

THE ECONOMIC IMPACT OF UNIVERSITIES IN 2014-15

REPORT FOR UNIVERSITIES UK

OCTOBER 2017

Oxford Economics

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EXECUTIVE SUMMARY

The higher education sector is vitally important to the UK economy, society, and individuals. Universities employ thousands of staff throughout the country and through their direct activities they generate and deliver taxes to the Exchequer. But on top of this, they also have an important part to play in supporting a wide range of industries—their supply chains stretch far and wide supporting GDP and jobs, as the impact ripples through the economy (known as the ‘indirect’ impact). In the wider consumer economy, the presence of universities is strongly felt as their own staff and employees within their supply chains all spend money on retail, accommodation, leisure and transport (known as the ‘induced’ impact), as do international students and visitors to those students. Each of these channels, in turn, generates more GDP, jobs and tax receipts.

This report investigates the economic contribution universities make to the UK economy annually by generating GDP, jobs and taxes. It then focuses on how universities also have a longer-term impact on the UK, as they boost the productivity of the economy by building individual knowledge through the education they provide and by enhancing the wider pool of human knowledge through academic exploration and research.

In total, the economic activity of universities, the international students they attract and their visitors, supported more than 940,000 jobs in the UK in 2014-15.¹ This is equivalent to three percent of all employment in the UK. To give a sense of scale, this is two and a half times the number of people who work in the whole of Manchester and three times the number employed in the accountancy and tax consulting sector.

In 2014-15, universities themselves employed 404,000 people, or 1.3 percent of all UK employment. By buying goods and services from UK firms in their supply chains and through the consumer spending supported by the wages they pay their staff, an additional 430,000 jobs were sustained in that year. On top of the impact of universities themselves, expenditure of the 437,000 international students who studied at UK universities in 2014-15 and the friends and family who visited them stimulated another 110,000 jobs.²

UK universities, together with their international students and visitors, generated £95 billion of gross output in the economy in 2014-15. Ignoring the inputs from other industries included in this figure, universities generated a £52.9 billion gross value added contribution to UK GDP in 2014-15. This accounts for 2.9 percent of all the economic activity generated in the nation that year. Put another way, around £1 in every £34 of UK GDP is attributable to the activities of universities and their international students’ and visitors’ expenditure. This is equivalent to more than double the gross value added produced by all firms and other institutions in Glasgow. Calculated on a

¹ Employment calculated on a ‘headcount’ basis. This equates to approximately 800,000 full-time equivalent jobs.

² Please note that due to rounding, values may not sum to totals.

consistent basis, the gross value added supported by universities increased by 15 percent in real terms between 2011-12 and 2014-15.

The gross value added contribution of universities' own operations to GDP, at £21.5 billion in 2014-15, is larger than that made by a number of sizable industries. It is 22 percent greater than that produced by the whole accountancy sector and almost 50 percent more than the contribution of the advertising and market research industry.

UK universities, together with their international students and visitors, supported £14.1 billion in tax receipts for the Exchequer in 2014-15. This is equivalent to 2.7 percent of total tax receipts received by HMRC in the same year. This total tax contribution is 37 percent higher than the total UK public funding the universities themselves received in 2014-15.

Fig. 1. The economic impact of UK universities, 2014-15

	Universities' operations (Chapter 2)	International students' subsistence spending (Chapter 3.1)	Overseas visitors' spending (Chapter 3.2)	Total impact of UK Universities (Chapter 4)
Gross Output (£ billion)				
Direct	33.2			33.2
Indirect	18.3	8.3	0.7	27.3
Induced	31.2	3.1	0.3	34.5
Total	82.8	11.3	1.0	95.0
GDP (£ billion)				
Direct	21.5			21.5
Indirect	8.9	4.0	0.3	13.2
Induced	16.4	1.6	0.1	18.2
Total	46.8	5.6	0.5	52.9
Employment (persons, 000s)				
Direct	404			404
Indirect	160	70	9	238
Induced	273	27	2	303
Total	837	97	11	944
Taxes (£ billion)				
Direct	5.3			5.3
Indirect	2.1	0.8	0.1	2.9
Induced	5.5	0.3	0.0	5.8
Total	12.9	1.1	0.1	14.1

Source: Oxford Economics

Splitting these impacts by the source of the spending, the 437,000 international students and their visitors made a significant contribution to the UK economy. Their on- and off-campus spending generated £25.8 billion in gross output for the UK economy. This activity contributed £13.8 billion in

gross value added to UK GDP and supported 250,000 jobs on a headcount basis.³

In total, universities in the UK earned £13.1 billion in export receipts in 2014-15. This was through the revenue they generated themselves from abroad, through tuition fees and research grants, etc., the subsistence spend of the international students they attract and those students' visitors' expenditure. This is equivalent to 2.6 percent of all UK exports of goods and services in the same year.

For all the short-term benefits universities bring, it is their ability to boost the productive capacity of the economy (or supply-side) that matters in the longer term. For the first time in this series of reports, experimental new figures are published which estimate two aspects of universities' contribution to the productive capacity of the UK economy.

The education universities provide imparts knowledge to students, which boosts the productivity of graduates over their working lifetime, and supports the long-term prosperity of the UK. The education that universities provided in 2014-15 increased the value of graduates' human capital by some £63 billion (or 28 percent), relative to its pre-degree value.

The research universities undertake also benefits the supply-side of the economy leading to the development of new products, enhancing productive processes and fostering innovation more broadly. In 2014-15, universities undertook some £7.9 billion worth of research. This is estimated to deliver a stream of returns equivalent to £28.9 billion in additional gross value added, equating to more than a £1,000 increase in income per household in the UK in 2014-15.

³ International students' tuition fees and other payments to UK universities (for example, for accommodation, catering, etc) are included in universities' operations in Fig 1. The figures presented in this bullet point separate them out, isolating the impact of international students.

1. INTRODUCTION

This report is the latest in a series of studies commissioned by Universities UK looking at the impact of universities on the UK economy, the first undertaken by Oxford Economics. It does so in three ways. First, as in previous editions, it undertakes an economic impact assessment using Higher Education Statistics Agency's (HESA) data on universities. This explores the short-term impacts of 162 universities' expenditure as it stimulates economic activity across the UK. It focuses on their operational, supply chain and wage payment spending in 2014-15. As part of this exercise, it also looks at the subsistence expenditure of the international students and their visitors that the universities attract. This is additional expenditure in the UK economy, so creates extra economic activity and employment beyond that generated by UK residents' spending.

Second, the report looks at the longer-term impacts universities have on the UK economy. These work through altering the economy's productive capacity. They are sometimes referred to as 'supply side' developments. This is the first time in this series of studies Universities UK have sought to estimate the supply side impact of universities on the economy. This study looks at two of the major ways universities impact the supply side of the economy. It looks at the impact universities have on the productivity of the workforce, through educating students. This enhances the available pool of skills and capabilities firms and other employers can access in the UK. The report also investigates the benefits universities' research delivers to the UK economy. It may bring on stream new products and services or foster innovations to existing ones. We have attempted to quantify the benefits of both the investment in human capital and research deliver. As there is considerable controversy over the best way of estimating both effects, the estimates should be regarded as illustrative and were produced to stimulate debate.

Lastly, the focus turns to universities' local impact on the firms and other institutions that operate in the same neighbourhoods. It looks at five examples (though case studies) of universities' business support efforts. While the five have been selected to illustrate a variety of the efforts universities undertake, in no way do they capture the entire breadth of this type of activity.

The paper is organised as follows:

- Chapter 2 looks at the economic impact of universities' expenditure and the activity that it stimulates around the UK economy;
- Chapter 3 looks at the expenditure undertaken by the international students and their visitors, universities attract to the UK;
- Chapter 4 summarises the expenditure impacts generated by universities, the international students and the visitors they attract;
- Chapter 5 looks at two ways in which universities impact the productive potential of the economy in the longer term.

INTRODUCING ECONOMIC IMPACT ANALYSIS

This study quantifies the contribution universities makes to the UK economy, using an analytical method called an Economic Impact Assessment. The results presented are for the academic year ended July 2015, reflecting the latest year for which HESA data were available.

To assess the contribution universities make to the economy, this report examines three channels of expenditure which stimulate economic activity around the UK (Fig. 2):

- Universities' **direct impact** reflects the operational expenditure they undertake to supply the teaching and research, residence and catering, sport and other activities.
- The **indirect impact** occurs as a result of universities' expenditure on inputs of goods and services from UK suppliers. Additionally, international students' subsistence expenditure and the spending of their visitors.
- The **induced impact** arises as universities and the firms in their supply chains, and firms in the supply chains of businesses providing the consumer goods purchased by international students and visitors pay their staff wages. These workers spend a proportion of this income in the consumer economy, mainly at retail and leisure outlets. These impacts then ripple out across these outlets' UK-based supply chains.

The economic impacts measured in this study are quantified using four metrics. These are:

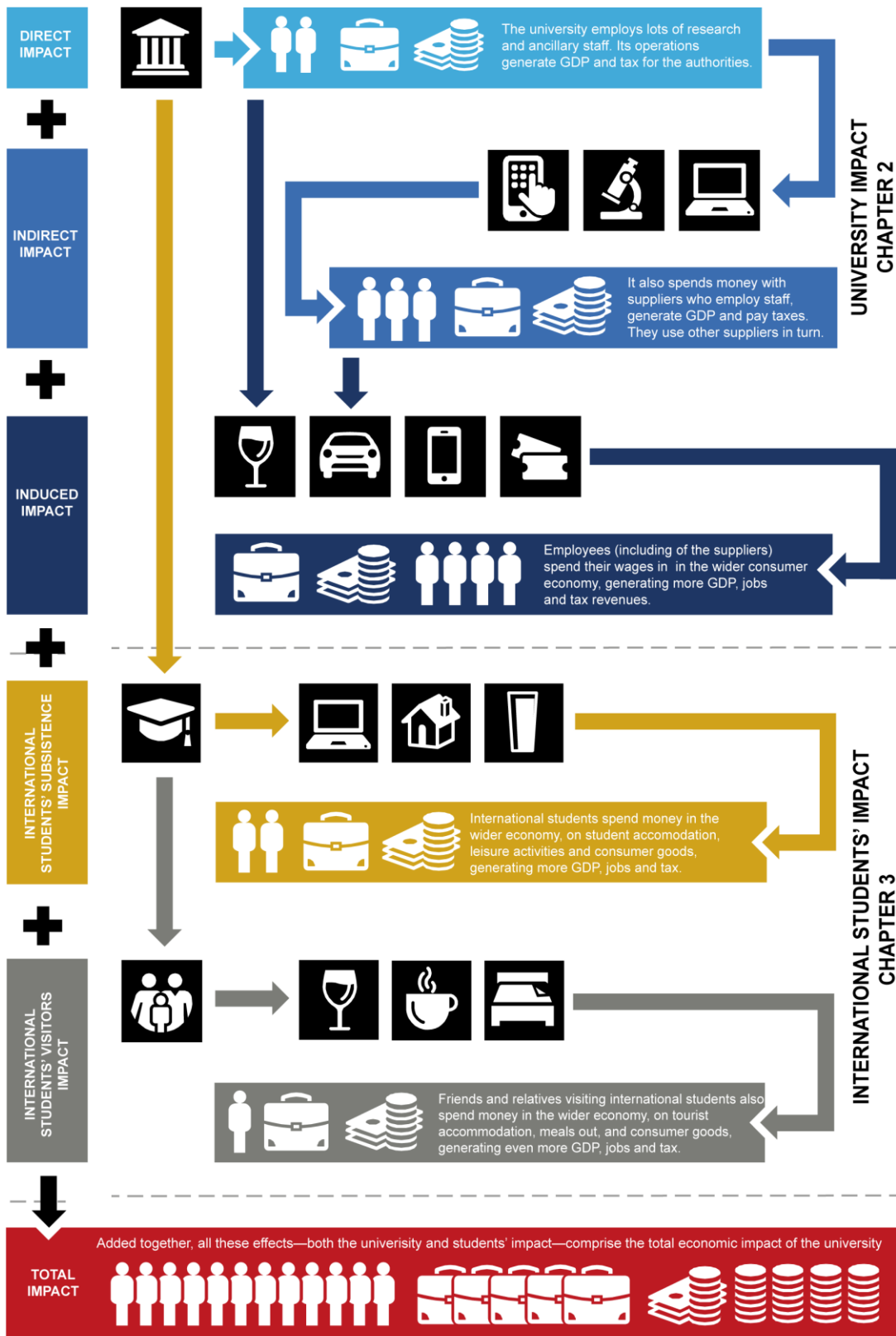
- **Gross output** is the value of an industry's sales or receipts. It includes the value of the inputs of goods and services it buys in plus the value added by the industry itself.
- **Gross value added contribution to Gross Domestic Product (GDP)** is a measure of net output. It is most easily thought of as the value of an industry's sales minus the value of inputs of goods and services used up in their production. It is the measure the Office for National Statistics (ONS) use to quantify the contribution to the economy of each individual producer, industry or sector.⁴
- **Employment**, measured on a headcount basis to facilitate comparison with employment data for other industrial sectors sourced from the ONS.
- **Tax revenues**, including all income taxes, National Insurance Contributions (NICs), and corporation taxes attributable to universities' activities.

The results are presented on a gross rather than a net basis.⁵ This means the study measures the economic 'footprint' of universities in the UK, as it stood during the 2014-15. It does not attempt to estimate what economic benefits could arise if the labour and capital resources employed by universities, and their suppliers, were put to alternate uses. This is because it is impossible to know what the labour and capital would have produced if they were employed in their second most productive use. Nor does it address the activity that UK universities displaced from other industries or sectors.

⁴ Gross value added (plus net taxes on products) is aggregated to form the basis of GDP, the main measure of the total level of economic activity in a country.

⁵ This is a standard procedure in the analysis of the economic impact of individual industries or businesses.

Fig. 2. The channels of economic impact



2. UNIVERSITIES AND THEIR MULTIPLIER IMPACTS

Main points

- In total, UK universities and their expenditure supported a £46.8 billion gross value added contribution to GDP. This equates to 2.6 percent of the economic activity that occurred in the UK in the same year. To put this into context, universities supported twice the gross value added created in the city of Birmingham in 2015.
- Universities' gross value added multiplier is 2.17, so for every £1 million in gross value added generated on campus, a further £1.17 million in gross value added is supported elsewhere in the economy.
- If £1 million is spent on universities, it has a greater impact on gross value added and employment than spending it on public administration & defence, or the health sector.
- In 2014-15, universities and their expenditure supported almost 840,000 jobs in the UK.⁶ This equates to 2.7 percent of all employment in the UK. To put this into context, this is three times the total employment in Sheffield in 2015.
- Universities have an employment multiplier of 2.07. So for every 100 jobs located on campus, universities support a further 107 jobs in other industries across the UK economy.
- Universities and their expenditure supported around £12.9 billion in tax receipts in 2014-15. This tax revenue is equivalent to 2.5 percent of total tax receipts received by HMRC in the same period.

This Chapter investigates the contribution UK universities make to the economy through their own activities, and the expenditure required to provide teaching, research, and other services. It looks at the three channels of expenditure they introduce and the activity it stimulates. These are the impact of universities operational expenditure (the direct impact), their expenditure on inputs of goods and services (the indirect impact) and their payment of wages (their induced impact).

2.1 THE DIRECT IMPACT

2.1.1 Income

In 2014-15, universities in the UK received £33.2 billion in income.⁷ This is equivalent to 26 percent of the total income received by the education sector in 2014.⁸ To put this into context, universities generate larger annual turnover than the legal activities sector and the advertising and marketing sector (Fig.

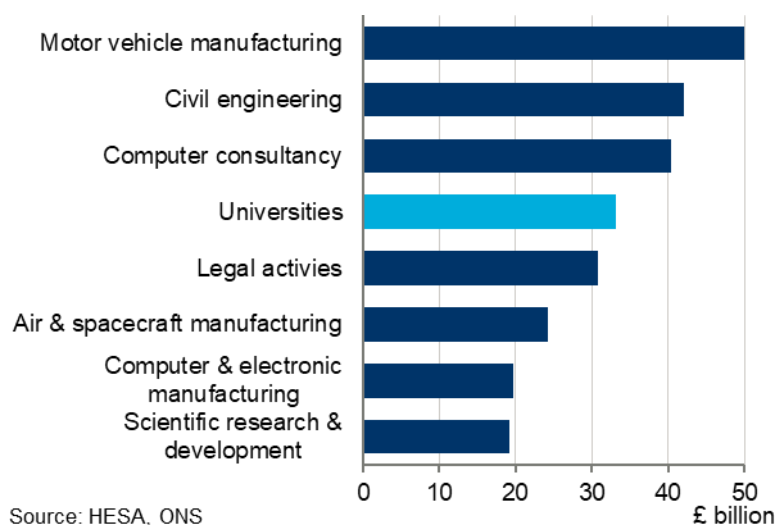
⁶ Employment calculated on a headcount basis. This equates to approximately 710,000 full-time equivalent jobs.

⁷ HESA, "HE Finance Plus, 2014-15", February 2016.

⁸ ONS, "Supply and Use Tables to 2014", July 2016.

3).⁹ As income is equivalent to gross output, this is the value of universities' gross output.

