

An Update on IP-Related and Commercialisation Activities in England in 2018/19.

Report detailing IP-related and commercialisation activities submitted as part of the HE-BCI survey, focussing on those conducted in England in 2018/19.

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HE-BCI Survey 2018/19

To	Heads of Research England-funded higher education providers
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Enquiries to	Ellen Bamford KEPolicy@re.ukri.org 0117 450 1697

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Introduction

1. Drawing data from university returns to the Higher Education – Business and Community Interaction (HE-BCI) survey, this report discusses the intellectual property (IP) related and commercialisation activities conducted by providers in the academic year 2018/19. It also makes comparisons of the performance of the sector with that during previous reporting periods.
2. This report also makes international comparisons on key IP indicators from the United States, building on analysis previously published by Higher Education Funding Council for England (HEFCE) in the [HE-BCI Survey report](#) in 2017 with the most recent two years of HESA published data from 2017/18 and 2018/19.
3. The HE-BCI survey is an essential source of information on university knowledge exchange (KE) in the UK. ‘Business’ in this context may refer to private, public, and third-sector partners of all sizes¹. ‘Community’ in this context means society as a whole outside higher education providers (HEPs), including all social, community and cultural organisations, individuals, and the public, both nationally and internationally.
4. The survey records information on a wide range of interactions with external partners and the wider world, such as collaborative and contract research, consultancy, continuing professional development, regeneration and development programmes, the exploitation of intellectual property and other activities with a direct social benefit, such as hosting events in museums and giving public lectures.
5. The data is collected by the Higher Education Statistics Agency (HESA). All publicly funded HEPs in the UK are required to submit data to the HE-BCI survey. HEPs who do not receive public funding may also submit data to HE-BCI but they have been excluded from the data presented in this report². HEPs provided data for activity occurring during the academic year 2018/19.
6. The HE-BCI survey collects income to HEPs, which is considered a sound proxy for the impact of their KE activities³. The main indicators for which income to HEPs reflects the market value of these resources in the economy and society are collaborative research, contract research, consultancy, equipment and facilities, continuing professional development, regeneration and IP income.

¹ The ‘third sector’ refers to voluntary and community groups, social enterprises, charities, co-operatives and mutuals.

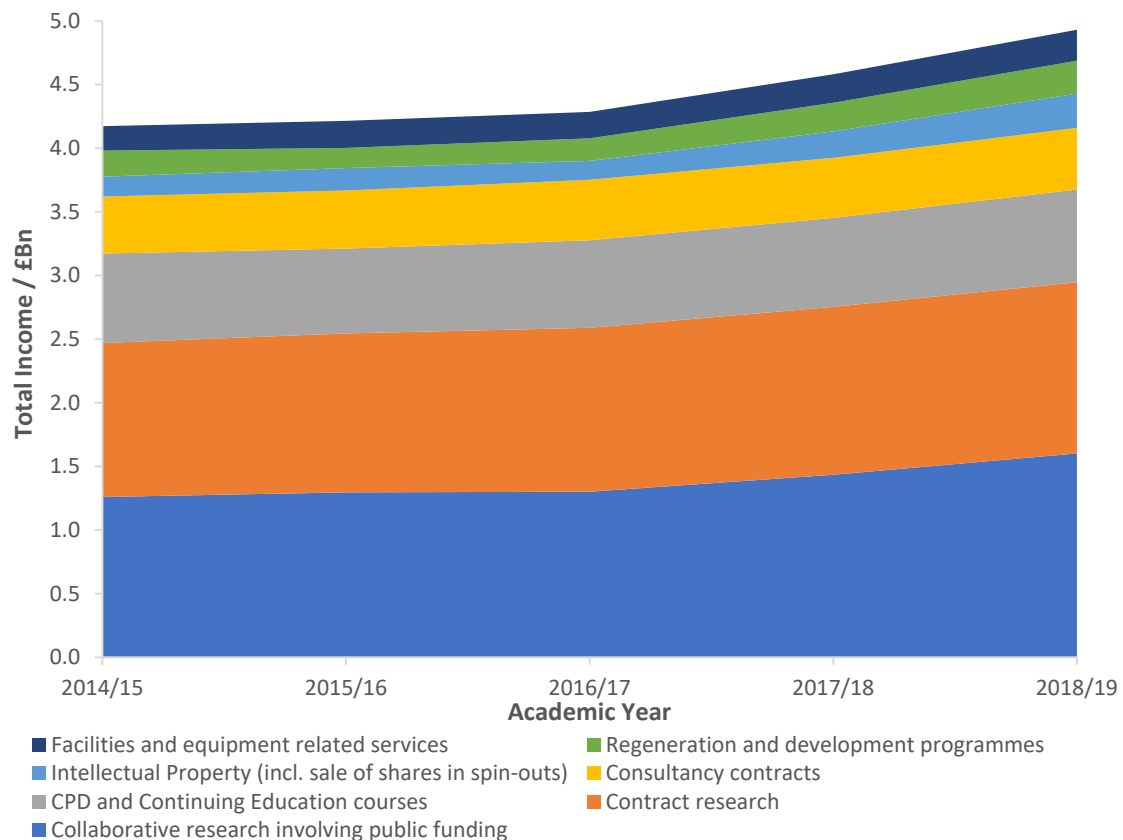
² Data from the University of Buckingham is excluded from this report as it is not a publicly funded HEP.

