.4, while a breakdown by region and sector (where available) is presented in Annex A2.2.3.

Figure 12 Total impact of the University of Oxford's research and knowledge exchange activities in 2021-22, £m



Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

2.4 Change in impacts over time

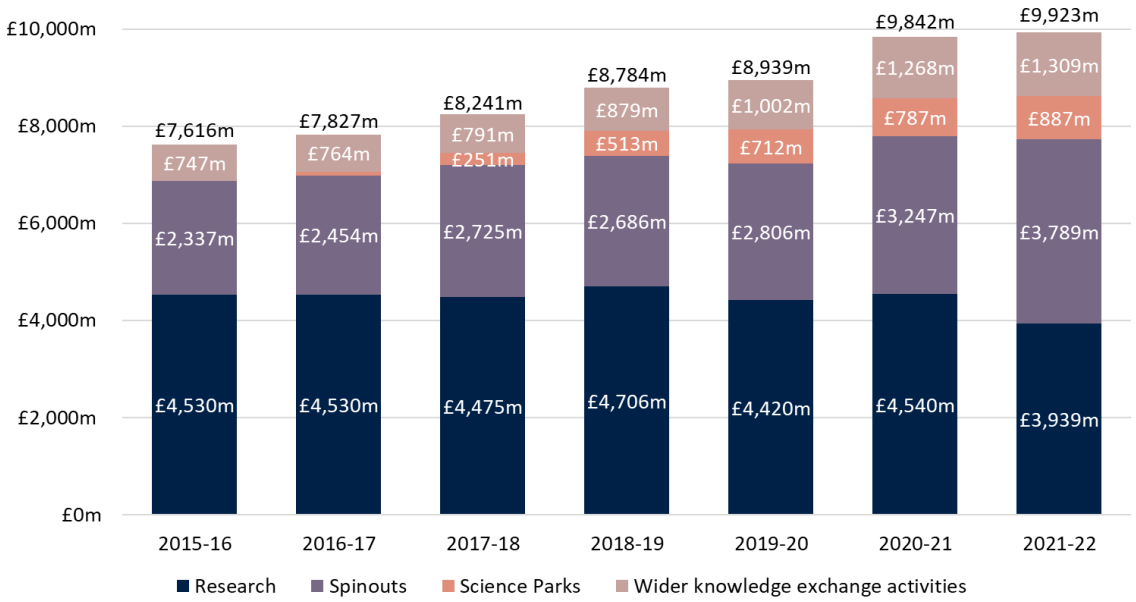
In addition to the above core estimates for the 2021-22 academic year, to examine changes in impacts over time, we applied a similar methodology to estimate the economic impact associated with the University of Oxford's research and knowledge exchange in the previous six academic years (2015-16 to 2020-21). The resulting estimates, all in (constant) 2021-22 prices[66], are presented in Figure 13 and Figure 14.

The total economic impact of the University of Oxford's research and knowledge exchange activities has grown steadily across the seven consecutive academic years. Looking across the whole period, there has been a **30%** increase in impact (in real terms) between 2015-16 and 2021-22, from approximately **£7.6 billion** to **£9.9 billion** (Figure 13). Within this overall change:

- The impact of companies based at the University's **Science Parks** has increased by far the most (in relative/percentage terms), from only approximately **£3 million** in 2015-16 to **£887 million** in 2021-22.
- The impact of the University's **spinout companies** has risen by **62%** since 2015-16 (from **£2.3 billion** to **£3.8 billion**). The majority of this increase has occurred since 2018-19.
- The impact of the University's **wider knowledge exchange activities**[67] has increased by **75%** over the period, from **£747 million** to **£1.3 billion**. This is driven by increases in the University's contract research activities as well as the wider health benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine.
- In contrast, there has been a reduction in the impact of the University's **research activities** (by approximately **13%**, from **£4.5 billion** in 2015-16 to **£3.9 billion** in 2021-22, driven by a change in the composition of the University's research income[68] and an increase in its income from contract research. As outlined in Section 2.1.2, the latter is deducted from the research impact element of the analysis to avoid double-counting, and is instead captured within the University's wider knowledge exchange activities (therefore contributing to the increase in the impact of these activities as shown in Figure 13).

[66] To uprate previous years' estimates to 2021-22 prices, we used quarterly Consumer Price Index (CPI) inflation data published by the Office for National Statistics (2024).
[67] Here, the impact of 'wider knowledge exchange activities' includes the health benefits associated with the University's development of the Covid-19 vaccine (see Section 2.2.4 for more detail).
[68] Between 2018-19 and 2021-22, there was a decline in the proportion of the University's total research income received from the UK Research Councils and UK charities. These income sources are subject to the higher assumed productivity spillover multiplier of 12.7 (mirroring the existing academic literature; see Section 2.1.4); therefore, changes in the distribution of research income away from these sources and towards other sources have resulted in a smaller *average* spillover impact associated with the University's research income, and therefore a lower total estimated impact of research here.

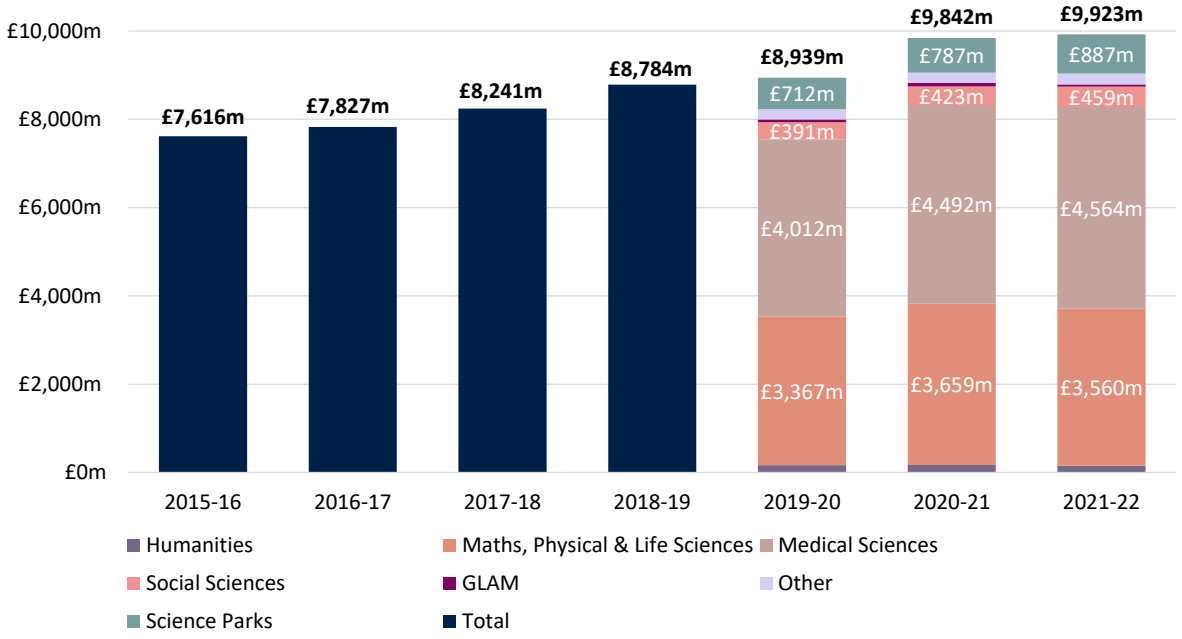
Figure 13 Total impact of the University of Oxford's research and knowledge exchange activities by type of activity between 2015-16 and 2021-22, £m



Note: All values are presented in 2021-22 prices, rounded to the nearest £1 million, and may not add up precisely to the totals indicated. Here, the impact of 'wider knowledge exchange activities' includes the health benefits associated with the University's development of the Covid-19 vaccine (see Section 2.2.4 for more detail).
Source: London Economics' analysis

For the final three years of analysis (2019-20 to 2021-22), it is also possible to provide a breakdown by academic division (see Figure 14). Throughout each of these three academic years, the **Medical Sciences** division accounted for the largest research and knowledge exchange impact (approximately **45%** of the total impact in each academic year, or **£4.6 billion** in 2021-22). The **Maths, Physical & Life Sciences** division is the second largest contributor, accounting for **36%** (**£3.6 billion**) of the total impact of the University in 2021-22, with the University's Science Parks contributing a further **9%** in 2021-22 (**£887 million**).

Figure 14 Total impact of the University of Oxford's research and knowledge exchange activities by academic division between 2015-16 and 2021-22, £m



Note: All values are presented in 2021-22 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 the University's teaching and learning activities

Box 3 Key findings: Teaching and learning

The analysis of the impact of the University's teaching and learning activities estimates the **enhanced employment and earnings benefits to graduates** and the additional **taxation receipts accrued by the Exchequer** associated with the **8,220 UK domiciled students** commencing a higher education qualification or stand-alone module at the University of Oxford in the 2021-22 academic year.

Incorporating both the benefits and costs to students/graduates, the analysis suggests that the **net graduate premium** achieved by a representative student in this cohort completing a full-time first degree at the University of Oxford (over their working life) stands at approximately **£77,000** on average (in 2021-22 money terms). Similarly, taking account of the benefits and costs to the public purse, the analysis indicates that the corresponding **net Exchequer benefit** associated with these students also stands at **£77,000**. At postgraduate level, the net (post)graduate premium for a representative student completing a full-time postgraduate taught degree at the University of Oxford stands at approximately **£27,000**, while the net Exchequer benefit stands at **£44,000**.

Combining information on the net graduate premiums and net Exchequer benefits (by gender, study mode, study level, domicile, and prior attainment, and adjusted for the subject mix of the cohort) with information on the number of UK domiciled students starting higher education qualifications at the University in 2021-22, the **aggregate economic impact generated by the University of Oxford's teaching and learning activities** associated with the 2021-22 cohort stood at approximately **£557 million**. This is split approximately equally between the University's students/graduates and the Exchequer, with **£254 million** (**46%**) of economic benefit accrued by students, and the remaining **£304 million** (**54%**) accrued by the public purse.

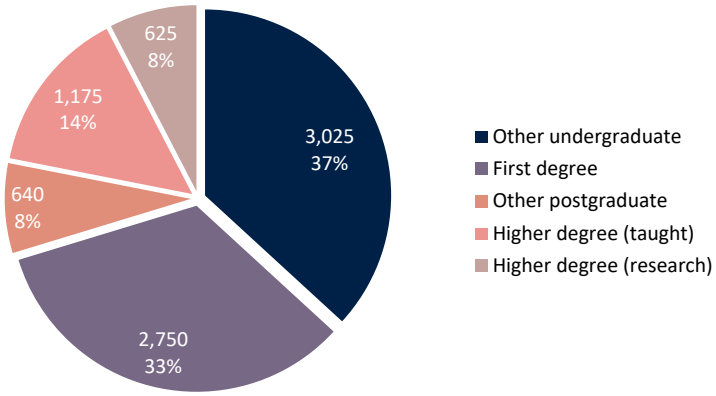
Teaching and learning constitute some of the University of Oxford's primary activities, providing major benefits to the UK economy by improving the labour market productivity of graduates. In this section of the report, we detail our estimates of the economic impact of the teaching and learning activities undertaken at the University of Oxford, 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 2021-22 cohort of UK domiciled students studying at the University of Oxford

The analysis of the economic impact of the teaching and learning activities of the University of Oxford is based on the **2021-22 cohort of UK domiciled students**. In other words, instead of the University's entire student body of **27,290** students in the 2021-22 academic year (*irrespective* of when these individuals may have started their studies), the analysis in this

section focuses on the **8,220** UK domiciled[69] students **starting higher education qualifications (or standalone modules/credits) in the 2021-22 academic year**[70].

Figure 15 UK domiciled students in the 2021-22 cohort of University of Oxford students, by level of study



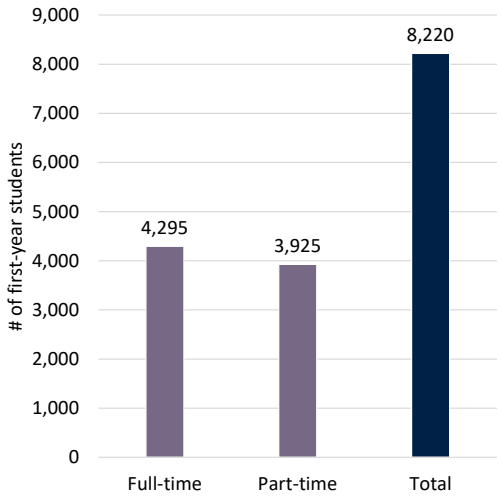
Note: All numbers are rounded to the nearest 5, and the total values may not add up due to this rounding. 'Other undergraduate' learning includes Certificates of Higher Education, Diplomas of Higher Education, other undergraduate-level diplomas, and undergraduate-level credits. 'Other postgraduate' learning includes Postgraduate Certificates in Education; diplomas or certificates at postgraduate level, other taught qualifications at postgraduate level, or taught work or advanced taught study for credit at postgraduate level.
Source: London Economics' analysis based on University of Oxford Higher Education Statistics Agency (HESA) data

In terms of **level of study** (Figure 15), approximately **33%** (**2,750**) of students in this cohort of UK domiciled students were undertaking **first degrees**, with a further **1,175** students (**14%**) undertaking **postgraduate taught degrees**, and **625** students (**8%**) enrolled in **postgraduate research degrees**. An additional **3,025** (**37%**) students were undertaking **other undergraduate qualifications**[71], while the remaining **640** (**8%**) students were enrolled in **other postgraduate qualifications**[72].

In relation to **mode of study** (Figure 16), **4,295** (**52%**) students in the cohort were undertaking their studies with the University of Oxford on a full-time basis, while the remaining **3,925** (**48%**) were enrolled on a part-time basis. As shown in Table 7, most full-time students were undertaking first degrees (**64%** of full-time students), while part-time students in the cohort were predominantly enrolled in other undergraduate qualifications (**77%** of part-time students).

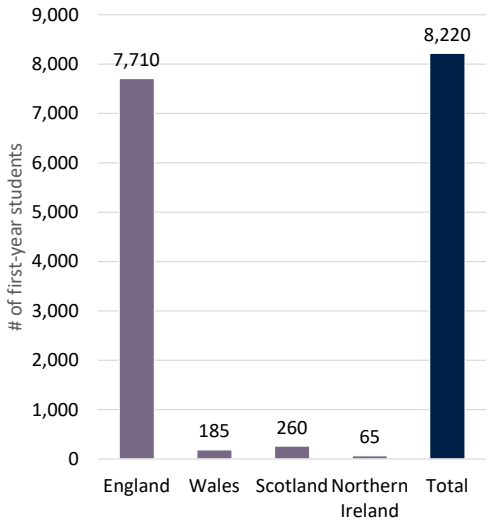
[69] A proportion of EU and non-EU domiciled students undertaking their studies at the University of Oxford will remain in the UK to work following completion of their studies; similarly, a proportion of UK domiciled students will leave the UK to pursue their careers in other countries. Given the uncertainty 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, for the purposes of this analysis, 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 the University of Oxford.
[70] We received HESA data on a total of 12,760 first-year students in 2021-22 from the University of Oxford. Of these, we excluded 20 students who did not have a stated gender, 5 students with an unknown age at enrolment, and 4,520 non-UK domiciled students (who are instead considered as part of the analysis of educational exports (see Section 4)). Figures may not add up precisely due to rounding.
[71] 'Other undergraduate' learning includes Certificates of Higher Education, Diplomas of Higher Education, other undergraduate-level diplomas, and undergraduate-level credits.
[72] 'Other postgraduate' learning includes Postgraduate Certificates in Education; diplomas or certificates at postgraduate level, other taught qualifications at postgraduate level, or taught work or advanced taught study for credit at postgraduate level.

Figure 16 UK domiciled students in the 2021-22 cohort of University of Oxford 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 University of Oxford HESA data

Figure 17 UK domiciled students in the 2021-22 cohort of University of Oxford 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 University of Oxford HESA data

In terms of **domicile** (Figure 17), the vast majority of students (**7,710**, **94%**) in the cohort were domiciled in England. A further **260** (**3%**) students were domiciled in Scotland, and the remainder were domiciled in Wales (**185**, **2%**) and Northern Ireland (**65**, **1%**).

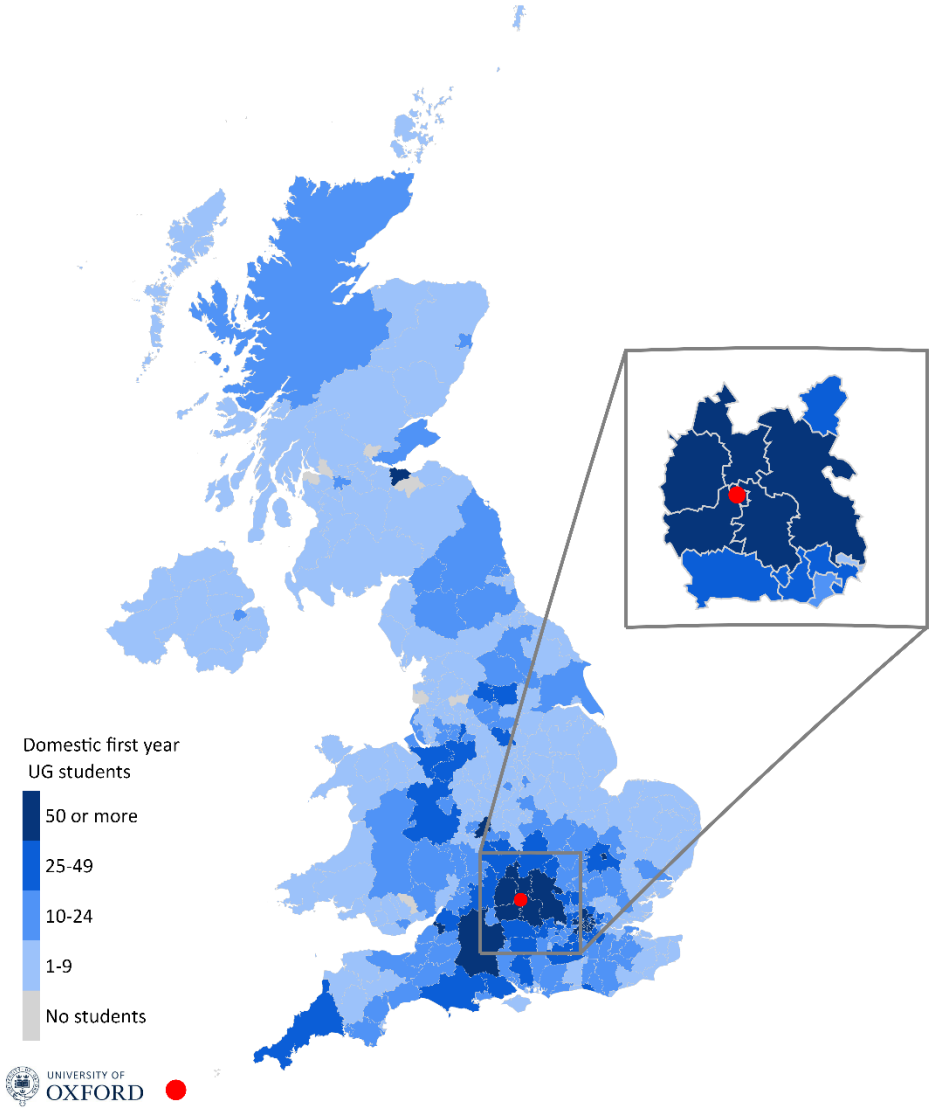
Table 7 UK domiciled students in the 2021-22 cohort of University of Oxford students, by level of study, mode, and domicile

Level and mode of study	Domicile				
	England	Wales	Scotland	Northern Ireland	Total
Full-time					
Other undergraduate	10	0	0	0	**10**
First degree	2,610	65	55	20	**2,750**
Other postgraduate	150	10	5	10	**175**
Higher degree (taught)	735	20	25	5	**785**
Higher degree (research)	540	15	20	5	**575**
Total	**4,045**	**110**	**105**	**35**	**4,295**
Part-time					
Other undergraduate	2,785	60	140	30	**3,015**
First degree	0	0	0	0	**0**
Other postgraduate	450	10	5	0	**470**
Higher degree (taught)	380	5	5	0	**390**
Higher degree (research)	45	0	0	0	**45**
Total	**3,665**	**75**	**150**	**35**	**3,925**
Total					
Other undergraduate	2,800	60	140	30	**3,025**
First degree	2,615	65	55	20	**2,750**
Other postgraduate	605	20	10	10	**640**
Higher degree (taught)	1,115	25	30	5	**1,175**
Higher degree (research)	580	15	20	5	**625**
Total	**7,710**	**185**	**260**	**65**	**8,220**

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, Diplomas of Higher Education, other undergraduate-level diplomas, and undergraduate-level credits. 'Other postgraduate' learning includes Postgraduate Certificates in Education; diplomas or certificates at postgraduate level, other taught qualifications at postgraduate level, or taught work or advanced taught study for credit at postgraduate level. ***Source: London Economics' analysis based on University of Oxford HESA data***

Figure 18 presents the distribution of the University of Oxford's 2021-22 cohort of UK domiciled undergraduate student starters by domicile at the Local Authority level. The map illustrates the University's wide appeal to students from across the whole of the UK. Among UK domiciled first-year undergraduate students studying at the University in 2021-22, **26%** (**1,530**) came from the South East, including **9%** (**550**) from the Local Authorities immediately surrounding the University (i.e. Oxford, West Oxfordshire, South Oxfordshire, Cherwell, and Vale of White Horse). In addition, **25%** (**1,435**) of students were domiciled in London, while **10%** (**590**) were from the South East, **8%** (**490**) were from the East of England, **7%** (**390**) were from the South East, and **6%** (**355**) were domiciled in the North West.

Figure 18 UK domiciled first-year undergraduate students in the 2021-22 cohort of University of Oxford students, by Local Authority of domicile



Note: We received HESA data on 5,835 UK domiciled first-year undergraduate students from the University of Oxford. We excluded students from Guernsey, Jersey, and the Isle of Man, or those with an unspecified domicile (total of 50 students).
Source: London Economics' analysis based on data from the University of Oxford and the Office for National Statistics. Contains National Statistics, OS, Royal Mail, Gridlink, ONS, NISRA, NRS, and Ordnance Survey data © Crown copyright and database right 2024.

3.2 Methodological approach

The analysis of the impact of the University's teaching and learning captures the enhanced labour market benefits and taxation receipts (minus the costs of attendance/provision) associated with students in the above cohort completing qualifications at the University of Oxford. Specifically, the fundamental objective of the analysis is to estimate the **gross and net graduate premium** to the individual and the **gross and net public purse benefit** to the

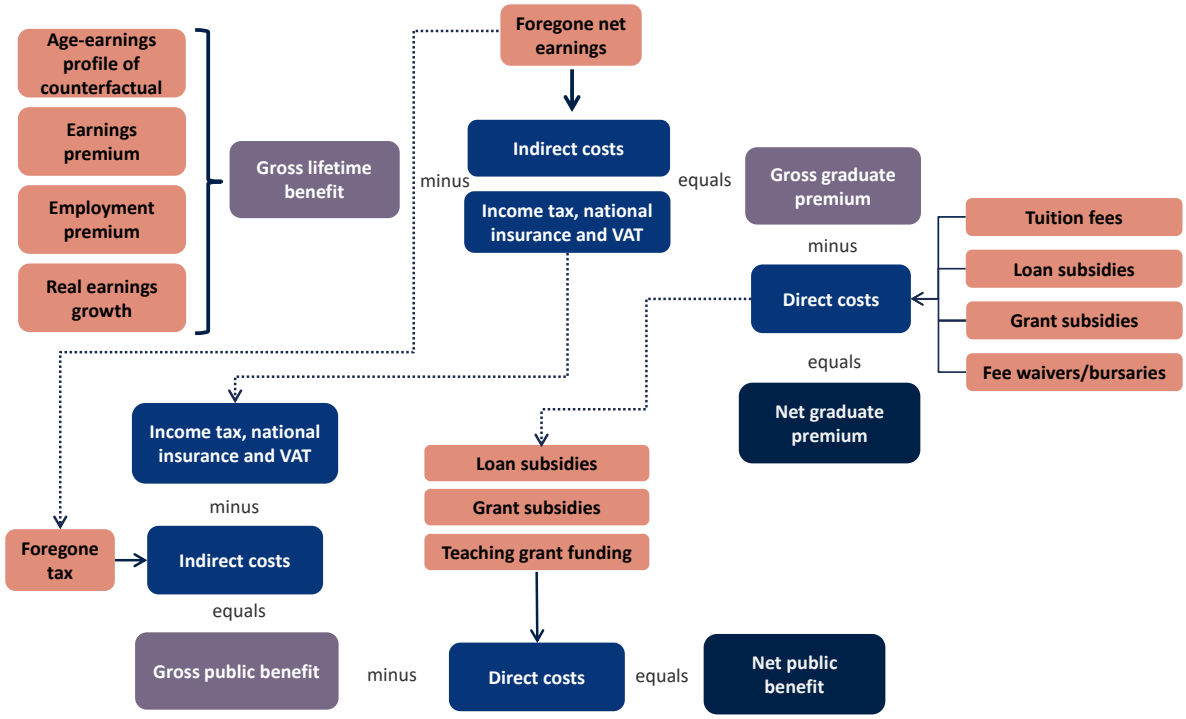
Exchequer associated with higher education qualification attainment, defined as follows (and presented in Figure 19)[73]:

- 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 any foregone tax revenues 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.

The analysis examines the benefits of the above-described single cohort of students (i.e. the cohort of the 2021-22 starters) across their lifetimes in present value terms (i.e. in today's money). A detailed methodology is presented in Annex A2.3.

[73] See Annex A2.3 for a detailed description of the methodology used to estimate the impact of the University's teaching and learning activities.

Figure 19 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)

3.3 Estimated impact of the University's teaching and learning activities

3.3.1 Estimated net graduate premium and net Exchequer benefit per student

Table 8 presents the estimated average net graduate premiums and net Exchequer benefits achieved by UK domiciled students starting qualifications at the University of Oxford in the 2021-22 academic year (by study mode, on average across men and women, and on average across students from all domiciles)[74].

The net graduate premium for a representative full-time first degree student stands at £77,000.