Fig. 3. Industry comparisons by turnover, 2014-15



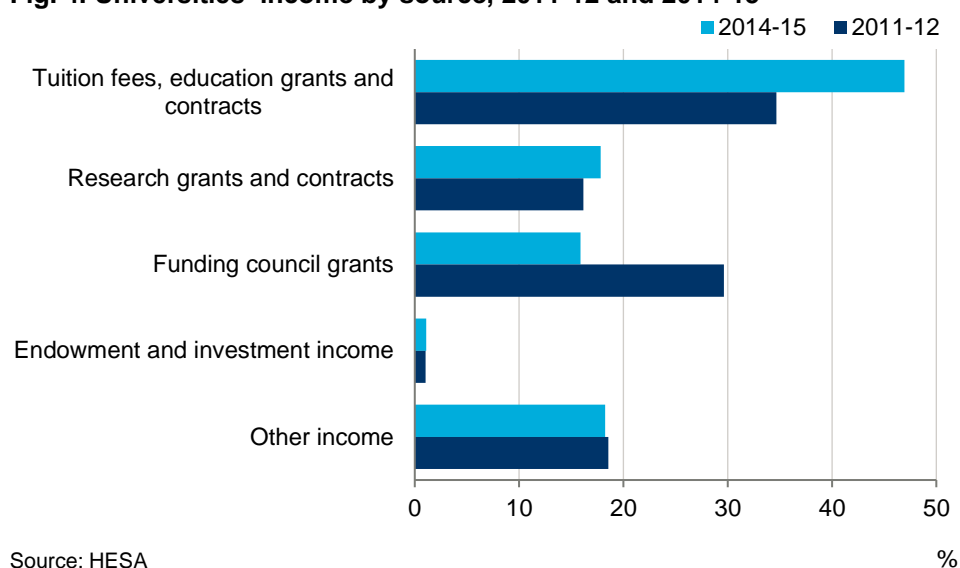
Between 2011-12 and 2014-15, universities' income rose by £5.3 billion in nominal terms or 19 percent. After allowing for price inflation, this equates to 15 percent growth in real terms, or an average annual growth of 5 percent. This compares to growth in the total economy over the same time period of 13 percent, or 7 percent in real terms.¹⁰

In 2014-15, tuition fees, education grants and contracts provided universities with £15.6 billion in income, or 47 percent of their total earnings. This is an increase of 12 percentage points on their share in 2011-12 (Fig. 4). Research grants and contracts are the second largest source of income, providing £5.9 billion or 18 percent of total. Funding Council grants fell to third in importance with funding of £5.3 billion or 16 percent of total, some £3.0 billion lower than in 2011-12.

⁹ Data for comparator industries are ONS data for 2014 and 2015, adjusted to match the university 2014-15 year of 1 July 2014 to 31 August 2015. ONS, "Turnover in Production and Services Industries", September 2016.

¹⁰ Calculated using ONS GDP data, released 26 November 2016.

Fig. 4. Universities' income by source, 2011-12 and 2014-15



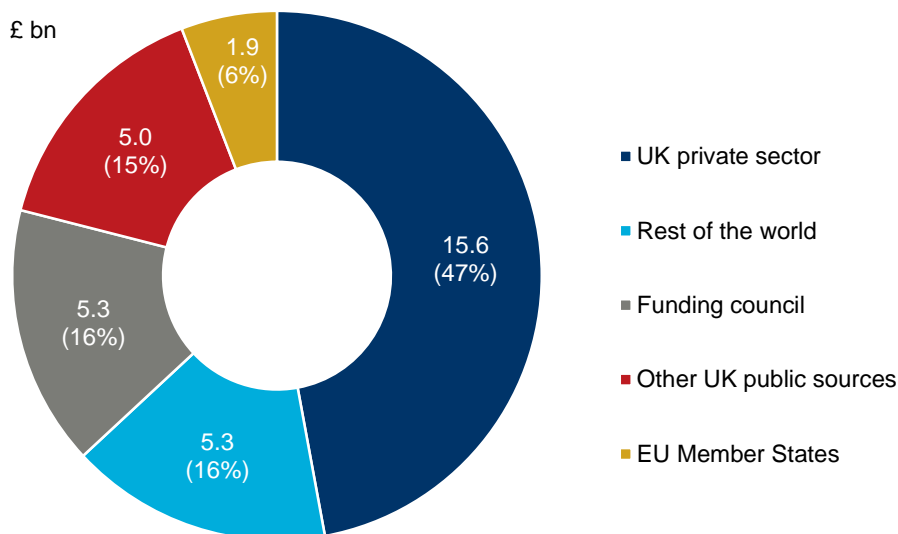
The £5.9 billion growth in tuition, education grants and contracts income between 2011-12 and 2014-15 reflects changes in both the number of students and fees charged. Some 77 percent of the increase is from domestic students. Some 3 and 19 percent from students from other EU Member States and the rest of the world, respectively.

The increase in the cap on tuition fees paid by domestic and EU students attending English and Welsh universities and the reduction in Funding Council grants, provided additional stimulus to the share of university funding from the UK private sector.

In 2014-15, the UK private sector provided 47 percent of universities' total income (Fig. 5). This share has increased significantly from 2011-12, when UK private sector sources contributed 31 percent to total university revenue. As a corollary, funding from UK public sources has fallen in recent years, both as a proportion of total income and in real terms. In 2014-15, 31 percent of income came from the UK public sector.

Income from abroad contributed 22 percent of universities' income. Some 6 percentage points of this came from other EU Member States and 16 percentage points from the rest of the world.

Fig. 5. University income by source, 2014-15¹¹



Source: HESA, Oxford Economics

2.1.2 Gross value added

As gross output does not isolate the contribution universities make to the UK economy as it includes the value of inputs from other industries, this section focuses on universities' direct gross value added contribution. In 2014-15, universities made an estimated £21.5 billion gross value added contribution. This was 1.2 percent of the UK's GDP.¹²

To give an alternative sense of scale, universities' direct gross value added contribution to GDP is 22 percent greater than that produced by the accounting, bookkeeping and tax consulting industry. It is 48 percent greater than the contribution made by the advertising and market research industry (Fig. 6).¹³

¹¹ HESA provides income by source for a number of income types. Where a breakdown is not explicitly given, for example for Home/EU tuition fees, Oxford Economics has estimated it using data such as student numbers. Public sector sources include revenue from any UK public source including funding councils, research councils, local councils, development agencies, NHS trusts, and other related bodies. This includes funding of tuition and research, as well as payment for other university services, including capital grants. Private sources include income from any UK private source, including business payments for research, consultancy or other services, and fee payments by private individuals. Student loan company payments are treated as private, as although the loans are provided by the public sector, the individual student is responsible for the repayment. It should be noted that the size of this income source is dependent on how many students fail to repay their loans.

¹² UK GDP data from ONS, "Gross Domestic Product, chained volume measures, seasonally adjusted", December 2016.

¹³ Gross value added comparators from the ONS' Annual Business Survey (2015).

Fig. 6. Industry comparisons by gross value added contributions in 2014



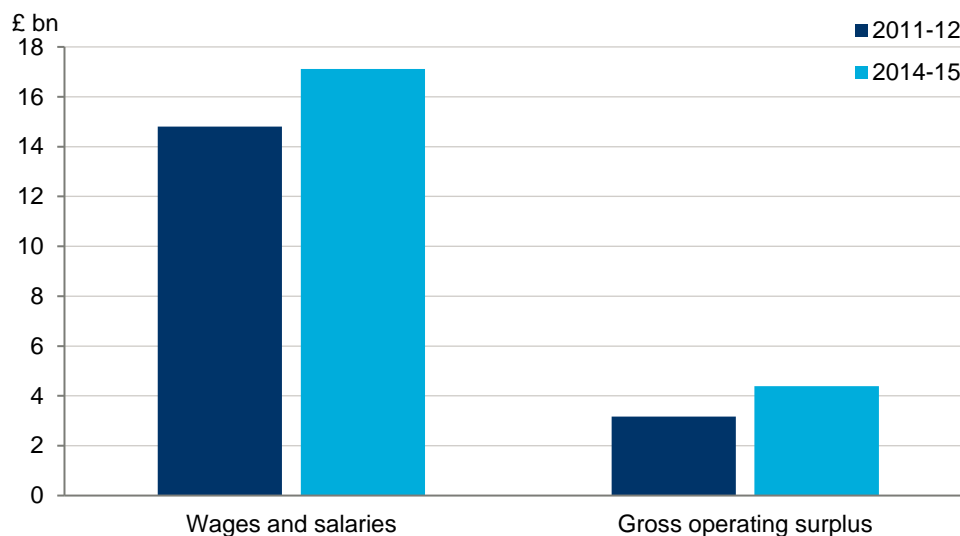
Source: ONS, Oxford Economics

Between 2011-12 and 2014-15, universities' direct gross value added contribution rose by 15 percent in real terms. This increase is in line with the growth in their real income. This masks some small changes in the distribution of income spent on staff, procuring inputs or building reserves. Employee compensation rose considerably, by more than 11 percent in real terms, over the three years to 2014-15. However, as it did not rise as rapidly as gross surplus, its share fell to comprise 80 percent of the total, down from 82 percent in 2011-12 (Fig. 7).

Universities' operating surplus rose more rapidly, to contribute 20 percent of the gross value added contribution in 2014-15. Surpluses have become increasingly important for universities to withstand unexpected changes to revenue and costs, and also to finance investment in improving teaching and research. In particular, the vast majority of investment in new facilities and refurbishment is funded by universities themselves: of the £1,487 million growth in universities' capital expenditure between 2011/12 and 2014/15, £1,010 million or 68 percent was funded from internal sources.¹⁴ Government funding for investment is limited and not all universities are able to borrow.

¹⁴ HESA, "Finance Plus, 2014/15", February 2016.

Fig. 7. Gross value added contribution to GDP made by universities in 2011-12 and 2014-15



Source: Oxford Economics

2.1.3 Employment

Universities provide significant numbers of jobs. In 2014-15, they employed 403,800 people.¹⁵ This is equivalent to 1.3 percent of all people in employment in the UK in 2015.¹⁶ It is 35 percent of 1,135,000 people employed in the education sector.¹⁷

Between 2011-12 and 2014-15 employment at universities rose by 6.8 percent. This is a faster rate of growth than in the whole economy, where employment increased by 4.9 percent.¹⁸

Universities employ large numbers of people across all the UK's nations and regions. In 2014-15, universities employed the most staff in London (73,400 people or 18 percent of the total (Fig. 8)). The South East (62,000 people or 15 percent) and Scotland (42,900 people or 11 percent) ranked second and third, respectively.

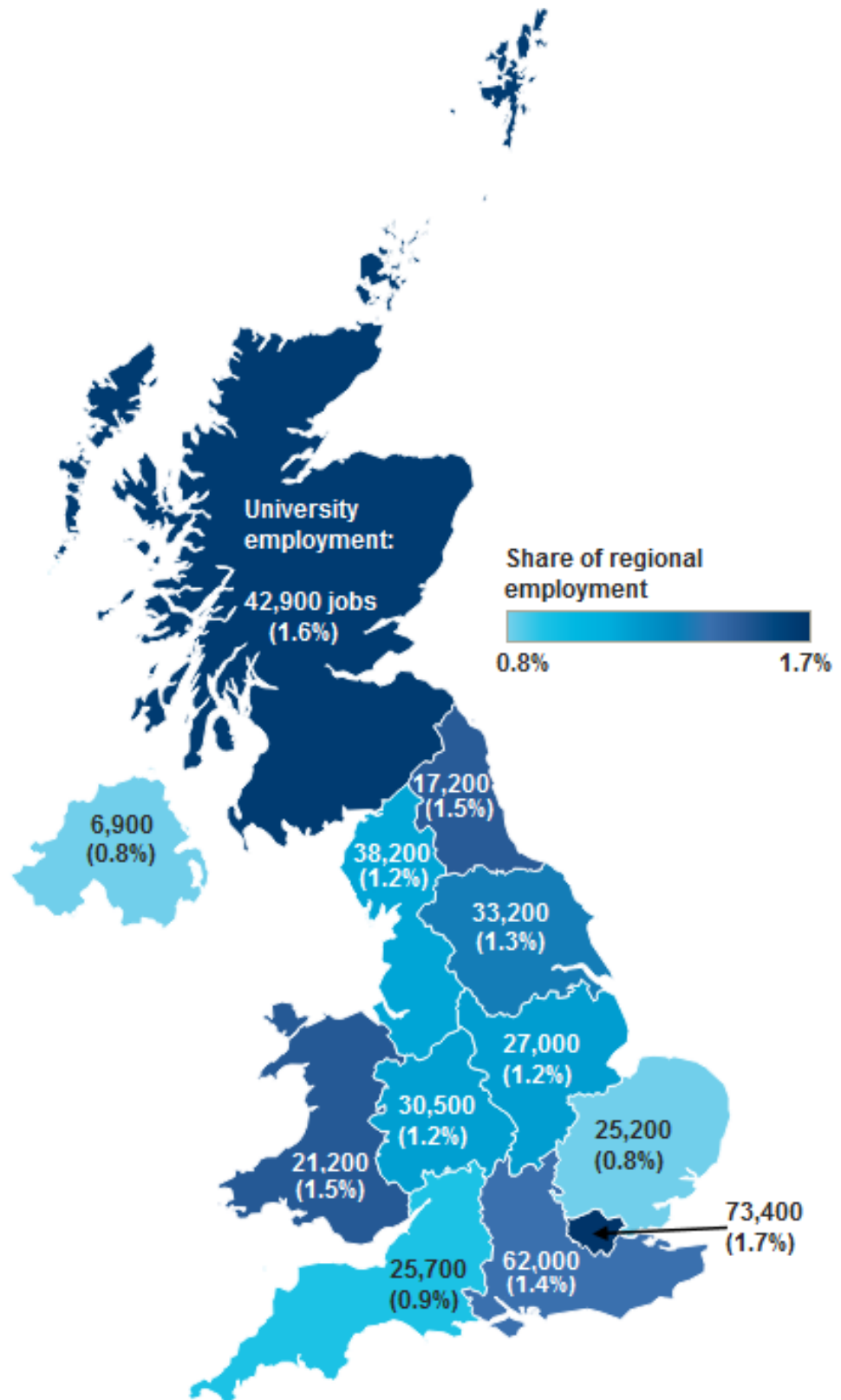
¹⁵ Employment on a 'headcount' basis. This is equivalent to 342,640 full-time equivalent jobs (HESA HE employment 2014-15). This figure excludes 'atypical' employees, who are normally hired on a casual, one-off or occasional basis.

¹⁶ Based on 31,315,295 working aged people in employment in the UK in June-August 2015. ONS, "Labour Market Statistics" 16 November 2016.

¹⁷ ONS, "Annual Business Survey – 2015 Provisional Results", 10 November 2016.

¹⁸ Calculated using data on the number of working aged people in employment in the UK in June-August 2012 and June-August 2015. ONS, "UK Labour Market: Nov 2016", Statistical Bulletin, 16 November 2016.

Fig. 8. University employment as a proportion of regional employment, 2014-15

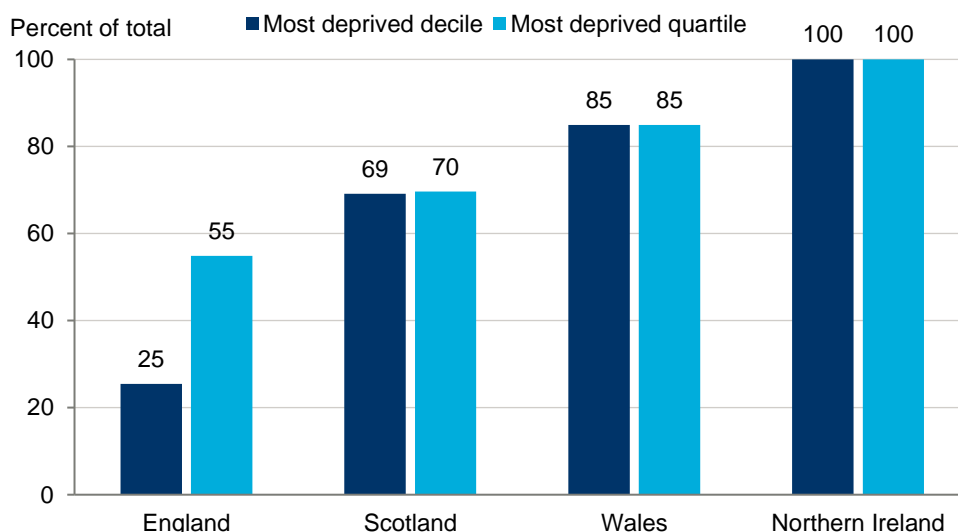


Source: HESA, Oxford Economics

Relative to the scale of total employment in each of the UK's nations and regions, universities have the greatest impact on the capital's labour market. Some 1.7 percent of all employment in London is at one of the 38 universities located there. The 18 Scottish universities employ 1.6 percent of all the people employed in Scotland. The nine Welsh universities employ 1.5 percent of the people employed in Wales.¹⁹ The four Northern Irish universities provide 0.8 percent of total employment.

The jobs universities create were in some of the most deprived local communities. In 2014-15, universities employed 80,100 people or 25 percent of all staff in local authorities ranked among the 10 percent most deprived in England. This includes the 15,000 employed in Manchester, which ranks as the most deprived local authority according to the English Indices of Deprivation.²⁰ A further 93,000 jobs or 30 percent of the total were located in the rest of the most deprived quartile of local authorities in England (Fig. 9).

Fig. 9. Share of higher education employment in 2014-15 in the most deprived decile and quartile of local authorities in each country



Source: Oxford Economics

In the other three nations, employment is even more concentrated in local authorities ranked as the most deprived in each country. Some 29,700 people or 69 percent of total employment at Scottish universities is located in the most deprived decile of local authorities in Scotland. The figure is 85 and 100 percent for Welsh and Northern Irish universities.²¹

¹⁹ Regional employment data from the ONS regional labour market statistics, released 20 July 2016, and relate to June-August 2015.