³ See ‘Allocating HEIF: The suitability of knowledge exchange income as a proxy for outcome performance’, available at www.hefce.ac.uk/ke/keresearch/.

The UK's KE Landscape

7. This section provides a brief overview of the headline figures from the HE-BCI survey, and highlights year-on-year changes. In 2018/19 the total income to UK HEPs increased by £350m (7.5%) to £4.93bn compared to 2017/18, with increases observed across all individual categories of income as illustrated by Figure 1 below.

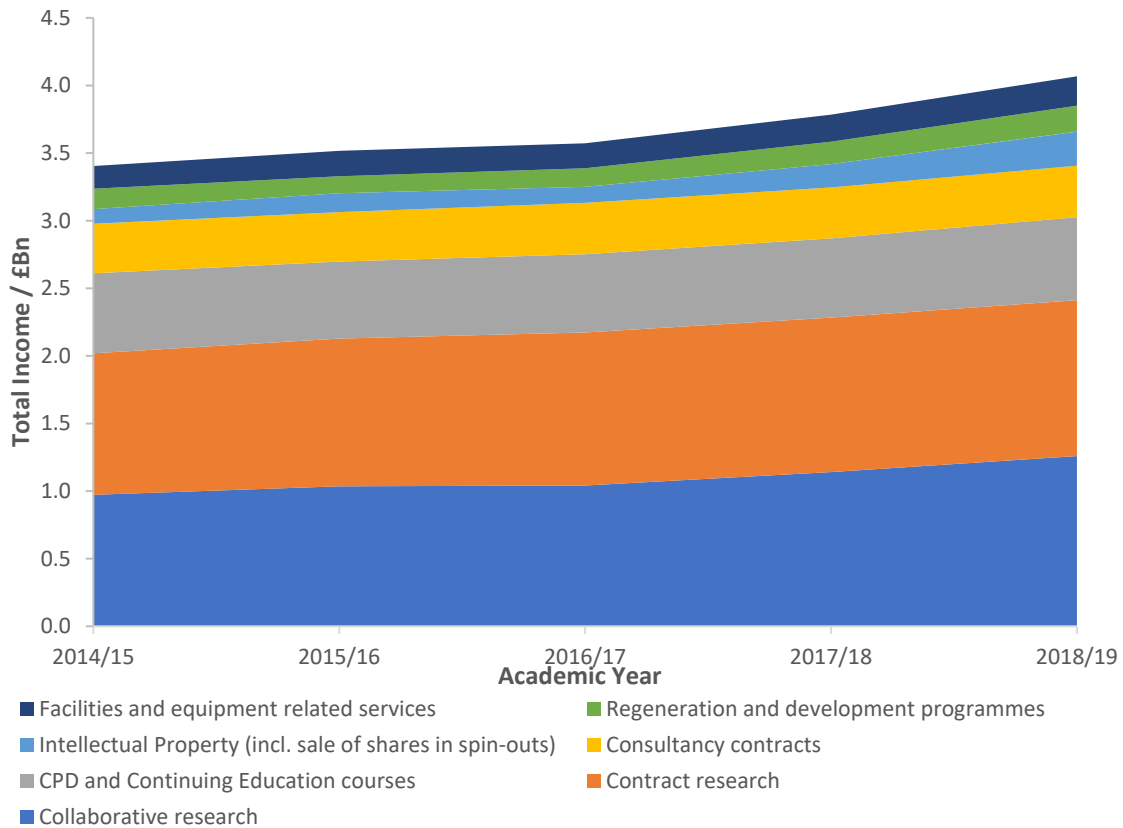
Figure 1: Total income for each category across all UK providers stacked for each academic year from 2014/15 to 2018/19.