The analysis indicates that the estimated **net graduate premium** achieved by a representative[75] student in the 2021-22 cohort completing a **full-time first degree** at the University of Oxford (with 2 or more A Levels as their highest level of prior attainment) is approximately **£77,000** in 2021-22 money terms[76]. At postgraduate level, the net (post)graduate premium for a representative[77] student completing a full-time

[74] The full set of net graduate premiums and net Exchequer benefits (for all study levels, study modes, and prior attainment levels, and separately by gender) is presented in Annex A2.3.8.
[75] The analysis is based on an average age at graduation of 21 for students undertaking full-time first degrees at the University of Oxford in the 2021-22 cohort (also see Annex A2.3.5 for further information).
[76] i.e. in net present values in 2021-22 prices.
[77] This is based on an average age at graduation in the 2021-22 cohort of 25 for full-time higher degree (taught) students and 30 for full-time higher degree (research) students.

postgraduate taught or **postgraduate research degree** at the University of Oxford (relative to a first degree) stands at approximately **£27,000** and **£58,000**, respectively.

The net Exchequer benefit associated with a representative full-time first degree student also stands at £77,000.

The public purse also benefits significantly from students' higher education qualification attainment. The **net Exchequer benefit** for a representative **full-time first degree student** (again with 2 or more A Levels as their highest level of prior attainment) stands at approximately **£77,000** – thus mirroring the above-discussed net graduate premium (i.e. the net benefits from these qualifications are shared roughly equally between students/graduates and the public purse). The corresponding net Exchequer benefits for representative students completing a full-time **postgraduate taught** or **postgraduate research degree** (relative to a first degree) were estimated at approximately **£44,000** and **£119,000**, respectively[78].

There are also large net benefits (to both students/graduates and the Exchequer) associated with **part-time** qualification attainment at the University of Oxford. For instance, for a representative part-time student in the cohort completing a **postgraduate taught degree**, the estimated **net graduate premium** stands at approximately **£32,000** (compared to **£27,000** for full-time students), and the estimate for part-time **postgraduate research degrees** stands at **£51,000** (vs. **£58,000** for full-time students). The fact that part-time students tend to complete their studies much later in life[79] (and, therefore, spend fewer years in the labour market post-graduation) results in a relative reduction in the net graduate premiums for part-time students compared to full-time students. However, we assume 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 during their studies. Depending on which of these effects dominates, the net graduate premiums for part-time students can be lower or higher than the net graduate premiums achieved by full-time students. The corresponding **net Exchequer benefits** for a representative part-time student undertaking a **postgraduate taught** or **postgraduate research degree** stand at approximately **£37,000** and **£83,000** (respectively).

[78] Compared to corresponding net graduate premium for full-time postgraduate research degree students (**£58,000**), the much higher net Exchequer benefit (**£119,000**) predominantly reflects the relatively limited direct Exchequer costs (in terms of public funding) and low indirect costs (in terms of foregone taxation during study) associated with these qualifications.
[79] Again, see Annex A2.3.5 for more information.

Table 8 Net graduate premium and net Exchequer benefit per UK domiciled student at the University of Oxford, 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]	£18,000	£9,000	£20,000	£6,000
First degree[1]	£77,000	-	£77,000	-
Other postgraduate[2]	£19,000	£21,000	£34,000	£22,000
Higher degree (taught)[2]	£27,000	£32,000	£44,000	£37,000
Higher degree (research)[2]	£58,000	£51,000	£119,000	£83,000

Note: All estimates constitute weighted averages across men and women (weighted by the estimated number of student completers in the 2021-22 cohort) and are presented in 2021-22 prices, discounted to net present values, and rounded to the nearest £1,000.
We assume that the gross graduate premium / Exchequer benefit associated with any HE qualification attainment can never be negative – i.e. students will never incur a wage/employment penalty from achieving additional qualifications. In instances where this would be the case, we instead assume a £0 gross graduate premium / Exchequer benefit (while the costs of qualification attainment would still be incurred). Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (with 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 2 or more GCEE A Levels (see Annex A2.3.3 for further detail).
[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

3.3.2 Total impact of teaching and learning activities at the University of Oxford

Combining the information on the number of UK domiciled students in the 2021-22 University of Oxford cohort (see Section 3.1), expected completion rates, and the net graduate and public purse benefits associated with the different qualification levels (relative to students' specific prior attainment), the **aggregate economic benefit of the University of Oxford's teaching and learning activities** associated with the 2021-22 cohort was estimated at approximately **£557 million** (see Table 9).

The total economic impact of teaching and learning generated by the 2021-22 cohort of University of Oxford students stood at £557 million.

This total is split roughly evenly between the Exchequer and students, with **£304 million** (**54%**) of economic benefit accrued by the Exchequer, and the remaining **£254 million** (**46%**) accrued by students. In terms of the breakdown by study level, **75%** (**£417 million**) of the estimated economic impact is generated by the University's undergraduate students, with the remaining **25%** (**£141 million**) generated by its postgraduate students. In terms of domicile, mirroring the distribution of students in the cohort, **94%** (**£527 million**) of the estimated economic impact is associated with students from England, while the remaining **6%** (**£31 million**) is generated by students coming to Oxford from elsewhere in the UK.

Table 9 Aggregate impact of the University of Oxford's teaching and learning activities associated with the 2021-22 cohort (£m), by type of impact, domicile, and level of study

Beneficiary and study level	Domicile				
	England	Wales	Scotland	Northern Ireland	Total
Students	**£240m**	**£6m**	**£6m**	**£2m**	**£254m**
Undergraduate	£201m	£5m	£4m	£1m	**£211m**
Postgraduate	£39m	£1m	£2m	£0m	**£42m**
Exchequer	**£287m**	**£7m**	**£7m**	**£2m**	**£304m**
Undergraduate	£195m	£5m	£4m	£1m	**£205m**
Postgraduate	£91m	£3m	£3m	£1m	**£98m**
Total	**£527m**	**£13m**	**£13m**	**£4m**	**£557m**
Undergraduate	£396m	£9m	£8m	£3m	**£417m**
Postgraduate	£131m	£4m	£5m	£1m	**£141m**

Note: All estimates are presented in 2021-22 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

3.4 Analysis of earnings and employment outcomes of the University of Oxford's graduates

In addition to the above analysis of the economic impact of the University's teaching and learning activities, we analysed the Longitudinal Education Outcomes (LEO) dataset to examine the labour market outcomes of the University of Oxford's graduates.

3.4.1 Underlying data from the Longitudinal Education Outcomes (LEO) dataset

The LEO dataset is a matched individual-level dataset produced by the Department for Education, combining information from multiple educational data sources with information on earnings and employment outcomes[80]. The data provides disaggregated information on graduates' post-graduation outcomes by tax year, qualification level, subject area of study, gender, and higher education provider, separately for graduates 1, 3, and 5 years after graduating[81].

For this analysis, we used data from the Department for Education (2023b), covering the outcomes of three different graduating cohorts in the tax year 2020-21. These graduating cohorts include the 2018-19 graduating cohort (at 1 year after graduation), the 2016-17 cohort (at 3 years after graduation), and the 2014-15 cohort (at 5 years after graduation).

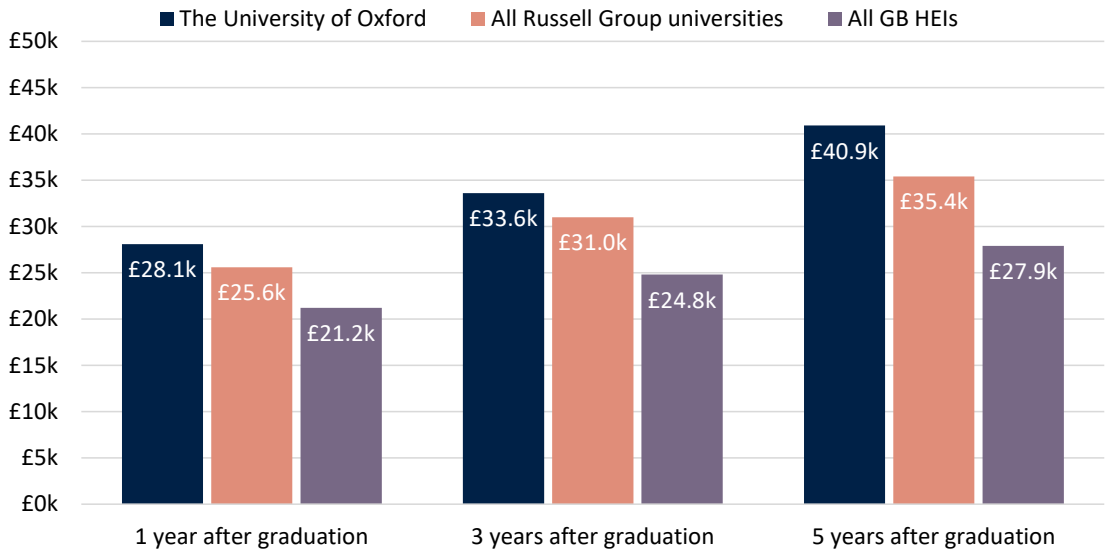
[80] These sources combine data on school (National Pupil Database, NPD), further education (Individualised Learner Record, ILR), and higher education (HESA) participation and attainment with information on earnings, employment, and benefits records from administrative data sources (HM Revenue and Customs P14, P45 and self-assessment data (covering both employees and self-employed individuals), and the National Benefits Database from the Department for Work and Pensions).
[81] Note that institutions from Northern Ireland are not covered by the LEO data and are therefore excluded from this analysis. Additionally, to avoid distortion by very small providers, those with fewer than 100 graduates have been excluded from rankings and averages across higher education institutions.

Importantly, and unlike the analysis presented elsewhere in this section, this analysis of the LEO data does *not* control for graduate characteristics (e.g. subject composition), nor does it account for any counterfactual (i.e. a graduate's potential earnings if they had not undertaken a given qualification).

3.4.2 Earnings outcomes of the University of Oxford's graduates

Figure 20 presents the weighted median earnings of UK domiciled first degree graduates of the University of Oxford, compared to the corresponding values for graduates at all Russell Group universities and all higher education institutions located in Great Britain (GB HEIs)[82], by year post-graduation. Across the three graduating cohorts, the University of Oxford consistently places among the **top 10** of all HEIs in Great Britain in terms of median graduate earnings.[83] For example, in the 2020-21 tax year, the observed median earnings 5 years after graduation are **£40,900** for University of Oxford graduates, compared to only **£27,900** for graduates from all GB HEIs and **£35,400** for all Russell Group universities combined. This places the University of Oxford fifth out of all GB HEIs, and fourth among Russell Group universities in terms of median earnings 5 years post-graduation.

Figure 20 Weighted median earnings of UK domiciled first degree graduates of the University of Oxford vs. all Russell Group institutions and all GB HEIs



Note: Based on the 2014-15, 2016-17, and 2018-19 graduating cohorts. All estimates are for the 2020-21 tax year, and presented in 2020-21 prices

Source: London Economics' analysis using Longitudinal Education Outcomes data (Department for Education, 2023b)

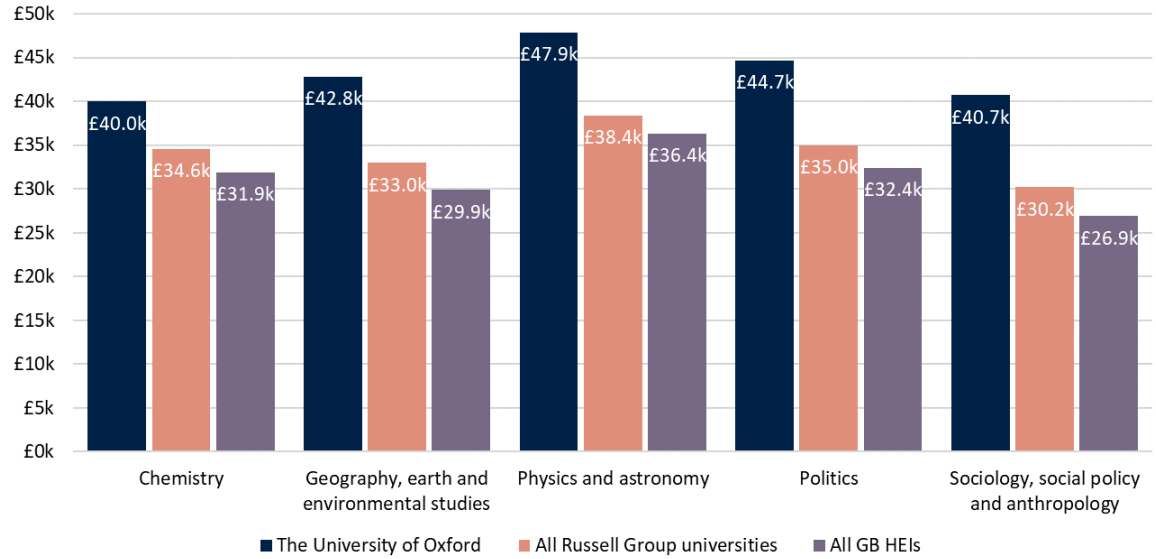
In terms of earnings by subject studied, Figure 21 shows selected subject groupings for which graduating from the University of Oxford resulted in particularly strong median earnings for the cohort 5 years post-graduation. For example, the University of Oxford was

[82] Again, note that institutions in Northern Ireland are excluded from the LEO data. The data here also excludes further education colleges and alternative providers.

[83] As above, note that the figures provided do not control for graduate characteristics (most notably, subject of study), so differences across HEIs are likely to be partially driven by those characteristics.

the **top-ranked GB HEI** with regards to median earnings 5 years after graduation for those studying **Geography, Earth and Environmental Studies** and **Sociology, Social Policy and Anthropology**. Median earnings 5 years after graduation in relation to these subject groupings were **£42,800** and **£40,700** respectively, which are both substantially greater than the weighted median earnings seen across Russell Group institutions for these subject groupings (**£33,000** and **£30,200**).

Figure 21 Weighted median earnings of UK domiciled first degree graduates of the University of Oxford vs. all Russell Group institutions and all GB HEIs, 5 years after graduation for selected subject groupings



Note: Based on the 2014-15 graduating cohort. All estimates are for the 2020-21 tax year, and presented in 2020-21 prices
Source: London Economics' analysis using Longitudinal Education Outcomes data (Department for Education, 2023b)

Using artificial intelligence to tackle global challenges

Researchers at the University of Oxford are harnessing the power of artificial intelligence (AI) to tackle some of society's greatest challenges. Below are three examples of applications of AI undertaken at the University.

Identifying Risk of Heart Attack

© Alamosa County Public Health

The Antoniades Group at the Radcliffe Department of Medicine has developed technology to identify people at high risk of heart attacks up to ten years before they strike.[84] The group has used machine learning to develop a new biomarker called the fat radiomic profile (FRP). The biomarker detects biological red flags in the 'perivascular space', which relates to the lining blood vessels which supply blood to the heart. The technology can assess a greater number of predictors of a future heart attack compared to current clinical tools, such as scarring, inflammation and other changes to blood vessels, and trials also found that the biomarker is superior to the standard care.[85] Further, as more heart scans are added, the technology will learn more about the predictors of heart attacks and accuracy will increase further.

Detecting Floods from Space

Oxford researchers, in collaboration with the European Space Agency, have pioneered a new AI technology to pilot the detection of flood events from space. Based at the Department of Engineering Science and Computer Science, the team developed a machine learning model called 'Worldfloods'. The technology is a flood segmentation model with the purpose of detecting flood events and significantly improving disaster response operations.

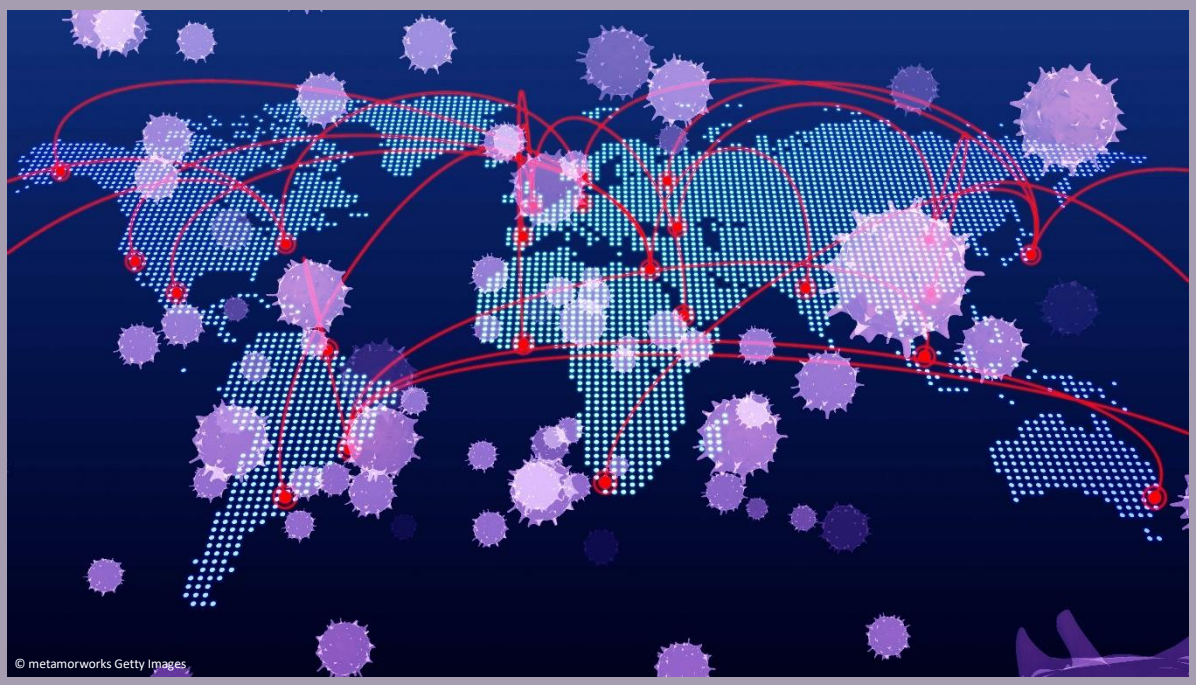

© Melissa Leake, US Coast Guard

Worldfloods is specifically designed for deployment on low-cost satellites in Low Earth Orbit[86], so it is hoped that it could therefore become a low-cost flood detection technology which is particularly beneficial to developing countries. The team at Oxford has been working with leaders in commercial AI such as Google Cloud and Intel, as well as with UNICEF on the humanitarian aspects of the project.

[84] https://oxford.shorthandstories.com/ai-how-is-it-being-used-at-oxford/index.html
[85] https://www.rdm.ox.ac.uk/news/new-ai-technology-for-advanced-heart-attack-predictions
[86] https://eng.ox.ac.uk/news/artificial-intelligence-to-detect-floods-launches-into-space/

Prediction of Viral Outbreaks

A team of researchers from the University of Oxford's Department of Computer Science have developed a tool that could help predict new viral variants before they emerge, using a model called EVEscape. The model combines a deep learning model of evolutionary viral sequences with detailed biological and structural information about the virus. It works by predicting the likelihood that a viral mutation will enable it to escape immune responses, such as by preventing antibodies from binding, allowing the technology to make predictions about the variants most likely to occur as the virus evolves.[87] Solely using information available at the start of an outbreak, this approach could facilitate more effective preventative action, and the design of vaccines which targets new viral variants before they become prevalent.



[87] https://www.ox.ac.uk/news/2023-10-19-new-ai-tool-could-help-predict-viral-outbreaks

4 The impact of the University of Oxford's educational exports

Box 4 Key findings: Educational exports

There were a total of **4,520** non-UK domiciled students who started higher education qualifications at the University of Oxford in the 2021-22 academic year. Of these students, **870** (**19%**) were EU domiciled, and **3,650** (**81%**) were from non-EU jurisdictions.

The economic impact of the University of Oxford's contribution to educational exports is based on the **direct injection of tuition fee and non-tuition fee income from these international students**. As with the University's research and knowledge exchange activities, this income generates **indirect and induced impacts** throughout the UK economy, through supply chain and wage income effects.

Combining the estimated tuition fee income (net of the University of Oxford's cost of fee waivers and bursaries for international students) and non-tuition fee income associated with international students in the 2021-22 University of Oxford cohort, the **total export income** (**i.e. direct impact**) generated by this cohort stood at **£331 million**. Over half of this income (**£193 million**) was generated from international students' (net) tuition fee expenditure accrued by the University, while the remaining **£137 million** was generated from these students' non-tuition fee expenditure.

Applying relevant economic multipliers, the **total direct, indirect, and induced economic impact** of these educational exports was estimated to be **£926 million**. Of this total, **£553 million** was associated with international students' (net) tuition fees, and **£373 million** was associated with their non-tuition fee expenditures over the duration of their studies at the University of Oxford.

With the United Kingdom, and the University of Oxford in particular, 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 the University.** Specifically, we analyse overseas income in the form of **tuition fee spending** (net of any fee waivers and other bursaries provided by the University) and **non-tuition fee (off-campus) expenditures** by international (EU and non-EU domiciled) students in the 2021-22 cohort of University of Oxford students, over the entire course of their studies[88]. The analysis estimates the **direct, indirect, and induced economic impacts** associated with this export income, defined as follows:

[88] Note that other types of export income accrued directly by the University of Oxford (such as research income from international sources, or any other income received from non-UK sources) are accounted for in our analysis of the impact of the University's research activity (Section 2.1) and the impact of the expenditures of the University (Section 5), and are thus excluded from the analysis of exports to avoid double-counting.

- **Direct effect:** This is captured by the level of (net) fee income (accrued by the University of Oxford itself) and non-fee income (accrued by other organisations providing goods and services to international students) associated with non-UK students in the 2021-22 cohort.
- **Indirect effect ('supply chain impacts'):** The University 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 the University of Oxford (supported by its tuition fee income) and of companies providing goods and services to the University'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 further 'ripple effect' throughout the economy as a whole[89].

The analysis here follows a similar methodology to the one used to estimate the direct, indirect, and induced economic effects associated with the University's research and knowledge exchange activities (see Section 2), operational and capital expenditures (see Section 5), and tourism impact (see Section 6).

4.1 The 2021-22 cohort of international University of Oxford students

Figure 22, Figure 23, and Figure 24 present information on the number of non-UK domiciled students in the 2021-22 cohort of University of Oxford students (by domicile, mode of study, and level of study, respectively).

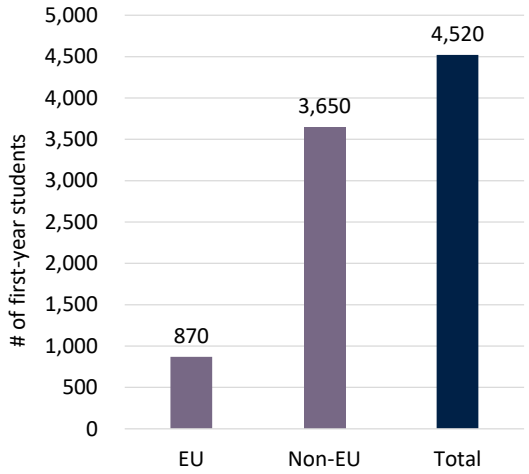
In terms of domicile (Figure 22), of the total of **4,520** international students starting higher education qualifications at the University of Oxford in 2021-2022, **870** (**19%**) were domiciled within the European Union, while **3,650** (**81%**) were from non-EU countries. Figure 25 presents more detailed information on the country of domicile of international students in the 2021-22 cohort.

In terms of study mode (Figure 23), **3,725** international students in the cohort (**82%**) were undertaking their qualifications on a full-time basis, with the remaining **795** (**18%**) studying on a part-time basis. In terms of study level (Figure 24), in contrast to UK domiciled students (see Section 3.1), the majority of non-UK domiciled students in the cohort were undertaking postgraduate qualifications (**3,715, 82%**), including **2,445** students (**54%**) enrolled in postgraduate taught degrees, **955** (**21%**) undertaking postgraduate research degrees, and

[89] 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 the University of Oxford). The economic impact associated with UK students' tuition fee expenditures is instead (implicitly) included in the estimated direct, indirect, and induced impacts associated with the University of Oxford's own expenditures (Section 5).

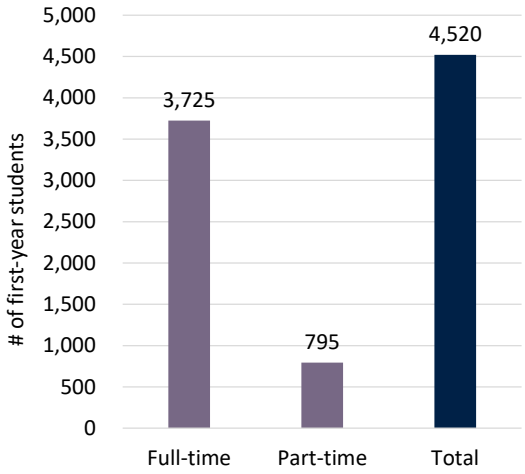
315 (**7%**) undertaking other postgraduate qualifications. At undergraduate level, there were **640** (**14%**) students undertaking first degrees, while the remaining **165** (**4%**) students were enrolled in other undergraduate learning[90].

Figure 22 Non-UK domiciled students in the 2021-22 cohort of University of Oxford students, by domicile



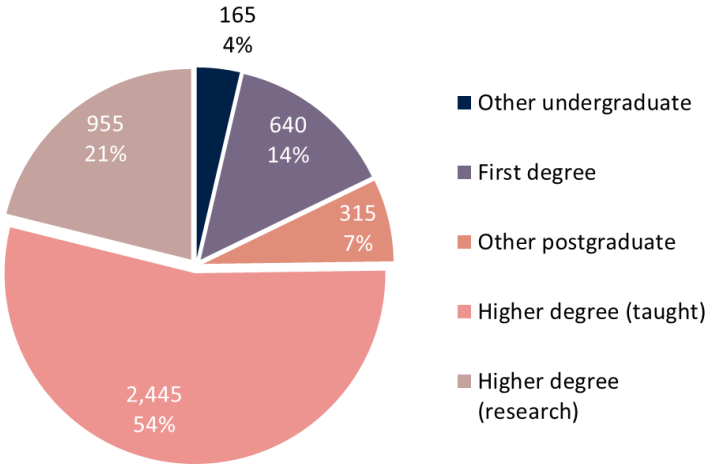
Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding.
Source: London Economics' analysis based on University of Oxford HESA data.

Figure 23 Non-UK domiciled students in the 2021-22 cohort of University of Oxford 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 University of Oxford HESA data.