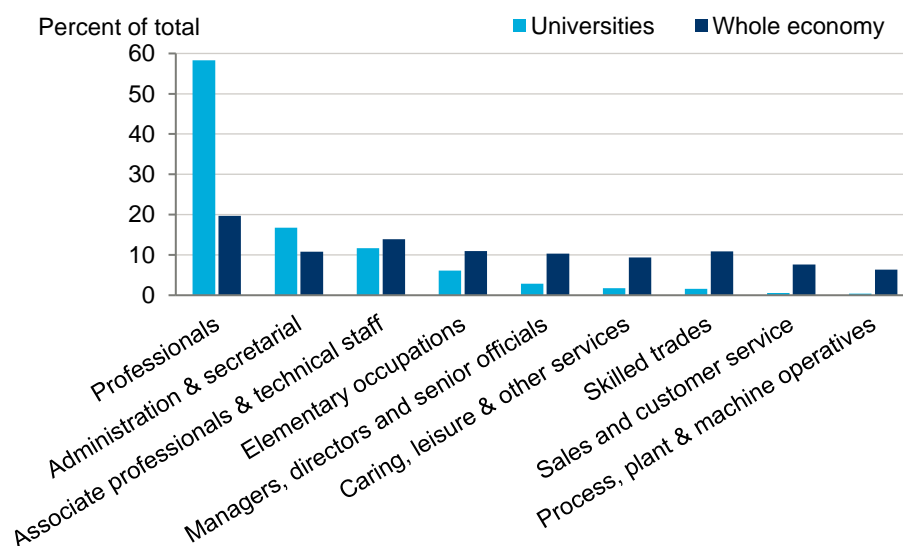
²⁰ Department for Communities and Local Government, "The English Indices of Deprivation 2015", 30 September 2015.

²¹ Scottish Government, "Scottish Index of Multiple Deprivation", 2016.; Northern Ireland Statistics and Research Agency, "Northern Ireland Multiple Deprivation Measure", 2010.; Statistics for Wales, "Welsh Index of Multiple Deprivation", 2014.

Universities employs a range of people with different skill sets and backgrounds. Professional occupations provided 58 percent of the employment at universities. These 235,300 jobs include 196,500 academic roles. Administrative and secretarial staff constitute the second largest occupational category, comprising 17 percent of the workforce. Associate professional and technical occupations, and elementary occupations (for example, gardeners and cleaners) rank third and fourth at 12 and 6 percent, respectively.²²

Relative to the whole economy, universities employ a disproportionately large number of professionals. Their share of university employment is almost three times their share in the whole economy (Fig. 10). As a result, universities account for almost 4 percent of UK employment in professional occupations.²³

Fig. 10. Share of employment by occupation at universities and in the wider economy, 2014-15



Source: ONS, Oxford Economics

Universities employ a wide range of people, with staff on different contract types. One key characteristic of university employment is the significant number of part-time employees. Some 33 percent of university staff work part-time; this is larger than the 27 percent in the whole economy. This may provide employees with greater flexibility, allowing a wider range of individuals the opportunity of work.

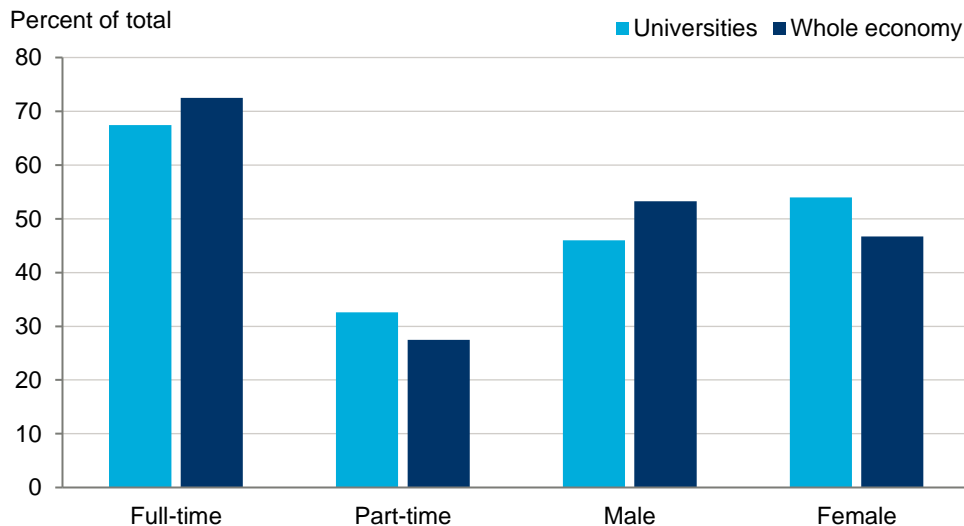
Universities are key employers of female workers. They employ just over 218,000 female staff, accounting for 1.5 percent of UK female employment in

²² It should be noted that the occupation coding framework used by HESA has changed since 2011-12, making comparison with previous Universities UK studies inappropriate. Details can be found under "Activity (2012/13 onwards)", within the HESA staff definitions available here: <https://www.hesa.ac.uk/support/definitions/staff>

²³ Data on UK employment by occupation are from the Labour Force Survey. ONS, "Employment by status, occupation and sex" (Labour Force Survey, August 2015).

the UK. This is 54 percent of their total workforce (Fig. 11). This is greater than female's 47 percent share of all employment in the whole economy.

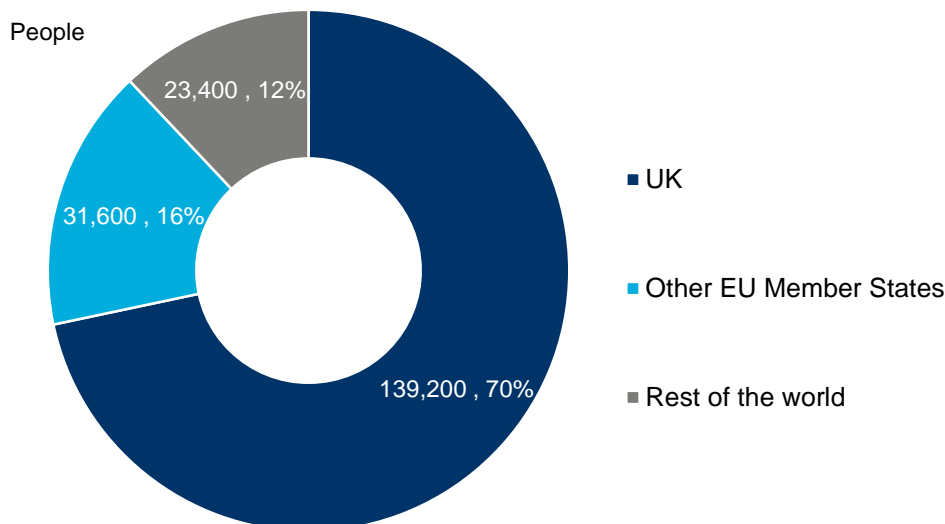
Fig. 11. University part-time and full-time employment, 2014-15



Source: ONS, Oxford Economics

Some 70 percent of academic staff or 139,000 people employed are UK nationals. Of the remainder, 58 percent (or 32,000 people) are from other EU Member States and 42 percent (or 23,000 people) from the rest of the world (Fig. 12).

Fig. 12. Academic staff by nationality, 2014-15

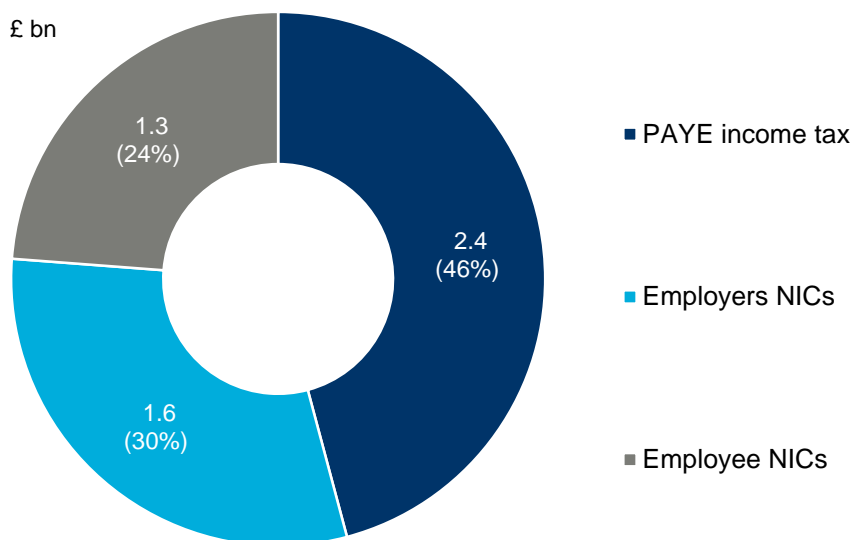


Source: HESA

2.1.4 Tax receipts

Universities directly generate substantial tax receipts for the UK Exchequer. In 2014-15, universities and their staff made an estimated £5.3 billion tax contribution (Fig. 13). This figure encompasses both types of labour taxes, namely income tax, and employers' and employees' NICs.^{24, 25}

Fig. 13. Tax receipts generated by universities and their staff, 2014-15



Source: Oxford Economics

These tax contributions are equivalent to almost 100 percent of the Funding Council grants universities received in 2014-15. Further, they account for over half (51 percent) of all UK public funding received by universities in 2014-15.

2.2 UNIVERSITIES' MULTIPLIER IMPACTS

Aside from their direct contribution to the economy, universities also stimulate economic activity around the UK through multiplier effects. These are the jobs, gross value added, gross output and taxes they generate through purchasing from UK suppliers and paying wages, which staff spend in the consumer economy. These knock-on impacts ripple out across the economy, touching all corners of the UK.

2.2.1 Universities' indirect impacts

To educate students, undertake research and provide other services, universities purchase inputs from a wide range of suppliers. This procurement expenditure stimulates economic activity across many industrial

²⁴ Income tax contributions have been estimated using employee income brackets from HESA HE Finance Plus and data on HMRC's income tax allowances and rates.

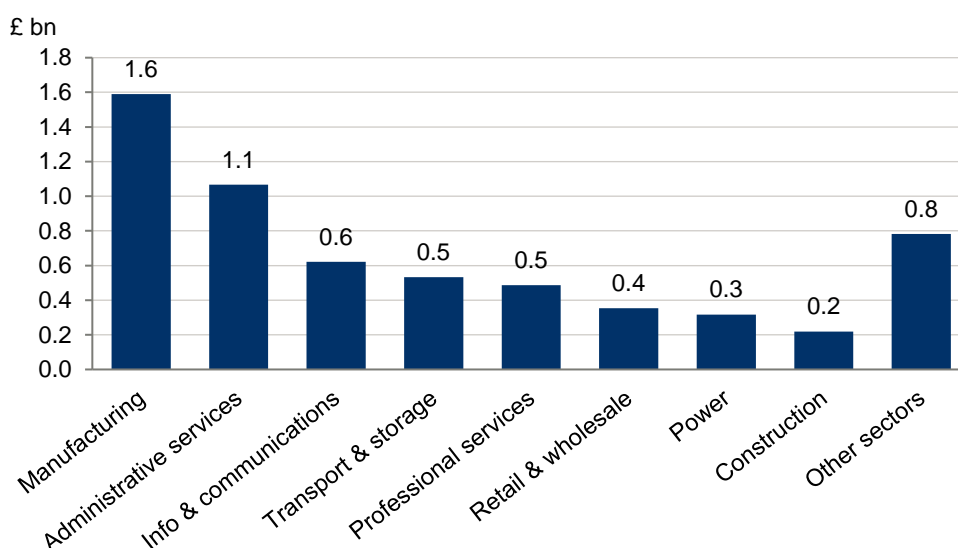
²⁵ Some universities also pay corporation tax on the profits of their subsidiary companies, however this figure is not easily accessible and so has been excluded from the tax calculations.

sectors throughout the UK economy. This spending supports employment, gross value added, and tax receipts the length and breadth of the country.

Universities' expenditure on inputs can be broadly split into two categories. First is the procurement of operational inputs of goods and services that are used up in the delivery of the universities' services. Second is the expenditure universities undertake on capital or investment goods, such as the construction of new buildings or research equipment that will support their operations over a number of years.

Universities spent £11.7 billion on operational inputs of goods and services in 2014-15. Of this, £6 billion, or 51 percent is estimated to have been spent with UK suppliers in industries other than the education sector.²⁶ Manufacturing, and the administrative and support services industry—which includes cleaning services and companies providing human resources support, for example—benefit the most from universities' operational procurement, receiving 17 percent and 18 percent of spending, respectively (Fig. 14).

Fig. 14. Universities' operational expenditure by sector (basic prices), 2014-15²⁷



Source: Oxford Economics

Universities spent a further £4.2 billion on capital goods in 2014-15. The construction sector received 50 percent of this spending, reflecting the investment in campus infrastructure.

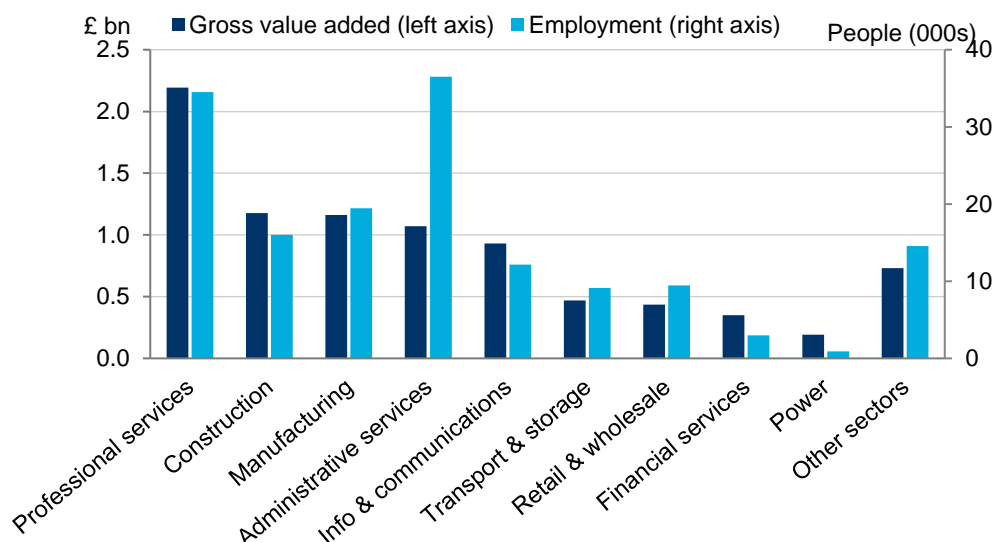
Both types of expenditure are estimated to stimulate £18.3 billion of gross output in 2014-15. Through this, universities' expenditure generated a £8.9 billion gross value added contribution to UK GDP along its domestic supply chain. Industries which experienced the largest boost to their gross value added from this procurement were professional services (such as accounting

²⁶ Education spending has not been included in the supply chain impact as it is captured in the direct impact.

²⁷ Basic prices exclude expenditure on taxes and imports.

and engineering) and the construction (Fig. 15), accounting for 25 percent and 14 percent of the gross value added supported at universities' suppliers, respectively.

Fig. 15. The employment and gross value added universities support along their supply chain by industrial sector, 2014-15



Source: Oxford Economics

Universities' procurement is estimated to sustain almost 160,000 jobs in the UK in 2014-15.²⁸ Some 23 percent of these were in the administrative services sector, and a further 22 percent employed by the professional services sector. Fewer jobs are supported in professional services and manufacturing compared to their share of gross value added as these sectors have high labour productivity.

Universities' expenditure on operational and capital inputs is estimated to generate £2.1 billion in tax receipts along its supply chain. This encompasses corporation tax, labour taxes such as income tax and NICs, taxes on products procured (i.e. VAT), and other taxes on businesses' production.

2.2.2 Universities' induced impact

The final expenditure channel is the 'induced' impact. This describes the gross output, gross value added, employment, and tax receipts supported by the universities' and those firms' in their direct supply chain payment of wages to staff, who spend a proportion of this income in the consumer economy.

In 2014-15, the higher education sector paid £17.1 billion in gross wages and salaries.²⁹ University employees, and workers at firms in universities'

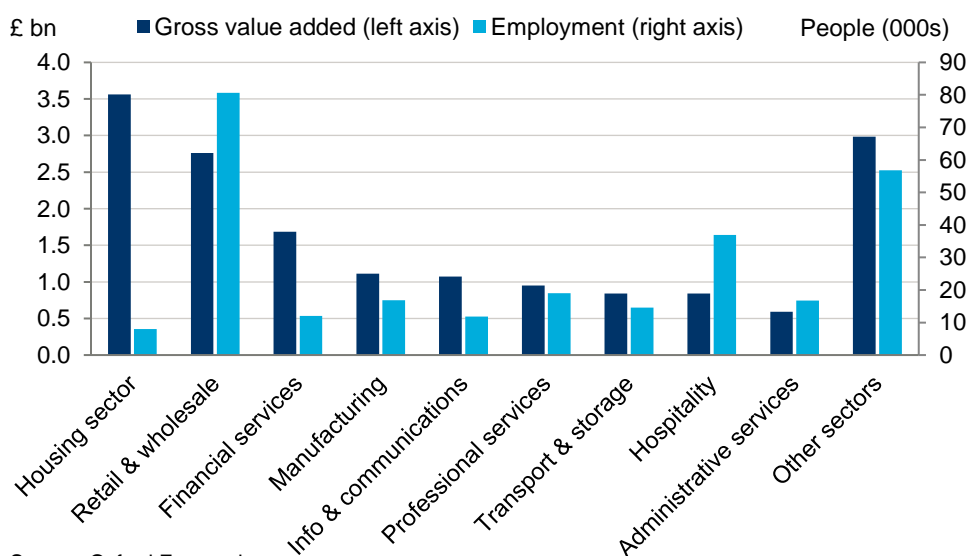
²⁸ Employment calculated on a 'headcount' basis. This equates to over 140,000 full-time equivalent jobs.

²⁹ HESA, "HE Finance Plus 2014-15", February 2016.

supply chains, spend part of their disposable income at retail, leisure and other outlets. This stimulates economic activity down these sectors' supply chains.

This wage-financed consumption is estimated to have supported £31.2 billion in gross output in 2014-15. Through their wage payments, and those of their supply chain, universities generated a £16.4 billion gross value added contribution to UK GDP. The greatest boost in economic output was seen in real estate through home rental payments and housing transactions (Fig. 16), and the wholesale and retail sectors where gross value added increased by £3.6 billion and £2.8 billion, respectively.