For the remaining sections of this report all data is based on English providers only unless otherwise stated.

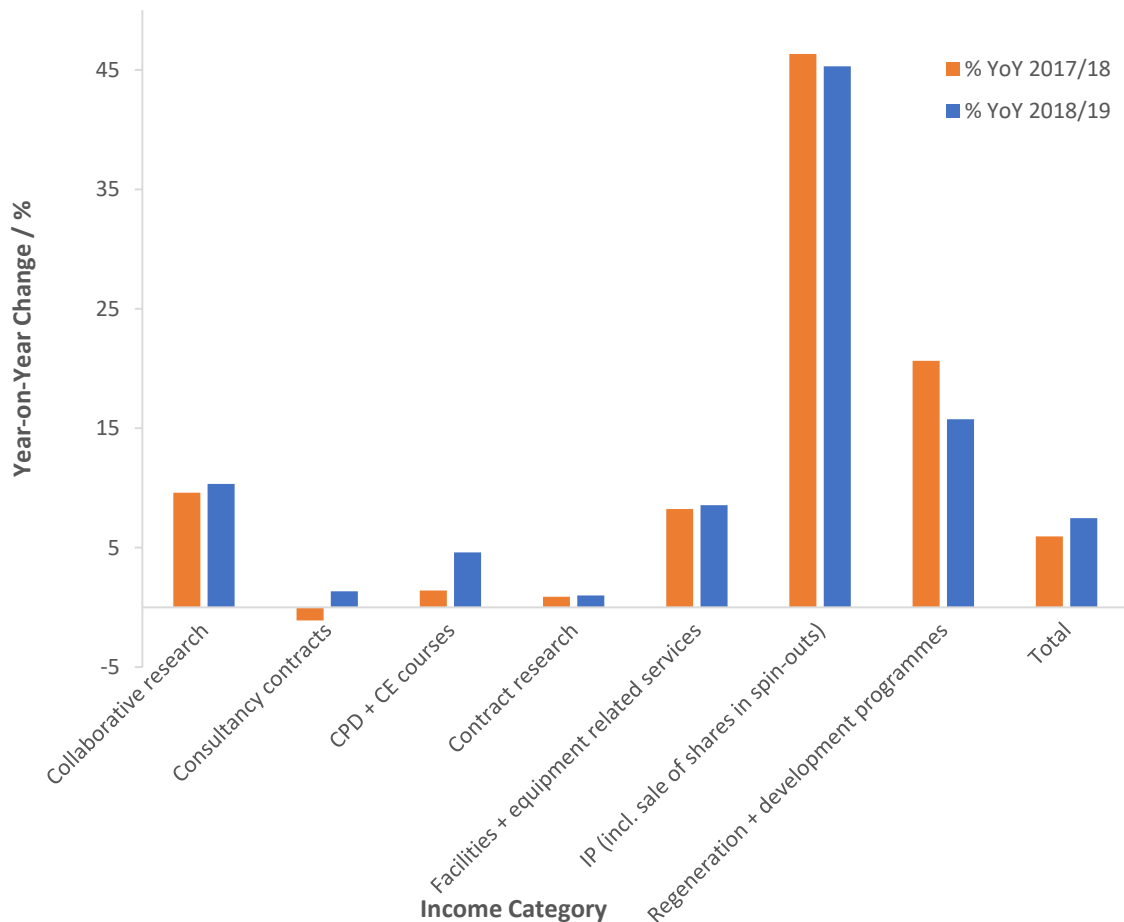
8. Similarly, in England increases in income for all categories were observed in 2018/19 as shown in Figure 2. The total income for 2018/19 was £4.067bn which is an increase of £283m (7.5%) compared to 2017/18. In addition, for the majority of categories of income the year-on-year increase in 2018/19 was greater than that in 2017/18, except for IP income and regeneration and development programmes which observed slightly lower growth rates, as shown in Figure 3.