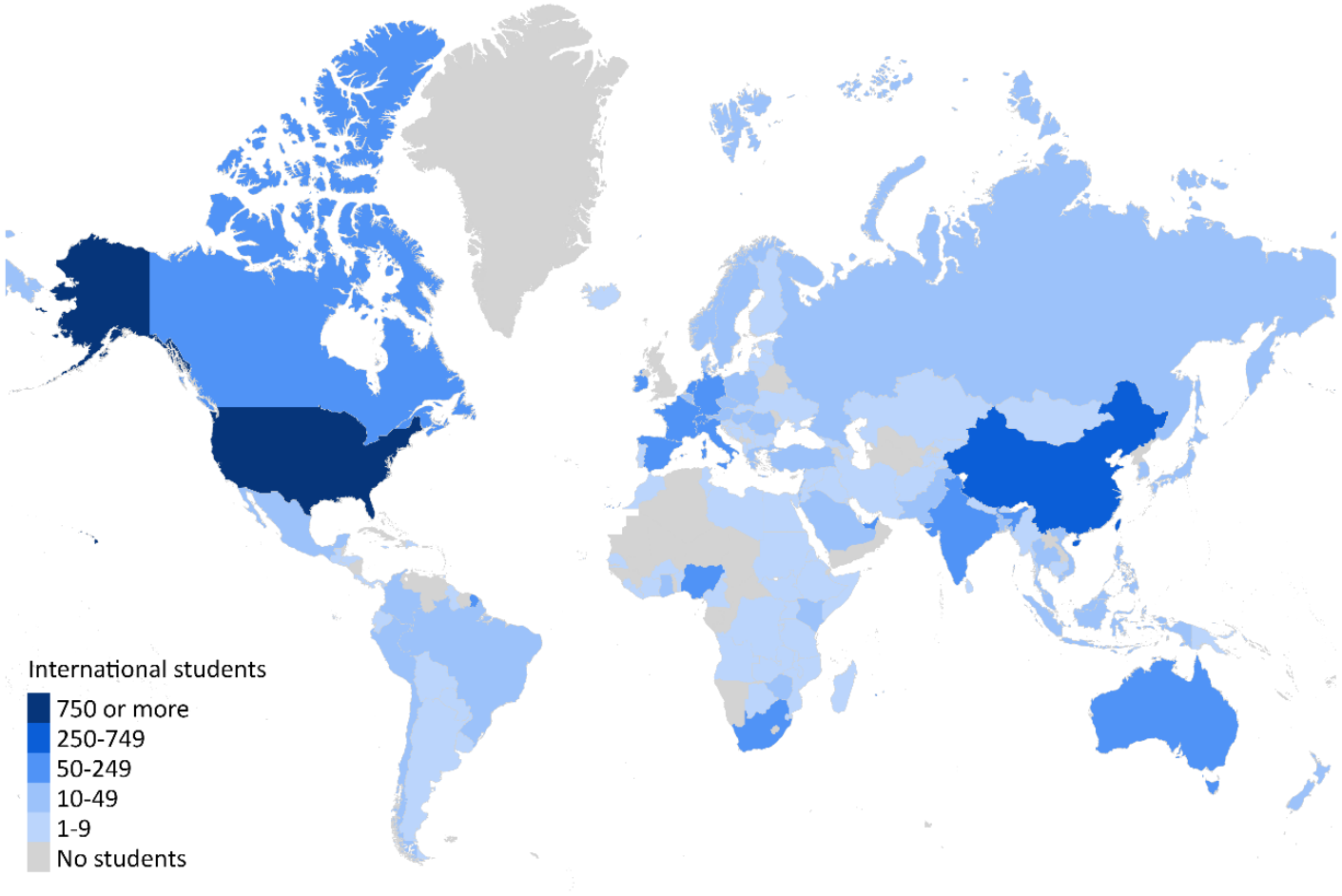
Figure 24 Non-UK domiciled students in the 2021-22 cohort of University of Oxford students, by level of study



Note: All numbers are rounded to the nearest 5, and the total values may not add up precisely due to this rounding.
'Other undergraduate' learning includes Certificates of Higher Education, Diplomas of Higher Education, other undergraduate-level diplomas, and undergraduate-level credits. 'Other postgraduate' learning includes Postgraduate Certificates in Education; diplomas or certificates at postgraduate level, other taught qualifications at postgraduate level, or taught work or advanced taught study for credit at postgraduate level. ***Source: London Economics' analysis based on University of Oxford HESA data.***

[90] For more detailed information on the University of Oxford's 2021-22 cohort of non-UK domiciled students, please refer to Annex A2.4.2.

Figure 25 Non-UK domiciled students in the 2021-22 cohort of University of Oxford students, by country of domicile



Note: Based on data provided by the University of Oxford on **4,475** first year overseas domiciled students from the University of Oxford in 2021-22. Of these students, **35** were excluded as they could not be matched to a country within the World Bank data.

Source: London Economics' analysis based on University of Oxford and World Bank data.

4.2 Direct impact

4.2.1 Methodology

Net tuition fee income

To assess the level of ***gross* tuition fee income** associated with international students in the 2021-22 cohort, we made use of data on the average tuition fees per student charged by the University of Oxford in the 2021-22 academic year (by study level, mode, and domicile[91]). Assuming the same average study durations as in the analysis of the impact of the University of Oxford's teaching and learning activities provided to UK-domiciled students (see Annex A2.3), we calculated the resulting tuition fee income per international student in the cohort from the start of a student's learning aim until completion. Expressing the total fee income until completion in 2021-22 prices and using the HM Treasury Green Book real discount rate of 3.5% (see HM Treasury, 2022), 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 any **fee waivers and bursaries** paid to international students by the University of Oxford[92]. These costs were again calculated over students' total study duration and estimated in present value terms[93]. These estimates per student were combined with information on the number of non-UK students in the 2021-22 cohort, and the same assumptions on completion rates as for UK domiciled students (used as part of the analysis of the impact of teaching and learning (see Annex A2.3.1)[94].

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 the University of Oxford. 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.);

[91] As in the analysis of the University of Oxford's teaching and learning activities (see Annex A2.3), we made use of information provided by the University of Oxford on the average tuition fees charged per *full-time* student at the University in the 2021-22 academic year, separately by domicile 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 arrive at the net fees per *part-time* student (ensuring that the fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2021-22 cohort), we adjusted the respective full-time rates for the average study intensity amongst part-time students in the cohort.
This approach was used to derive the estimated tuition fees per non-EU student (by study level and mode); as outlined in further detail in Annex A2.4.1, following the UK's exit from the European Union, we assume that all EU students in the 2021-22 cohort were charged the same tuition fees as non-EU students (as EU students were generally no longer eligible for 'home' fee status). As a result, we apply the average non-EU fee rates to both non-EU *and* EU students (i.e. we assume the same fees per student per year for EU students as for non-EU students).
[92] See Annex A2.3.7 for more information on our assumptions in relation to fee waivers and bursaries.
[93] For information on the estimated levels of net fee income per student, please refer to Annex A2.4.3.
[94] For more information on the impact of Brexit on fees and funding for EU students, please refer to Annex A2.4.1.

- **Facilitation costs** (e.g. course-related travel costs); and
- **Spending on children** (including childcare that is not related to students' course participation).

To analyse the level of non-tuition fee expenditure associated with the 2021-22 cohort of international students studying at the University of Oxford, we used estimates from the **2021-22 Student Income and Expenditure Survey** (SIES)[95]. 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 SIES estimates:

- We excluded estimates of **tuition fee expenditure** (to avoid double-counting with the net tuition fee income analysis presented in this section).
- We deducted any **on-campus expenditure** that students might incur (to avoid double-counting with the analysis of the impacts of the expenditure of the University of Oxford itself as well as its colleges (see Section 5))[96].
- 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 estimates for the longer **average stay durations** in the UK of non-EU students compared to EU students[97].

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 2021-22 prices, by level of study, mode, and domicile[98]. Again, the estimated non-tuition fee income per student was combined with the number of international students in the 2021-22 cohort expected to complete qualifications (or credits/modules) at the University of Oxford.

4.2.2 Total direct impact

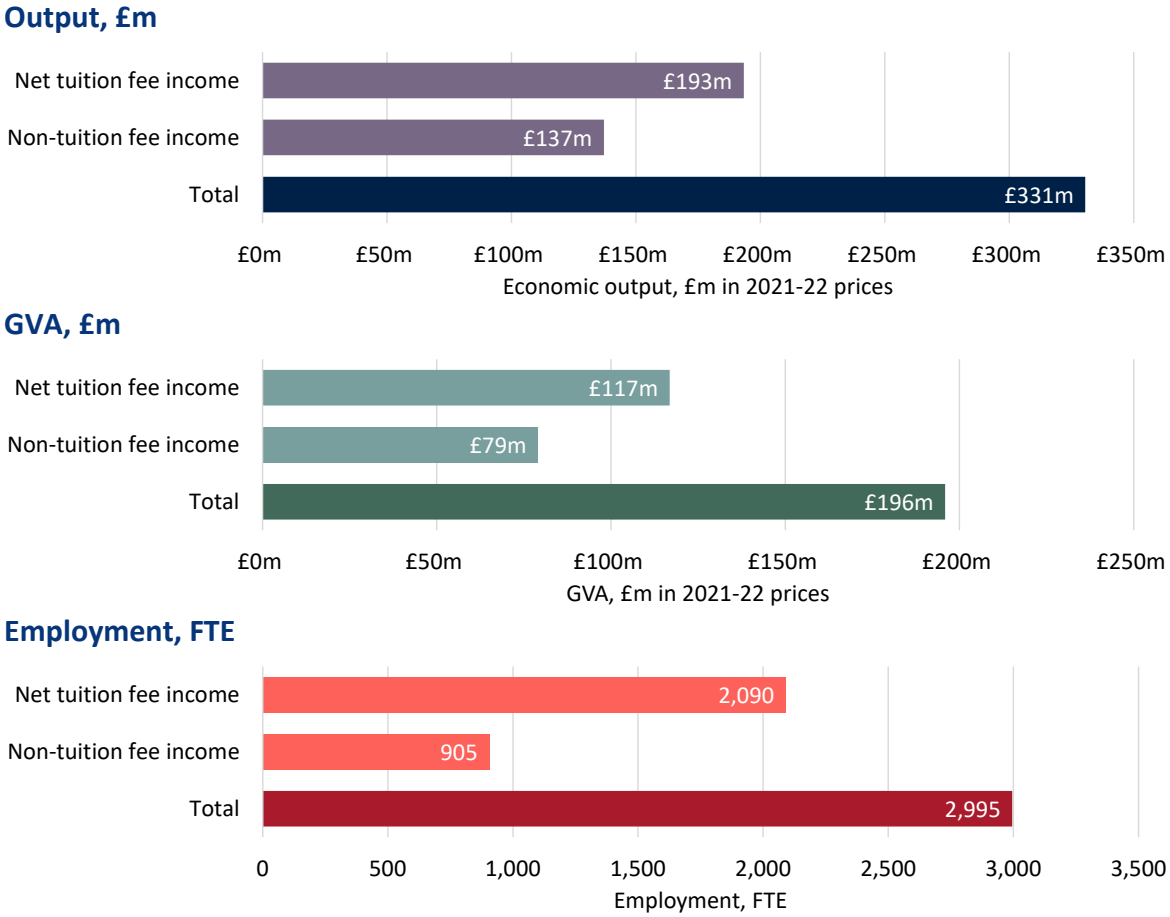
The total direct economic impact of the expenditures of international students in the 2021-22 University of Oxford cohort (in economic output terms) was estimated at **£331 million** (Figure 26). Over half of this total (**£193 million, 59%**) was generated from international students' tuition fees accrued by the University of Oxford (net of any fee waivers or bursaries provided by the University), while the remaining **£137 million** (**41%**) was generated from international students' non-tuition fee spending. In terms of students' domicile, most of this impact (**£262 million**, **79%**) was generated by non-EU domiciled

[95] See Institute for Employment Studies & National Centre for Social Research (2023).
[96] 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 the University of Oxford itself).
[97] 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 A2.4.4.
[98] For information on the estimated levels of non-tuition fee income per student, please refer to Annex A2.4.5.

students, while **£69 million** (**21%**) was associated with EU students (not presented graphically here).

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 supported[99]. We thus estimate that the export income generated by international students in the 2021-22 University of Oxford cohort directly generates **£196 million in GVA** (**£117 million** from international (net) fee income and **£79 million** from non-fee income) and supports **2,995 FTE jobs** (**2,090** from (net) tuition fee income and **905** from non-tuition fee income).

Figure 26 Direct impact associated with non-UK domiciled students in the 2021-22 University of Oxford cohort, by type of impact



Note: All monetary estimates are presented in 2021-22 prices, discounted to reflect net present values, and rounded to the nearest £1m. The employment figures are rounded to the nearest 5. Values may not add up precisely to the totals due to rounding.
Source: London Economics' analysis

[99] To estimate the direct GVA and employment associated with the (net) tuition fee income generated by the University of Oxford's international students, we multiplied this income by the average ratio of GVA to output and FTE employees to output within the South East's government, health, and education sector as a whole (again based on the above-described multi-regional Input-Output model, using a similar approach as for the impact of the University's research and wider knowledge exchange activities). To estimate the direct GVA and employment associated with the non-tuition fee income generated by the University of Oxford'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 the South East (again based on the multi-regional Input-Output model). In other words, we assume that the non-tuition fee expenditures of the University of Oxford's international students support the same levels of GVA and employment (in relative/proportionate terms) as the expenditure of households located in the South East more generally.

4.3 Total economic impact associated with the University of Oxford's educational exports

To estimate the total (direct, indirect, and induced) economic impact associated with the export income generated by international students studying at the University of Oxford, we again used economic multipliers derived from the above-described multi-regional Input-Output model (see Section 2.1), 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 2021-22 cohort, including:

- **Multipliers relating to international tuition fee income (accrued by the University of Oxford itself)**: The multipliers used to estimate the impact of the University of Oxford's international fee income were calculated based on the inter- and intra-industry flows of goods and services for the South East's government, health, and education sector as a whole[100].
- **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 the South East[101], and subsequently applied to the estimated off-campus non-tuition fee expenditures of overseas students in the 2021-22 cohort of University of Oxford 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 10 presents the economic multipliers applied to the income generated by international students at the University of Oxford (in terms of the impact on the South East and the UK economy as a whole)[102].

[100] This approach is based on the fact that the tuition fee income from international students is accrued by the University of Oxford itself. In other words, similar to the impact of the University's research and wider knowledge exchange activities, we assume that the expenditure patterns of the University are the same as for other institutions operating in the South East's government, health, and education sector. Specifically, we apply these multipliers to the gross tuition fee income generated by international students in the 2021-22 University of Oxford cohort, and then deduct the University's cost of provision (i.e. the University of Oxford's fee waivers and bursaries) to arrive at the net direct, indirect and induced impact associated with this income.

[101] In other words, for the purpose of applying relevant economic multipliers, we assume that international students studying at the University of Oxford have similar expenditure patterns as households in the South East 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.

[102] While the table presents the multipliers for the impacts on the South East and the UK as a whole, a full breakdown of the total economic impact of the University's education exports across all regions (as well as by sector) is provided in Figure 27, and a similar breakdown across all of the University's activities is provided in Section 7.1.

Table 10 Economic multipliers associated with the income from international student entrants in the 2021-22 cohort of University of Oxford students

Location of impact and type of income	Output	GVA	FTE employment
Tuition fee income			
South East	1.69	1.57	1.38
Total UK	2.64	2.41	2.01
Non-fee income			
South East	1.77	1.72	1.74
Total UK	2.72	2.62	2.85

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 impacts[103], 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 2021-22 University of Oxford cohort amounts to **£926 million** of **economic output** (see top panel of Figure 27):

The impact of the export income generated by the 2021-22 University of Oxford student cohort stood at £926 million.

- In terms of the breakdown by type of income from international sources, **£553 million** of this impact was associated with international students' (net) **tuition fees**, and **£373 million** was associated with these students' **non-tuition fee expenditures** over the duration of their studies at the University of Oxford.
- In terms of the breakdown by region, most of this impact (**£597 million**, **64%**) was generated in **the South East**, with the remaining **£329 million** (**36%**) occurring in **other regions** across the UK.
- In terms of sector, the tuition fee and non-tuition fee income generated from the University of Oxford's international students generated particularly large impacts within the **government, health, and education sector** (**£269 million** (**29%**)), given that the cohort's tuition fee income is accrued as income by the University of Oxford itself). In addition, there are relatively large impacts felt within the **distribution, transport, hotel, and restaurant sector** (**£165 million**, **18%**), and the **production industry** (**£123 million, 13%**)[104].

The impact in terms of gross value added was estimated at **£510 million** across the UK economy as a whole (with **£334 million** generated within the South East), while the corresponding estimates in terms of employment stood at **7,075 full-time equivalent jobs** across the UK as a whole, with **4,650** jobs supported across the South East.

[103] 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 2021-22 University of Oxford cohort, and then deduct the University's cost of provision (i.e. the University of Oxford's fee waivers and bursaries) to arrive at the net direct, indirect and induced impact associated with this income.
[104] Again, for more detail on which industries are included in this high-level sector classification, please refer to Table 15 in Annex A2.1.2.

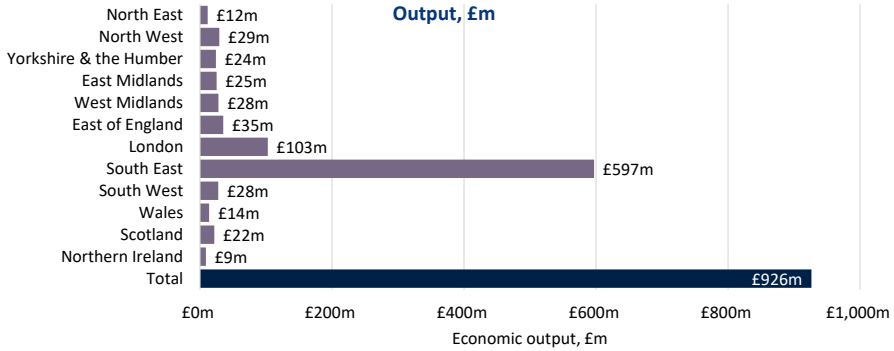
Box 5 The impact of international students living in Oxford and the surrounding area

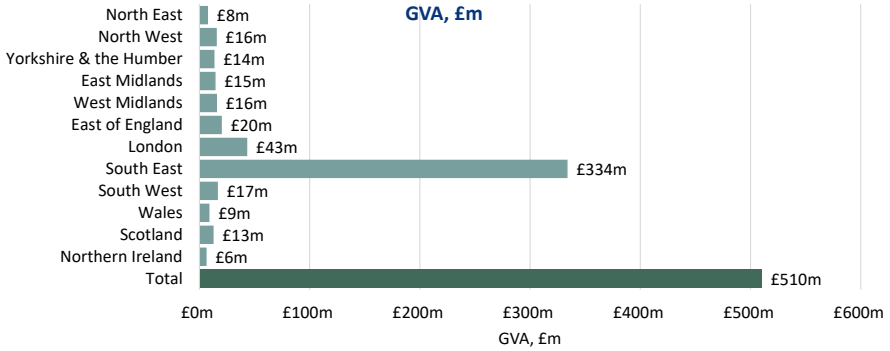
As part of a separate recent analysis by London Economics (2024a[105]), we estimated the economic value to the UK economy of international students by parliamentary constituency, based on the new constituency boundaries introduced ahead of the 2024 General Election. The analysis finds that there are significant economic impacts on the UK generated by international students living in and around Oxford. For example, the analysis indicates that first-year international students who enrolled in UK higher education in 2021-22 living in the **Oxford West and Abingdon** constituency[106] had a net impact on the UK economy of **£277 million**, placing the constituency **20th** out of the total of 650 constituencies in terms of net impact. In addition, international students living in the **Oxford East** constituency had a net impact of **£204 million** on the UK economy, ranking **38th** overall. These net impacts are equivalent to **£2,610** and **£1,740** per resident in the respective constituency.

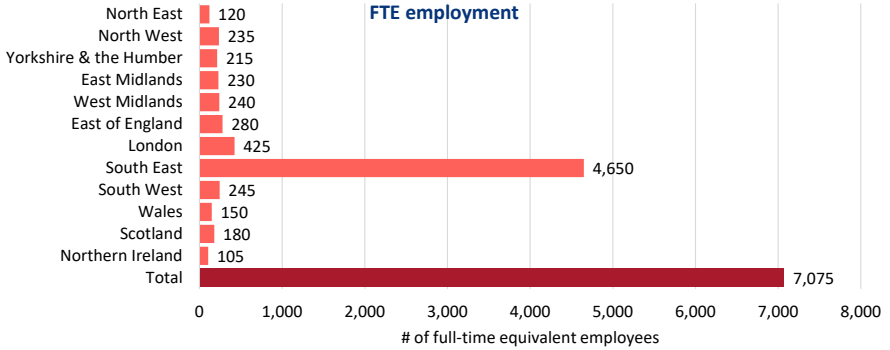
[105] The analysis was undertaken on behalf of the Higher Education Policy Institute and Kaplan International Pathways.
[106] Note that the analysis estimated the impact of *all* international students residing within each constituency, without specifying which higher education institution they are studying at.

Figure 27 Total economic impact associated with the University of Oxford's educational exports in the 2021-22 academic year, by region and sector

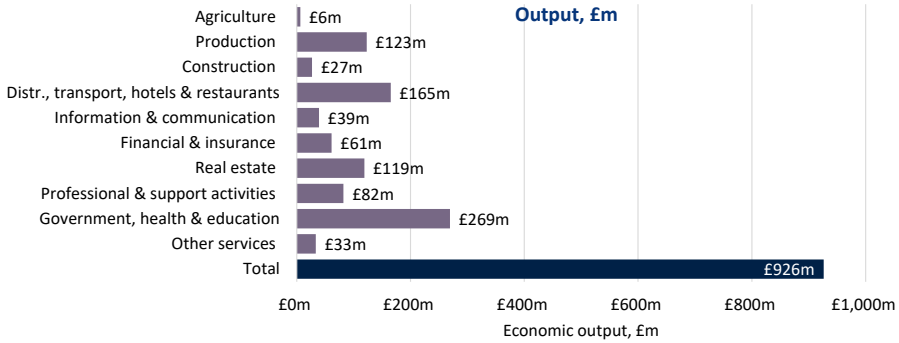
By region

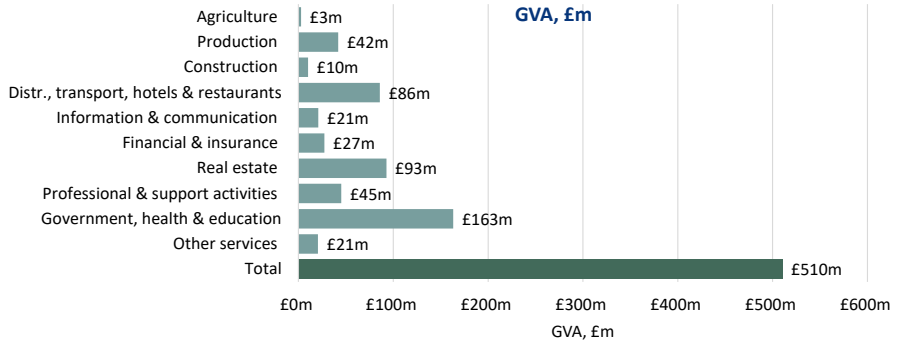


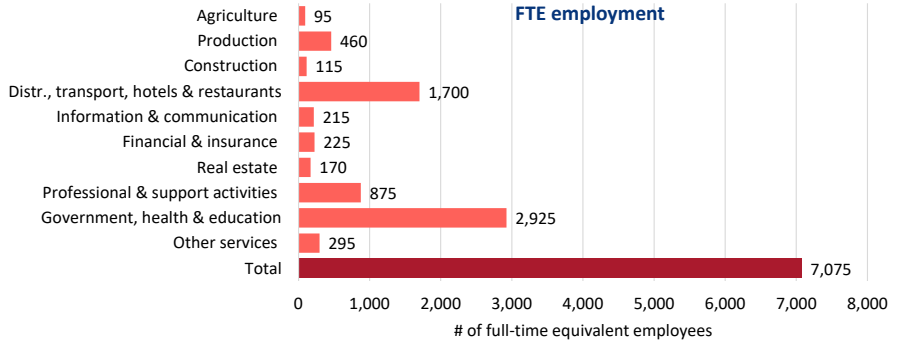




By sector







Note: Monetary estimates are presented in 2021-22 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***

Preserving collections through digital innovation

The University of Oxford is home to many treasured collections of ancient manuscripts and artifacts. Below are three examples of how the University has embarked on groundbreaking digital initiatives that both protect these collections and bring them to a global audience.

Contested Legacies of the Portuguese Colonial Empire

A team from the University of Oxford has helped to develop a digital archive reflecting contested legacies in Portugal, aiming to provide essential insights into the country's role in the Atlantic slave trade. Staff in the Faculty of History at the University worked with the European Association of History Educators to create a digital archive of 12 sites across Lisbon and Lagos[107]. Video and audio material of the sites was recorded in Portugal, which was then accompanied by historical source material selected and translated by the Oxford team, before being hosted on a user-friendly online platform. The contested legacies archive aims to better contextualise Portugal's role in the slave trade, which is argued to be under-discussed both within Portugal and internationally[108].

Digital Preservation of Ancient Coin Hoards

The Coin Hoards of the Roman Empire project at the University of Oxford represents another impactful initiative of digital preservation. This project involves the digitization and cataloguing of coin hoards from across the Roman Empire, spanning multiple countries and regions. By creating a centralized digital repository which is accessible through a web app, the project brings together disparate collections held in museums, private collections, and archaeological sites, making this vast heritage accessible to researchers and the public worldwide[109]. The project both preserves these invaluable artifacts and provides a rich, interactive resource that enables users to explore the economic, political, and cultural history of the Roman Empire through its currency.

Unlocking the Secrets of Ancient Music

Lastly, Digital Delius is a project which has undertaken a digitization of the work of the British composer Frederick Delius. The project team, consisting of musicologists, computer scientists, heritage experts and performers, have developed a digital catalogue of the composer's work which has resulted in Delius' entire works becoming freely available to the public[110]. As a result, many have had the opportunity to gain a deeper understanding of the interconnection of different versions of Delius' works and the landscapes and cultures that feature within them[111]. Moreover, Digital Delius has also fostered innovative teaching practices, such as through the *Discovering Music* pages of the British Library which provide learning resources such as exercise sheets, interactive video and audio material.