Fig. 16. The employment and gross value added supported by universities' and their suppliers' payment of wages, 2014-15



Source: Oxford Economics

Over 270,000 jobs were supported by staff spending their wages in 2014-15.³⁰ Some 81,000 people or 29 percent of this occurred in the retail and wholesale industry, while 37,000 people or 14 percent occurred in the hospitality industry.

UK universities wage consumption impacts supported some £5.5 billion in tax contributions. This encompasses corporation taxes, labour taxes such as income tax and NICs, consumption taxes, and various other taxes on businesses that serve this consumer demand.

2.3 UNIVERSITIES' TOTAL EXPENDITURE IMPACTS

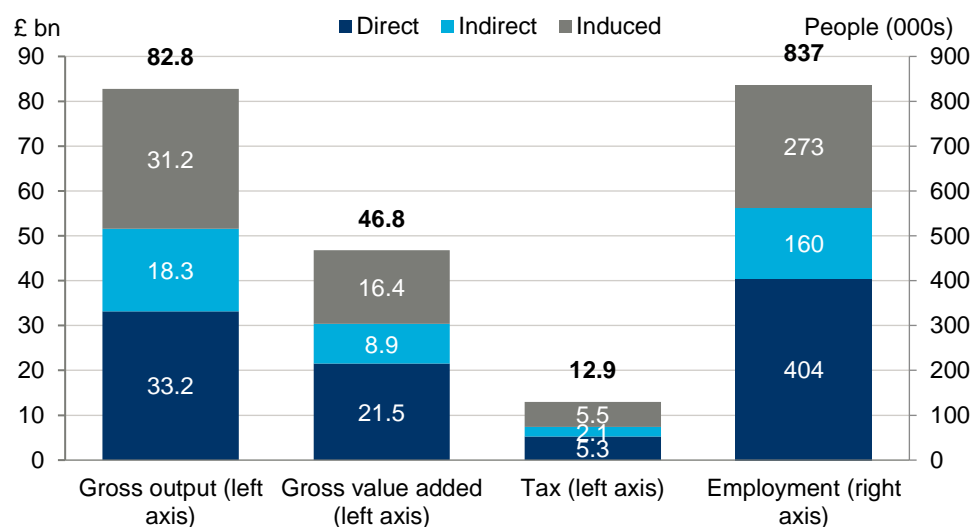
Taking the three streams of expenditure together, universities are estimated to have supported £82.8 billion in gross output in the UK in 2014-15. Through this, universities generated a £46.8 billion gross value added contribution to GDP. This equates to 2.6 percent of the economic activity that occurred in the UK in the same year. To put this into context, universities

³⁰ Employment calculated on a 'headcount' basis. This equates to over 220,000 full-time equivalent jobs.

supported twice the gross value added created in the city of Birmingham in 2015.

Analysis of where the gross value added is created suggests that some £21.5 billion was generated at universities themselves and £25.3 billion elsewhere in the economy (Fig. 17). This suggests universities gross value added multiplier is 2.17, so for every £1 million in gross value added generated on campus, a further £1.17 million in gross value added is supported elsewhere in the economy.

Fig. 17. Total impact of UK higher education, 2014-15



Source: Oxford Economics

In 2014-15, universities' expenditure supported almost 840,000 jobs in the UK.³¹ This equates to 2.7 percent of all employment in the UK in 2014-15. To put this into context, this is three times the total employment in Sheffield in 2015.

Universities have an employment multiplier of 2.07. So for every 100 jobs located on campus, universities support a further 107 jobs in other industries across the UK economy.³²

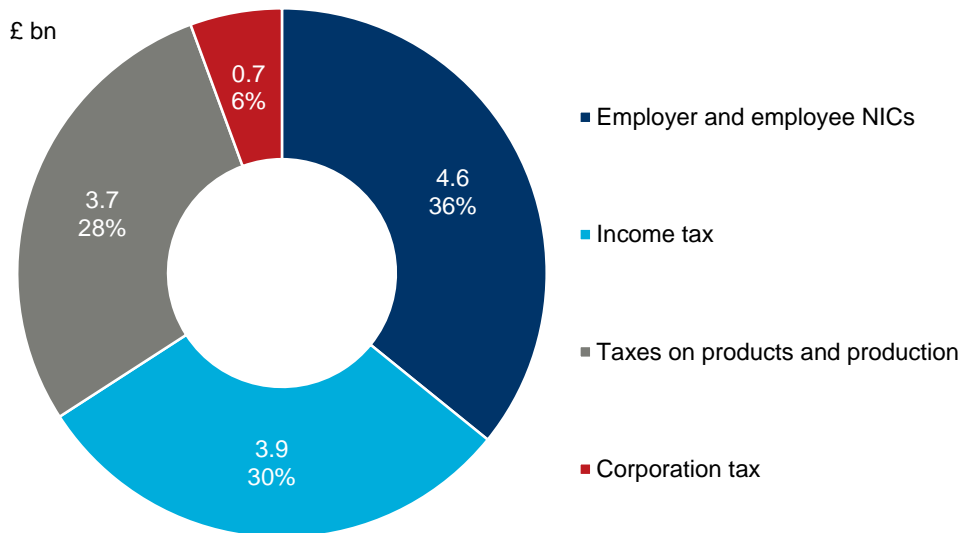
Further, universities' expenditure supported around £12.9 billion in tax receipts in 2014-15. This encompasses corporation tax, labour taxes (including income tax, and employer and employee NICs), consumption taxes, and other business taxes (Fig. 18). This tax revenue is equivalent to 2.5 percent of total tax receipts received by HMRC in the same period. To put this

³¹ Employment calculated on a 'headcount' basis. This equates to over 700,000 full-time equivalent jobs.

³² At 2.07 the employment multiplier is lower than the one of 2.28 calculated on a consistent basis for 2011-12 (see Appendix 2). This reflects the increasing globalisation of supply chains and changes in productivity levels at universities' UK suppliers.

into context, this contribution is larger than the Department for Culture, Media and Sport's expenditure in 2014-15.³³

Fig. 18. Total tax receipts supported by universities and their expenditure, 2014-15



Source: Oxford Economics

In addition to estimating the multiplier impacts of university spending, we also consider the relative impact of this spending, to investigate how effective it is in supporting wider output, jobs and GDP contributions. This involves calculating universities' indirect and induced impact per £1 million of expenditure, and comparing this with equivalent figures for other sectors in the UK economy. The spending pattern of the comparative sections is based on the ONS' input-output tables.

The extent of this wider impact is shaped by the industries that receive it. Different sectors have varying import propensities, and so expenditure that flows to industries with deeper links to other domestic sectors will deliver a higher UK-level output impact. Spending with labour-intensive sectors (and sectors with deeper links to other labour-intensive activities) will result in a greater employment impact. Similarly, procurement from highly productive sectors of the economy generates a large gross-value added contribution to GDP.

³³ HM Treasury, "Chapter 5: Public sector expenditure by function, sub-function and economic category", HM Public Expenditure Analysis, 2015.

Fig. 19. Total impact per £1 million expenditure on universities and selected comparative sectors, 2014-15

	Gross output (£m)	Employment (FTE)	GDP (£m)
Universities	1.9	14.9	0.9
Construction	2.0	13.9	1.0
Manufacture of computers & electronics	1.8	12.5	0.9
Computer services	1.8	15.9	0.9
Scientific research & development	1.7	15.9	0.9
Public admin & defence	1.5	11.4	0.7
Health	1.3	11.4	0.7

Source: Oxford Economics

UK universities generate sizeable output, employment and GDP impact through their expenditure. This is because their supply chains are made up to a relatively large extent of UK firms, pushing the output impact higher than that of many comparator sectors (Fig. 19). Universities also tend to purchase from sectors which are quite labour-intensive (for example administrative, catering and employment services), as seen in their comparatively high employment impact.

3. IMPACT OF INTERNATIONAL STUDENTS AND VISITORS SPENDING

Main points

- In 2014-15, UK universities attracted 437,000 international students into the UK. Of these, 125,000 or 29 percent were from other EU Member States and 312,000 or 71 percent from the rest of the world.
- These students off-campus subsistence spending and that of their visitors supported £12.3 billion in gross output, a £6.1 billion gross value added contribution to GDP, 108,000 jobs and £1.2 billion in tax receipts.³⁴
- Looking separately at the impact of all international students' exports, their tuition fees and other payments to universities, off campus spending, and the spending of their visitors together generated £25.8 billion in gross output in the UK in 2014-15. This contributed £13.8 billion gross value added to GDP and supported 250,000 jobs, and £3.3 billion of tax receipts in 2014-15.³⁵

3.1 INTERNATIONAL STUDENTS' SUBSISTENCE EXPENDITURE

Each year, universities attract a substantial number of overseas students into the UK. Those students spend money on a wide range of goods, services, and activities. As this expenditure is additional to that undertaken by UK residents, it creates extra economic activity in the economy.

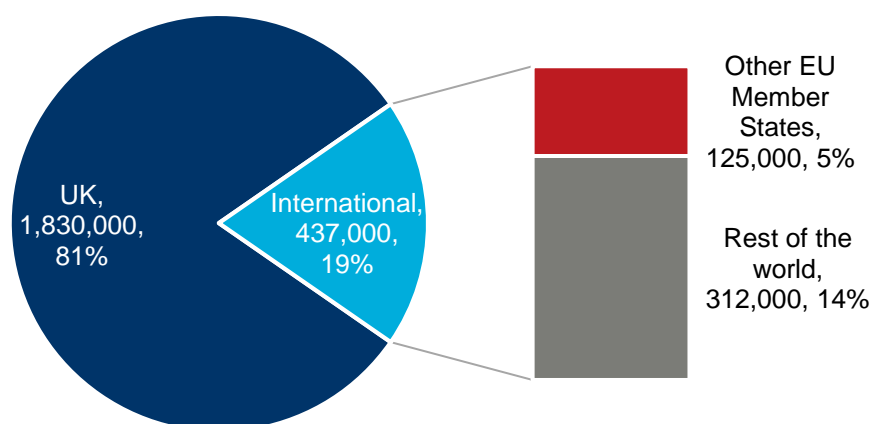
This Chapter analyses the number of international students who come to the UK to study and the scale of their off-campus subsistence spending. The term off-campus implies the income is not received by the university at which they study, so expenditure on university provided accommodation, catering or course-related activities such as field trips are excluded as these are captured in Chapter 2 of this report. It goes on to estimate the number of jobs, the gross value added and tax receipts international students' off campus subsistence spending generates in the UK. The contribution they make to export earnings is examined in the box on pages 33-34.

There were approximately 437,000 international students enrolled at UK universities in 2014-15. This is a slight increase of 0.3 percent on the academic year 2011-12. International students accounted for 19 percent of all students registered at UK universities. Of these, 5 percentage points or 125,000 come from other EU Member States and 14 percentage points or 312,000 from the rest of the world (Fig. 20).

³⁴ Employment calculated on a 'headcount' basis. This equates to almost 91,000 full-time equivalent jobs.

³⁵ Employment calculated on a 'headcount' basis. This equates to nearly 210,000 full-time equivalent jobs.

Fig. 20. Students attending UK universities by nationality, 2014/15



Source: HESA

International students spent an estimated £6.1 billion in the UK economy in 2014-15. This figure includes all subsistence spending, including payments to universities, except for expenditure on tuition fees. International tuition fee payments are a significant UK export, totalling £4.8 billion in 2014-15, but are not included in the impact of international student spending here as they are captured in the direct impact as university income, analysed in Chapter 2.³⁶ Student subsistence spending has been calculated using survey evidence on the expenditure of students attending English, Welsh and Scottish universities, multiplied by the number of international students (see Appendix 3 for more details on the methodology).³⁷

Some £140 million of this international student subsistence spending is estimated to have been funded by UK earnings. Many part-time students will have jobs while studying in the UK, and expenditure funded by these earnings cannot be thought of as export earnings from abroad. Taking this into account, £6 billion of international students' subsistence spending can be thought of as additional to the UK economy.

A further £600 million of international students' spending is estimated to have taken place on campus. This includes payments to universities for accommodation and catering. The impact of this spending is therefore captured in Chapter 2 as part of universities' direct impact.

We estimate that £5.4 billion of the international students' subsistence expenditure funded from abroad was spent off campus. This spending generated an estimated £11.3 billion of gross output in the UK in 2014-15. This

³⁶ Of this £4.8 billion, just under £600 million is comprised of other EU Member States students' fees, while £4.2 billion is made up of rest of the world students' fees.

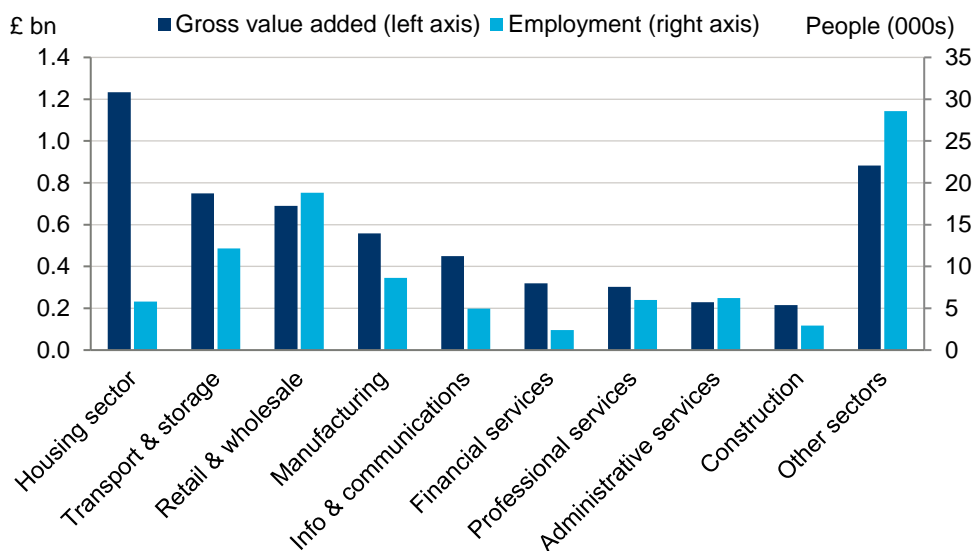
³⁷ As there are no survey data on student expenditure in Northern Ireland, students there are assumed to spend the same as their English counterparts, adjusted for differences in price levels between England and Northern Ireland using ONS' relative regional consumer price level data.

economic activity was stimulated both from the initial supplier and along their supply chain, but also through the wage consumption impacts detailed as part of the induced impact.

International students' off campus subsistence expenditure is estimated to have supported a £5.6 billion gross value added contribution to UK GDP in 2014-15. Rent payments for accommodation and to a lesser extent fees from house purchase, meant the real estate sector benefitted the most from international students' expenditure. Its gross value added contribution was £1.2 billion or 22 percent of the total impact from this expenditure (Fig. 21).

The transport sector and the retail sector were also significant beneficiaries of the international students' subsistence spending. The £750 million and £690 million boost to their gross value added comprised 13 percent and 12 percent of the total increase in value added from the presence of the international students, respectively.³⁸

Fig. 21. The impact of international students' off campus subsistence spending, 2014-15



Source: Oxford Economics

International students' subsistence expenditure supported an estimated 97,000 jobs in the UK in 2014-15.³⁹ Of these, almost 19,000 jobs or 20 percent were in the retail and wholesale sector. The transport sector was the second largest beneficiary, with an additional 12,000 jobs or 13 percent of total due to the international students spend.

The economic activity and employment sustained by international students' subsistence spending also generated £1 billion in tax revenues for the Exchequer in 2014-15. This figure encompasses corporation tax,

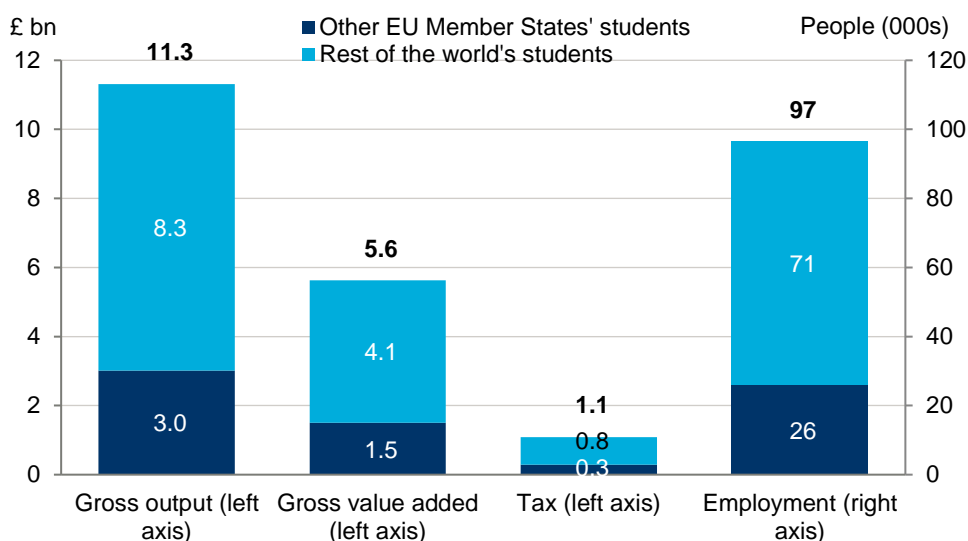
³⁸ Please note that the numbers in this sentence has been revised since the release of "The Economic Impact of International Students" in March 2017.

³⁹ Employment calculated on a 'headcount' basis. This equates to 82,000 full-time equivalent jobs.

labour taxes (including income tax and NICs), consumption taxes, and other taxes on businesses. It is sufficient to pay the salaries of 31,700 full-time nurses or 25,000 full-time police officers.⁴⁰

We estimate that 29 percent of the impact across the three metrics is attributable to students from other EU Member States. This is a rough calculation based on the assumption that spend per student is the same, regardless of nationality. This means £1.5 billion in gross value added (Fig. 22), 26,000 jobs, and £290 million in tax receipts are attributable to the subsistence spending of students from other EU Member States.