Figure 2: Total income for each category across all English HEPs stacked for each academic year from 2014/15 to 2018/19.



9. Despite the slight decrease in growth rate, the increase in IP income (including the sale of shares in spin-outs) is still significant for 2018/19 at £251m, an increase of 45.3% compared to 2017/18. Particularly of note (and which is discussed in more detail later in this report) is the increase in the number of spin-outs across the sector in England, in-year and cumulatively, and the strong growth in external investment.

Figure 3: Year-on-year percentage change in income for each category in 2017/18 and 2018/19.



Intellectual Property Income, Patents and Spin-Outs

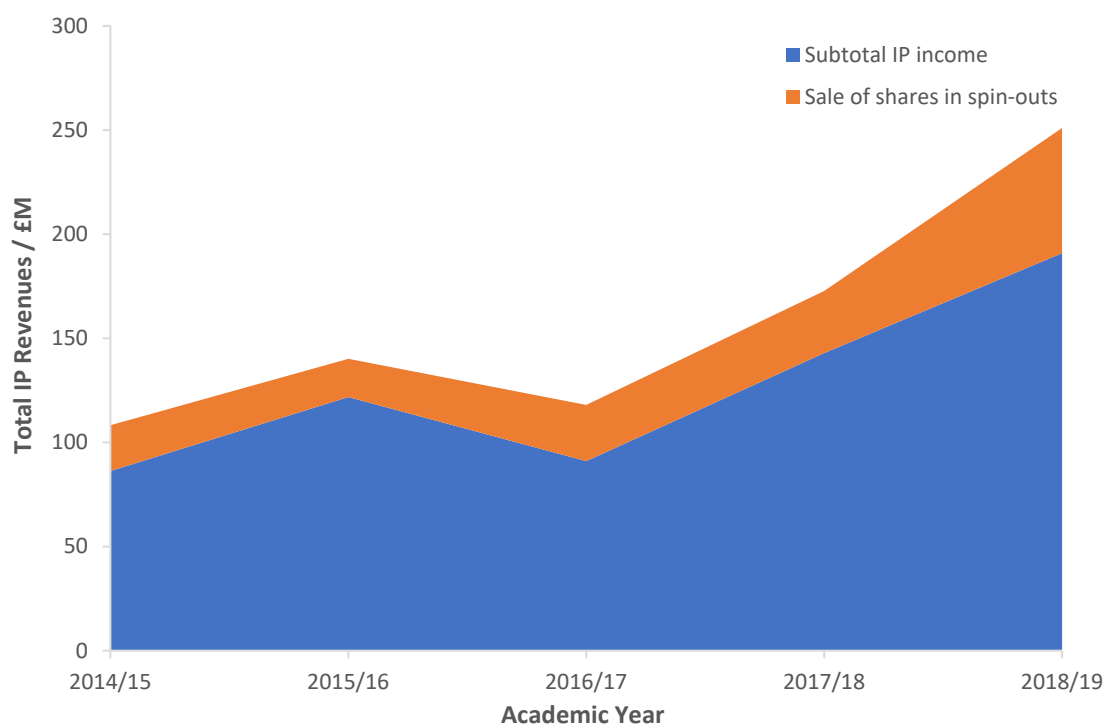
10. One area of knowledge exchange receiving considerable interest is commercialisation and the exploitation of research for the benefit of society and the economy. Therefore, the remainder of this report focusses on this area of current policy interest, examining income from intellectual property, patents, and spin-outs.