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[107] https://www.ox.ac.uk/research/research-impact/contested-legacies
[108] https://contestedhistories.org/early-atlantic-slave-trade-in-portugal/
[109] https://oxrep.classics.ox.ac.uk/coin_hoards_of_the_roman_empire_project/
[110] https://eng.ox.ac.uk/news/music-project-wins-vice-chancellors-public-engagement-with-research-award/
[111] https://www.ox.ac.uk/research/research-impact/digital-delius

5 The impact of the University of Oxford's expenditures

Box 6 Key findings: University expenditures

The University of Oxford's physical footprint supports jobs and promotes economic growth throughout the UK economy. This is captured by the **direct, indirect, and induced impact** associated with the expenditures of the University itself, as well as the expenditures incurred by the University's 39 colleges and 6 permanent Private Halls.

The **direct impact** of the University's physical footprint was based on the operating and capital expenditures of the University and its colleges. In 2021-22, the University of Oxford incurred a total of **£2.5 billion** of relevant expenditure, while the corresponding spending of the University's colleges stood at **£692 million**. Hence, the total direct impact of the expenditures of the University and its colleges was estimated at **£3.2 billion**.

Similar to the research and knowledge exchange, educational exports, and tourism strands of analysis, the direct increase in economic activity resulting from the expenditures of the University and its colleges generates additional rounds of spending throughout the economy (through the University's and its colleges' supply chains, and the spending of staff). Applying relevant economic multipliers, the **total direct, indirect, and induced impact** associated with the expenditures of the University of Oxford and its colleges in 2021-22 was estimated at **£5.0 billion**. Of this total, **£3.2 billion** was associated with the spending of the University of Oxford itself, while **£1.8 billion** was generated by the University's colleges.

In this section, we outline our estimates of the **direct, indirect, and induced impacts** associated with the operational and capital expenditures of the University of Oxford itself, as well as the expenditures incurred by the University's **39 colleges** and **6** permanent Private Halls[112]. 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 associated with the University's research and knowledge exchange activities (see Section 2), educational exports (see Section 4), and tourism impact (see Section 6), the direct, indirect, and induced economic impacts of the University's expenditures are measured in terms of economic output, gross value added, and FTE employment, and are derived using relevant multipliers from the above-described multi-regional Input-Output model.

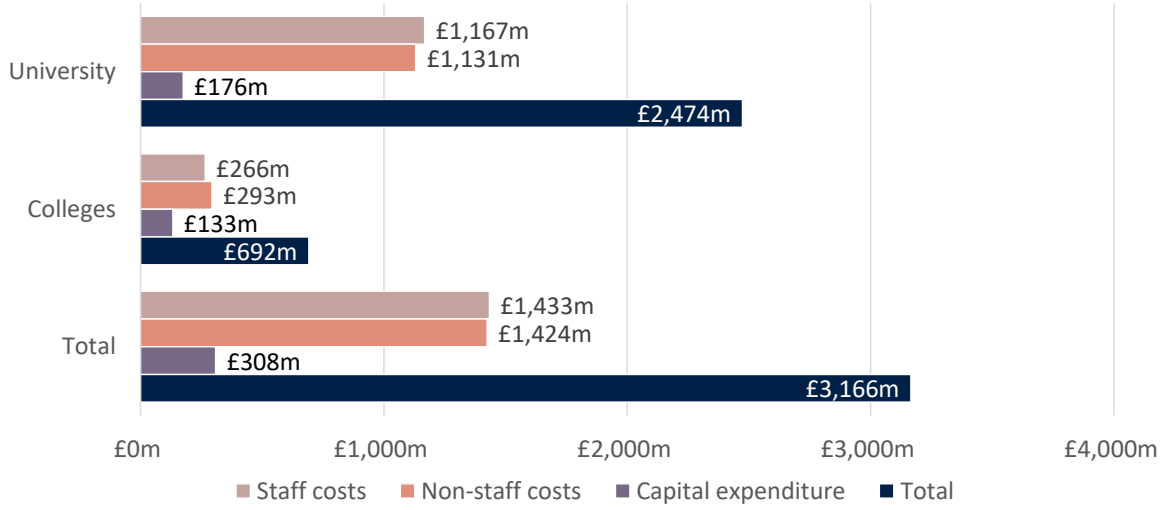
[112] The accounts of 3 of the University's colleges (including Kellogg College, St Cross College, and Reuben College) and 6 permanent Private Halls are consolidated into the University's finances (i.e. are included in the level of expenditure of the University itself), as they are departments of the University. In contrast, the University's financial statements exclude the accounts of 36 colleges that are separate and independent legal entities.

5.1 Direct impact of the University's and its colleges' expenditures

5.1.1 Gross direct impact of the University's expenditures

To measure the direct economic impact of the purchases of goods, services, and labour by the University of Oxford and its colleges, we used information on the University'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 2021-22 academic year.[113] This was combined with separate financial and staff data for the University's colleges[114].

Figure 28 Gross direct economic impact (in terms of output) of the University of Oxford's expenditure in the 2021-22 academic year, by type of expenditure



Note: From the University's total operating expenditure, we exclude **£125 million** of non-staff costs associated with depreciation and **£369 million** of staff costs associated with movement in pension provisions, as it is assumed that these costs are not relevant from a procurement perspective (i.e. these costs are not accounted for as income by other organisations). We also exclude **£106 million** of non-staff costs in payments to colleges to avoid double-counting. From the aggregate college operating expenditure, we exclude **£45 million** of non-staff costs associated with depreciation and **£25 million** of staff costs associated with movement in pension provisions.
Source: London Economics' analysis based on HESA (2024a, 2024b) and the University of Oxford (2022, 2023a, 2023b).

Based on this, in terms of monetary economic output (measured in terms of expenditure), the **gross direct economic impact** associated with the expenditures of the University of Oxford and its colleges stood at approximately **£3.2 billion** in the 2021-22 academic year, including **£2.5 billion** of expenditures by the University and a further **£692 million** from the University's colleges (see Figure 28). Across both the University and its colleges, this includes **£1.4 billion** of operating expenditure on staff related costs, **£1.4 billion** of

[113] Based on staff and financial data published by HESA (2023a, 2023b, 2023c and 2023d) and the University of Oxford's annual accounts (University of Oxford, 2022).
[114] The University provided us with information on the operational (i.e. staff and non-staff) expenditures of each college. The information on colleges' capital expenditures and staff (including employed college trustees as well as other college employees) was extracted from each of the colleges' published financial accounts (see University of Oxford, 2023a and 2023b). In this respect, note that for all colleges, the number of college trustees was only available in *headcount* terms (rather than FTE employees). The same applies to the information on other college employees included in several colleges' financial statements. In all of these instances, the number of FTE staff was *estimated* by multiplying the corresponding headcount number by the ratio of FTE to headcount staff among the University of Oxford's own employees (0.92, excluding atypical staff employed by the University).

expenditure on other (non-staff) operating expenses[115], as well as **£308 million** of capital expenditure incurred in that academic year.

In terms of **employment**, the University of Oxford directly employed **12,780** FTE staff[116] in 2021-22, while the number of staff employed by its colleges stood at **6,815** FTE staff. Therefore, in total, there were **19,595** FTE staff employed by the University and its colleges in 2021-22.

5.1.2 Net direct impact of the University's expenditures

To arrive at the net direct impact associated with the University of Oxford's expenditure, 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 the University between different agents in the UK economy. Specifically, we deducted a total of **£1.3 billion** from the above gross direct impact, including:

- The total research income received by the University in the 2021-22 academic year (**£606 million**), to avoid double-counting with the estimated impact of the University's research activities (Section 2.1);
- The direct impact associated with the University's knowledge exchange activities (excluding the impact of spinouts and companies based at the University's Science Parks) of **£418 million** (in economic output terms), to avoid double-counting with the impact of the University's wider knowledge exchange activities (Section 2.2);
- **£15 million** in University of Oxford bursary spending for UK domiciled students[117], as this was included (as a benefit) in the analysis of the University's teaching and learning activities (Section 3); and
- The direct impact generated by the University's (gross) international fee income associated with the 2021-22 cohort of non-UK students (**£219 million**[118]), to avoid double-counting with the impact of the University's educational exports (Section 4).

[115] The total operational expenditure (excluding capital expenditure) of the University of Oxford and its colleges stood at **£3.5 billion** in 2021-22. From the University's total operating expenditure of **£2.9 billion**, for the purpose of the analysis, we excluded **£125 million** in depreciation and amortisation and **£369 million** in movement in pension provisions (as it is assumed that these costs are not relevant from a procurement perspective (i.e. these costs are not accounted for as income by other organisations)), as well as a further **£106 million** in payments to colleges to avoid double-counting. From the aggregated college operating expenditure of **£630 million**, we excluded **£45 million** in depreciation and amortisation and **£25 million** in movement in pension provisions. This results in a total operational expenditure across the University and its colleges of **£2.9 billion** in 2021-22. Totals may not add up precisely due to rounding.

[116] This excludes any staff on atypical contracts employed by the University of Oxford. In addition, to again avoid double-counting, the number of staff employed by the University excludes **610** staff who were jointly appointed by the University and its colleges (as college trustees) in 2021-22.

[117] The University's bursary support to UK domiciled students is considered as a benefit to the student in the analysis of the impact of teaching and learning activities (see Section 3). It was therefore necessary to deduct these bursaries from the direct impact of the University's spending to correctly take account of the fact that these bursaries are a transfer from the University to its students, and not an additional benefit to the UK economy.

[118] This is slightly larger than the above direct impact of the net tuition fee income associated with international students in the 2021-22 cohort (**£193 million**; see Section 4.2.2), as the value deducted here relates to the impact of the University's gross international fee income before the deduction of the University fee waiver/bursary costs associated with these students (since these costs are already removed when estimating the impact of the University's educational exports).

After accounting for these deductions, the net direct impact of the University's and its colleges' expenditure in 2021-22 stood at **£1.9 billion**.

5.1.3 The University's geographical footprint

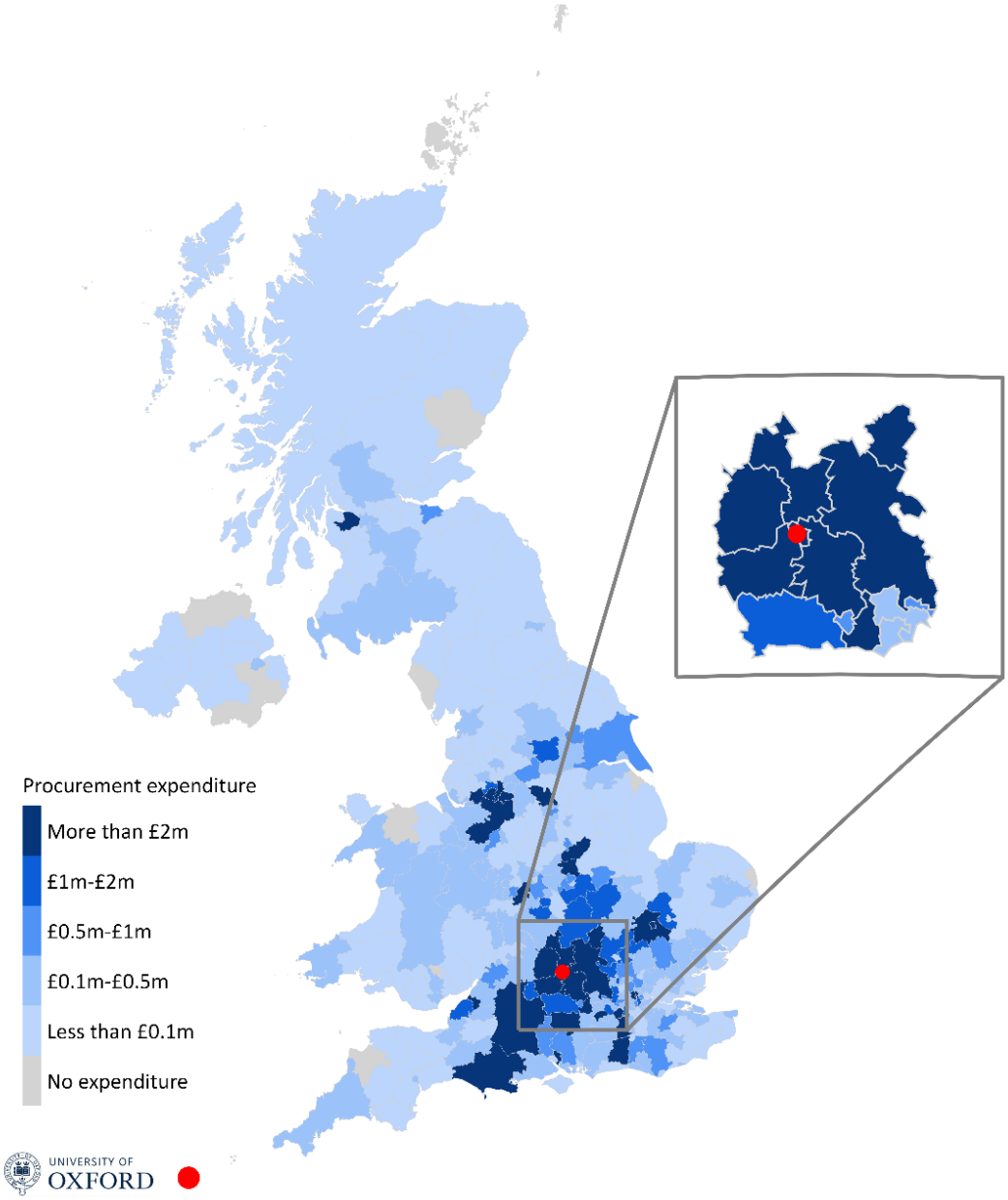
In addition to these total expenditures, we investigated the geographical breakdown of the University of Oxford's[119] procurement expenditures and its number of staff, to demonstrate the University's impact across the South East and the rest of the UK.

Figure 29 presents the distribution of the University of Oxford's UK procurement expenditure (based on invoice data for 2021-22) by Local Authority. The map illustrates a concentration of procurement expenditure in the South East (approximately **45%** of expenditure), with **8%** of all UK procurement expenditure taking place in the Local Authority of **Oxford**. **Oxfordshire** accounted for a total of **21%** of the University's procurement expenditure, including **6%** in the **Vale of White Horse** and **3%** in **Cherwell**. The University also spent significant amounts on goods and services from suppliers in other regions, such as London (**13%** of UK procurement expenditure)[120], the East of England (**9%**), and the North West (**8%**).

In addition, Figure 30 illustrates the distribution of the University's staff headcount by Local Authority (based on the postcode sector of employees' home addresses). As expected, the map shows a particularly strong concentration of staff in the area immediately surrounding the University, with approximately **half** (**50%**) **living in Oxford** and **four-fifths** (**80%**) living within **Oxfordshire**. This includes substantial proportions of staff living in **Cherwell** (**10%**), the **Vale of White Horse** (**7%**), and **West Oxfordshire** (**7%**).

[119] Unlike the remainder of Section 5, the analysis in this sub-section only refers to the expenditures of and staff employed by the University itself, and does not include any analysis of the University's independent colleges.
[120] It is possible that the data overestimates the level of procurement expenditure occurring in London as compared to other regions, since the invoice data would often reflect suppliers' head office locations, rather than reflecting the location where these activities took place.

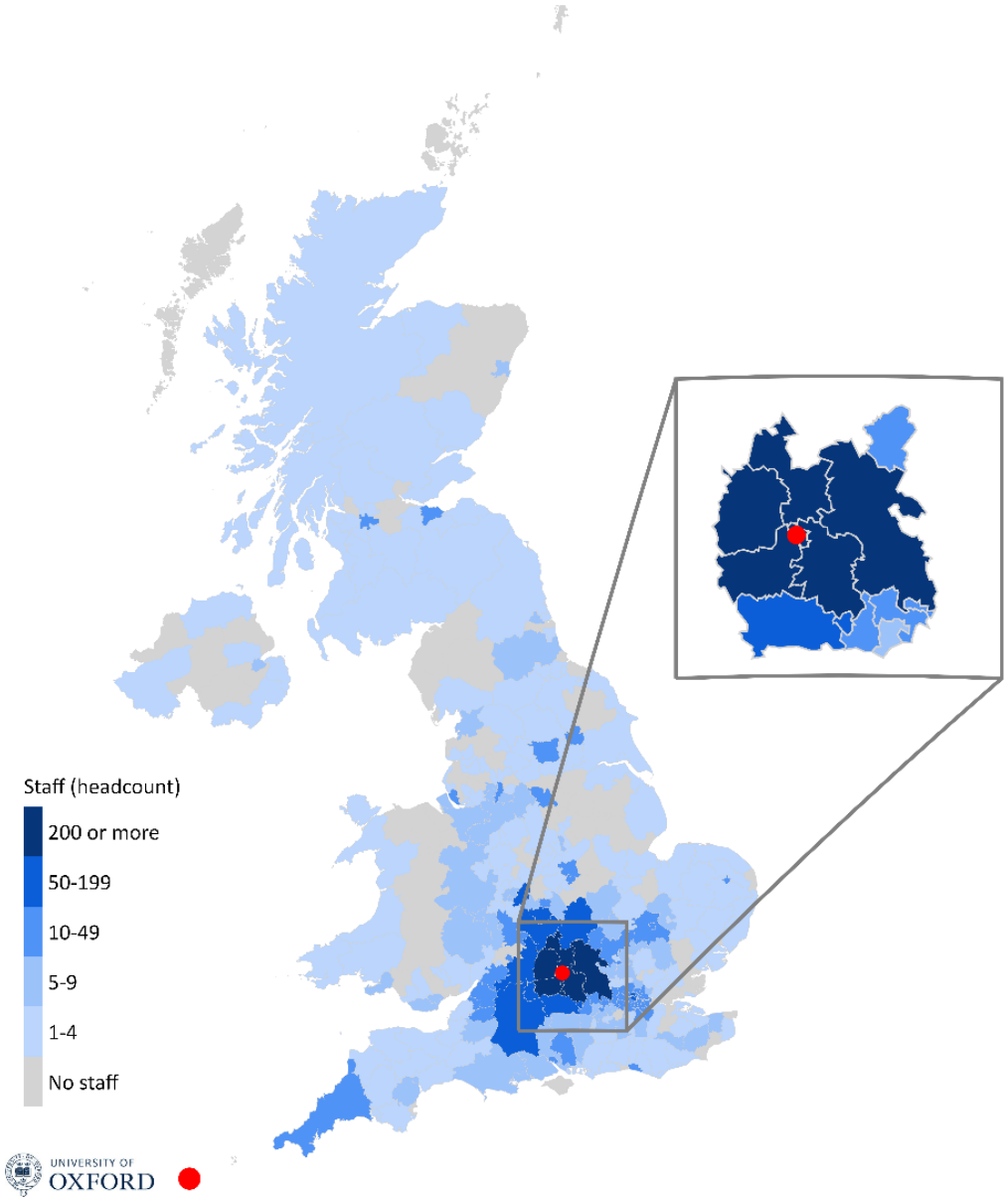
Figure 29 Distribution of the University of Oxford's procurement expenditure in the 2021-22 academic year by Local Authority (of invoice address)



Note: We received data on the invoice postcodes associated with **£267 million** of procurement expenditure by the University of Oxford. Of this total, we excluded expenditure records with invalid postcodes (**65** records). As a result of these exclusions, the figure is based on a total of **£255 million** of procurement expenditure.

Source: London Economics' analysis based on data from the University of Oxford, and the Office for National Statistics. Contains National Statistics, OS, Royal Mail, Gridlink, ONS, NISRA, NRS and Ordnance Survey data © Crown copyright and database right 2024.

Figure 30 Distribution of the University of Oxford's staff (in headcount) by Local Authority (of home address) in the 2021-22 academic year



Note: We received data on home address postcode sector for a total **15,295** staff (in headcount) from the University of Oxford. Of this total, we excluded staff records with an invalid postcode sector (**3** in total). The figure is thus based on the home address of **15,290** staff. Staff associated with postcode sectors that are spread across multiple Local Authorities have been apportioned equally across them.

Source: London Economics' analysis based on data from the University of Oxford, and the Office for National Statistics. Contains National Statistics, OS, Royal Mail, Gridlink, ONS, NISRA, NRS and Ordnance Survey data © Crown copyright and database right 2024.

Oxfordshire is a growing hub for cutting edge research and innovation

The University of Oxford is essential to the wider ecosystem of innovation within the Oxfordshire region and contributes substantially through its science parks and incubators. Here we provide more information on the three science parks included within the economic impact analysis as well as the Oxford Innovation Society.

The Oxford Science Park

The Oxford Science Park is majority owned by Magdalen College Oxford[121]. The park was founded in 1989 as a hub for cutting-edge research and development, and currently maintains a collaborative community of nearly 100 leading life science and technology businesses. The latest addition to the park is 'The Daubeny Project', which is a 450,000ft^2 commercial life science development set to be completed in 2026. The development consists of three high-spec buildings, each of which will feature advanced lab infrastructure to support cutting-edge research, with flexible spaces accommodating both wet and dry labs. This project is complemented by plans to reinstate a train station at The Oxford Science Park, which will provide access to Oxford in 6 minutes[122].

Begbroke Science Park

Begbroke Science Park, five miles from Oxford city centre, has been home to a wide range of research and development activities since 1999. Begbroke provides an environment fostering innovative science and technology businesses' development and growth, hosting thirty high-tech companies and over twenty research groups[123]. The park has recently celebrated the completed development of two new research and innovation buildings at Begbroke Science Park, which add around 12,500m^2 of flexible office and laboratory space to the park[124]. One building provides academic facilities and is occupied by university research groups, while the other consists of commercial space tailored towards research spinouts and innovative private sector partners. The developments mark a step in the University's ambitious plans for the area, which includes further R&D spaces, new homes and local amenities.

BioEscalator

The BioEscalator, a University of Oxford biotech incubator, provides lab space and entrepreneurial support for growing spinout and startup companies. The incubator is situated on the University's Old Road Campus, which houses many of the University's premier institutes and departments. This ideal location allows the BioEscalator to guide early-stage biotech companies towards sustainability, encouraging collaboration with the NHS and academics and fostering a community of entrepreneurial medical scientists and

[121] https://oxfordsp.com/about/welcome.aspx
[122] https://www.daubenyoxfordsp.com/
[123] https://www.begbroke.ox.ac.uk/
[124] https://www.mpls.ox.ac.uk/latest/news/begbroke-science-park-expands-with-handover-of-two-major-new-buildings

innovators[125]. The BioEscalator recently celebrated its 5th anniversary, allowing it to showcase the substantial contributions it has made to the life sciences sector since its inception. Key achievements include attracting £1.6 billion in investment, supporting the formation of 36 new companies, creating over 300 jobs, and seeing 12 companies graduate from the incubator[126].

Oxford Innovation Society

The Oxford Innovation Society brings together diverse members of the University of Oxford's innovation ecosystem around a common goal to broaden and deepen the impact of innovation in the region[127]. Formed over 30 years ago, the Society is comprised of academic founders, investors, industry partners, campuses and service providers. An annual programme of events is open to members and special guest who can reap the benefits of making connections and receiving support from the team of experts at Oxford University Innovation.

[125] https://www.bioescalator.ox.ac.uk/
[126] https://www.medsci.ox.ac.uk/news/celebrating-5-years-of-the-bioescalator
[127] https://innovation.ox.ac.uk/about/networks/oxford-innovation-society/

5.2 Indirect and induced impacts of the University of Oxford's expenditures

As with the economic impact of the University of Oxford's research and knowledge exchange activities (see Section 2), educational exports (see Section 4), and tourism (see Section 6), the assessment of the indirect and induced economic impacts associated with the expenditures of the University and its colleges is based on economic multipliers derived from the above-discussed multi-regional Input-Output model.[128] We applied the estimated average economic multipliers associated with organisations in the South East's government, health, and education sector. This mirrors the approach used to assess the impact of the University's international tuition fee income and the income derived from its research and wider knowledge exchange activities, since this income was accrued (and subsequently spent) by the University of Oxford itself. Again, this approach asserts that the spending patterns of the University (and its colleges) reflect the average spending patterns across organisations operating in the South East's government, health, and education sector. These multipliers are applied to the **net direct impact** of the University of Oxford's and its colleges' expenditures of **£1.9 billion**.

The multipliers (for the impact on the South East and the UK economy as a whole) are presented in Table 11, and mirror those presented in Section 4.3 (in relation to the University's international fee income) as well as in Sections 2.1.3 and 2.2.3 (in relation to the University's research and wider knowledge exchange activities, respectively).

Table 11 Economic multipliers associated with the spending of the University of Oxford and its colleges

Location of impact and type of income	Output	GVA	FTE employment
South East	1.69	1.57	1.38
Total UK	2.64	2.41	2.01

Note: All multipliers constitute Type II multipliers, defined as [Direct + indirect + induced impact]/[Direct impact].
Source: London Economics' analysis

5.3 Aggregate impact of the University of Oxford's spending

Figure 31 presents the estimated total direct, indirect, and induced impacts associated with the expenditures incurred by the University of Oxford and its colleges in the 2021-22 academic year (after the above-described adjustments have been made). The aggregate impact of these expenditures was estimated at approximately **£5.0 billion** in economic output terms (see top panel of Figure 31):

The impact of the expenditures of the University of Oxford and its colleges on the UK economy in 2021-22 stood at £5.0 billion.