Fig. 22. Impact of international students' off campus subsistence spending by nationality, 2014-15



Source: Oxford Economics

3.2 VISITORS' EXPENDITURE

Friends and relatives will often visit international students studying at UK universities. Parents may travel to the UK to drop off or collect their children, attend open days and graduation ceremonies, or visit whilst on holiday. As the expenditure they undertake in the UK is additional to that spent by UK residents, it stimulates extra economic activity within the country.

Unfortunately, it is not known how many visitors from home each international student receives. The analysis (described in detail in Appendix 3) uses data on students' nationality, the nationality of the wider population, and the origin of visitors to friends and relatives in the UK to estimate the number of visitors each student receives, and how much they spend.

In 2014-15, visitors to international students in the UK spent an estimated £520 million. In the first place, this expenditure is likely to benefit the

⁴⁰ ONS, "Annual Survey of Hours and Earnings: 2015 Provisional Results", 18 November 2015. The median salary for a full-time nurse and police officer (sergeant and below) was £31,497 and £40,014 in 2015, respectively. Numbers rounded to the nearest hundred.

transport, hotels, hospitality, cultural, recreational and sports attraction sectors. It then is likely to ripple out along their supply chains to the rest of the economy, with the associated wage-consumption impacts.

Overseas visitors' spending generated an estimated £1 billion in gross output in 2014-15. Of this, £300 million is attributable to visitors from other EU Member States, while the remaining £700 million was generated by the spending of visitors from the rest of the world.

International students' visitors' spending is estimated to contribute £480 million in gross value added to UK GDP in 2014-15. It supports a further 11,000 jobs and £100 million in tax receipts. Around 30 percent of this impact is attributable to visitors to students from other EU Member States, with the remainder due to their counterparts from the rest of the world.

THE IMPACT OF INTERNATIONAL STUDENTS ON THE UK

Chapter 3 focuses on the economic impact of international students' off campus spending and the impact of their visitors' expenditure. It deliberately ignores international students' payments to universities for tuition or for accommodation, catering and other services, as these are included as part of universities' income and impacts discussed in Chapter 2. This box considers the impact of international students in isolation.

International students paid an estimated £4.8 billion in tuition fees to UK universities in 2014-15. This accounts for over 14 percent of total university income. Some 88 percent, £4.2 billion, of this fee income was paid by students from outside of the EU. The remaining 12 percent, or just under £600 million, was paid by students from other EU Member States. International students also paid UK universities an additional £600 million for accommodation, catering, and other services.

Taking their university payments, off campus spending, and the spending of their visitors together, international students generated £25.8 billion in gross output in the UK in 2014-15. This contributed £13.8 billion gross value added to GDP and supported 250,000 jobs, and £3.3 billion of tax receipts in 2014-15.

Students from outside of the EU were responsible for 80 percent of this total impact. Through all their spending, and that of their visitors, they generated £20.6 billion of gross output, £11 billion in gross value added, almost 200,000 jobs (almost 170,000 full-time equivalent jobs), and £2.7 billion of tax receipts (Fig. 23).

Fig. 23. The total economic impact of international students, 2014-15

	Gross Output (£bn)	GDP (£bn)	Employment (FTE, 000s)	Taxes (£bn)
Students from other EU Member States	5.2	2.7	40.7	0.6
Students from outside the EU	20.6	11.1	165.9	2.7
Total	25.8	13.8	206.6	3.3

Source: Oxford Economics

Put another way, every student from other EU Member States generated £42,000 in gross output in the UK economy in 2014-15. These earnings supported a £22,000 gross value added contribution, one third of a full-time equivalent job, and £5,000 in tax receipts. Each student from outside of the EU is responsible for generating £66,000 of gross output, £35,000 in gross value added, more than half of a full-time equivalent job and £9,000 in tax revenue (Fig. 24).

Fig. 24. Per capita impact of international students, 2014-15 (to the nearest £1,000)

Per capita	Gross Output (£)	GVA (£)	Employment (FTE)	Taxes (£)
Students from other EU Member States	42,000	22,000	0.33	5,000
Students from outside the EU	66,000	35,000	0.53	9,000

Source: Oxford Economics

4. TOTAL IMPACT OF UNIVERSITIES, THE INTERNATIONAL STUDENTS THEY ATTRACT AND THEIR VISITORS

Main points

- In 2014-15, universities' expenditure, and that of their international students and their visitors stimulated a £52.9 billion gross value added contribution to UK GDP. This accounts for 2.9 percent of UK GDP.
- In total, universities and their international students and visitors supported over 940,000 jobs in 2014-15.⁴¹ This is equivalent to 3 percent of total UK employment. This is 2.5 times the number of people working in Manchester in 2015.
- UK universities supported £14.1 billion in tax receipts for the Exchequer in 2014-15. This is equivalent to 2.7 percent of total tax receipts received by HMRC in the same period. This total tax contribution is 37 percent higher than the total UK public funding the universities themselves received in 2014-15.

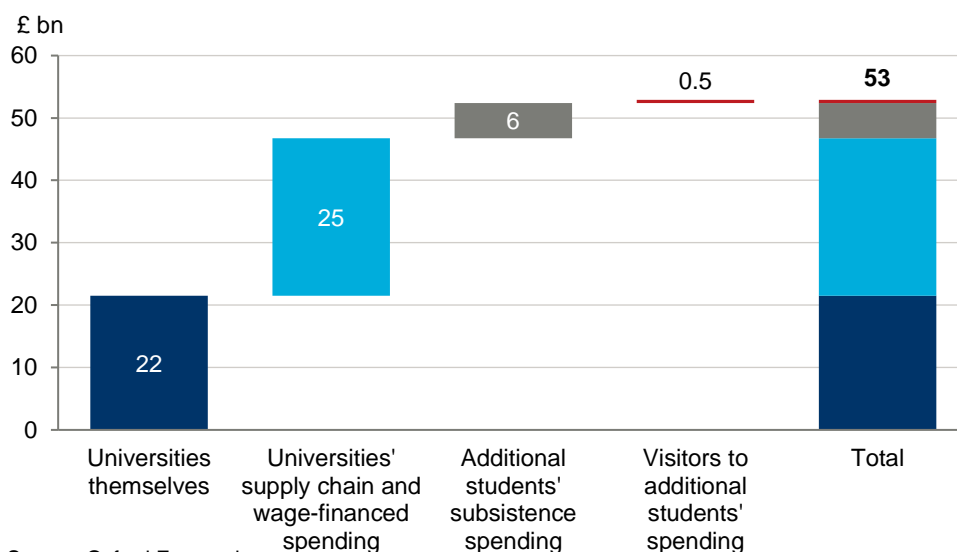
The total economic contribution universities make to the UK economy is the sum of the three different streams of expenditure they support. This includes the expenditure they undertake to operate, their procurement and payment of wages; the expenditure of the international students they attract into the UK; and those students' visitors' expenditure.

In 2014-15, universities' expenditure, and that of their international students and their visitors stimulated £95 billion of gross output. Through this, universities generated a £52.9 billion gross value added contribution to UK GDP (Fig. 25). This accounts for 2.9 percent of UK GDP in the same period. Put another way, around £1 in every £34 of UK GDP is attributable to the activities of universities and their international students and visitors.

Of this contribution, £21.5 billion or 41 percent was generated by universities themselves on campus. Their procurement expenditure and payment of wages stimulated another £25.3 billion elsewhere in the economy or 48 percent of total. The international students' and their visitors' expenditure supported the remaining £6.1 billion or 12 percent.

⁴¹ Employment estimated on a 'headcount' basis. This equates to almost 800,000 full-time equivalent jobs.

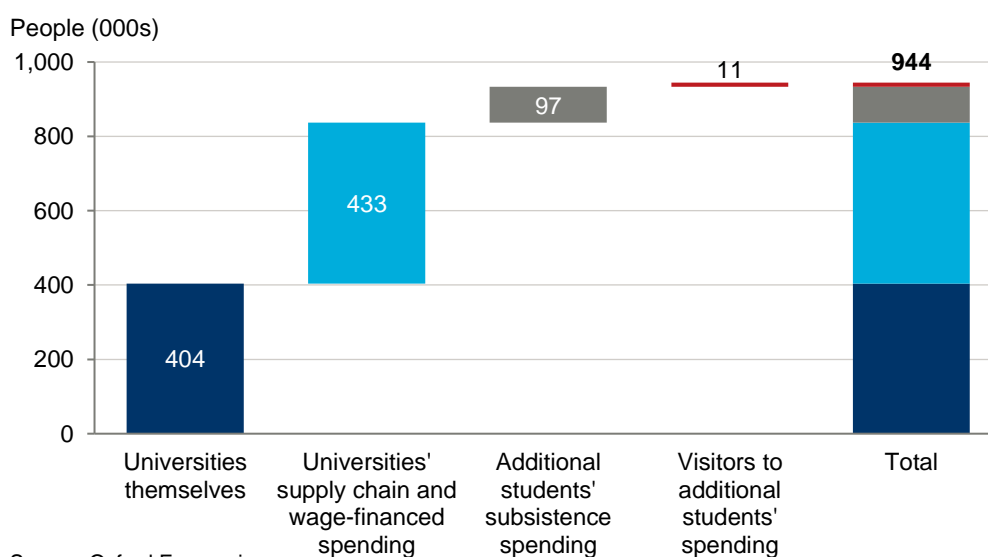
Fig. 25. Total gross value added sustained by UK universities, 2014-15



Source: Oxford Economics

In total, universities and their international students and visitors supported over 940,000 jobs in 2014-15.⁴² This is equivalent to 3 percent of total UK employment in June-August 2015. This is 2.5 times the number of people working in Manchester in 2015.⁴³

Fig. 26. Total employment supported by UK universities, 2014-15



Source: Oxford Economics

Of this employment, more than 400,000 workers or 43 percent were employed by universities themselves. A further 430,000 jobs or 46 percent were

⁴² Employment calculated on a 'headcount' basis. This equates to approximately 800,000 full-time equivalent jobs.

⁴³ Employment in Manchester in 2015 was 382,000 people.

supported by universities' indirect and induced impacts (Fig. 26). Another 110,000 jobs or 11 percent by international students and their visitors' expenditure.⁴⁴

UK universities supported £14.1 billion in tax receipts for the Exchequer in 2014-15 (Fig. 27). This encompasses corporation tax, labour taxes including income tax and NICs, consumption taxes, and other taxes on businesses. This is equivalent to 2.7 percent of total tax receipts received by HMRC in the same period.⁴⁵ This total tax contribution is 37 percent higher than the total UK public funding the universities themselves received in 2014-15.⁴⁶

Fig. 27. Total impact of UK universities, their international students and overseas visitors, 2014-15

	Universities' operations	International students' subsistence spending	Overseas visitors' spending	Total impact of UK Universities
Gross Output (£ billion)				
Direct	33.2			33.2
Indirect	18.3	8.3	0.7	27.3
Induced	31.2	3.1	0.3	34.5
Total	82.8	11.3	1.0	95.0
GDP (£ billion)				
Direct	21.5			21.5
Indirect	8.9	4.0	0.3	13.2
Induced	16.4	1.6	0.1	18.2
Total	46.8	5.6	0.5	52.9
Employment (persons, 000s)				
Direct	404			404
Indirect	160	70	9	238
Induced	273	27	2	303
Total	837	97	11	944
Taxes (£ billion)				
Direct	5.3			5.3
Indirect	2.1	0.8	0.1	2.9
Induced	5.5	0.3	0.0	5.8
Total	12.9	1.1	0.1	14.1

Source: Oxford Economics

⁴⁴ These headcount figures equate to almost 343,000 full-time equivalent jobs at universities themselves, a further 370,000 supported in universities' supply chains and by wage-financed consumption, and more than 90,000 full-time equivalent jobs sustained by the spending of international students and overseas visitors.

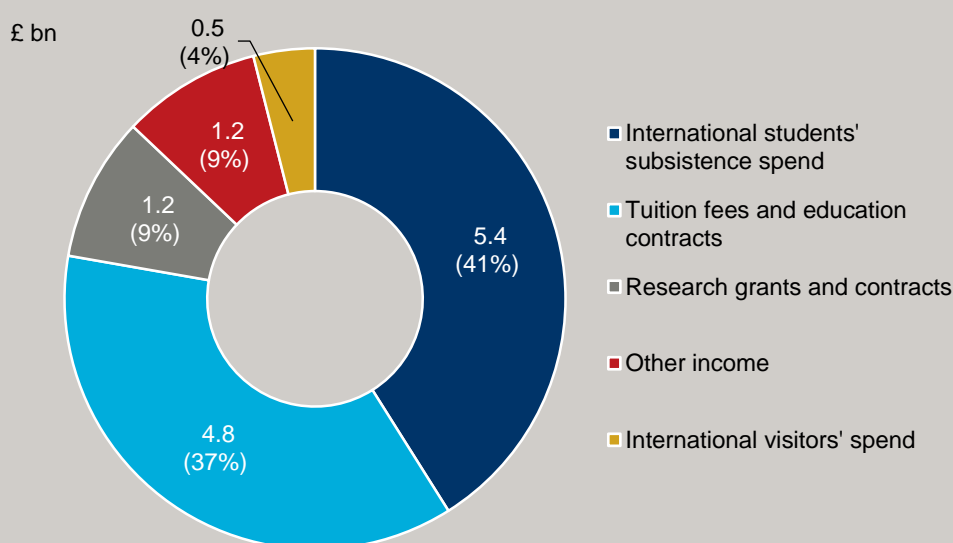
⁴⁵ HMRC, "HM Revenues and Customs receipts statistics", December 2016.

⁴⁶ The comparison ignores the Student Loans Company's loans and grants to students.

UNIVERSITIES' EXPORT EARNINGS

In total, universities in the UK earned £13.1 billion in export receipts in 2014-15. This was through the revenue they generated themselves from abroad, through tuition fees and research grants, etc., the subsistence spend of the international students they attract and those students' visitors' expenditure. This is equivalent to 2.6 percent of all UK exports of goods and services in the same year.⁴⁷ Alternatively, it was more than a third of the value of all business and professional services exports in 2014-15.⁴⁸

Fig. 28. Total exports generated by universities, their international students' subsistence spend and their visitors' expenditure, 2014-15



Source: HESA, IPS, Oxford Economics

Of this £13.1 billion, £7.2 billion was earned by universities themselves, through fees, contracts, grants, and other services. This is larger than telecommunication service exports in the same period.⁴⁹ This income includes tuition fees paid by international students, research grants and contracts and other income. Some 26 percent, or £1.9 billion, originated from other EU Member States and 74 percent, or £5.3 billion, from the rest of the world.

The 437,000 international students universities attracted into the UK in 2014-15 are estimated to have spent £6 billion on accommodation, food and personal items, etc., excluding spending funded by UK earnings. Stripping out that earned by universities as not to double count, this amounts to £5.4 billion in earnings or 41 percent of total (Fig. 28). Friends and relatives visiting these students are estimated to have spent £520 million in the same year or 4 percent of total export earnings.

⁴⁷ UK exports: Table 1 of ONS, "UK Trade in Goods and Services Publication Tables", September 2016.

⁴⁸ Business and professional service exports were worth around £37.4 billion in the same period, calculated using Table C1 of ONS, "International Trade in Services, 2015", January 2017.

⁴⁹ Telecommunication exports of services were approximately £7 billion in 2014-15, calculated using Table C of ONS, "International Trade in Services, 2015", January 2017.

Across all three channels, 27 percent of export earnings, or £3.5 billion, are from other EU Member States, with the remaining 73 percent, or £9.6 billion, from the rest of the world (Fig. 29).

Fig. 29. Total exports generated by universities, their international students' subsistence spend and their visitors' expenditure by source, 2014-15

£ billion	University income	International students' subsistence spending	Overseas visitors' spending	Total exports
Other EU Member States	1.9	1.4	0.2	3.5
Rest of the world	5.3	4.0	0.4	9.6
All international sources	7.2	5.4	0.5	13.1

Source: Oxford Economics

5. UNIVERSITIES' CONTRIBUTION TO THE UK ECONOMY'S PRODUCTIVE CAPACITY

Main points

- We find that universities' investment in skills during 2014-15 increased the UK's stock of human capital by some £63 billion. This reflects the change in highest qualification level among graduates during that year. Following their graduation, these students accounted for 1.5 percent of the UK's entire stock of human capital.
- The R&D performed by UK universities in 2014/15 is estimated to deliver a stream of benefits into the future. If these are discounted into a net present value in 2014/15, they equate a £28.9 billion increase in gross value added. This is equivalent to £1,071 per household in the UK.

When considering the value that universities deliver to the UK economy, it is possible to consider either the expenditure impacts (known as demand-side) or the impact universities have on the productive capacity of the economy (known as supply-side) channels. An example of demand-side analysis is the standard economic impact approach, that traces the footprint from the spending of universities, international students and their visitors, and has been undertaken in Chapters 2 to 4.

But it can be argued that in a hypothetical world in which universities did not exist, the resources employed to meet these demands would have been put to an alternative use. For example, the revenues accrued by universities could have been directed (by government and students, respectively) to other purposes and activities. The sectors supplying these alternative services would generate their own direct employment, gross value added and tax contributions. Further, the supply chains serving universities' input demands could likewise engage in production to meet the procurement needs of these alternative sectors. While this counterfactual situation could not be achieved instantaneously (i.e. if the universities sector were to disappear immediately), over the long-term it is likely that comparable economic contributions could be achieved by the same pool of labour and capital resources. In this view, the demand-led impact of the universities sector is not truly 'additional', in the sense that it does not contribute value that would not have partly arisen anyway.