IP Income

11. The HE-BCI survey collects data on the total IP income received by providers which can be divided into income due to sales of shares in spin-outs and the subtotal IP income. In addition, the subtotal income can be further categorised by the source of income (software licences, non-software licences, and other IP) and the type of organisation.

12. Total IP revenues continued to increase in 2018/19 and with a greater proportion being in sales of shares in spin-outs relative to the previous year, as illustrated in Figure 4. This relative increase in share sales can be attributed in part to substantial sales by the Universities of Cambridge and Oxford with values of £19m and £24m respectively. Together these providers comprise 71% of exits in 2018/19, and are increases of 3,000% and 22,000% respectively from 2017/18. However, it is important to note that sales in shares are highly variable in nature and these trends are not necessarily expected to continue.

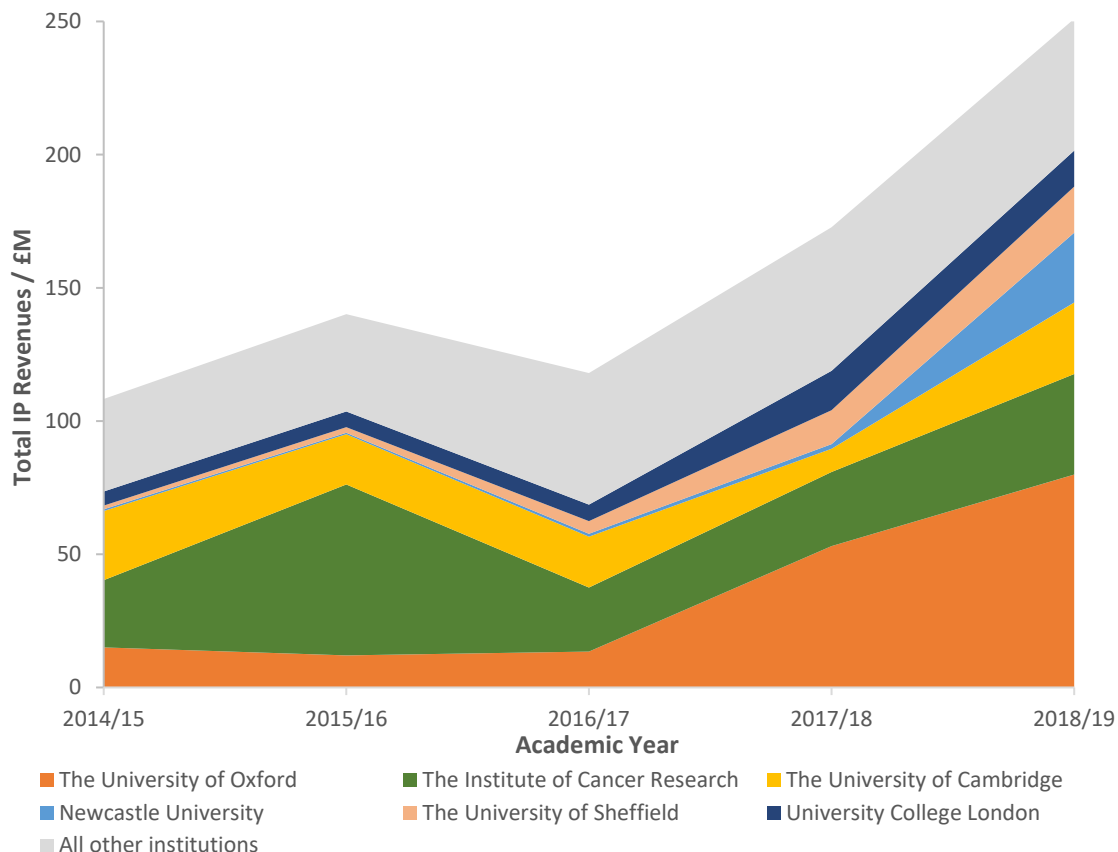
Figure 4: Combined total of the sale of shares in spin-outs and the subtotal IP income for each academic year from 2014/15 to 2018/19.