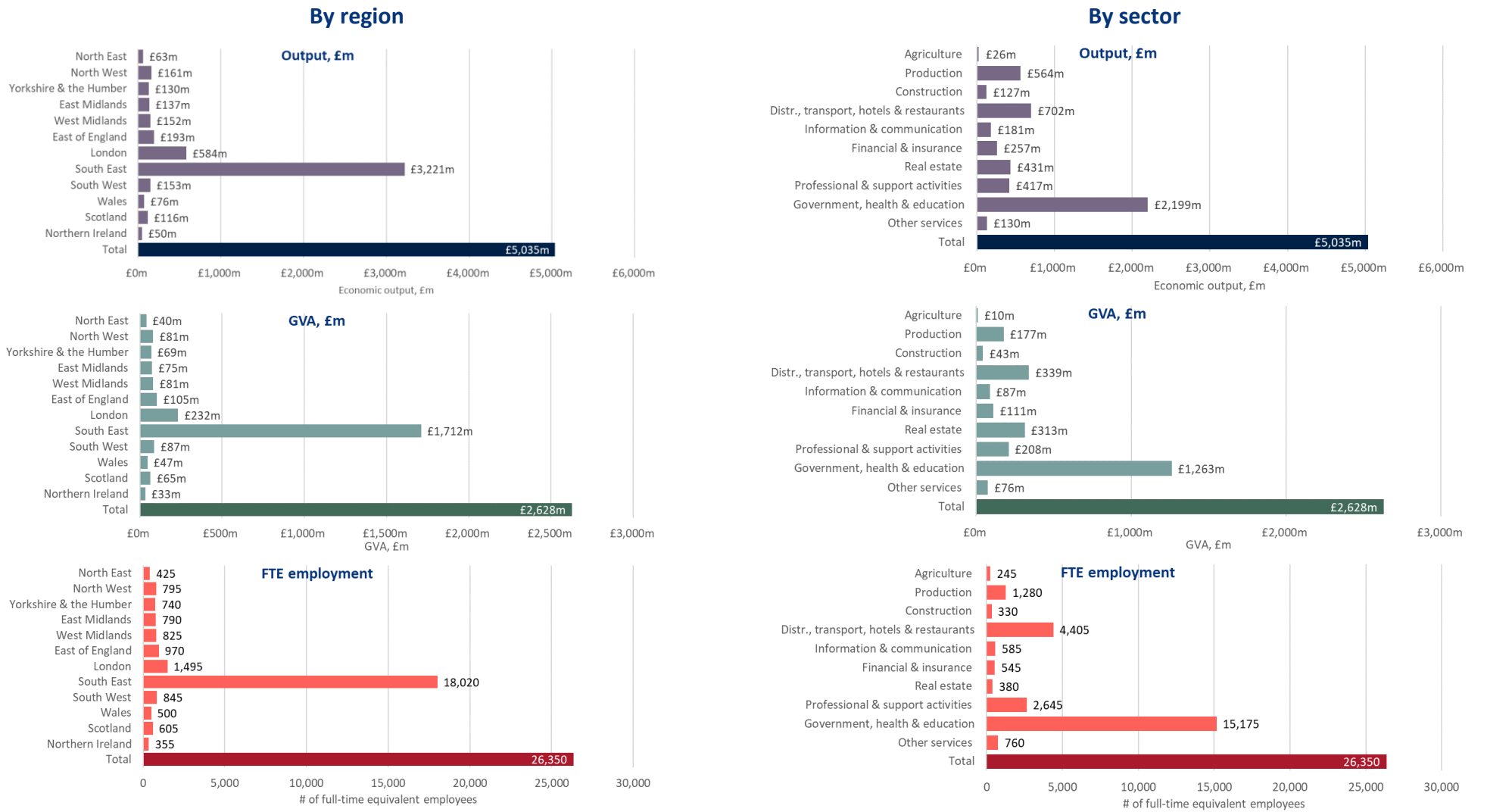
[128] Again, see Annex A2.1 for more information.

- In terms of the source of expenditure, **£3.2 billion** (**64%**) of this impact was associated with the spending of the University of Oxford itself, while the remaining **£1.8 billion** (**36%**) was generated by the University's colleges.
- In terms of region, the majority of this impact (**£3.2 billion**, **64%**) was generated in the South East, with the remaining **£1.8 billion** 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 (**£2.2 billion**, **44%**), there are also large impacts felt within other sectors, including the distribution, transport, hotels & restaurant sector (**£702 million**, **14%**), the production sector (**£564 million**, **11%**), and the real estate sector (**£431 million**, **9%**).[129]

In terms of employment, the results indicate that the spending of the University and its colleges supported a total of **26,350** FTE jobs across the UK economy in the 2021-22 academic year (of which **18,020** were located in the South East). In addition, the impact in terms of gross value added was estimated at **£2.6 billion** across the UK economy as a whole (with **£1.7 billion** accrued within the South East).

[129] Again, for more detail on which industries are included in this high-level sector classification, please refer to Table 15 in Annex A2.1.2.

Figure 31 Total economic impact associated with the University of Oxford's expenditures in the 2021-22 academic year, by region and sector



Note: Monetary estimates are presented in 2021-22 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 The University of Oxford's contribution to tourism

Box 7 Key findings: Contribution to tourism

To understand the economic impact associated with the University's contribution to tourism, we estimated the number of visitors to Oxford in 2021-2022 that were **associated with the University's presence**. The analysis focuses only on visits to Oxford that involved **overnight stays by visitors from overseas**, as it is assumed that any domestic (day or overnight) visits to Oxford would have displaced activity from other regions of the UK (and should not be considered 'additional' to the UK economy). The types of visitors included in the analysis included tourists coming to Oxford to explore the University's unique cultural and heritage sites, business visitors, friends and family visiting the University's staff and students, and participants in study trips to the University.

Out of a total of **425,000** overnight visits from overseas visitors to Oxford in 2021-2022, we estimate that **211,000** (**50%**) resulted directly from the University's activities. Combined with information on the average trip expenditure per visitor, the **direct impact** of the University's contribution to tourism was estimated at **£165 million**.

As with many of the University's other activities, this visitor expenditure results in subsequent rounds of expenditure throughout the UK economy. Applying the relevant multipliers to the estimate of direct expenditure, the analysis indicates that the total **direct, indirect, and induced impact** of the visitor expenditure generated by the University of Oxford in 2021-2022 stood at approximately **£445 million**.

As a final strand of economic contribution, the University attracts a range of visitors to Oxford, including tourists visiting the University's unique cultural and heritage sites (such as the Ashmolean Museum, the Bodleian Libraries, or the Oxford Botanic Garden), business visitors, friends and family visiting the University's staff and students, or visitors participating in study trips to the University.

To understand the economic impact associated with the University's contribution to tourism, we combine information on the number of visits to Oxford associated with the University with information on the average expenditure per visitor. As with the University's research and knowledge exchange activities (see Section 2), educational exports (see Section 4), and the operational and capital expenditures of the University and its colleges (see Section 5), these visitors' expenditures result in subsequent rounds of spending and economic activity within the local economy, captured by the direct, indirect, and induced impacts associated with these expenditures. Again, these impacts are estimated using economic multipliers, and are measured in terms of the contribution to **economic output**, **gross value added**, and (FTE) **employment** in 2021-22.

6.1 Estimating the number of visitors associated with the University's activities

Data from the International Passenger Survey (IPS) published by the Office for National Statistics[130] estimated that, in 2022, there were a total of approximately **425,000** overseas overnight visits to Oxford.[131] Domestic visits are not considered in the analysis as they do not contribute additionally to the UK economy.[132] As a result, the remainder of this analysis focuses only on the **425,000** trips to Oxford involving overnight stays by visitors from overseas.

In addition to the total number of these overseas overnight visits, a key element of the analysis involves understanding the specific reason for these visits. Based on the IPS data, of the total of **425,000** overnight trips to Oxford by overseas visitors, approximately **35%** (**150,000**) were undertaken for the purposes of visiting friends and family, **34%** (**146,000**) were holiday or excursion visits, **22%** (**95,000**) were business trips, **5%** (**22,000**) were study trips to Oxford, and the remaining **3%** (**13,000**) were trips for other purposes. Using this breakdown by purpose of visit to estimate the impact of the University of Oxford's contribution to tourism in 2021-22, we made the following assumptions in relation to the **number of overseas overnight visits to Oxford that resulted from the University's presence**:

- We assumed that *all* visits for the purposes of **holidays** (**146,000**) were directly as a result of the University (i.e. that all visitors on holiday were attracted by the University's campus and its heritage and cultural assets).
- In relation to **business trips**, the University and its colleges employed approximately **21,210** staff in 2021-22 (in headcount terms, equivalent to **19,595** FTE employees (see Section 5.1.1))[133], accounting for around **23%** of the total employed population of Oxford in 2021-22.[134] Based on this, it is assumed that **23%** of business trips to Oxford in 2021-22 were related to the University (corresponding to approximately **22,000** visits/trips).
- With respect to **trips to visit family and friends**, data from HESA[135] indicates that approximately **33%** of staff employed by the University (with a known nationality) were non-UK nationals. Applying this percentage to the total number of University and college staff (in headcount terms, i.e. **21,210** (as above)), it is estimated that approximately **7,090** non-UK nationals were employed by the University and its

[130] See Visit Britain (2023b). Number of visits is based on the city's visitors' reported spending on at least one night during their trip.
[131] Data from 2022 are used as they are the most recent data available and cover the majority of the 2021-22 academic year. The ONS was unable to interview at the Eurotunnel from January to June 2022 due to COVID-19 restrictions, so those data were instead modelled by the ONS for consistency.
[132] More specifically, it is likely that any domestic (day or overnight) visits to Oxford would have *displaced* activity from other regions of the United Kingdom. Therefore, following standard evaluation guidance (HM Treasury, 2022), all visitor trips and associated expenditure originating from elsewhere in the United Kingdom - i.e. domestic day trips and domestic overnight trips - are excluded from the analysis.
[133] In 2021-22, there were **19,595** FTE staff employed by the University of Oxford and its colleges. Using the same staff data as in Section 5 to calculate the number of the University's FTE employees as a proportion of headcount employees (**92%**), we thus estimate that there were approximately **21,210** staff employed by the University and its colleges in headcount terms.
[134] Using official UK labour market statistics data (Nomis, 2024a), there were approximately **92,100** individuals employed (or self-employed) in Oxford between January 2022 and December 2022.
[135] See HESA (2024).

colleges in 2021-22 (representing **4.3%** of the total resident population of Oxford). Further, there were **9,260** non-UK domiciled students attending the University[136] in 2021-22 (representing around **5.7%** of the resident population). Based on London Economics' previous analysis of the economic impact of international students on the UK economy[137], it is assumed that, on average, there were **0.8** visits from overseas per non-EU domiciled student or non-EU member of staff, and **3.1** visits from overseas per EU domiciled student or EU member of staff in 2021-22. This represents a weighted average of **1.4** visits per non-UK student and **2.0** visits per non-UK staff at the University of Oxford (weighted by the corresponding EU and non-EU domiciled students and staff at the University in 2021-22).[138] Combined with a 2022 total population estimate for the city of Oxford of **163,300**[139], it is therefore assumed that approximately **18%** of all overseas visits to Oxford to visit family or friends were to the University's students and staff (equivalent to approximately **27,000** trips in 2021-22).

- In terms of the **study trips** to Oxford, it is assumed that all trips were either to the University of Oxford or to Oxford Brookes University. The University of Oxford accounted for **74%** of the total non-UK domiciled student population across these two institutions in 2021-22. It is assumed that study trips by international students are made in proportion to the number of international students at each institution - i.e. that **74%** of all study trips to Oxford in 2021-22 were related to the University of Oxford. This corresponds to approximately **16,000** visits/trips.
- Finally, we assumed that none of the remaining **trips to Oxford for other purposes** were as a result of the University.

Table 12 presents the resulting estimated number of trips to Oxford by overseas visitors in 2021-22 that were due to the University of Oxford's activities, estimated at a total of **211,000** (or **50%** of all overseas trips to Oxford).

Table 12 Total number of visits to Oxford and University-related visits by overseas overnight visitors in 2021-22

Type of trip	Total visits	Visits associated with the University	% associated with the University
Holidays	146,000	146,000	100%
Study trips	22,000	16,000	74%
Business trips	95,000	22,000	23%
Trips to visit friends and family	150,000	27,000	18%
Other trips	13,000	-	-
Total visits	**425,000**	**211,000**	**50%**

Note: All numbers are rounded to the nearest 1,000, and the total values may not add up due to this rounding.
Source: London Economics' analysis

[136] Note that this includes *all* students enrolled with the University in 2021-22, i.e. including both first-year and continuing students.
[137] See London Economics (2023).
[138] The previous analysis (London Economics, 2023) estimated the number of visits from overseas per EU and non-EU student per year (standing at 3.1 and 0.8, respectively). Here, we then assumed the same average number of visitors per EU and non-EU *staff* employed at the University of Oxford.
[139] See Nomis (2024b).

6.2 Direct impact associated with visitor expenditure

The associated **average spending in the UK per overseas visit** was calculated using information on the total visitor spend by trip purpose and the associated number of visits by purpose to Oxfordshire from VisitBritain (2023a). Based on this information, the estimated **211,000** overnight visits to Oxford from overseas visitors in 2021-2022 associated with the University were associated with an average expenditure per trip of **£783**. As a result, the **direct impact** associated with the University's contribution to tourism in 2021-22 was estimated at approximately **£165 million.**

In terms of the nature of this visitor expenditure, approximately **£46 million** (**28%**) of this total was spent on food and drink, **£40 million** (**24%**) was associated with general shopping activities, **£33 million** (**20%**) was spent on accommodation, **£31 million** (**19%**) was spent on travel, and the remaining **£15 million** (**9%**) was associated with entertainment.[140]

In addition to economic output (i.e. visitor expenditure), the above estimates can again be converted into gross value added and the number of FTE jobs supported by this expenditure[141]. It is estimated that the visitor expenditure associated with the University's activities directly generated **£80 million** in GVA and supported **1,365 FTE jobs**.

6.3 Indirect and induced impacts associated with visitor expenditure

As with the impacts of the University's knowledge exchange activities (see Section 2), the expenditures of its international students (Section 4), and the expenditure of the University and its colleges (Section 5), the assessment of the indirect and induced economic impacts associated with visitor expenditure is again based on economic multipliers derived from the above-described multi-regional Input-Output model[142]. In particular, given the concentration of visitor expenditure in the distribution, transport, hotels, and restaurants sector and the 'other' services sector[143], we applied the estimated average economic multipliers associated with organisations in these sectors located in the South East.

These multipliers (for the South East and the UK as a whole) are presented in Table 13, and indicate that every £1 million of (overseas overnight) visitor expenditure associated with the University of Oxford generates an *additional* **£1.70 million** of impact throughout the UK economy, of which **£0.73 million** is generated in the South East. In terms of employment, for every 1,000 (FTE) staff directly supported by this visitor expenditure, an additional **1,360** staff are supported throughout the United Kingdom, of which **510** are located in the South East.

[140] This breakdown was estimated using a breakdown of expenditure by type provided by Experience Oxfordshire (2024).
[141] To estimate the direct GVA and employment associated with overseas visitor expenditure, we multiplied this expenditure by the average ratio of GVA to output and FTE employees to output within the South East's distribution, transport, hotels and restaurants sector (for any expenditure on accommodation, shopping, food and drink, and travel) and the 'other' services sector (for any expenditure on entertainment).
[142] See Section 2.1.3 and Annex A2.1 for more information.
[143] As above, the estimated visitor expenditure on accommodation, shopping, food and drink, and travel was assigned to the distribution, transport, hotels, and restaurants sector. The estimated visitor expenditure on entertainment as instead assigned to the 'other' services sector.

Table 13 Economic multipliers associated with tourism expenditures related to the University

Location of impact	Output	GVA	FTE employment
South East	1.73	1.73	1.51
Total UK	2.70	2.78	2.36

Note: All multipliers constitute Type II multipliers, defined as [Direct + indirect + induced impact]/[Direct impact].
Source: London Economics' analysis

6.4 Total impact associated with visitor expenditure

The impact of the University's contribution to tourism in 2021-22 stood at £445 million.

Figure 32 presents the estimated total direct, indirect, and induced impacts associated with the above visitor expenditures generated by the University's activities in 2021-22. The aggregate impact of these expenditures stood at approximately **£445 million** in economic output terms (see top panel of Figure 32).

In terms of region, the majority of this impact (**£286 million**, **64%**) was generated in the **South East**, with **£160 million** (**36%**) occurring in **other regions** across the UK.

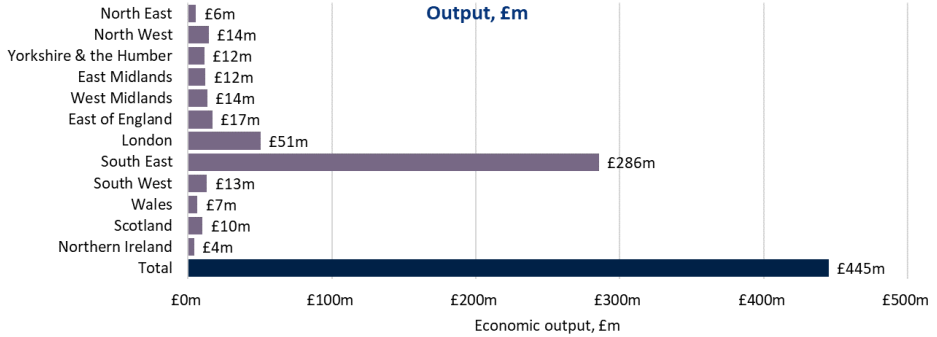
In terms of sector of impact, in addition to the impacts occurring in the **distribution, transport, hotels and restaurants sector** (**£227 million**, **51%**), there were also large impacts within other sectors, such as the **production sector** (**£54 million**, **12%**), the **professional and support activities sector** (**£38 million**, **9%**), and the **real estate sector** (**£36 million**, **8%**).[144]

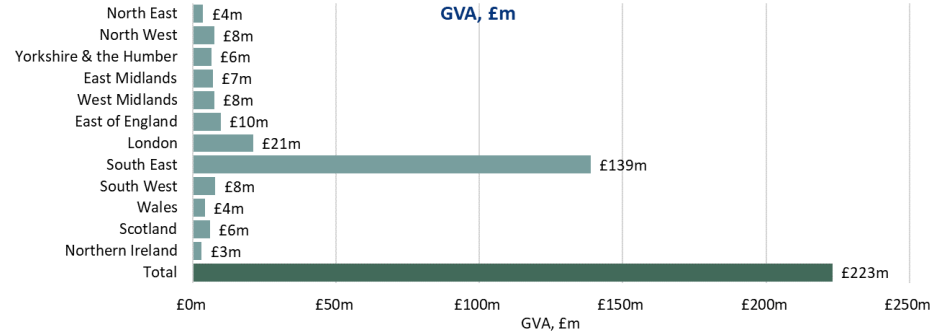
In terms of employment, the results indicate that the visitor spending generated by the University's activities supported a total of **3,225** FTE jobs across the UK economy in 2021-22, of which **2,070** are located in the South East (presented in the bottom panel of Figure 32). In addition, the impact in GVA terms was estimated at **£223 million** across the UK economy as a whole, of which **£139 million** was generated within the South East (see the middle panel of Figure 32).

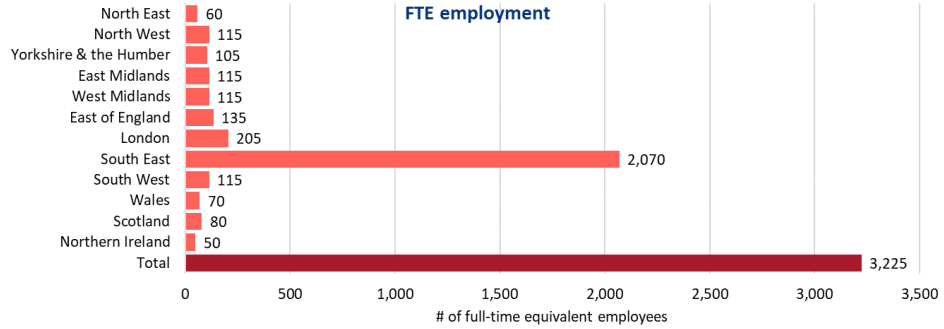
[144] Again, for more detail on what industries are included in this high-level sector classification, please refer to Table 15 in Annex A2.1.

Figure 32 Total economic impact associated with the University's contribution to tourism in 2021-22, by region and sector

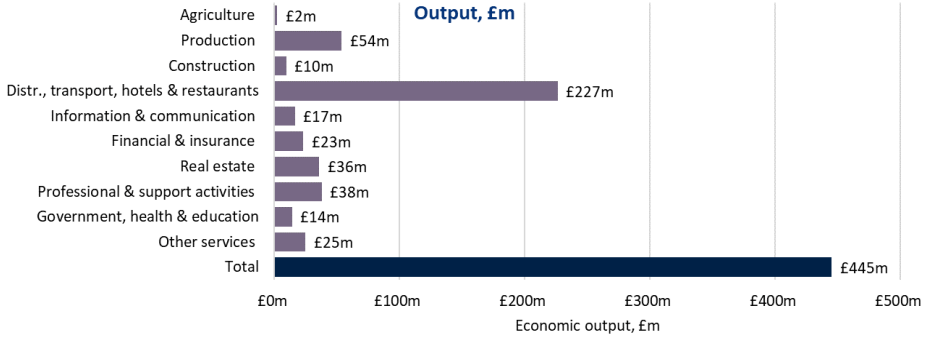
By region

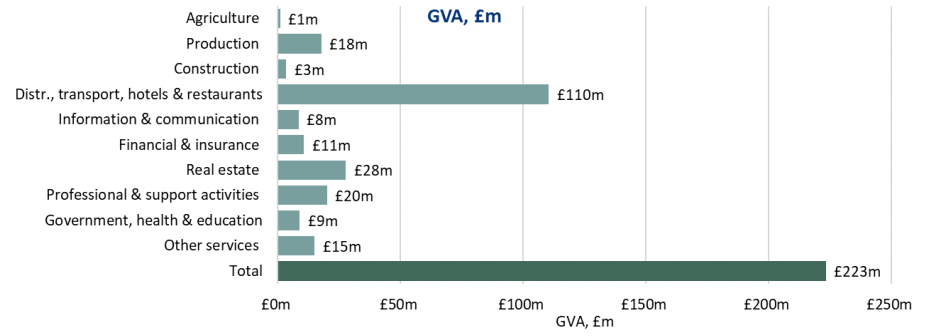


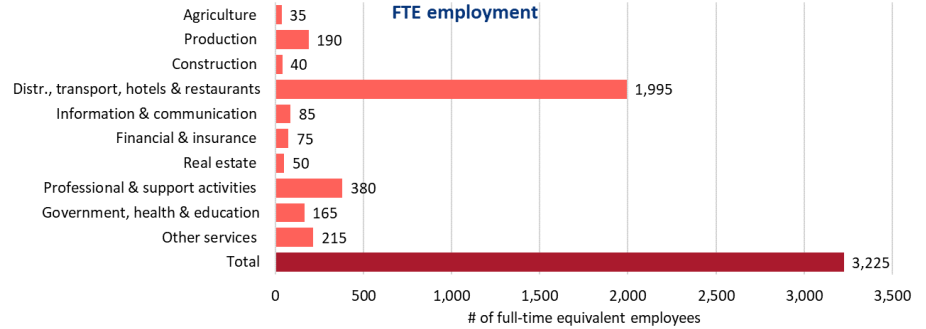




By sector







Note: Monetary estimates are presented in 2022 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

Supporting society and social equity

Water scarcity is one of the most pressing issues facing the world today, with 1.8 billion people expected to face "absolute water scarcity" by 2025[145]. Below we highlight three examples of how the University of Oxford has played an important role in tackling water scarcity through community-owned social enterprises and groundbreaking research.

REACH Fair Water

The School of Geography and the Environment at the University has led the REACH programme since 2015, aiming to improve water security for people in Africa and South Asia[146]. It is a partnership alongside an international consortium, including organisations such as UNICEF and the International Water Association. REACH's research projects focus on the links between drinking water, water for livelihoods, water for economic growth and water ecosystem risks. For example, in partnership with UNICEF and local institutions, REACH developed and employed the Safepani model in rural Bangladesh. This model made drinking water for households, schools and healthcare facilities more accessible and safer through reforms in institutional design, sustainable finance and information systems[147].

Smart Handpumps

Handpumps are essential for rural communities in Africa to ensure that they have access to clean water, but around a quarter were found to be out of access at any one time. This motivated a research team at the University to develop smart handpumps, where a novel transmitter is installed in a handpump's handles to generate real-time data on their use and performance[148]. Trials of the technology found a reduction in the average downtime of a handpump from thirty days to under three days. The success of the research initiated a social enterprise, FundiFix[149], which implements the smart handpumps in rural Kenya. FundiFix was founded

[145] https://www.unep.org/news-and-stories/story/global-water-shortages-are-looming-here-what-can-be-done-about-them
[146] https://reachwater.uk/about-reach/
[147] https://www.safepani.org/
[148] https://www.ox.ac.uk/research/research-impact/smart-handpumps
[149] https://fundifix.org/

in 2013 and is a Kenyan-owned social enterprise, ran by former students at the School of Geography and the Environment at the University of Oxford.

Using mathematical modelling to improve water filtering systems

A research team led primarily by Professor Ian Griffiths used mathematical modelling to improve the structure of water filters in order to better mitigate arsenic poisoning. In partnership with the Indian Institute of Technology Kharagpur, the team developed technology which allowed the cheap upscaling of filters, from single-home use to use in schools and communities[150]. The large-scale filters have been deployed in communities living in the Ganges-Brahmaputra delta, which is a global hotspot for arsenic groundwater contamination. The new filters now cater for 150,000 people and are estimated to have prevented approximately 1,950 premature deaths due to the removal of arsenic from drinking water.

[150] https://timesofindia.indiatimes.com/city/kolkata/iit-kharagpur-develops-arsenic-filter-for-the-aam-aadmi/articleshow/51250227.cms

7 The total economic impact of the University of Oxford on the UK economy in 2021-22

Combining all of the above strands of analysis, the total economic impact on the UK economy associated with the University of Oxford's activities in the 2021-22 academic year was estimated at approximately **£16.9 billion** (see Table 14). In terms of the components of this impact:

- The University's **research and knowledge exchange activities** accounted for **£9.9 billion** (**59%**) of this impact;
- The value of the University of Oxford's **teaching and learning activities** stood at **£557 million** (**3%**);
- The impact associated with the University's **international students** was estimated at **£926 million** (**5%**);
- The impact generated by the **operating and capital expenditures of the University and its colleges** stood at **£5.0 billion** (**30%**); and
- The impact of **tourism** activities associated with the University was estimated at **£445 million** (**3%**).

The total economic impact associated with the University of Oxford's activities in 2021-22 stood at £16.9 billion.