HM Treasury issues guidance on how to appraise project's impacts in the Green Book. It argues "*Additionality can also be referred to as a 'supply side' or 'structural' impact, which operates by altering the productive capacity of the economy. This can occur either because of a change in the size of the workforce or a change in the productivity of the workforce. Examples of interventions that promote supply-side benefits include improving the working*

of markets and economic institutions, strengthening capabilities, and facilitating greater participation in the workforce. The extent to which a proposal may *produce a supply side benefit is an important component of an appraisal.*⁵⁰

By considering higher education in this context, it can be seen that the UK's universities sector does also have important 'supply-side' impacts, through improving the productive capacity of the economy. Two of the most conspicuous ways that universities achieve this are through improving the UK's skill base, and through driving innovation with its research and development activities. The remainder of this Chapter presents an initial exploration of those impacts.

The estimates presented in this Chapter cannot be considered 'additive' to those presented in Chapters 2 to 4. The demand-led analysis considers the impact that university-linked expenditures have on economic metrics such as GDP or employment (impacts that may have arisen anyway, in the absence of universities' activities) in a particular year. By contrast, the supply-side impacts discussed here describe how universities boost the productive potential of the economy year after year. The difference between potential and actual and the timeframe mean it is not possible to add the two impacts.

5.1 UNIVERSITIES' CONTRIBUTION TO UK HUMAN CAPITAL

In 2014-15, some 2.3 million students attended a university in the UK. For those that remain in the country the education they received will deepen the pool of skills available within the workforce, which is a key driver of productivity and economic growth.

In other words, universities deliver investments in the UK's stock of human capital. Human capital describes the aggregate knowledge and skills of individuals within the UK's labour market, which are accumulated over time and used in the production of goods and services. It is an important indicator of an economy's long-term health, with higher levels of human capital associated with greater potential output in the future.

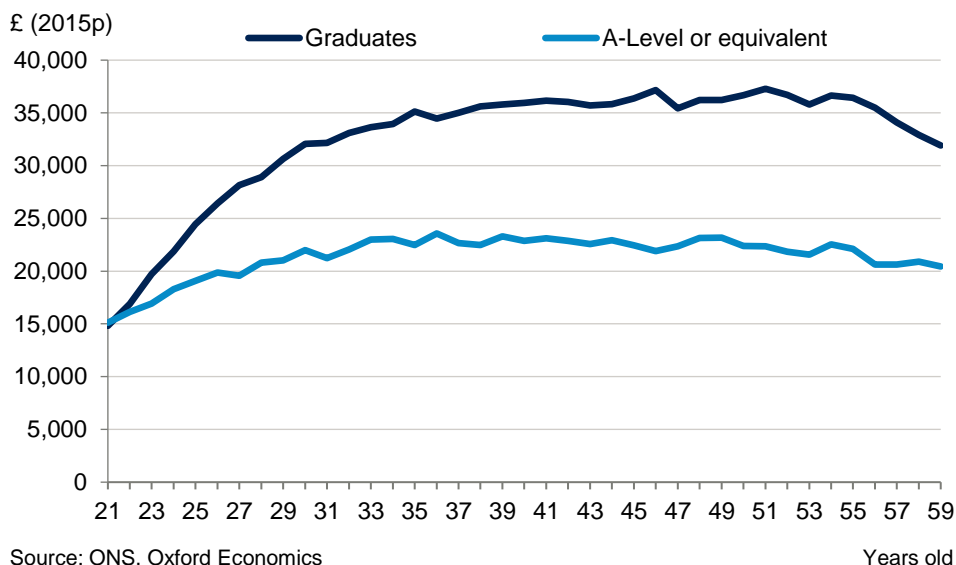
Directly measuring the value of this human capital is not straightforward, and a number of approaches have been proposed and developed for its measurement. The approach adopted for this report follows the method used by the ONS' appraisals of the UK's human capital stock. This method estimates the discounted (present) value of individuals' future lifetime employment income.⁵¹

On this approach, one can assess the value of universities' investment in skills by measuring the difference that university qualifications make to students' lifetime incomes. This reflects the increased productivity and earnings associated with higher education (Fig. 30).

⁵⁰ HM Treasury, "The Green Book; Appraisal and Evaluation in Central Government" (Treasury Guidance, 2003).

⁵¹ For more detail on this methodology, the assumptions underpinning it and its limitations, see Appendix 3.

Fig. 30. Average gross annual salary, by age and highest level of qualification, 2015 prices

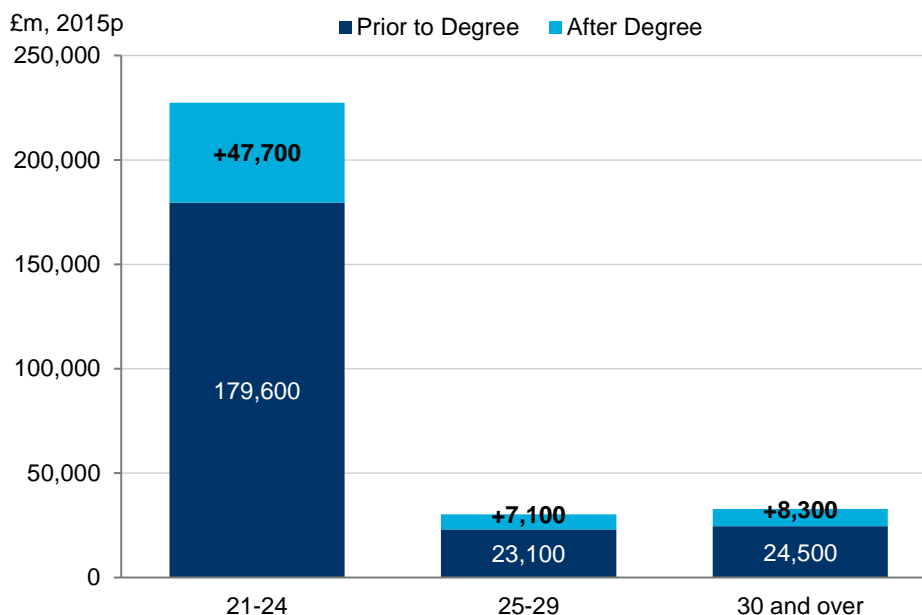


In the analysis that follows, we measure the impact of universities' investment in human capital during the 2014-15 academic year. For this assessment, we mapped out the average lifetime earnings patterns of students graduating from their first undergraduate degrees against what they would have earned if they had A-levels or their equivalent. We then aggregated the graduate earnings premium across their lifetime for the 328,000 UK-domiciled 'first degree qualifiers' in 2014-15, factoring in their age and gender. It is an underestimate in that it doesn't cover postgraduate degrees, because the data are unavailable.

We find that universities' investment in skills during 2014-15 increased the UK's stock of human capital by some £63 billion. This reflects the change in highest qualification level among first degree graduates during that year. Following their graduation, these students accounted for 1.5 percent of the UK's entire stock of human capital.

Some 76 percent of the growth in human capital for the 2014-15 cohort of graduates is seen within those aged 21-24 (Fig. 31). The predominance of this age group reflects the high proportion of young people within universities' first degree recipients, as well as the longer expected working lives (and hence earnings) ahead of them in future. By contrast, mature students (aged 30+) are smaller in number and see a lower lifetime earnings impact.

Fig. 31. Value of human capital embodied in UK-domiciled 'first degree' graduates, 2014/15



Source: ONS, HESA, Oxford Economics

As noted in Appendix 3, this calculation assumes that the higher wages of graduates reflect their greater marginal productivity, on average. In reality, other determinants of wages include place-specific dynamics of (local) labour demand and supply, collective bargaining, prevailing price levels, etc.

Moreover, the difference in the lifetime earnings of graduates and non-graduates is assumed to reflect the value of education delivered by the higher education institution, as proxied by the award of a first degree. However, other structural variations between these two groups (such as their aspirations, expectations, self-belief, etc.) may also drive some of the observed divergence in lifetime earnings.

It is worth noting here that universities' contributions to the UK's human capital go beyond disseminating the academic content of traditional degree courses. For example, many universities offer enterprise programmes that are focused on equipping students with skills required for the workplace or entrepreneurship. Examples include funded internships and placements with businesses, knowledge transfer programmes, and the assistance of careers advisors. Moreover, the networks and contacts that students establish at universities, among faculty as well as other students, can form an important foundation for a successful career. These connections increase students' access to new employment or entrepreneurial opportunities, ultimately helping them forge careers in areas where they can be more productive and contribute more to the economy. These factors, in addition to the knowledge and skills imparted through university courses, are contributors to the higher future earnings that are observed among university graduates.

A considerable number of university graduates go on to be successful entrepreneurs, with more than 4,100 graduate start-ups created in 2014-15.⁵² Many of these businesses go on to achieve success: there are 11,000 active UK businesses that began life as the start-ups of graduates from UK universities. Together, these firms employed around 21,000 people on a FTE basis in 2014-15.

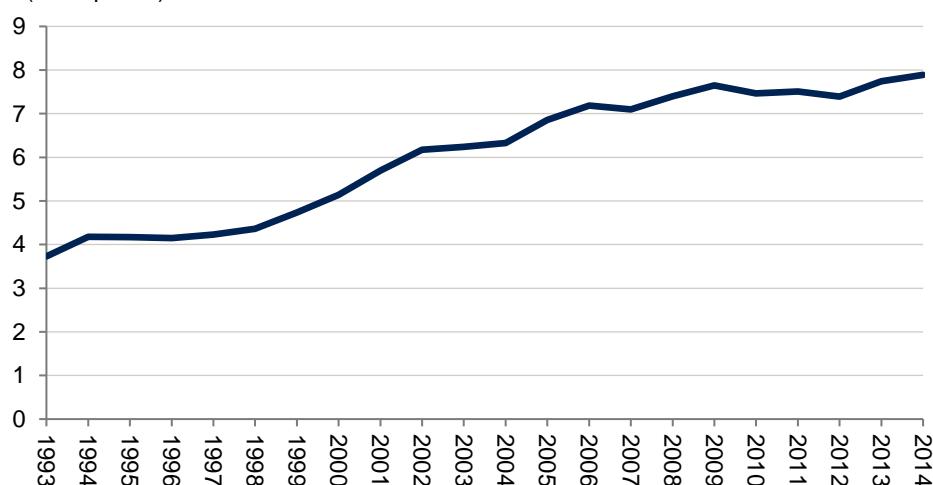
In 2014-15, UK universities also provided 3.9 billion days of continuing education and continuing professional programme days. These projects also add to the stock of human capital, by providing the opportunity for training throughout an individual's lifetime. Through such courses, universities provide education and upskilling that is focused on the needs of employees, employers, and individuals.

5.2 UNIVERSITIES' CONTRIBUTION TO PRODUCTIVITY GROWTH THROUGH RESEARCH AND DEVELOPMENT

Universities undertake a significant amount of research and development (R&D). In 2014, they undertook £7.9 billion of R&D, this was double the amount they performed in 1993 having allowed for price inflation (Fig. 32).⁵³ The majority of this is funded by other sectors of the economy, for example, private companies and government sources.

Fig. 32. Research and development performed by universities

£bn (2014 prices)



Source: ONS, Oxford Economics

As with contributions to human capital, there is no single agreed upon methodology for calculating the returns on investment in research and development, although a number of techniques have been developed. Most notably in the UK, Haskel, Hughes and Bascavusolgu-Moreau (2014) investigate how public science funding can drive productivity improvements in

⁵² Table 4b, HESA, "HE Business and Community Interaction Survey 2014-15", 2016.

⁵³ ONS, "UK Gross Domestic Expenditure on Research and Development: 2014", 18 March 2016.

the private sector, finding a 20 percent rate of return on investment to the UK economy.⁵⁴

Drawing upon various literature sources, we follow an input-based approach to estimate the return on research and development undertaken by universities. This involves first calculating the stock and value of research and development undertaken by universities, then estimating the return on investment, taking into account depreciation, time lags, and how much of the research is truly additional. In our central estimate, we assume a depreciation rate of 2 percent a year, 75 percent of the research is additional, a six-year lag between the investment occurring and the associated benefits being realised, and returns to university research of 30 percent.⁵⁵

The R&D performed by UK universities in 2014/15 is estimated to deliver a stream of benefits into the future. If these are discounted into a net present value in 2014/15, they equate to a £28.9 billion increase in gross value added. This is equivalent to £1,071 per household in the UK. The results are however very sensitive to the assumptions. Changes to them alter the scale of the results substantially (Fig. 33).

Fig. 33. Assumptions for calculating the impact of the research undertaken by universities in 2014-15

	Depreciation Rate	Additionality	Returns to HE sector R&D	NPV R&D performed in HE (2014 funding)
Low	20%	75%	20%	£5.4bn
Central Assumptions	2%	75%	30%	£28.9bn
High	0%	100%	40%	£79.0bn

Source: Oxford Economics

The R&D activities undertaken by UK universities led to the filing of almost 2,200 patents in 2014-15, and more than 950 being granted in the year. Almost 1,400 further patents were filed by external parties which listed higher education institutions as the inventors.⁵⁶ This evidences how university research often leads to the development of new products and processes, with significant commercial applications. Given that high levels of patent applications are correlated with both regional and national economic growth, this contributes significant benefits to universities' local areas, and the UK more widely.⁵⁷

⁵⁴ Jonathon Haskel, Alan Hughes and Elif Bascavusolgu-Moreau, "The Economic Significance of the UK Science Base", UK-Innovation Research Centre, 2014.

⁵⁵ Additionality assumption based on an evaluation of the Science and Research Investment Fund 2008-08 (PACEC, 2012).

⁵⁶ Table 4a, HESA, "HE Business and Community Interaction Survey 2014-15", 2016.

⁵⁷ John Goddard, "Connecting Universities to Regional Growth: A Practical Guide", European Union Regional Policy, 2011.

Universities often devote substantial resources to the commercialisation and real-world application of their innovations. This includes the licencing of intellectual property to existing firms, with experts providing assistance on commercialising and protecting patents. Through this process, even small firms are able to establish intellectual property, protected by patents, encouraging innovation-led growth.

Universities granted over 41,000 licenses to businesses and other organisations in 2014-15.⁵⁸ The majority of these, 88 percent, were to non-commercial organisations. Access to universities' intellectual property is particularly beneficial to small firms, who may not have the resources to engage in substantial R&D activity themselves. Although their share of the number of licences granted was small, SMEs accounted for 13 percent of the value of all licences granted in 2014-15.

Universities encourage the commercial use of their intellectual property through the creation of spin-off companies, more than 140 of which were set up in 2014-15.⁵⁹ Some 91 percent of these firms benefit from some university ownership, and often grow to become successful companies: over 1,000 of the 1,300 currently active companies spun-off from UK universities have survived for at least three years, which is a significant milestone for start-ups.

University spin-off firms had a combined turnover of almost £1.9 billion in 2014-15, and directly employed around 17,600 workers on an FTE basis in that year.

UK universities also provided valuable external consultancy services to over 98,000 organisations, earning more than £440 million, in 2014-15.⁶⁰ These arrangements provide businesses with unique access to specialists in their field, and encompass short-run consulting as well as longer-term innovation support.

These channels demonstrate the myriad ways that universities support innovation and technological development in the UK. By providing support to businesses and other organisations engaged in innovation, universities contribute to new products and processes, beyond the work done by university students and staff.

To illustrate how universities foster and interact with business of all types, from start-ups to seasoned firms, from SMEs to large multinationals, case studies have been included from five universities (Falmouth University, Keele University, Sheffield Hallam, the University of Sheffield and the University of Sunderland). Lastly, one from King's College, London, on how universities reach out to policymakers, to help them deal with complex policy and practice challenges.

⁵⁸ Table 4a, HESA, "HE Business and Community Interaction Survey 2014-15", 2016.

⁵⁹ Table 4b, HESA, "HE Business and Community Interaction Survey 2014-15", 2016.

⁶⁰ Table 2, HESA, "HE Business and Community Interaction Survey 2014-15", 2016.

CASE STUDY – FALMOUTH UNIVERSITY’S LAUNCHPAD PROGRAMME

Falmouth University is committed to generating and supporting innovation, growth, and employment in Cornwall. As part of the University’s 2015-2020 Strategic Plan, it has an objective to help Cornwall grow, with a focus on expanding the Creative Industries cluster that has been developing in the county. These efforts are particularly significant given that Cornwall has among the lowest levels of GDP per capita in the UK.

The University engages with the local area in a number of ways. Falmouth University is committed to attracting local students from under-represented areas of Cornwall, through access and outreach work, and by offering substantial grants to young people in higher education ‘cold spots’. The University also strives to retain graduates in Cornwall, ensuring the local area benefits from a highly skilled workforce. This includes, not only helping students to find jobs, but also offering unique opportunities for students to become directors of their own businesses.

Falmouth University started an innovative incubation and acceleration programme—Falmouth Launchpad—in May 2014. Launchpad’s aim is to boost Cornwall’s economy through the creation of sustainable, high-growth, digital and creative businesses. Launchpad aims to build new businesses to meet demand rather than commercialising existing technologies. Industry partners approach the University with an identified opportunity or problem, around which students build a project, team and, ultimately, a business.

Launchpad’s pilot programme, funded by ERDF and HEFCE’s Catalyst Fund, resulted in the incorporation of six new businesses in fields from digital games to e-learning and data aggregation. All based in Cornwall, these businesses created 19 directorship roles and attracted £400,000 of external investment between them. Launchpad supports the student start-ups through the provision of a stipend, businesses support, and mentoring. Training is underpinned by postgraduate study, and students finish the programme with a fully funded MA in Entrepreneurship.

The success of the 2014-15 pilot has led to a major rollout of the programme from 2017-8, which will create 32 new high growth companies across three year, 128 new jobs, and assisting 64 enterprises. The 2017-2020 programme is funded by ERDF, Cornwall Council, and Falmouth University.

Falmouth University collaborates locally, nationally and internationally on three research themes: the digital economy, smart design, and creative connected communities. One example of a major project in the latter theme is the Online Orchestra, an AHRC funded project which harnesses the internet to give children and amateur musicians who live in remote communities around the country the same opportunities to play in an orchestra as those who live in larger towns and cities. The Online Orchestra allows people who live hundreds of miles apart to make music together for the same time.