13. It's important to note that trends observed in the total IP revenues are highly dependent on changes in a small number of providers. As illustrated by Figure 5, in 2018/19 IP income was from just six providers representing 80% of the total figure income.

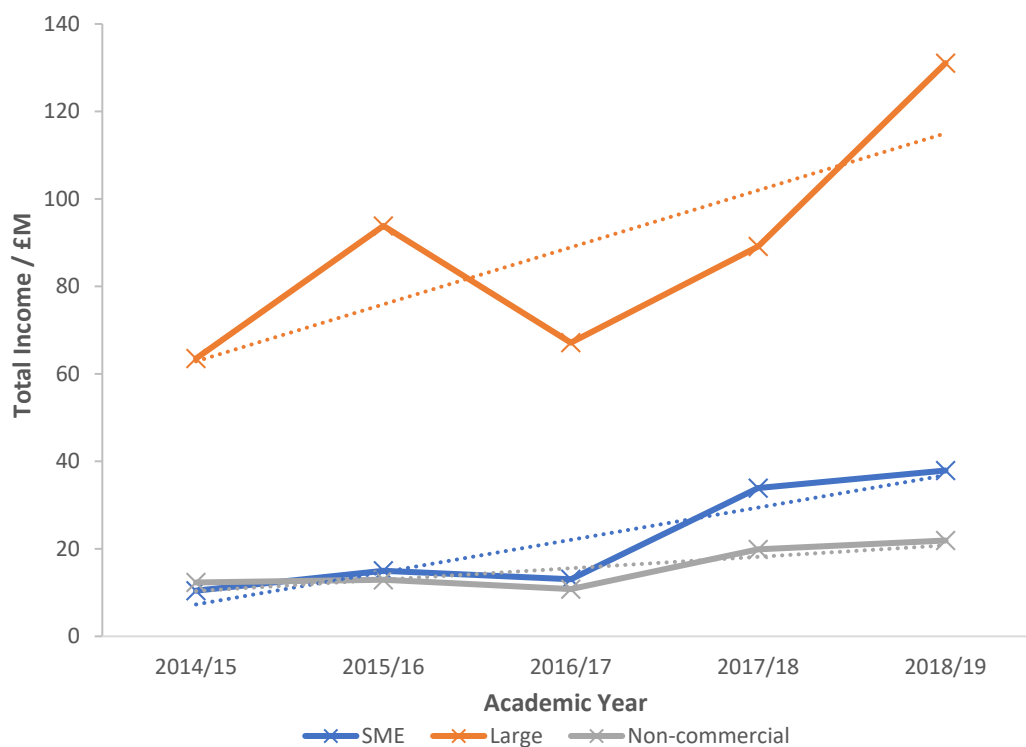
14. It is also important to emphasise that Figure 5 includes the sale of shares, which are naturally highly variable, and that the six providers highlighted are those specifically with the greatest IP income in 2018/19 so this analysis should be considered as a snapshot rather than indicative of a long-term trend.

Figure 5: Total IP income (including sale of shares in spin-outs) across English HEPs for each academic year from 2014/15 to 2018/19, highlighting the proportion contributed by the six providers with the greatest total IP incomes in 2018/19.



15. Totalled across all sources of IP income, increases have been seen for all types of business (large businesses, SMEs and non-commercial) in 2018/19 as demonstrated in Figure 6. A significant growth of 47% was observed for large businesses, compared to 33% in 2017/18. However, in 2018/19 SMEs and non-commercial business saw growth of only 12% and 10% compared with growth of 160% and 84% respectively for the previous year.

Figure 6: Total IP income for different organisation types for each academic year from 2014/15 to 2018/19.



16. Figures 7 and 8 compare the sources of IP income for each organisation type. In 2017/18 (Fig. 7) and 2018/19 (Fig. 8) relatively little change is observed in the distribution of income for SMEs and large businesses. However, there were some shifts for non-commercial businesses in 2018/19 as the proportion of total income from non-software sources decreased, while an increase was seen in the proportion from other sources.

Figure 7: Proportion of IP income from different sources for each organisation type in 2017/18.