Table 14 Total economic impact of the University of Oxford's activities in the UK in 2021-22 (£m and % of total)

Type of impact		£m	%
	**Impact of research and knowledge exchange**	**£9,923m**	**59%**
	Research activities	£3,939m	23%
	Knowledge exchange activities	£5,984m	35%
	**Impact of teaching and learning**	**£557m**	**3%**
	Students	£254m	2%
	Exchequer	£304m	2%
	**Impact of international students**	**£926m**	**5%**
	Tuition fee income	£553m	3%
	Non-tuition fee income	£373m	2%
	**Impact of the University's and its colleges' spending**	**£5,035m**	**30%**
	Direct impact	£1,907m	11%
	Indirect and induced impact	£3,128m	19%
	**Impact of tourism**	**£445m**	**3%**
	Direct impact	£165m	1%
	Indirect and induced impact	£281m	2%
Total economic impact		**£16,887m**	**100%**

Note: All estimates are presented in 2021-22 prices, rounded to the nearest £1m, and may not add up precisely to the totals indicated.
Source: London Economics' analysis

Compared to the University's and its colleges' total relevant operational costs of approximately **£2.9 billion** in 2021-22[151], the total impact of the University of Oxford's activities on the UK economy was estimated at **£16.9 billion**, which corresponds to a **benefit to cost ratio of approximately 5.9:1**.

7.1 Total impact by region and sector (where available)

In addition to the total impact on the UK economy as a whole, it was possible to disaggregate *some* strands of the University's economic impact by sector and region (and estimate the impacts in terms of economic output *as well as* GVA and FTE employment). The strands of impact for which this disaggregation was achievable include:

- The direct, indirect and induced impact of the University's **research activities** (estimated at **£1.1 billion**, see Section 2.1)[152];
- The direct, indirect and induced impact of the University's **knowledge exchange activities** (estimated at **£5.8 billion**, see Section 2.2)[153];
- The impact of the University's **educational exports** (**£926 million**, see Section 4);
- The impact associated with the **operating and capital expenditure of the University and its colleges** (**£5.0 billion**, see Section 5); and
- The impact resulting from the **tourism** activities associated with the University (**£445 million**, see Section 6).

Hence, approximately **£13.3 billion** (**79%**) of the University of Oxford's total impact of **£16.9 billion** can be disaggregated in this way[154].

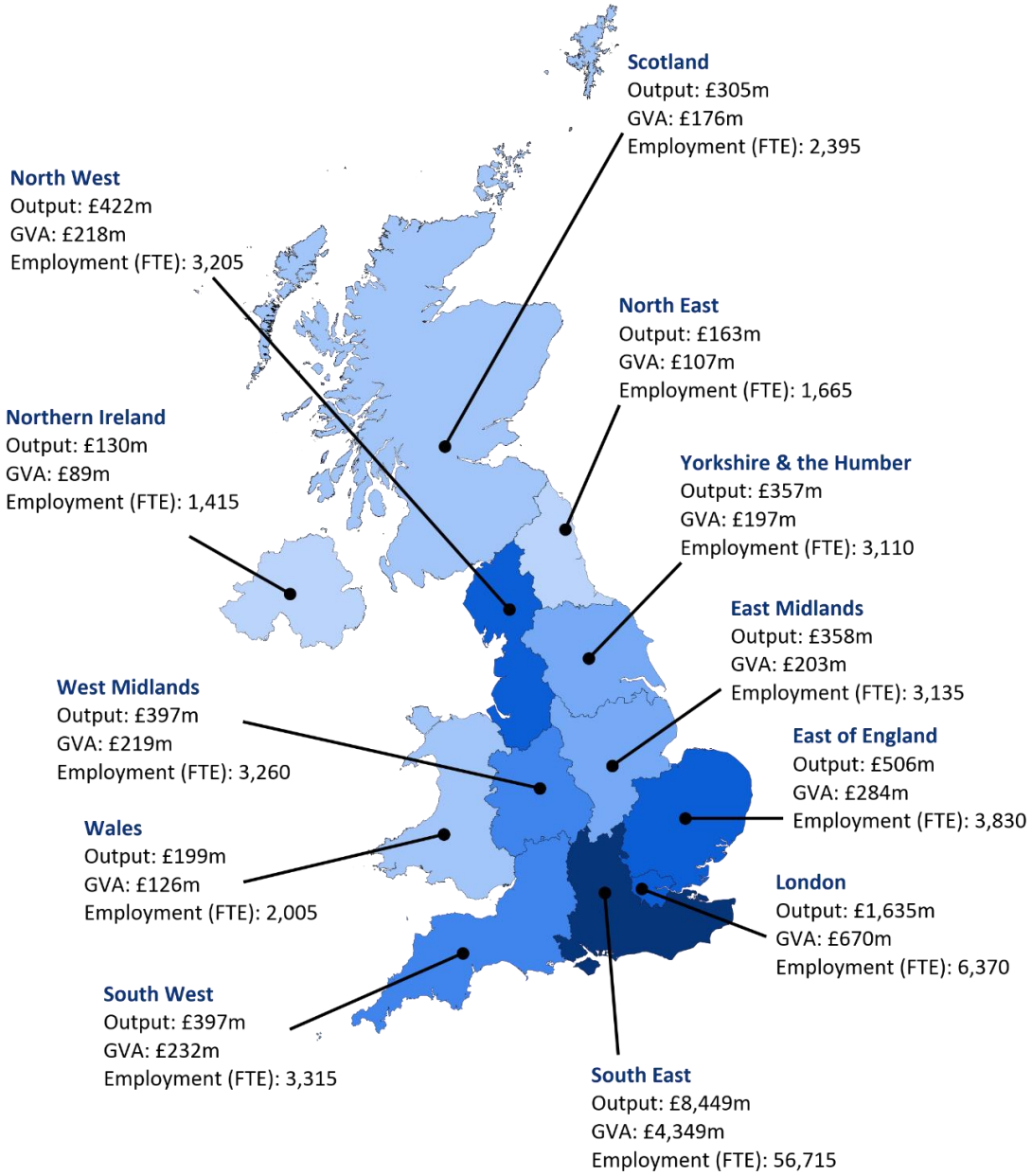
In terms of the breakdown by region, the analysis indicates that of this total of **£13.3 billion**, approximately **£8.4 billion** (**63%**) occurred in the **South East**, with the remaining **£4.9 billion** (**37%**) occurring in **other regions** across the UK (see Figure 33).

In terms of sector, the University's activities resulted in particularly large impacts within the **government, health, and education sector** (**£3.8 billion**, **29%**), the **professional and support activities sector** (**£2.1 billion**, **16%**), the **distribution, transport, hotel, and restaurant sector** (**£2.0 billion**, **15%**), and the **production sector** (**£2.0 billion**, **15%**) (see Figure 34).

[151] This relates to the total operating expenditure of the University and its colleges, excluding capital expenditure, depreciation, amortisation, and movements in pension provisions.
[152] Note that this does not include the productivity spillovers associated with the University's research activities, as these cannot be attributed to a region or sector.
[153] Note that this excludes the **£206 million** of estimated wider economic health benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine, as these cannot be disaggregated by region or sector.
[154] The remaining **£3.6 billion** of impact includes the productivity spillovers associated with the University's **research activities** (**£2.8 billion**, 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 the University's research); the wider economic benefits associated with the University's Covid-19 vaccine research (**£206 million**, where a breakdown by region and sector is not available as it was not possible to assign the geographical location where reductions in Covid-19 infections, hospitalisations and deaths took place due to the Oxford-AstraZeneca vaccine, nor the relative size of these impacts on each sector); and the impact of **teaching and learning activities** (**£557 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)).

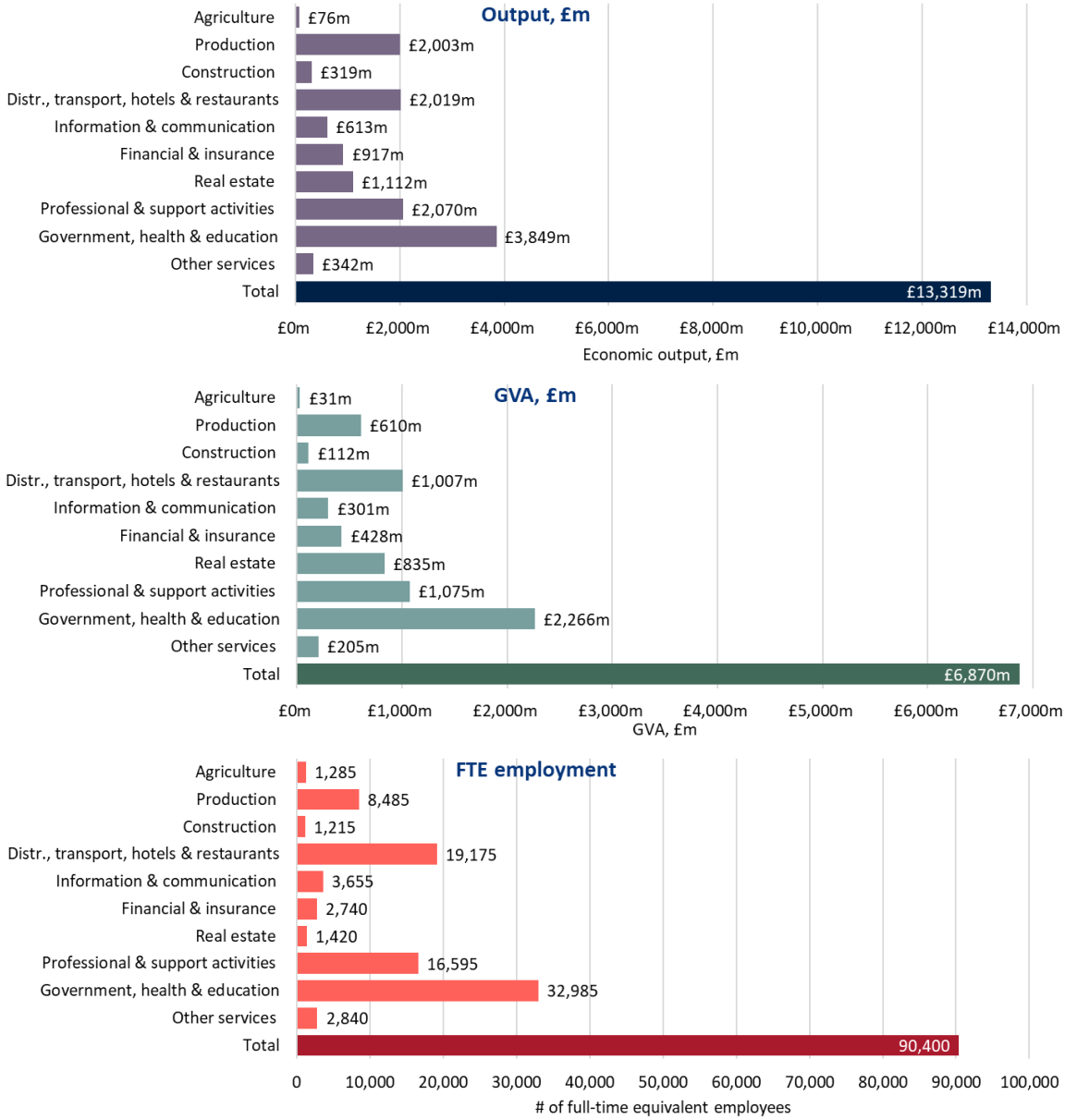
In terms of the number of FTE jobs supported, the results indicate that the total impact generated by the University's activities (where available/identifiable) supported a total of **90,400** FTE jobs across the UK economy in the 2021-22 academic year, of which **56,715** were located in the **South East**. In addition, the impact in terms of gross value added was estimated at **£6.9 billion** across the UK economy as a whole, of which **£4.3 billion** was generated within the **South East**.

Figure 33 Total identifiable economic impact associated with the University's activities in 2021-22, by region



Note: Monetary estimates are presented in 2021-22 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. The map only contains the **£13.3 billion** (of the University's total **£16.9 billion**) of economic impact that can be attributed to a region. ***Source: London Economics' analysis***

Figure 34 Total identifiable economic impact associated with the University's activities in 2021-22, by sector



Note: Monetary estimates are presented in 2021-22 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. The chart only contains the **£13.3 billion** (of the University's total **£16.9 billion**) of economic impact that can be attributed to a region. ***Source: London Economics' analysis***

Index of Tables, Figures, and Boxes

Tables

Figures

Boxes

ANNEXES

Annex 1 References

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Annex 2 Technical annex

A2.1 Multi-regional Input-Output tables

A2.1.1 Derivation of economic multipliers from multi-regional Input-Output tables

This section provides further detail on the economic multipliers utilised in this analysis, as first introduced in Section 2.1.3.

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 (here); employment by sector and region (here); gross disposable household income by region (here); population by region (here); mean weekly total paid hours worked by industry, for full-time vs. part-time employees (here); employed residents by region of usual residence and region of workplace (here); and UK imports into each region and exports by each region, by commodity (here).

In terms of sector breakdown, the original UK Input-Output tables are broken down into 105 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 15 below).

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) 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.

A2.1.2 Industry classifications for multi-regional Input-Output analysis

Table 15 provides an overview of the high-level industry classifications used throughout the multi-regional Input-Output analysis.

Table 15 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	Information and communication [58-63]
Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	
Telecommunications	
Computer programming, consultancy and related activities; information service activities	
Financial service activities, except insurance and pension funding	Financial and insurance [64-66]
Insurance, reinsurance and pension funding, except compulsory social security	
Activities auxiliary to financial services and insurance activities	
Real estate activities excluding imputed rents	Real estate [68.1-2-68.3]
Imputed rents of owner-occupied dwellings	
Legal and accounting activities; activities of head offices; management consultancy activities	Professional and support activities [69.1-82]
Architectural and engineering activities; technical testing and analysis	
Scientific research and development	
Advertising and market research	
Other professional, scientific, and technical activities; veterinary activities	

Industries included in original UK Input-Output table	High-level industry group [and UK SIC Codes]
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	
Creative, arts and entertainment activities; libraries, archives, museums, and other cultural activities; gambling and betting activities	Other services [90-97]
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 (2023) and UK SIC Codes (see Office for National Statistics, 2022)

A2.2 Impact of the University's research and knowledge exchange activities

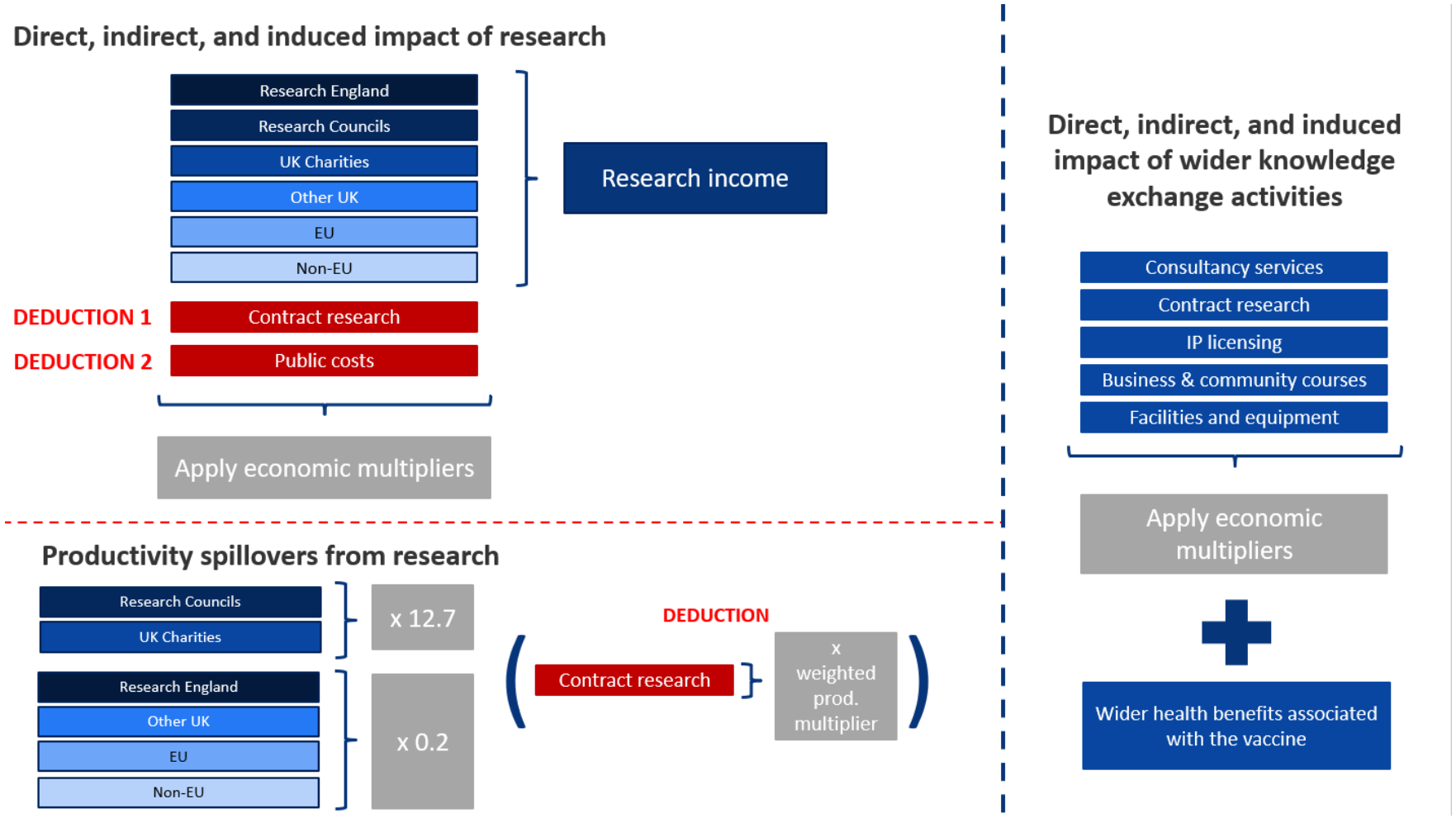
A2.2.1 Overview of the analysis of research and wider knowledge exchange activities

Figure 35 provides a schematic overview of the methodological approach adopted to analyse the economic impact of the University of Oxford's research and wider knowledge exchange activities[155] in terms of:

- The direct, indirect, and induced impact of research (Section 2.1.3);
- The productivity spillovers from the University's research (Section 2.1.4);
- The direct, indirect, and induced impact of the University's wider knowledge exchange activities (Section 2.2.3); and
- The wider health benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine (Section 2.2.4).

[155] For simplicity, the chart here excludes the impact of the University's spinout companies and of companies based at the University's Science Parks.

Figure 35 Overview of the analysis of research and wider knowledge exchange activities



Note: Research funding includes collaborative research funding, which is divided into public, cash and in-kind funding. Cash and public fall under and are included in the research categories. In-kind is excluded from the impact analysis since these contributions do not represent a cash transaction for which we can robustly apply economic multipliers. To avoid double-counting, contract research funding is deducted from the impact of research, as this is already included within the impact of wider knowledge exchange activities.

Source: London Economics analysis

A2.2.2 Literature discussing productivity spillovers

This section provides further detail on the literature estimating the productivity spillovers associated with research activities, as outlined in Section 2.1.4.

Of particular interest in the context of research conducted by universities, a study by Haskel and Wallis (2010)[156] investigates evidence of **spillovers from publicly funded research & development 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[157, 158], 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 Councils.[159] 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 insight into the size of potential productivity spillovers from university research. Rather than estimating effects on the UK economy as a whole, the authors analyse the size of spillover effects from public research across different UK industries.[160] The authors investigate the correlation between the combined research conducted by the UK Research Councils, the higher education sector, and central government itself (e.g. through public research laboratories)[161], interacted with measures of industry research activity, and total factor productivity within the different market sectors.[162] 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)**.

[156] Also, see Imperial College London (2010) for a summary of Haskel and Wallis's findings.
[157] The authors use data on government expenditure published by the (former) Department for Business, Innovation and Skills for the financial years between 1986-87 and 2005-06.
[158] This is undertaken by regressing total factor productivity growth in the UK on various measures of public sector R&D spending.
[159] Note that the authors' regressions only test for correlation, so their results could be subject to the problem of reverse causation (i.e. it might be the case that increased market sector productivity induced the government to raise public sector spending on R&D). To address this issue, the authors not only test for 1-year lags, but for lags of 2 and 3 years respectively, and 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.
[160] Haskel et al. (2014) use data on 7 industries in the United Kingdom for the years 1995 to 2007.
[161] A key difference to the multiplier for Research Council spending provided by Haskel and Wallis (2010) lies in the distinction between *performed* and *funded* research, as outlined by Haskel et al. (2014). In particular, whereas Haskel and Wallis (2010) estimated the impact of research *funding* by the Research Councils on private sector productivity, Haskel et al. (2014) instead focus on the *performance* of R&D. Hence, they use measures of the research undertaken by the Research Councils and the government, rather than the research funding which they provide for external research, (e.g. by higher education institutions). The distinction is less relevant in the higher education sector. To measure the research performed in higher education, the authors use Higher Education Funding Council funding where research is both funded by and performed in higher education.
[162] In particular, the authors regress the three-year natural log difference of total factor productivity on the three-year and six-year lagged ratio of total research performed by the Research Councils, government, and the Higher Education Funding Councils over real gross output per industry. To arrive at the relevant multiplier, this ratio is then interacted with a measure of co-operation of private sector firms with universities and public research institutes, capturing the fraction of firms in each industry co-operating with government or universities. The lagged independent variables are adjusted to ensure that the resulting coefficients can be interpreted as annual elasticities and rates of return.

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?

While 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 (2014a) 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.[163] 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. 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 multiplier of 9.76, which may be expected given the different country studied (Elnasri and Fox, 2017).[164] This demonstrates that researchers using different methods and datasets find similar results with regard to estimates of research spillovers.

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 (2014b) that focuses on internationally benchmarking the UK science and innovation system notes a rate of return in the range of 20% to 50%.[165]

A2.2.3 Regional and sectoral impact of research and knowledge exchange activities

The total direct, indirect, and induced impact of the University of Oxford's research and knowledge exchange activities can also be broken down by **region** as well as by **sector**, and can be presented in GVA and FTE employment terms.[166] These disaggregated estimates are presented in Figure 36 and Figure 37, respectively.

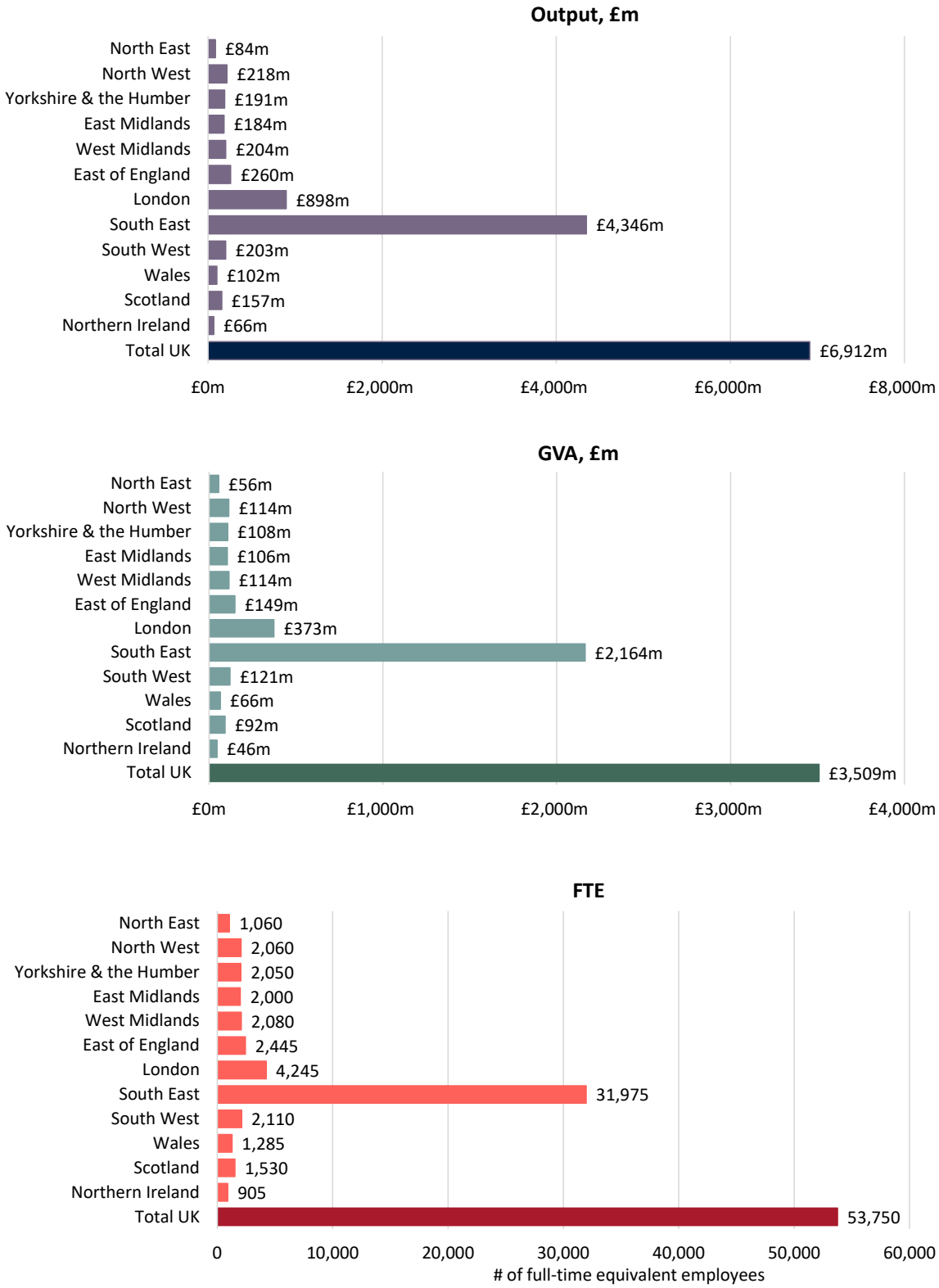
Considering the breakdown by region, in terms of **economic output** (top panel), more than half of the total impact (**£6.9 billion**[167]) of the University of Oxford's research and knowledge exchange activities occurred in the **South East** (**£4.3 billion**, **63%**), but there

[163] 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.
[164] See London Economics (2018). Elnasri and Fox (2017) find an elasticity of 0.175, which we converted to a research spillover of 9.76.
[165] See also Salter and Martin (2001).
[166] Note that this does *not* include the productivity spillovers associated with the University's research (as it is not possible to assign a geographic location or sector to each business benefiting from productivity spillovers generated by the University of Oxford's research). In addition, it is also not possible to provide a regional or sector breakdown of the wider health benefits associated with the University's Covid-19 vaccine research (where a breakdown by region and sector is not available as it was not possible to assign the geographical location where reductions in Covid-19 infections, hospitalisations and deaths took place due to the Oxford-AstraZeneca vaccine, nor the relative size of these impacts on each sector).
[167] Note again that this is the total impact that can be broken down by region and sector, i.e. the impact of research and knowledge exchange activities *excluding* productivity spillovers and the wider health impacts of the Oxford-AstraZeneca Covid-19 vaccine.

were also significant impacts occurring in other regions, particularly in **London** (**£898 million**, **13%**) and the **East of England** (**£260 million**, **4%**).