CASE STUDY – THE NEW KEELE DEAL

Keele University and its local partners are investing £70 million into programmes aimed at generating significant long-term economic growth in Staffordshire and Stoke-on-Trent through the New Keele Deal, which launched in January 2017. The partnership is made up of the University, Staffordshire County Council, Stoke-on-Trent City Council, Newcastle-under-Lyme Borough Council, University Hospitals of North Midlands NHS Trust, and the Stoke-on-Trent and Staffordshire Local Enterprise Partnership. Together it will expand on Keele University's successful existing regional engagement work and cutting-edge research and development, to increase productivity, grow a positive culture of innovation and research, and create more new higher-value jobs in the region.

The New Keele Deal is focused on local, innovation-led growth, targeting small and medium sized enterprises (SMEs). By providing support, facilities, and funding to over 1,000 businesses, the Deal plans to create at least 700 high-value jobs and inject £210 million in the local economy. The first two priorities (of eight) identified by Keele University and its partners aim to better equip firms with the skills and knowledge to innovate successfully.

The Keele Research and Innovation Support Programme (KRISP) supports SMEs considering, or in the process of developing a new product, process or service. Over ten weeks, KRISP provides businesses with the support of a team of innovation and business advisers, dedicated research and development associates, and academic experts. At the end, firms have the opportunity to apply for grants of up to £2,000 to match their own investment into further research and development of the product, process or service worked on during the programme. KRISP not only benefits individual firms, but also contributes to the UK's stock of research and development, increasing the UK's productive capacity, and generating significant spill-over benefits.

The New Keele Deal's second priority is an innovation leadership programme, run through the Mercia Centre for Innovation Leadership (MCIL). Worth £15,000 per person, the fully funded programme helps local business leaders and entrepreneurs gain the leadership and management skills required for sustained business growth. These skills are developed through both group and one-on-one sessions run by academic experts and business leaders. In addition, participants have access to a dedicated Entrepreneur in Residence and a Keele academic to provide individual advice and coaching throughout the programme.

The New Keele Deal will grow the University's collaborative efforts with the local NHS Trust in the field of Healthcare and Medical Technology (MedTech). In addition to the expert advice, partnership working and specialist facilities that businesses can already access, SMEs will soon benefit from a new Business Bridge. This will include Innovation Vouchers for expert advice in the Healthcare and MedTech markets, greater access to researchers and clinicians when developing products, seminars and workshops, and improved local business networks.

Further plans in the New Keele Deal include the expansion of the specialist business facilities at Keele University's Science and Innovation Park, which provides office and laboratory space designed for SMEs. The Deal commits to growing the University's work experience programmes, including placements, internships and knowledge transfer partnerships. These benefit students and local businesses alike, encouraging innovation and sharing of knowledge and skills. Firms will further benefit from opportunities for continuing professional development for their staff, through courses aimed at meeting employers' demand for higher skill levels.

CASE STUDY – SHEFFIELD HALLAM – THE SHEFFIELD INNOVATION PROGRAMME

The Sheffield Innovation Programme (SIP), led by Sheffield Hallam University, delivers innovation support to businesses across the Sheffield City Region. Run in partnership with the University of Sheffield, the SIP allows small and medium enterprises (SMEs) to access academic expertise, specialist facilities, and other university resources, and supports business growth through bespoke research and innovation based consultancy.

Launched in October 2016, the £3 million programme is funded by the Universities, the Higher Education Innovation Fund, and the European Structural and Investment Fund in coordination with the Sheffield City Region Growth Hub. The programme aims to develop relationships with more than 200 regional businesses over a three-year period to 2019, with a goal of delivering new products and solutions to the market, while supporting individual firms' growth.

Sheffield Hallam University offers access to a range of academic expertise through consulting services and workshops; businesses can benefit from the University's knowledge of packaging, digital and product design, leadership and management, advanced manufacturing, sports engineering, robotics, food engineering and science, and materials engineering. By August 2017, more than 30 client projects had been completed with a further 80 in progress.

Projects begin with up to five days of academic time spent discussing a firm's ideas and problems to shape the way forward, be that consulting services from an academic expert, testing at the University's facilities, or exploring funding options for larger projects. These services and resources would normally be out of reach for small firms, with cost a barrier to innovative activity. Many of the programme's projects result in the development of new products, with considerable wider benefits.

The SIP has already led to significant advancements in product development. One successful collaboration was by Dext Heat Recovery and the University's energy experts, with the aim of recovering waste heat in industrial kitchens. The initial consultation led to a successful Knowledge Transfer Partnership, with an associate working between the company and Sheffield Hallam. The subsequent development of new technology resulted in significant energy savings for major restaurant chains, as well as having wider environmental benefits.

Steel company Al Materials Ltd approached Sheffield Hallam through the SIP to help meet its requirement for tougher stainless steel. The company sought out a combination of the University's material knowledge and experimental capabilities, benefitting from both extensive academic research and bespoke analysis on material samples. Sheffield Hallam's work with Al Materials Ltd has not only improved the company's capability and knowledge of advanced stainless steel materials, but also resulted in a long-term relationship between the two parties.

For businesses without a specific problem or product idea but have an interest in innovation, the SIP also provides funded industry focussed workshops and themed events. These events range in focus from scientific and technical, to business management. While less bespoke than consulting services, specialised workshops can provide invaluable information to small businesses, and an opportunity to network with other firms. One example is the SIP workshop exploring The Science of Brewing, delivered by the Biomolecular Science Research Centre. Targeted at head brewers and technical staff at micro, small, and medium sized breweries in the region, the workshop aimed to provide a better understanding of brewing processes and quality control, and to help businesses increase their product range.

CASE STUDY – THE UNIVERSITY OF SHEFFIELD – ADVANCED MANUFACTURING RESEARCH CENTRE

Sheffield University's Advanced Manufacturing Research Centre (AMRC) brings together the University's expertise and innovation capabilities with the experience and resources of some of the country's most significant industry leaders. It has a global reputation for overcoming advanced manufacturing challenges in fields as diverse as high-tech assembly, robotics, virtual and augmented reality, and 3D printing and metal casting.

Since its launch in 2001, the AMRC has helped hundreds of businesses to improve their technological capabilities, efficiency and competitiveness, across industries from aerospace and automotive to nuclear and healthcare. More than 100 companies are members including Boeing, Rolls-Royce, Jaguar Land Rover, Siemens, McLaren and BAE Systems. For example, the AMRC worked with Rolls-Royce to develop an advanced method for manufacturing gas turbine discs that led to the company making a £100 million investment in a new UK manufacturing facility. Similarly, after its 16-year collaboration with the AMRC, Boeing announced in February 2017 plans to open a production facility to manufacture high-tech components for Boeing's next generation of aircraft in Sheffield. But it is not just global giants that AMRC helps. It also works with small and medium-sized enterprises and specialist suppliers. For example, it worked with Tinsley Bridge, a Sheffield-based automotive SME, helping them to develop a revolutionary hybrid metal and composite anti-roll bar.

Within the AMRC are many specialist operations. For example, the Nuclear AMRC, which is part of the High Value Manufacturing Catapult, backed by Innovate UK, sees collaboration between industrial and academic partners to drive innovation and economic growth in the civil nuclear manufacturing sector. The Medical AMRC is working with doctors, medical services and suppliers to design new products and processes that will revolutionise healthcare technology and address pressing medical and social care challenges. And the AMRC's Factory 2050 is a centre for research into robotics and automation and is the UK's first fully reconfigurable digital factory for collaborative research. It leads the AMRC's work on the Internet of Things, on the handling of data, virtual and augmented reality and robot-human collaboration and safety.

The AMRC is an important player in driving the wider industrial strategy of the Sheffield City Region, the Northern Powerhouse initiative and the Northern Advanced Manufacturing Corridor. Its strength not only supports UK businesses at home but assists in the UK's balance of payments—drawing inward investment. This has included, for example the re-shoring of the McLaren Supercar build to the UK and the announcement in March 2017 of Boeing's first production facility in Europe—Boeing Sheffield. On the international stage, AMRC works with companies and governments across the world to create opportunities for economic diversification and to break down barriers to growth, particularly in the development of advanced manufacturing training facilities and skills programmes.

The benchmark for this work is the AMRC Training Centre, based in Rotherham, which since opening in 2014, has trained more than 800 apprentices, all sponsored by industry. Apprentices have access to many education routes through the centre, including degree apprentices, post-graduate and MBA routes. Indeed, the University of Sheffield was the first UK research-led university to offer full advanced manufacturing degrees as part of an apprentice route into higher education. Its apprentice programme was named Times Higher Education Widening Participation Initiative of the Year in 2014.

CASE STUDY – UNIVERSITY OF SUNDERLAND’S HOPE STREET EXCHANGE

Hope Street Xchange is a £10 million centre for enterprise and innovation, funded by the University of Sunderland and supported by £4.9 million investment from the North East Local Enterprise Partnership, via the Government’s Growth Deal programme. The centre supports fledgling start-ups and offers space for existing businesses to develop and grow. Located on the University’s city centre campus, it also serves as a gateway to the University’s research, expertise and problem solving capabilities.

Sunderland Business Group was behind the initial proposal for a one-stop shop to increase entrepreneurship in the city and tackle the low levels of enterprise and business start-ups in the region. Representing leaders from public and private sectors, the Business Group works collaboratively on strategic projects to support Sunderland’s growth and prosperity; the University is one of the Group’s founding members, and has been central to its many successful initiatives, all of which have benefited the city.

The vision was to create a hub where businesses interact with the University to support innovation and growth: from internships, placements, knowledge transfer partnerships, and creative endeavour, to higher and degree apprenticeships and access to facilities and laboratory space. The facility was to include the region’s first FabLab where designers and entrepreneurs can prototype ideas using the latest digital fabrication facilities.

This resonated with the institutional vision outlined in the University’s new Strategic Plan ‘We are the Tomorrow Makers’ which sets out a bold ambition for Sunderland graduates to become the future leaders of societies and economies. The plan also articulates the University’s role as an anchor institution in the North East, making significant social, economic and cultural contributions to its locality. A recent independent economic impact study estimates that the University generates £432 million in gross value added for the North East economy, supporting 5,400 jobs.

The Hope Street Xchange will accommodate 49 established businesses and 150 new business ventures, creating almost 400 jobs in innovative, high-growth sectors linked to the University’s academic strengths and research practice, including advanced manufacturing and technology, health sciences, business and finance, and the creative and cultural sector.

Hope Street Xchange will also provide immediate access to a wealth of ‘real life’ applied research, practical business advice, expert mentoring, knowledge transfer partnerships and support through student work placements and graduate interns.

The finished building provides a nurturing environment to support entrepreneurialism and welcomes businesses large and small to engage with the University. As well as the region’s first FabLab the centre includes hatchery and hot-desk space for University staff and student enterprise projects, flexible light-industrial, laboratory and office space for businesses seeking to co-locate with the University, a new home for the University’s graduate enterprise development facility, and a choice of 30 Grade A offices plus workshops, conference area and meeting spaces.

A team of advisers, including a dedicated business development support team provide a wrap around service for the Hope Street Xchange community of entrepreneurs, businesses, and fledgling enterprises; the ‘Tomorrow Makers’ vision will become reality through this University and city initiative.

CASE STUDY – THE POLICY INSTITUTE AT KING’S COLLEGE LONDON

The Policy Institute at King’s addresses complex policy and practice challenges with rigorous research, academic expertise and analysis focused on improving outcomes. The Institute’s vision is to undertake and enable the translation of research into policy and practice, and to translate policy and practice needs into a demand-focused research culture. The Institute does this by bringing diverse groups together and facilitating engagement between academic, business, philanthropic and policy communities around current and future issues for the UK and internationally.

The Institute has cultivated strong relationships with a number of individuals and institutions, and current Visiting Professors include senior civil servants, politicians, journalists and independent thinkers. They are currently working with Dame Margaret Hodge MP on research exploring attitudes to migration and integration in Barking and Dagenham. The aim is to improve understanding of borough residents’ experiences of diversity and change, as well as their attitudes to their local community. By working with the Policy Institute, the research is rooted in the wider evidence base on building tolerance and inclusion, and is designed to create recommendations which will inform decisions about the interventions and policies which might help to improve community cohesion in the borough and beyond. The deep subject expertise and broad policy expertise of the Institute’s staff is acknowledged nationally and internationally, with the Director, Professor Jennifer Rubin serving as UK Representative to the NATO taskforce on ethnic intolerance in the military, and Institute staff regularly asked to contribute to government reviews and inform new policy development.

Many of the Institute’s Visiting Professors and collaborators have first-hand experience of making and implementing policy, providing a great opportunity for students to learn from those who have worked right at the heart of government, bringing to life the topics studied and helping to shed light on the complexity of decision-making associated with such positions of power. Another student experience offered by the Institute is an annual policy pitching competition called Policy Idol. The competition provides a platform to staff and students to pitch a policy idea to a panel of experts from the worlds of politics, academia and industry, with the best ideas selected for the final in front of a live audience.

Contributing to public discussion and debate through policy briefings, blogs, seminars and events is also an important way in which the Institute engages with people – and it has established a series of reports and briefings that cover particularly pertinent and often controversial issues such as higher education funding and how the UK can retain global influence following Brexit.

The Institute is also committed to helping researchers communicate their work effectively and to think about its impact at an early stage. It does this by delivering courses on communicating with policymakers and research impact, as well as advising individuals and being involved in various projects across the university. These efforts help to translate research undertaken by King’s academics into policy and practice, and brings policy orientation and focus to many wider academic areas being researched. For instance, the Institute has worked with Westminster City Council and Professor Frank Kelly, Director of the Environmental Research Group at King’s, to review the available evidence on interventions to address air pollution. This work supports the Council’s Air Quality Task Group by looking locally and internationally for examples of good practice in tackling air pollution.

APPENDIX 1

THE ECONOMIC IMPACT OF UK UNIVERSITIES ON ENGLAND

The economic impact of UK universities reaches all parts of the UK. There are universities in every nation and region, which make purchases from a wide range of businesses throughout the UK. However, the impact of universities is not spread evenly; the size of the impact in each region depends on the size of university operations there, and the value of procurement from firms located in that region. The strength of the region's economy, and how frequently businesses appear in the supply chain of universities and businesses from other parts of the UK, also play a significant role.

In this Appendix, we explore the contribution UK universities made to the English economy in 2014-15. We used our UK regional model to isolate the impact of universities' expenditure, and that of their international students and visitors, on England.

England was home to 131 of the 162 universities operating in the UK in 2014-15. While they therefore account for 80 percent of UK universities, English universities were responsible for generating 84 percent of all university income in 2014-15, earning £27.7 billion of the £33.2 billion UK total (Fig. 34). They additionally accounted for £18.0 billion, or 84 percent, of the total direct gross value added contribution made by UK universities in 2014-15. Universities in England employed 82 percent of all UK universities' staff, employing almost 333,000 people in that year.

English universities spent £11.7 billion on operational goods and services in 2014-15, or 83 percent of total UK university operating expenditure in that year. Supply chains in England benefitted from this spending, and from a portion of the spending by universities in the rest of the UK. Through the indirect channel of impact, an estimated £13.7 billion of gross output was generated in England in 2014-15. Through this expenditure, UK universities generated a £6.5 billion gross value added contribution to English GDP. This economic activity was responsible for supporting near to 120,000 jobs throughout the nation in the same period.

University employees in England, and the other nations of the UK to a lesser degree, spend some of their wages in the English consumer economy. Through this 'induced' channel, universities supported £24.8 billion of gross output in England in 2014-15. Universities' staff, and workers in their supply chains, supported a gross value added contribution of £13 billion to English GDP. This economic activity sustained over 210,000 jobs in that year.

English universities attracted almost 360,000 international students in 2014-15, or 82 percent of all those enrolled at UK universities. These students paid English universities £4.1 billion in tuition fees. The subsistence spending of these students benefits the local economy, with the impact reaching all corners of the UK through supply chains of those firms supplying consumer goods and services. The impact of the spending of international students at UK universities reflects the English firms in the supply chains of those businesses servicing the students in England, as well as spillovers from the other nations of the UK.

The expenditure of international students in the UK supported £8.5 billion of gross output in England in 2014-15. Through this, student subsistence spending generated a £4.1 billion gross

value added contribution to English GDP in the year. This economic activity supported a further 69,000 jobs in England.

With their considerable number of international students, English universities also attracted many overseas visitors. The spending of these visitors, and those visiting the rest of the UK, supported £700 million of gross output in England in 2014-15. This generated an estimated £400 million gross value added contribution to English GDP, and sustained almost 8,000 jobs in the year.

Fig. 34. The total economic impact of UK universities on England, 2014-15

	Universities' operations	International students' subsistence spending	Overseas visitors' spending	Total impact of UK Universities
Gross Output (£ billion)				
Direct	27.7			27.7
Indirect	13.7	6.0	0.5	20.2
Induced	24.8	2.4	0.2	27.5
Total	66.2	8.5	0.7	75.4
GDP (£ billion)				
Direct	18.0			18.0
Indirect	6.5	2.9	0.2	9.6
Induced	13.0	1.3	0.1	14.3
Total	37.5	4.1	0.4	42.0
Employment (persons, 000s)				
Direct	333			333
Indirect	116	48	6	170
Induced	211	21	2	234
Total	660	69	8	737

Source: Oxford Economics

APPENDIX 2

COMPARISON TO 2011-12

The results presented in this study are not directly comparable to those calculated in previous editions of the Impact of Universities on the UK economy report. While there has been significant growth in the contributions made by universities, some of the changes in the scale of the expenditure impacts are a result of differences in scope, methodology and vintages of data between studies. In this Appendix, we present Oxford Economics' estimate of the impact of UK universities in 2011-12, along with some of the differences in approach between this study and that published in 2014.