The impact in terms of **GVA** (middle panel) was estimated to be approximately **£3.5 billion** across the UK economy as a whole, of which **£2.2 billion** (**62%**) occurred in the **South East**. Finally, of the estimated **53,750 FTE jobs** (bottom panel) that were supported by the University's research and knowledge exchange activities across the UK as a whole, the majority (approximately **31,975**) were located within the **South East**.

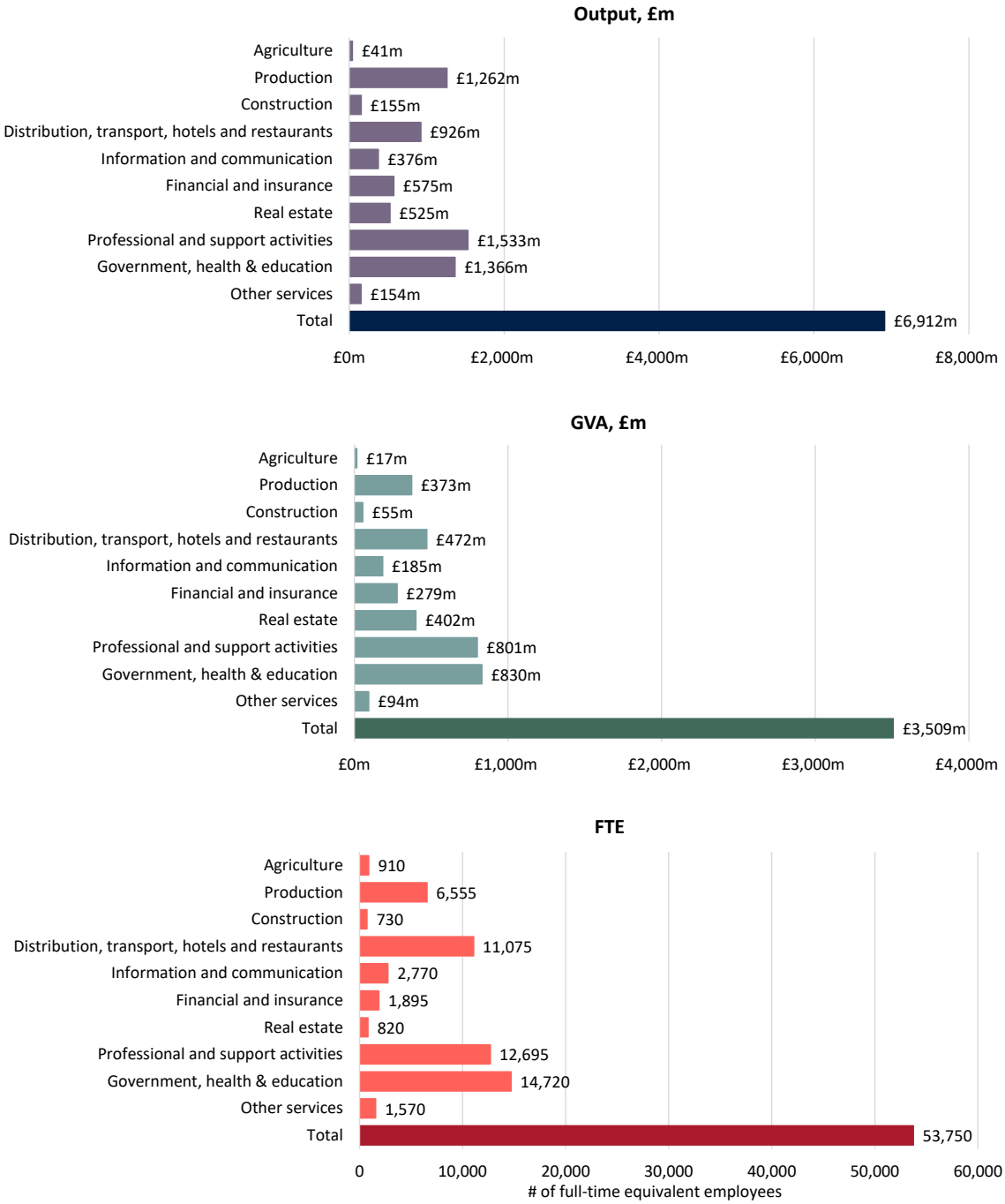
Figure 36 Direct, indirect and induced economic impact associated with the University of Oxford's research and knowledge exchange activities in 2021-22, by region



Note: Monetary estimates are presented in 2021-22 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. The estimates here *exclude* a total of **£2.8 billion** of productivity spillovers (in economic output terms) associated with the University's research, as well as **£206 million** of impact associated with the wider health benefits generated by the University's Covid-19 vaccine research.
Source: London Economics' analysis

In terms of sector, the University's research and knowledge exchange activities resulted in particularly large impacts within the **professional and support activities** sector (**£1.5 billion**, **22%**), the **government, health and education** sector (**£1.4 billion**, **20%**), and the **production** sector (**£1.3 billion**, **18%**).

Figure 37 Estimated total economic impact associated with the University of Oxford's research and knowledge exchange activities in 2021-22, by sector



Note: Monetary estimates are presented in 2021-22 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. The estimates here *exclude* a total of **£2.8 billion** of productivity spillovers (in economic output terms) associated with the University's research, as well as **£206 million** of impact associated with the wider health benefits generated by the University's Covid-19 vaccine research.
Source: London Economics' analysis

A2.2.4 Estimating the wider health benefits of the Oxford-AstraZeneca Covid-19 vaccine

As outlined in Section 2.2.4, as part of the impact of the University's knowledge exchange activities, we estimated the **specific economic benefits associated with the development of the Oxford-AstraZeneca Covid-19 vaccine**, arising from a reduction in Covid-19 infections, hospitalisations, and deaths.

The analysis relies on a study by Sandmann et al. (2021), who analyse the health and economic value of introducing Covid-19 immunisation alongside physical distancing in the UK, exploring different scenarios of UK mass immunisation over 10 years. They model scenarios under various physical distancing restrictions (ranging from a full lockdown to no restrictions) to estimate the number of Covid-19 infections, hospitalisations, and deaths that would occur under each scenario. They consider how, in each of these situations, the impacts of Covid-19 would differ after the introduction of a vaccine, presenting a range of estimates depending on varying degrees of vaccine efficacy. They then convert these estimates into monetary values by using quality-adjusted life years (QALYs), specifically considering the number of QALYs that would be lost as a result of Covid-19 infections, hospitalisations, and deaths under each scenario.

Table 16 presents the resulting net monetary impact of each vaccination scenario. This relates to the value of QALYs lost due to Covid-19 infections, hospitalisations, and deaths, as well as the costs of the health care provided as well as the cost of the development, manufacture, and administration of the vaccine[168]. All costs are presented in the physical distancing situation of no lockdown.

Table 16 Net monetary impact associated with Covid-19 in a scenario with no vaccine, a vaccine with worst-case efficacy and a vaccine with best-case efficacy

Vaccination scenario	Value of QALYs lost (£bn)	Costs (£bn)	Net impact (£bn)
No vaccine	-401.5	-85.6	**-487.1**
Worst-case vaccine efficacy	-288.9	-141.4	**-430.3**
Best-case vaccine efficacy	-60.0	-92.4	**-152.4**

Source: London Economics' analysis of Sandmann et al. (2021; see Supplementary Table 8)

Using these findings, a direct comparison between each vaccine efficacy scenario vs. the 'no vaccine' scenario can be undertaken, as shown in Table 17. The table shows the marginal economic benefits (in terms of the reduction in lost QALYs) and the marginal costs associated with the introduction of a Covid-19 vaccine (compared to a situation with no vaccine). Irrespective of the assumed vaccine efficacy, there are large economic benefits associated with the reduction Covid-19 infections, hospitalisations, and deaths from a vaccine, which outweigh the costs of the development, manufacture, and administration of

[168] Specifically, Sandmann et al. (2021) consider the NHS expenditures on Covid-19 related hospital admissions, enhanced personal protective equipment, visits to general practitioners, remote helpline calls, adverse events following immunization, and vaccine administration, as well as the wider costs associated with vaccination R&D using public funds, ultra-low temperature freezers for vaccine storage, and vaccine development and manufacturing.

the vaccine. In other words, either of the vaccine efficacy scenarios would result in a positive net monetary impact of the introduction of the vaccine. Dividing the marginal economic benefits associated with the vaccine by the marginal costs, depending on the efficacy of the vaccine, the benefit to cost ratio associated with the introduction of a vaccine stands at between **2.0** (under the worst-case vaccine efficacy scenario) and **50.1** (under the best-case vaccine efficacy scenario).

Table 17 Comparison between a scenario with no vaccine and scenarios with worst-case and best-case vaccine efficacy

Vaccination scenario	Marginal benefits (£bn)	Marginal costs (£bn)	Marginal net impact (£bn)	Benefit to cost ratio
No vaccine	-	-	-	-
Worst-case vaccine efficacy	112.6	-55.7	**56.9**	**2.0**
Best-case vaccine efficacy	341.5	-6.8	**334.7**	**50.1**

Source: London Economics' analysis of Sandmann et al. (2021; see Supplementary Table 8)

In the study by Sandmann et al. (2021), the worst-case vaccine efficacy scenario assumes a vaccine efficacy of **50%**, whilst the best-case scenario assumes a vaccine efficacy of **95%**[169]. The Oxford-AstraZeneca vaccine has a reported efficacy of **72%** (World Health Organisation, 2022), which is roughly the midpoint of these two efficacy scenarios. Therefore, our analysis here takes the midpoint of these two estimates, which is **26.0** – i.e. we assume that every **£1 million** spent on Covid-19 vaccine research results in wider health benefits worth **£26.0 million** to the UK economy.

A2.3 Impact of the University's teaching and learning activities

Section 3 above outlines our analysis of the **economic impact of teaching and learning activities** associated with the cohort of first-year UK domiciled students who started higher education qualifications at the University of Oxford in the 2021-22 academic year. In the following, we provide further details on the underlying methodological approach used to arrive at our estimates of this impact.

A2.3.1 Adjusting for completion rates

Section 3.1 above provides an overview of the number of UK domiciled students *starting* qualifications or modules at the University of Oxford in the 2021-22 academic year. However, to aggregate individual-level impacts of the University's teaching and learning activity, it is necessary to adjust the number of student 'starters' to account for **completion rates**.

To achieve this, we used information published by the Office for Students (OfS) on the historical completion outcomes of students from the University, broken down by study

[169] More specifically, the vaccination scenarios assumed by Sandmann et al.' (2021) involved vaccinating 75% of individuals in the UK aged 20 years or older (and annually revaccinating 50% of individuals aged 20–64 years and 75% of individuals aged 65 years or older). The worst-case vaccine efficacy scenario assumed 50% vaccine efficacy against disease and 45-week protection, while the best-case scenario assumed 95% vaccine efficacy against infection and 3-year protection.

mode and study intention (i.e. level of study)[170]. In other words, these completion data include the number of students who completed their intended qualification (or module); the remaining proportions of students (who did not complete their intended qualification) were modelled as completing learning 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))[171].

Table 18 presents the resulting completion rates applied throughout the analysis. We assume that, of those students starting a full-time first degree at the University of Oxford in the 2021-22 academic year, **99%** complete the first degree as intended, while the remaining **1%** undertake one or more of the credits/modules associated with their degree before discontinuing their studies (modelled as completion at 'other undergraduate' level). Similarly, at postgraduate level, we assume that of those individuals starting a full-time postgraduate taught degree, **99%** complete the qualification as intended, while the remaining **1%** complete another (lower) qualification or 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). In all these cases, **the analysis of the impact of teaching and learning calculates the estimated returns associated with the *completed* qualification/standalone module(s)**.

Table 18 Assumed completion rates of University of Oxford student 'starters'

Completion outcome	Study intention				
	Other undergraduate	First degree	Other postgraduate	Higher degree (taught)	Higher degree (research)
Full-time students					
Other undergraduate	100%	1%	-	-	-
First degree	-	99%	-	-	-
Other postgraduate	-	-	100%	1%	4%
Higher degree (taught)	-	-	-	99%	-
Higher degree (research)	-	-	-	-	96%
Total	**100%**	**100%**	**100%**	**100%**	**100%**
Part-time students					
Other undergraduate	100%	-	-	-	-
First degree	-	-	-	-	-
Other postgraduate	-	-	100%	7%	19%
Higher degree (taught)	-	-	-	93%	-
Higher degree (research)	-	-	-	-	82%
Total	**100%**	**-**	**100%**	**100%**	**100%**

Note: There were no students in the 2021-22 cohort of UK domiciled University of Oxford students undertaking first degrees on a part-time basis (also see Section 3.1). Totals may not sum due to rounding.
Source: London Economics' analysis based on data published by the Office for Students (2023)

[170] See Office for Students (2023). Data are based on full-time 2014-15 to 2017-18 entrants, and part-time 2012-13 to 2015-16 entrants to the University of Oxford. Completion rates are defined as 'the proportion of students that were observed to have gained a higher education qualification (or were continuing in the study of a qualification) four years and 15 days after they started their course (six years and 15 days for part-time students)'.
[171] In other words, we assume that students who did not complete their studies 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%.

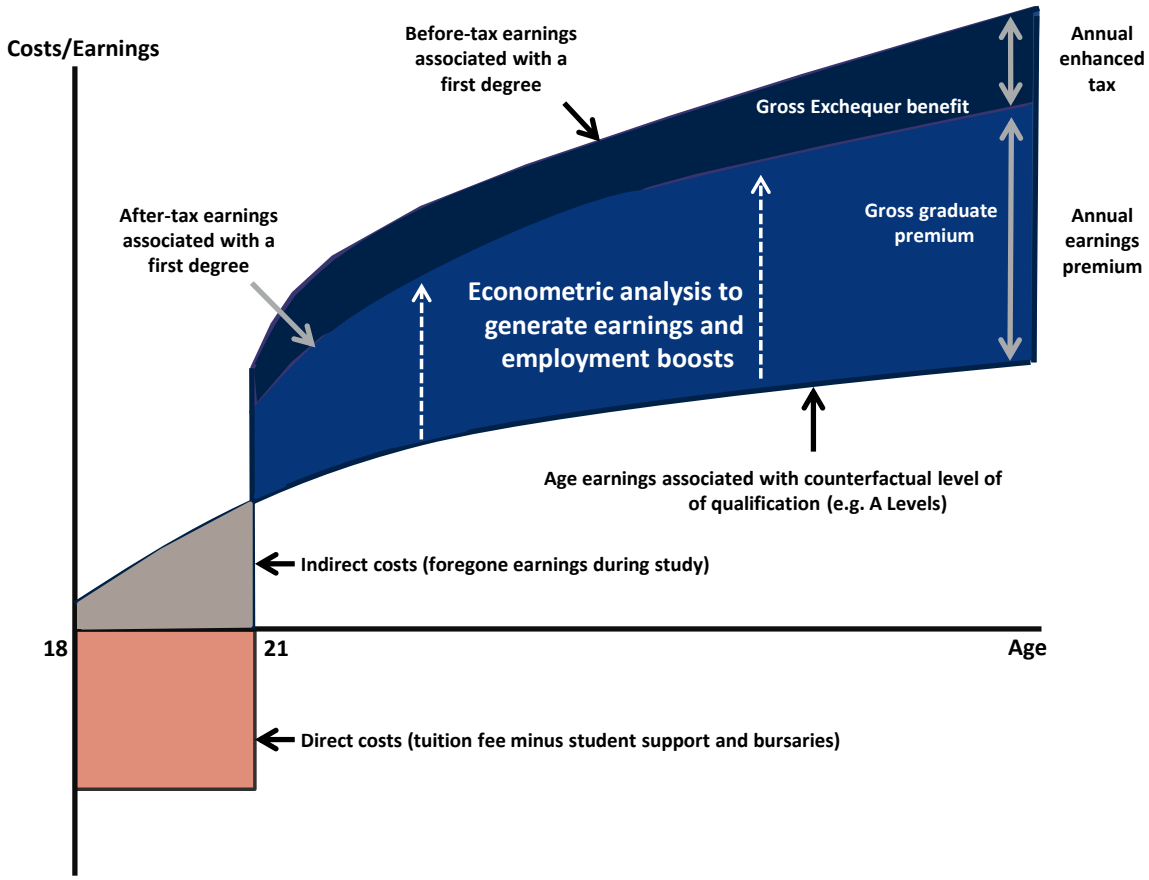
A2.3.2 Defining the gross graduate premium and gross public purse benefit

As summarised in Section 3.2, to measure the economic benefits of higher education qualifications, we estimate the **labour market value associated with these qualifications**, rather than simply assessing the labour market outcomes achieved by individuals *in possession* of higher education qualifications. 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' (to the greatest extent possible with the relevant data) 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 38 for an illustration of this). The treatment and counterfactual groups, and details of the econometric approach, are presented in Annex A2.3.3 and Annex A2.3.4, respectively.

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 adjusted for the specific **subject composition** of students studying at the University of Oxford, to reflect the fact that there is significant variation in post-graduation labour market outcomes depending on the subject of study. 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 market[172].

[172] See Annex A2.3.5 for more information.

Figure 38 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 the University of Oxford's UK domiciled student cohort data for 2021-22, where the mean age at enrolment for full-time first degree students stands at 18, and the average study duration for full-time first degree students is 3 years.
Source: London Economics

To estimate the **gross graduate premium**, based on the results from the econometric analysis, 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 A2.3.6 for more detail).

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 estimate 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 A2.3.6 for more detailed information on the calculation of the gross Exchequer benefit.

A2.3.3 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 A2.3.4) considered **five different higher education qualification groups** (i.e. five **'treatment' groups** for HE qualifications):

- **Three at postgraduate level** (higher degree (research), higher degree (taught) and 'other' postgraduate qualifications[173]); and
- **Two at undergraduate level** (first degrees and 'other' undergraduate qualifications[174]);

Table 19 presents these different undergraduate and postgraduate 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 above, we compare the earnings of the group of individuals in possession of each 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 us to control for other personal, regional, or socioeconomic characteristics that might influence *both* the determinants of qualification attainment as well as earnings/employment.

Table 19 Treatment and comparison groups used to assess the marginal earnings and employment returns to higher education qualifications

Treatment group – highest qualification	Comparison group - highest qualification
HE qualifications	
Higher degree (research)	First degree
Higher degree (taught)	First degree
Other postgraduate	First degree
First degree	2 or more GCE 'A' Levels
Other undergraduate	2 or more GCE 'A' Levels
Other	
2 or more GCE 'A' Levels	5 or more GCSEs grade A*-C

Source: London Economics

For the analysis of marginal labour market returns, postgraduate qualification holders are compared to first degree holders. In contrast, for individuals holding first degrees or 'other

[173] 'Other' postgraduate relates to Labour Force Survey variables HIQUAL8, HIQUAL11, HIQUAL15 and HIQUAL22 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).

[174] 'Other' undergraduate relates to Labour Force Survey variables HIQUAL8, HIQUAL11, HIQUAL15 and HIQUAL22 value labels 'other degree', 'diploma in higher education', and 'other higher education below degree'. Interviewers are instructed to use 'other higher education below degree' only if the respondent states that they have 'something from higher education but they do not know what it is'. It is therefore not possible to provide examples of typical qualifications that would normally fall under this category. The response option serves the purpose of confirming that higher education qualifications have been achieved but that the respondent is unaware of the actual qualification title itself.

undergraduate' level qualifications, the counterfactual group consists of individuals holding 2 or more GCE 'A' Levels as their highest qualification[175, 176].

In addition, we also included a separate specification comparing the earnings associated with 2 or more GCE A Levels to possession of 5 or more GCSEs at grades A*-C (or equivalent). This additional analysis was undertaken to reflect the fact that the academic 'distance travelled' by a (very small) proportion of students in the 2021-22 University of Oxford 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 the University of Oxford was higher or lower than the 'traditional' counterfactual qualifications outlined in Table 19, the analysis used a **'stepwise' calculation of additional lifetime earnings and employment**. For example, to calculate the earnings and employment returns for a student **in possession of an 'other undergraduate' qualification undertaking a first degree at the University of Oxford**, 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 A Levels). Similarly, to calculate the returns for a student **in possession of 5 GCSEs A*-C (or equivalent) undertaking a first degree at the University of Oxford**, we *added* the returns to achieving 2 or more A Levels (relative to the possession of 5 GCSEs A*-C) to the returns to undertaking a first degree (relative to the possession of 2 or more A Levels)[177].

A2.3.4 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 (LFS), 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

[175] This reflects the fact that, among students in the 2021-22 cohort of UK domiciled University of Oxford students who started undergraduate qualifications and who were in possession of Regulated Qualifications Framework (Level 3) qualifications as their highest prior attainment, the vast majority were in possession of 2 or more GCE 'A' Levels as their highest prior attainment (rather than any other types of Level 3 qualifications).

[176] In terms of prior attainment, note that for 120 students in the 2021-22 cohort of UK domiciled University of Oxford students, previous attainment levels were specified as 'Not known', '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 in the cohort undertaking qualifications at the same level (separately by study mode).

[177] 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).

earnings. In this model specification, we included individuals who were employed on either a full-time or a part-time basis. This approach has been used widely in the academic literature.

The basic specification of the model was as follows:

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

where ln(ω_i) represents the natural logarithm of hourly earnings, $\epsilon_i$represents an error term, α represents a constant term, i is an individual LFS respondent, and X_i provides the independent variables included in the analysis, as follows:

- Highest qualification held;
- Age;
- Age squared;
- Ethnic origin;
- Disability status;
- Region of work;
- 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; and
- Yearly dummies.

Using the above specification, we estimated earnings returns in aggregate and **for men and women separately**. Further, to analyse the benefits associated with different education qualifications over the lifetime of individuals holding these qualifications, the regressions were **estimated separately across a range of specific age bands** for the working age population, depending on the qualification considered. The estimated marginal earnings returns also take account of the specific subject mix of UK domiciled students in the 2021-22 University of Oxford cohort.[178] As a result, the estimated marginal wage returns **adjust for the specific subject composition of the University of Oxford's student cohort**, where possible.[179]

[178] This subject mix adjustment was made by applying weights in the LFS regressions reflecting the proportion of students in the cohort enrolled in each subject area. The HESA Common Aggregation Hierarchy (CAH) was used to classify subject areas for HE qualification holders. The following subject groups were distinguished: (1) Medicine & dentistry, (2) Subjects allied to medicine, (3) Biological and sports sciences, (4) Psychology, (5) Veterinary science, (6) Agriculture, food & related subjects, (7) Physical sciences, (8) General & others in sciences, (9) Mathematical sciences, (10) Engineering & technology, (11) Computer science, (13) Architecture, building & planning, (14) Humanities & liberal arts (non-specific), (15) Social sciences, (16) Law, (17) Business & management, (19) Language & area studies, (20) Historical, philosophical & religious studies, (22) Education and teaching, (23) Combined & general studies, (24) Media, journalism and communications, (25) Design, and creative and performing arts, and (26) Geography, earth and environmental studies.

[179] Note that the LFS data did not include information on subject for students undertaking 'other undergraduate' qualifications. Therefore, the subject mix adjustment factors for other undergraduate qualifications were instead based on the subject-level returns to first degrees, weighted by the number of students in the cohort undertaking other undergraduate qualifications in each subject, and multiplied by the overall ratio of the marginal earnings returns to other undergraduate qualifications relative to first degrees (across all subjects).

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.

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 Q1 2010 and Q4 2023**.

The resulting estimated marginal wage returns to the different qualifications of interest are presented in Table 20. In the earnings regressions, the coefficients provide an indication of the additional effect on hourly earnings associated with possession of the respective higher education qualification relative to the counterfactual level of qualification. To take an example, the analysis suggests that men aged between 41 and 45 in possession of a first degree achieve a **28.7%** hourly earnings premium compared to comparable men holding only 2 or more A Levels as their highest level of attainment. The comparable estimate for women aged between 31 and 35 stands at **34.7%**.

Table 20 Marginal earnings returns to higher education qualifications (weighted across subjects), in % (following exponentiation), by gender and age band

Qualification level (vs. counterfactual)	Age band								
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Men									
2+ A Levels (vs. 5+ GCSEs)[1]	8.3%	13.5%	21.7%	24.2%	20.3%	23.7%	19.7%	23.7%	18.9%
Other undergraduate (vs. 2+ A Levels)[2]			5.3%		12.5%		8.1%	7.8%	19.2%
First degree (vs. 2+ A Levels)[2]	9.0%	15.8%	22.5%	25.2%	28.7%	19.2%	26.6%	31.3%	30.6%
Other postgraduate (vs. first degrees)[3]		5.7%	6.4%						
Higher degree (taught) (vs. first degrees)[3]		3.4%	4.0%	9.1%	8.4%	5.4%	6.4%	12.1%	10.1%
Higher degree (research) (vs. first degrees)[3]	21.4%	11.7%	16.4%	17.0%	23.1%	32.8%	32.7%	23.4%	45.2%
Women									
2+ A Levels (vs. 5+ GCSEs)[1]	6.7%	11.0%	10.8%	18.2%	21.3%	15.4%	17.0%	15.5%	15.1%
Other undergraduate (vs. 2+ A Levels)[2]				9.5%	6.0%	8.9%	9.6%	12.0%	12.3%
First degree (vs. 2+ A Levels)[2]	9.5%	19.8%	29.6%	36.6%	34.7%	32.3%	35.3%	27.5%	25.1%
Other postgraduate (vs. first degrees)[3]		8.0%	9.4%	12.4%	12.9%	16.8%	22.4%	13.5%	20.8%
Higher degree (taught) (vs. first degrees)[3]		4.7%	9.6%	16.3%	17.8%	20.4%	12.3%	24.7%	24.9%
Higher degree (research) (vs. first degrees)[3]	11.3%	16.9%	28.4%	36.9%	34.4%	40.4%	45.9%	43.5%	45.2%

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 are estimated relative to 5 or more GCSEs at A*-C (or equivalent).

[2] Returns to other undergraduate qualifications and first degrees 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 first degrees.