OXFORD ECONOMICS' ESTIMATE OF THE IMPACT OF UNIVERSITIES IN 2011-12

In order to compare the 2014 study of the economic impact of UK universities in 2011-12 to this study of 2014-15, we undertook our own assessment of the contribution made in 2011-12 (Fig. 35). We followed the same methodology as for the 2014-15 assessment, as outlined in Appendix 3, with appropriate inflation adjustment made to international students' subsistence spending and their visitors' spending, and the appropriate productivity and output to gross value added ratios for 2011-12.

Fig. 35. The economic impact of UK universities, 2011-12

	Universities' own operations	International students' subsistence spending	Overseas visitors' spending	Total impact of UK universities
Gross output (£ billion)				
Direct	27.9			27.9
Indirect	14.0	7.7	0.5	22.2
Induced	26.1	2.9	0.2	29.1
Total	68.0	10.6	0.7	79.3
GDP (£ billion)				
Direct	18.0			18.0
Indirect	6.8	3.8	0.2	10.8
Induced	13.6	1.5	0.1	15.2
Total	38.4	5.3	0.3	44.0
Employment (persons, 000s)				
Direct	378			378
Indirect	132	71	6	209
Induced	245	27	2	274
Total	755	98	8	861

Source: Oxford Economics

Fig. 36. The economic impact of non-EU international students, 2011-12

	Gross output (£ billion)	GDP (£ billion)	Employment (people, 000s)
Expenditure on UK universities	9.2	5.2	93.0
International students' subsistence spending	7.5	3.7	68.9
Overseas visitors to students' spending	0.5	0.2	6.2
Total	17.2	9.2	168.1

Source: Oxford Economics

DIFFERENCES IN THE VINTAGES OF DATA AVAILABLE

Oxford Economics uses the most up-to-date data in our economic impact analysis. As such, the underlying data behind the input-output modelling will differ to that used in the study published in 2014. In particular, the model makes use of the newer 2010 ONS I-O tables, as opposed to the 2005 version available for use in the previous study. This will impact the size of the output multipliers used for each industry and the ratios about those industries (for example, gross value added to gross output).

DIFFERENCES IN METHODOLOGY

HESA provides data on UK universities' procurement of operational and capital inputs. In order to model the impact of this expenditure throughout the economy, it was necessary to allocate this spend to the industries fulfilling these orders. Without more detailed information, Oxford Economics did this using the typical spending of the education sector according to the ONS' I-O and Supply and Use tables. This is in contrast to the previous study, which used "data from a sector-wide survey conducted for previous studies, together with observations of detailed patterns of expenditure from a number of individual universities studied by the team, and information obtained from higher education purchasing consortia."⁶¹

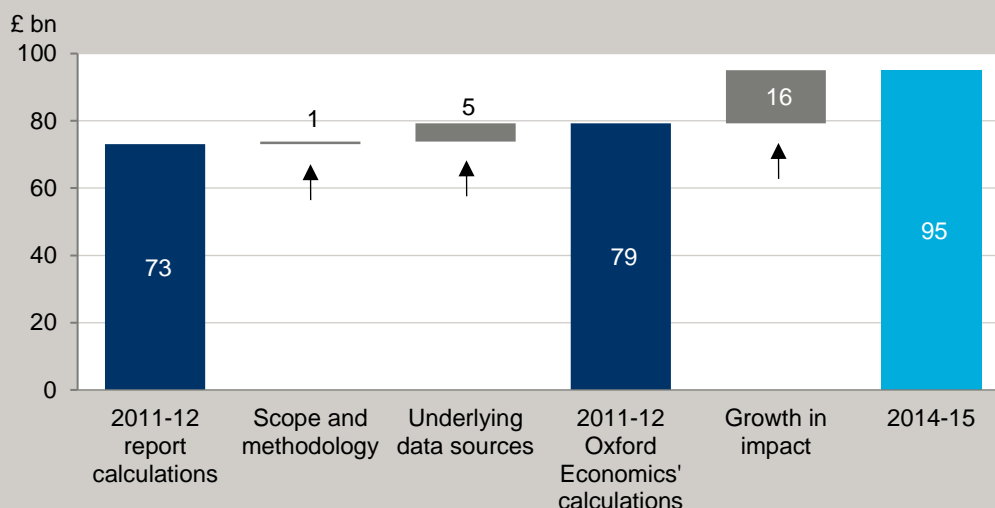
In order to analyse the economic impact of international students, it was necessary to calculate the spending per student. A detailed explanation of how this was calculated is provided in Appendix 3. In broad terms, Oxford Economics followed the same methodology as in the previous study when calculating student spending. This involved using the BIS Student Income and Expenditure Survey 2011/12. But there may be some minor methodological differences. First, our estimates take into consideration national differences in living costs. Second, we assume part-time international students' spending is higher than that of full-time students, in line with the BIS' survey of English and Welsh students. This is in contrast to the assumption made in the BIS' briefing on estimating the value of education exports, where it assumes that part-time students' living costs are the same as those of full-time students.

As outlined in Chapter 3, this study estimates the impact of the expenditure of visitors to international students. By contrast, the 2014 study estimated the impact of the expenditure of "university visitor numbers" based on an earlier survey "with an estimate of 1,148,695 business and 468,384 leisure visitor bednights in a single year."⁶² This is a clear difference in scope.

GROWTH IN UNIVERSITIES' ECONOMIC IMPACT

The differences in scope, methodology and data revisions lead to a £6.2 billion difference in the estimate of the impact of UK universities on gross output in 2011-12 (Fig. 37). The majority of this reflects differences in the data sources used in the comparison, rather than changes in scope or methodology.

Fig. 37. Sources of change in gross output generated through the direct, indirect, and induced impact of universities, 2011-12 to 2014-15



Source: Oxford Economics, Universities UK (2014)

On a comparable basis, gross output supported by UK universities and the spending of their international students and overseas visitors increased by £15.7 billion between 2011-12 and 2014-15 in nominal terms. On these earnings, the gross value added contribution to GDP they support increased by £8.9 billion (or 20 percent) in nominal terms or 15 percent in real terms (after allowing for inflation).

Between 2011-12 and 2014-15, the employment supported by UK universities is estimated to have increased by 83,000 jobs (or 10 percent). The smaller proportionate increase in employment compared to gross output and gross value added reflects an increase in the productivity of the UK workforce over the period.

⁶¹ Universities UK, "The Impact of Universities on the UK economy", April 2014. Page 15.

⁶² Universities UK, "The Impact of Universities on the UK economy", April 2014. Page 20.

APPENDIX 3

METHODOLOGY

UNIVERSITY EXPENDITURE IMPACTS

Direct impact

Our estimate for the direct gross value added contribution to GDP generated by universities is the sum of universities and colleges' surplus and gross staff costs. This is a method consistent with the principles of national accounting. Direct employment is the headcount of university staff, excluding atypical staff. These data were sourced from HESA HE Finance Plus 2014-15 and HESA Employment 2014-15.

Direct taxes have been estimated using HESA data that provides a breakdown of staff into wage bands.⁶³ We use average wages and HMRC data on tax allowances and receipts to estimate the size of labour taxes paid on universities' staff earnings, including income tax, and employer and employee NICs. Due to their charitable status, the universities in the study do not pay corporation tax.

Indirect impact

The modelling for this economic impact study was based on I-O tables, as published by the ONS. These data are the most detailed official record of the economic links between different parts of the UK economy, as well as with the rest of the world.

The I-O tables set out the goods and services that industries purchase from one another in order to produce their output. This includes their purchases from firms in the UK, as well purchases from abroad. Similarly, the tables provide details on the spending pattern of UK households, and indicate the proportion of this demand that is met by UK firms, and what goods and services are imported from abroad. In essence, the tables show who buys what from whom. The I-O tables used in this study pertain to the calendar year 2010, which were the most recent available at the start of the analysis.⁶⁴

Using the detail on these linkages provided by the I-O tables, Oxford Economics constructed a bespoke impact model that traces the supply chain impact attributable to UK universities. The key data inputs for this model were HESA HE Finance Plus 2014-15 information on universities' expenditure. Expenditure was 'mapped' to spending categories using I-O and Supply and Use table data for the education sector.

Oxford Economics' impact model then quantifies purchases along universities' complex network of supply chains. These transactions are then translated into gross value added, using UK-specific ratios of value-added to gross output, sourced from the I-O tables. The impact on employment was modelled using the latest data on output per head in the industrial sectors, derived from the I-O tables and Business Register Employment Survey, published by the ONS.

⁶³ Sourced from www.gov.uk.

⁶⁴ ONS, "United Kingdom Input-Output Analytical Tables, 2010", 2014.

Taxes were estimated using HMRC data on tax allowances and receipts, along with ONS statistics on the average profitability of each industrial sector derived from the IO tables, the average wage rates seen in these sectors (from the ONS' Annual Survey of Hours and Earnings), and the indirect employment supported within them.

Induced impact

The induced impact was modelled in a similar way. Using wage data from HESA HE Finance Plus 2014-15, Oxford Economics used household spending data sourced from the I-O tables to model the typical spending profile of university staff, making allowances for 'leakages' in the form of imports and savings.

For workers within the supply chains, we used industry-specific ratios of employee compensation per unit of output, in order to forecast how much household wages are supported among the suppliers' workers. These ratios are sourced from the 2010 I-O tables. Both of these spending streams were then fed into our I-O model for the UK, to calculate the total impact of this spending. Taxes were calculated using the same methodology as for the indirect impact.

INTERNATIONAL STUDENTS' SUBSISTENCE SPENDING

UK universities attract students from other parts of the world. The subsistence spending of these students would not otherwise occur in the UK economy and is, therefore, part of the overall impact of universities.

Subsistence expenditure refers to all spending on goods and services except for tuition fees. It includes, for instance, the purchases of items required for the facilitation of study—such as transport to university and required books—as well as other consumer expenditure—including spending on food, leisure and social activities. Payments to universities for accommodation, food, and other services are removed from the calculation so as not to double count.

The former Department for Business, Innovation and Skills (now known as the Department for Business, Energy, and Industrial Strategy) regularly publishes data on subsistence expenditure by students in England and Wales.⁶⁵ The latest available covered the 2011-12 academic year. This study focuses on home-domiciled students, however we follow BIS' assumption that international students' spending is not significantly different to a home students'.⁶⁶ Students' expenditure in the survey is disaggregated into the following categories:

- living costs, including food, drink, and personal items;
- housing costs, including rent, mortgage costs, and Council Tax;
- participation costs, including books, and stationery; and
- spending on children, if any.

Making allowance for the change in living costs between 2011-12 and 2014-15 using the ONS' Consumer Price Index indicates that the average full-time student at an English university spends just over £11,000 per year, including housing costs. In order to account for regional differences in

⁶⁵ Department for Business Innovation and Skills (now Department for Business, Energy and Industrial Strategy), "Student Income and Expenditure 2011/12," 2013.

⁶⁶ Department for Business Innovation and Skills (now Department for Business, Energy and Industrial Strategy), "Estimating the Value to the UK of Education Exports", BIS Research Paper Number 46, June 2011.

living costs, data have been collected on student subsistence spending by nation. Data for Welsh students were also included in the BIS survey, while data on Scottish students' expenditure has been sourced from a similar survey undertaken by the Scottish government.⁶⁷ As comparable data were not available for Northern Ireland, the ONS' relative regional consumer prices for goods and services was applied to the English data on students' expenditure patterns.⁶⁸

The BIS' student income and expenditure survey is based upon an academic year of 39 weeks, from September to June. Adjustments were made to non-EU undergraduate students' spending and all postgraduates' spending, in line with BIS' methodology in estimating the value of UK educational exports. In the paper on export earnings, BIS assume that non-EU students spend 42 weeks in the UK, and that all international postgraduate students spend 52 weeks in the UK, writing dissertations over summer. Weekly costs are assumed to be the same for all international students, regardless of their nationality, with full-time students spending less than part-time students, who are more likely to incur additional costs for families, and spend more on travel.

A further adjustment to the spending figure is made to reflect the likelihood that some part-time students work while studying. We follow the methodology used in the BIS paper on the value of education exports, assuming that half of part-time students work 20 hours a week alongside their studies. As some of their subsistence spending is funded by these earnings, not all of their expenditure can be thought of as exports. As such, we have adjusted the spending of part-time students to remove the proportion that is funded by UK work.

To estimate the impact of students' spending, it must be put into the same format as the I-O tables. We allocate the spending to the 106 product categories in the I-O tables, according to the type of good or service purchased. Oxford Economics' models adjust this spending to take into account what proportion of it reflects imports, taxes, and margins made by retailers and transport companies. It does this based on the proportion of spending that is typically made on these components for each industry in the I-O tables.

OVERSEAS VISITORS TO INTERNATIONAL STUDENTS

Universities' international students attract visitors to the UK from around the world. The spending of these visitors during their stay would not otherwise occur in the UK economy and is, therefore, part of the impact of UK universities, similarly to international student spending.

The ONS' International Passenger Survey (IPS) provides detailed data on the spending of international visitors to the UK, disaggregated by the purpose of the trip and by the nationality of the visitor.⁶⁹ This report uses data for those travelling with the purpose of visiting friends and relatives.

Data on the number of international students from each country/region were sourced from HESA students 2014-15. The Annual Population Survey (APS) records the number of people of each nationality living in the UK.⁷⁰ For the purpose of identifying the spending of those visiting friends and relatives attributable to universities, it is assumed that the proportion of travellers visiting students is the same as that of students in the general population of a nationality.

⁶⁷ The Scottish Government, "Higher and Further Education Students' Income, Expenditure and Debt in Scotland 2007-08", Scottish Government Social Research, 2009.

⁶⁸ ONS, "UK Relative Regional Consumer Price Levels for Goods and Services for 2010", 2011.

⁶⁹ ONS, "Overseas Residents Visits to the UK", 2014 and 2015.

⁷⁰ ONS, "Population of the United Kingdom by Country of Birth and Nationality: 2015", August 2016.

For example, if 29 percent of Chinese nationals living in the UK were students in 2014-15, then it is assumed that 29 percent of Chinese nationals travelling to the UK to visit friends and relatives did so to visit students. As such, 29 percent of Chinese nationals' spending on visiting friends and relatives is attributable to universities.

Applying this methodology to all international students at the 162 UK universities indicates that visitors to these students spent over £500 million in the UK in 2014-15. This spending is allocated to the 106 industries in the I-O tables and automatically adjusted in the models in the same way as with the subsistence spending. The breakdown of expenditure into goods and services has been calculated using the typical spending patterns of overseas visitors reported by the IPS.⁷¹

METHODOLOGY FOR ESTIMATING THE IMPACT ON HUMAN CAPITAL

In measuring the impact of universities on the UK's human capital stock, we follow the ONS' methodology for estimating human capital.⁷² This is an income-based approach that uses the sum of discounted lifetime earnings of individuals to calculate their level of human capital. This approach relies on the assumption that labour is paid according to its marginal productivity, as differences in productivity are calculated as differences in income.

The first step to calculating the impact of universities on human capital was developing a database of lifetime earnings, which represent the economic value of their labour market activities, for different categories of people. These were constructed using data on the earnings, life expectancy, and employment rates of these different categories. We assume that earnings differ according to highest level of qualification, age, and gender.

The second stage was to use the database to estimate the level of human capital stock in the UK economy. Using data from HESA Students 2014-15 on the age and gender of university graduates, we were able to estimate the increase in the life-time earnings of the 2014-15 graduating class as a result of their achieving a university degree. The increase in life-time earnings was discounted to give a net present value of the increase in economic output. Due to data limitations, we limited the approach to estimating just the increase enjoyed by those graduating with first degrees for the first time, and not by those currently studying. The analysis excludes students receiving postgraduate level degrees or their second or more first degree.

METHODOLOGY FOR CALCULATING THE IMPACT ON PRODUCTIVITY DRIVEN BY RESEARCH AND DEVELOPMENT

The data used to calculate the stock of university research and development investment is from the ONS, which records annual expenditure data.⁷³ We estimate the returns on investment for 2014, as this is the latest year for which data are available. Our methodology closely follows that of Haskel et al., with some assumptions amended where appropriate.

The lifetime value of the investment is estimated using a depreciation rate of 2 percent. This is a central estimate based on a literature review. Estimates range significantly, for example Hall (2005)

⁷¹ ONS, "The Regional Value of Tourism", 2011.

⁷² ONS, "Measuring the UK's Human Capital Stock", (Methodological Guidance, 2011).

⁷³ ONS, "UK Gross Domestic Expenditure on Research and Development: 2014", 18 March 2016.

states that depreciation can vary from 0 to 40 percent.⁷⁴ Haskell et al. use zero for the assumed depreciation rate, which we have included as a higher estimate (the lower the depreciation rate the higher the value of the stock investment).⁷⁵ Studies such as Pakes and Shankerman (1979) suggesting a depreciation rate of 0.17 to 0.26, using a methodology based on patent renewal prices.⁷⁶ We have included a depreciation rate of 20 percent to represent this other evidence. This study, by Pakes and Shankerman (1979), also forms the basis of our assumption that the benefits of research and development investment are not realised immediately, but occur with a lag of around six years. This is a result of the need to complete projects and then commercialise new technologies.

Before calculating the return on the stock of university research and development investment, it was necessary to calculate the proportion that is truly additional. We used an evaluation of the Science and Research Investment Fund 2006-08, which surveyed higher education institutions and found that between 24 percent and 27 percent of investment would have gone ahead in the absence of the funding. This is the basis of our assumption that 75 percent of non-university funded research and development taking place at universities is additional.

Using these data and assumptions, we developed a simple flow and stock model to calculate the value of cumulative investment in 2014-15, using net present values of the returns. Net present value has been calculated using a discount rate that takes into account that returns today are more valuable now than those accruing in the future.

⁷⁴ Hall, B.H., "Measuring Returns to R&D: The Depreciation Problem". *Annales D'Économie et de Statistique* 79/80, 2005.

⁷⁵ Haskel, et al (2014).

⁷⁶ Ariel Pakes and Mark Schankerman, "The Rate of Obsolescence of Knowledge, Research Gestation Lags, and the Private Rate of Return to Research Resources", 1979.

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