Source: London Economics' analysis of pooled Quarterly Labour Force Survey data for 2010 Q1 - 2023 Q4

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:

$$Probit(EMPNOT_i) = \alpha + \gamma Z_i + \epsilon_i \quad \text{for } i = 1 \text{ to n}$$[180]

The dependent variable adopted represents the binary variable $EMPNOT_i$, which is coded 1 if the individual is in employment and 0 otherwise.[181] 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:

- Highest qualification held;
- Age;
- Age squared;
- Ethnic origin;
- Disability status;
- Region of usual residence;
- 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 above-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 2021-22 cohort of UK domiciled students attending the University of Oxford. Further, and again similar to the analysis of earnings returns, employment returns were estimated at the national (i.e. UK-wide) level.

[180] Where i is again an individual LFS respondent.
[181] The probit function reflects the cumulative distribution function of the standard normal distribution.

Table 21 Marginal employment returns to higher education qualifications (weighted across subjects), in percentage points, by gender and age band

Qualification level	Age band								
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Men									
2+ A Levels (vs. 5+ GCSEs)[1]	2.3	4.2	2.5	1.5	1.8	1.4			
Other undergraduate (vs. 2+ A Levels)[2]					1.8		3.3		
First degree (vs. 2+ A Levels)[2]	-5.7	2.3			1.4		2.6		-3.4
Other postgraduate (vs. first degrees)[3]	7.4		2.0			3.4	3.6		-5.0
Higher degree (taught) (vs. first degrees)[3]	-4.6	-2.2						3.6	
Higher degree (research) (vs. first degrees)[3]	12.8	2.6		1.5	3.3		5.1	9.7	9.1
Women									
2+ A Levels (vs. 5+ GCSEs)[1]	4.4	4.5	2.5		2.4	3.3	2.2		
Other undergraduate (vs. 2+ A Levels)[2]	3.5		4.0	6.3	4.3	4.4	4.2	4.2	
First degree (vs. 2+ A Levels)[2]		3.6	4.8	5.7	4.8				
Other postgraduate (vs. first degrees)[3]	4.1		2.8	2.3	3.7	3.7		4.2	
Higher degree (taught) (vs. first degrees)[3]	-7.2	-2.9			2.3		2.5	4.0	4.3
Higher degree (research) (vs. first degrees)[3]		-3.2	2.6		4.2	4.7	7.4	9.8	17.3

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 are estimated relative to 5 or more GCSEs at A*-C (or equivalent).

[2] Returns to other undergraduate qualifications and first degrees 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 first degrees.

Source: London Economics' analysis of pooled Quarterly Labour Force Survey data for 2010 Q1 - 2023 Q4

The resulting estimated marginal employment returns to HE qualifications are presented in Table 21. 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 41 and 45 in possession of a first degree is **1.4 percentage points** more likely to be in employment than a man of similar age holding only 2 or more GCE A Levels as their highest level of attainment. The corresponding estimate for women stands at **4.8 percentage points**.

A2.3.5 '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 18 onwards (completing by the age of 21 or 22). These analyses assume that there are **direct costs** (tuition fees etc.), as well as **opportunity costs** (the foregone earnings while 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 student (e.g. the estimated average age at enrolment among students in the 2021-22 cohort completing postgraduate taught degrees with the University of Oxford on a part-time basis is **36**, compared to **24** 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 22 presents the assumed average age at enrolment, study duration, and age at completion for students in the 2021-22 University of Oxford cohort[182].

Table 22 Average age at enrolment, study duration, and age at completion for students in the 2021-22 University of Oxford 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	21	1	22	47	1	48
First degree	18	3	21	-	-	-
Other postgraduate	25	1	26	37	1	38
Higher degree (taught)	24	1	25	36	2	38
Higher degree (research)	26	4	30	38	6	44

Note: All values have been rounded to the nearest integer. Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (there were no students in the cohort undertaking first degrees on a part-time basis).

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

Given these characteristics, we adjust the methodology when estimating the returns to part-time (and any later full-time) education attainment at the University of Oxford, 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 earnings and employment benefit accrues to the individual[183]. 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

[182] The assumed average age at enrolment is based on the number of individuals in the cohort assumed to *complete* a given qualification at the University of Oxford (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 Annex A2.3.1 for more information)). In particular, the age at enrolment per qualification (based on the HESA data provided by the University of Oxford) is calculated as the weighted average age at enrolment across students in the 2021-22 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 durations of study for both full-time and part-time students (by qualification level) are based on separate information provided by the University of Oxford (derived from the University's HESA student return data for academic years 2018-19, 2020-21, and 2021-22).

[183] 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.

attainment (and perhaps reflect potentially different motivations among 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 23 presents the assumed age-decay adjustment factors which we apply to the marginal earnings and employment returns to full-time and part-time students undertaking qualifications at the University of Oxford in the 2021-22 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 **38** (on average)), these students recoup only **71%** of the corresponding earnings and employment premiums from that age (of attainment).

Table 23 Assumed age decay adjustment factors for students in the 2021-22 University of Oxford 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 the relevant average graduation age per full-time / part-time student at each level of study at the University of Oxford (also see Table 22):

Full-time students Part-time students

Again, note that there were no students in the cohort undertaking first degrees on a part-time basis.

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

A2.3.6 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 in Annex A2.3.4) 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 (e.g., 2 or more A Levels or first degrees), again using pooled Quarterly UK Labour Force Survey data between Q1 2010 and Q4 2023.
2. We inflated these baseline or counterfactual earnings using the marginal earnings premiums and employment premiums (presented in Table 20 and Table 21 in Annex A2.3.4), adjusted to reflect late attainment (as outlined in Annex A2.3.5), 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 are expected to increase over time (based on average annual earnings growth rate forecasts estimated by the Office for Budget Responsibility (2023 and 2024)[184]).
4. Based on the earnings profiles generated by qualification holders, and income tax and National Insurance rates and allowances for the relevant academic year[185], we computed the future stream of net (i.e. post-tax) earnings[186]. Using similar assumptions, we further calculated the stream of (employment-adjusted) foregone earnings (based on earnings in the relevant counterfactual group[187]) during the period of study, again net of tax, for full-time students only.
5. We calculated the **discounted** stream of additional (employment-adjusted) future earnings compared to the relevant counterfactual group (using a standard real discount rate of **3.5%** (Years 1-30) and **3.0%** (Years 31+) as outlined in HM Treasury Green Book (HM Treasury, 2022)), and the discounted stream of foregone earnings during qualification attainment (for full-time students), to

[184] Specifically, we make use of the Office for Budget Responsibility's most recent short-term forecasts (for 2022-23 to 2028-29; see Office for Budget Responsibility (2024)) and long-term forecasts (for 2029-30 onwards; see Office for Budget Responsibility (2023)) of nominal average earnings growth.

[185] i.e. 2021-22. 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 rates of average annual earnings growth (again based on Office for Budget Responsibility forecasts).

[186] The tax adjustment also takes account of increased VAT revenues for HMT, by assuming that individuals consume 91.3% 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 (2024), while the proportion of consumption subject to VAT is based on VAT estimates provided by the Office for Budget Responsibility (no date).

[187] 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 A2.3.3, some students in the 2021-22 University of Oxford 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 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 undertaken at the University of Oxford). In addition, the estimated foregone earnings for students previously in possession of postgraduate qualifications are based on the earnings of individuals in possession of first degrees.

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 first degree undertaking an additional degree at the University of Oxford 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 England.

A2.3.7 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 acquisition[188]. These direct costs refer to the **proportion of the tuition fee paid by the student**[189] net of any **tuition fee support** or **maintenance support** provided by the Student Loans Company (SLC, for students from Wales, England, and Northern Ireland) or the Students Awards Agency (SAAS, for students from Scotland)[190], and minus any **fee waivers or bursaries** provided by the University of Oxford[191]. In this respect, the

[188] 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 above-described gross graduate premium.

[189] We made use of information provided by the University of Oxford on the average tuition fees charged per *full-time* student at the University in the 2021-22 academic year, separately by domicile 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 arrive at the net fees per *part-time* student (ensuring that the fees for part-time students accurately reflect the average study intensity amongst part-time students in the 2021-22 cohort), we adjusted the respective full-time rates for the average study intensity amongst part-time students in the cohort. In turn, the average study intensity (separately by study level) was 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 the University of Oxford).

[190] 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 2021-22 (see Student Loans Company 2022a, 2022b and 2022c, 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, 2022). To ensure comparability across the different Home Nations, we focus only on core student support in terms of tuition fee grants, tuition fee loans, maintenance grants, and maintenance loans (where applicable), but *exclude* any Disabled Students' Allowance and other targeted support. Wherever possible, we focus on the average level of support for students in public providers only, for the most recent cohorts possible, split by domicile (i.e. 'Home' vs. EU). 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, where applicable, the assumed average fee loans or fee grants per student have been capped at the average tuition fees charged per University of Oxford student in 2021-22.

[191] Average fee waivers and non-fee waivers (i.e. other bursaries and scholarships) per student were calculated based on information provided by the University of Oxford on the total amount of scholarships, fee waivers, and other bursaries provided to students by the

student benefit associated with public tuition fee loan or maintenance loan support equals the **Resource Accounting and Budgeting charge** (RAB charge)[192], 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 Ireland.

The **direct costs**[193] **to the public purse** include the **teaching grant funding** administered by the Office for Students[194], the **student support** provided in the form of fee and maintenance loans/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 2021-22 money terms), all benefits and costs occurring at points in the future were **discounted** using the standard HM Treasury Green Book real discount rates of **3.5%/3.0%** (see HM Treasury, 2022). Deducting the resulting individual and Exchequer costs from the estimated gross

University in 2021-22, by domicile (i.e. UK, EU, and non-EU students) and level of study. The majority of the information was not split out by study mode; therefore, for simplicity, any funding that was not split by study mode was assumed to apply to full-time students only, and any (very small) amounts of funding explicitly associated with part-time students were excluded from the analysis. The information on total funding was then combined with HESA data provided by the University of Oxford in terms of the total number of (full-time) students enrolled with the University in 2021-22 (again by domicile and level), to arrive at an estimate of the average fee waiver/bursary funding per (full-time) student per year, by level and domicile. Note that, due to the devolved nature of the University, it was not possible to include bursary information from the University's divisions, departments, colleges, or other external funding partners. As a result, the estimates are based exclusively on centrally available data within the University of Oxford.

[192] For **undergraduate full-time students**, we have assumed a RAB charge of **28%** associated with tuition fee and maintenance loans for English domiciled students (based on data published by the Department for Education (2023a)), which includes the impact on the RAB charge of the Department's recently announced policy changes in response to the Augar Review of Higher Education (for post-2012 English loan borrowers). We have further assumed a RAB charge of **0%** for Welsh domiciled students, **30%** for Scottish domiciled students, and **14%** for Northern Irish students, all of which are based on our modelling of the Exchequer costs associated with the current higher education fees and funding systems (for undergraduate students) operating in Wales, Scotland, and Northern Ireland, respectively (for more information, see London Economics (2024b)).

For **undergraduate part-time students**, based on the same sources, we have assumed a RAB charge of **21%** for English domiciled students, **7%** for Welsh domiciled students; and **10%** for Northern Irish domiciled students. There is currently no student loan funding provided to Scottish domiciled undergraduate part-time students (so that no RAB charge assumptions are required).

For the loans for both **full-time and part-time postgraduate taught students** from England, we have assumed a RAB charge of **0%** (based on the Department for Education's (2023a) student RAB charge estimates for postgraduate Master's loans for English students). In the absence of alternative information, we have also assumed a RAB charge of **0%** for students from Wales, Scotland, and Northern Ireland (where applicable).

Finally, for **full-time and part-time postgraduate research students**, while there were no Doctorate loans available for Scottish domiciled or Northern Irish domiciled students, for students from England and Wales, we have assumed a RAB charge of **25%** (again based on Department for Education (2023a)).

[193] 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.

[194] This is based on published HESA financial information on the total OfS recurrent teaching grant received by the University of Oxford in 2021-22 (see HESA, 2024b), divided by the total number of UK domiciled and *continuing* EU students enrolled with the University in 2021-22 (excluding any first-year EU students, as well as 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)). The inclusion of *continuing* EU students in the calculations was based on the fact that EU domiciled *first-year* students starting HE qualifications in the UK in 2021-22 were subject to the new post-Brexit rules – and, therefore, were generally no longer eligible for public teaching grant funding. In contrast, EU domiciled *continuing* students in 2021-22 were, in general, still eligible for this funding. We then adjusted for the average assumed study intensity among full-time and part-time students in the 2021-22 University of Oxford student cohort, to arrive at separate rates of teaching grant funding by study mode.

graduate premium and gross public purse benefit, respectively, we arrive at the estimated **net graduate premium** and **net public purse benefit** per student (see Annex A2.3.8).

A2.3.8 Estimated gross and net graduate premiums and public purse benefits

Table 24 presents the estimated gross graduate premiums and gross public purse benefits per student associated with higher education qualifications at the University of Oxford (based on the 2021-22 cohort, and broken down by study mode, level of study, gender[195], and prior attainment) resulting from the above-outlined analysis. Table 25 provides corresponding information on the associated net graduate premiums and net public benefits per student.

[195] In terms of gender, it is important to note that the economic benefits associated with qualification attainment - expressed in *monetary terms* - are often lower for women than men, predominantly as a result of the increased likelihood of spending time out of the active labour force. However, reflecting the wider economic literature, the *marginal benefits* associated with qualification attainment - expressed as either the *percentage increase* in hourly earnings or enhanced probability of employment - are often greater for women than for men (see Annex A2.3.4).

Table 24 Gross graduate premiums and Exchequer benefits per student associated with HE qualification attainment at the University of Oxford, by study mode, level, gender, and prior attainment

Level of study	Previous qualification and gender													
	5+ GCSEs		2+ A Levels		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			£21,000	£22,000	-£12,000	-£11,000	-£9,000	-£10,000	-£9,000					
First degree	£193,000		£101,000	£76,000	£70,000	£44,000	-£23,000	-£22,000			-£23,000	-£22,000	-£23,000	
Other postgraduate							-£2,000	£55,000			-£19,000	-£18,000		-£18,000
Higher degree (taught)					£126,000	£123,000	£29,000	£52,000	£11,000	-£17,000	-£17,000	-£17,000	-£17,000	-£17,000
Higher degree (research)							£81,000	£89,000	£68,000	£25,000	£36,000	£22,000	-£88,000	-£78,000
Part-time students														
Other undergraduate	£29,000	£17,000	£9,000	£9,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
First degree														
Other postgraduate	£130,000			£99,000	£54,000	£77,000	£3,000	£46,000	£0	£0	£0	£0	£0	£0
Higher degree (taught)	£158,000				£84,000	£80,000	£33,000	£50,000	£31,000	£5,000	£0	£0	£0	£0
Higher degree (research)					£107,000		£80,000			£45,000	£61,000	£42,000		£0
Gross Exchequer benefits														
Full-time students														
Other undergraduate			£25,000	£25,000	-£3,000	-£2,000	-£1,000	-£2,000	-£1,000					
First degree	£187,000		£107,000	£78,000	£81,000	£52,000	-£2,000	-£4,000			-£2,000	-£4,000	-£2,000	
Other postgraduate							£8,000	£52,000			-£9,000	-£7,000		-£7,000
Higher degree (taught)					£129,000	£107,000	£41,000	£48,000	£23,000	-£7,000	-£7,000	-£7,000	-£7,000	-£7,000
Higher degree (research)							£134,000	£98,000	£121,000	£46,000	£87,000	£45,000	-£47,000	-£38,000
Part-time students														
Other undergraduate	£24,000	£13,000	£8,000	£7,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
First degree														
Other postgraduate	£113,000			£80,000	£49,000	£63,000	£4,000	£37,000	£0	£0	£0	£0	£0	£0
Higher degree (taught)	£142,000				£80,000	£64,000	£35,000	£39,000	£31,000	£3,000	£0	£0	£0	£0
Higher degree (research)					£108,000		£85,000			£35,000	£66,000	£33,000		£0

Note: All values are rounded to the nearest £1,000. Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (with the given characteristics). Grey shading indicates instances where the level of study at the University of Oxford 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 than 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 25 Net graduate premiums and Exchequer benefits per student associated with HE qualification attainment at the University of Oxford, by study mode, level, gender, and prior attainment

Level of study	Previous qualification and gender													
	5+ GCSEs		2+ A Levels		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
Net graduate premiums														
Full-time students														
Other undergraduate			£17,000	£18,000	-£16,000	-£15,000	-£13,000	-£14,000	-£13,000					
First degree	£183,000		£91,000	£66,000	£61,000	£34,000	-£33,000	-£32,000			-£33,000	-£32,000	-£33,000	
Other postgraduate							-£16,000	£41,000			-£33,000	-£32,000		-£32,000
Higher degree (taught)					£113,000	£109,000	£15,000	£38,000	-£3,000	-£31,000	-£31,000	-£31,000	-£31,000	-£31,000
Higher degree (research)							£55,000	£63,000	£42,000	-£1,000	£10,000	-£3,000	-£114,000	-£104,000
Part-time students														
Other undergraduate	£29,000	£17,000	£10,000	£9,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
First degree														
Other postgraduate	£125,000			£94,000	£49,000	£72,000	-£2,000	£41,000	-£5,000	-£5,000	-£5,000	-£5,000	-£5,000	-£5,000
Higher degree (taught)	£149,000				£74,000	£70,000	£24,000	£40,000	£21,000	-£5,000	-£10,000	-£10,000	-£10,000	-£10,000
Higher degree (research)					£78,000		£51,000			£15,000	£32,000	£13,000		-£29,000
Net Exchequer benefits														
Full-time students														
Other undergraduate			£20,000	£20,000	-£8,000	-£7,000	-£6,000	-£7,000	-£6,000					
First degree	£173,000		£93,000	£64,000	£66,000	£38,000	-£16,000	-£17,000			-£16,000	-£17,000	-£16,000	
Other postgraduate							£7,000	£51,000			-£10,000	-£9,000		-£9,000
Higher degree (taught)					£127,000	£106,000	£40,000	£47,000	£22,000	-£8,000	-£8,000	-£8,000	-£8,000	-£8,000
Higher degree (research)							£133,000	£97,000	£120,000	£44,000	£86,000	£43,000	-£48,000	-£40,000
Part-time students														
Other undergraduate	£23,000	£11,000	£7,000	£5,000	-£1,000	-£1,000	-£1,000	-£1,000	-£1,000	-£1,000	-£1,000	-£1,000	-£2,000	-£1,000
First degree														
Other postgraduate	£113,000			£80,000	£49,000	£63,000	£4,000	£37,000	£0	£0	£0	£0	£0	£0
Higher degree (taught)	£142,000				£79,000	£64,000	£35,000	£39,000	£31,000	£2,000	£0	£0	£0	£0
Higher degree (research)					£107,000		£83,000			£33,000	£64,000	£32,000		-£1,000

Note: All values are rounded to the nearest £1,000. Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (with the given characteristics). Grey shading indicates instances where the level of study at the University of Oxford is equal to or lower than the level of previous attainment. In these instances, the analysis implicitly assumes that all calculated net 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***

A2.4 Impact of the University's educational exports

A2.4.1 The impact of Brexit on fees and funding for EU students

The UK's exit from the European Union has had several significant impacts on the fees and funding rules for EU domiciled students studying in the UK, with 2021-22 being the first academic year in which post-Brexit rules applied to these students.

In relation to **tuition fees**, pre-Brexit, EU students were eligible for 'home' fee status (i.e., they were charged the same tuition fees as UK domiciled students studying in the UK[196]). However, following the end of the Brexit transition period, EU domiciled students starting HE qualifications in the UK from 2021-22 onwards are typically no longer eligible to pay 'home' fees – since, in general, only EU nationals with pre-settled or settled status (under certain residency conditions) in the UK are eligible for these (lower) fees[197]. We expect that the vast majority of first-year EU domiciled students starting HE qualifications in the UK in the 2021-22 academic year do *not* have settled or pre-settled status, and therefore assume that all EU domiciled students in the 2021-22 University of Oxford cohort are charged the same fees as non-EU students (which are typically much higher than the tuition fees charged to 'home' students)[198].

In relation to the **funding costs** associated with international students, in addition to any potential fee waivers and bursaries provided to international students by the University of Oxford itself, prior to 2021-22, our analysis of the impact of educational exports would also have deducted the cost of public **teaching grants** to fund the University's provision of teaching and learning activities for EU domiciled students, as well as the costs associated with public **tuition fee support** provided to EU domiciled students studying in England. However, following the end of the Brexit transition period, only EU nationals with pre-settled or settled status in the UK are generally eligible for this funding. Again, we expect that most EU domiciled students in the 2021-22 cohort did not hold pre-settled or settled status, and we therefore assume that there are no public teaching grants or student support costs applicable to the cohort[199]. Given these simplifying assumptions, note that our

[196] Specifically, institutions were obliged to charge the same tuition fees to EU domiciled students studying in England, Wales, Scotland, or Northern Ireland as for English students studying in England, Welsh students studying in Wales, Scottish students studying in Scotland, and Northern Irish students studying in Northern Ireland (respectively).

[197] The eligibility rules for home fee status and student finance from the 2021-22 academic year following the UK's exit from the EU (Department for Education, 2022) indicate that EU nationals with settled status can be awarded home fee status and fee and maintenance support if they have been resident in the UK (and Islands) for at least 3 years. For EU nationals with pre-settled status, the rules state that 'in practice, the Student Loans Company (SLC) will accept pre-settled status, together with ID documentation, as evidence for the purposes of awarding student support to EU, other EEA and Swiss nationals and their family members. We anticipate that providers will take the same approach when awarding home fee status where the student has 3 years' residence in the UK, Gibraltar, EEA, Switzerland or the British/EU overseas territories'.

[198] HESA does not collect data on the number of EU domiciled students that hold settled or pre-settled status in the UK. In the absence of this information, we have assumed that no EU domiciled students in the 2021-22 cohort have settled or pre-settled status, i.e., that all of these students pay the same fees that are charged to non-EU students. Note that HESA's definition of domicile states that a student's domicile is the 'country the student lived in for non-educational purposes before starting their course' (HESA, 2023f), but does *not* capture students' nationality (i.e., HESA's definition does not align exactly with the definition of EU students in the Department for Education's eligibility rules for home fee status and student finance (see Department for Education, 2022)).

[199] Note that different rules apply to Irish citizens living in the UK or Ireland, as these students are covered by the UK's Common Travel Area arrangement with Ireland, and are generally eligible for home fee status (and therefore supported by public teaching grants) as well as public tuition fee and maintenance support subject to meeting the eligibility criteria on the same basis as UK nationals. Again, our analysis does not take account of these special arrangements for students from the Republic of Ireland (i.e., the fact that these students would be charged 'home' fees and be eligible for public tuition fee support and teaching grant funding).

analysis is likely to *overestimate* the tuition fees and *underestimate* the funding costs associated with EU domiciled students in the 2021-22 cohort.

A2.4.2 Additional information on the 2021-22 cohort of non-UK domiciled student students studying at the University of Oxford

Table 26 presents a detailed breakdown of the 2021-22 non-UK domiciled University of Oxford cohort by domicile, level, and mode of study.

Table 26 Non-UK domiciled students in the 2021-22 cohort of University of Oxford 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	5	**5**
First degree	125	515	**640**
Other postgraduate	5	25	**30**
Higher degree (taught)	360	1,780	**2,140**
Higher degree (research)	200	710	**910**
Total	**690**	**3,035**	**3,725**
Part-time			
Other undergraduate	35	125	**160**
First degree	0	0	**0**
Other postgraduate	65	220	**285**
Higher degree (taught)	70	235	**305**
Higher degree (research)	10	35	**45**
Total	**180**	**615**	**795**
Total			
Other undergraduate	35	130	**165**
First degree	125	515	**640**
Other postgraduate	70	245	**315**
Higher degree (taught)	430	2,015	**2,445**
Higher degree (research)	210	745	**955**
Total	**870**	**3,650**	**4,520**

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, Diplomas of Higher Education, other undergraduate-level diplomas, and undergraduate-level credits. 'Other postgraduate' learning includes Postgraduate Certificates in Education; diplomas or certificates at postgraduate level, other taught qualifications at postgraduate level, or taught work or advanced taught study for credit at postgraduate level.

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

A2.4.3 Net tuition fee income per international student

Table 27 presents estimates of the net tuition fee income per international student in the 2021-22 University of Oxford cohort (over the entire study duration), by domicile, level of study, and mode of study.

Table 27 Net tuition fee income per international student in the 2021-22 cohort of University of Oxford students, by level of study, mode, and domicile

Level and mode of study	EU domiciled students		Non-EU domiciled students	
	Full-time	Part-time	Full-time	Part-time
Other undergraduate	£31,000	£4,000	£30,000	£4,000
First degree	£83,000	-	£81,000	-
Other postgraduate	£33,000	£12,000	£29,000	£12,000
Higher degree (taught)	£33,000	£22,000	£29,000	£22,000
Higher degree (research)	£81,000	£83,000	£69,000	£83,000

Note: Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2021-22 prices, discounted to reflect net present values, and rounded to the nearest £1,000.

Source: London Economics' analysis

A2.4.4 Assumed average stay durations among international student entrants

As outlined in Section 4.2, to estimate the non-tuition fee income associated with non-UK students in the 2021-22 University of Oxford 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 average[200]. 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 Table 28.

Table 28 Assumed average stay durations (in weeks per year) for non-UK domiciled students, by study level and study mode

Level of study	Domicile	
	EU	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)

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

A2.4.5 Non-fee income per international student

Table 29 presents estimates of the non-tuition fee income per international student in the 2021-22 University of Oxford cohort (over the entire study duration), by domicile, level of study, and mode of study.

Table 29 Non-fee income per international student in the 2021-22 cohort of University of Oxford 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	£12,000	£16,000	£13,000	£17,000
First degree	£35,000	-	£37,000	-
Other postgraduate	£16,000	£21,000	£16,000	£21,000
Higher degree (taught)	£16,000	£40,000	£16,000	£40,000
Higher degree (research)	£61,000	£112,000	£61,000	£112,000

Note: Gaps may arise where there are no students in the 2021-22 University of Oxford cohort expected to complete the given qualification (of the given characteristics). All estimates are presented in 2021-22 prices, discounted to reflect net present values, and rounded to the nearest £1,000.

Source: London Economics' analysis

LE London Economics

Somerset House, New Wing, Strand
London, WC2R 1LA, United Kingdom
info@londoneconomics.co.uk
londoneconomics.co.uk
@LE_Education | @LondonEconomics
+44 (0)20 3701 7700