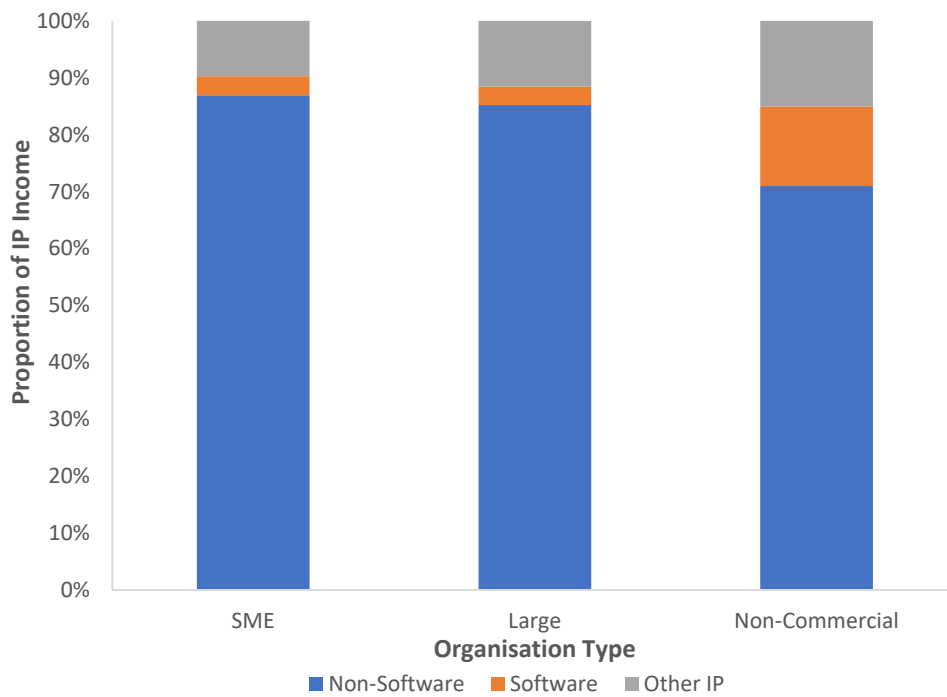
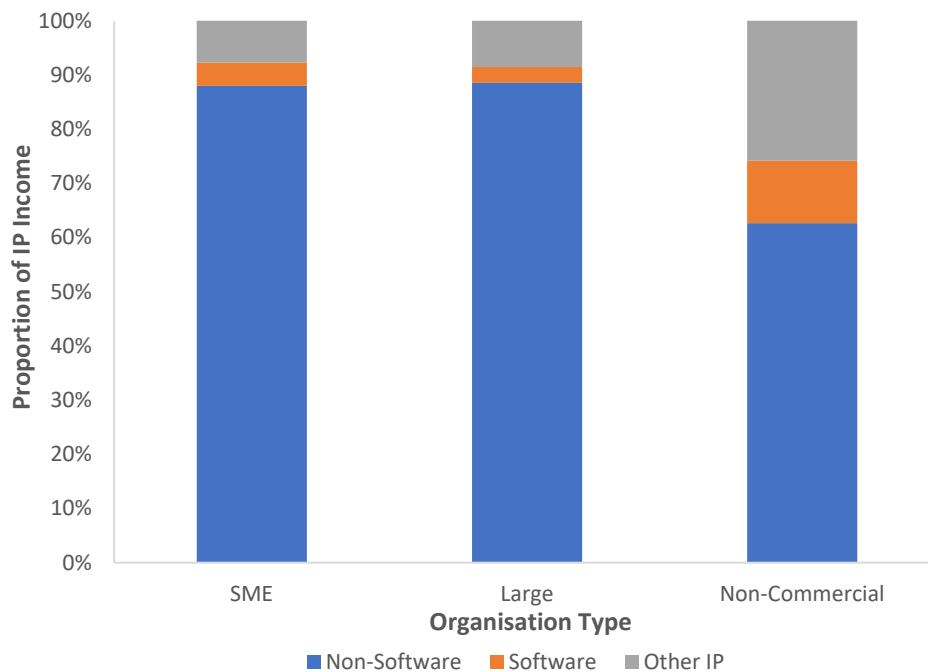
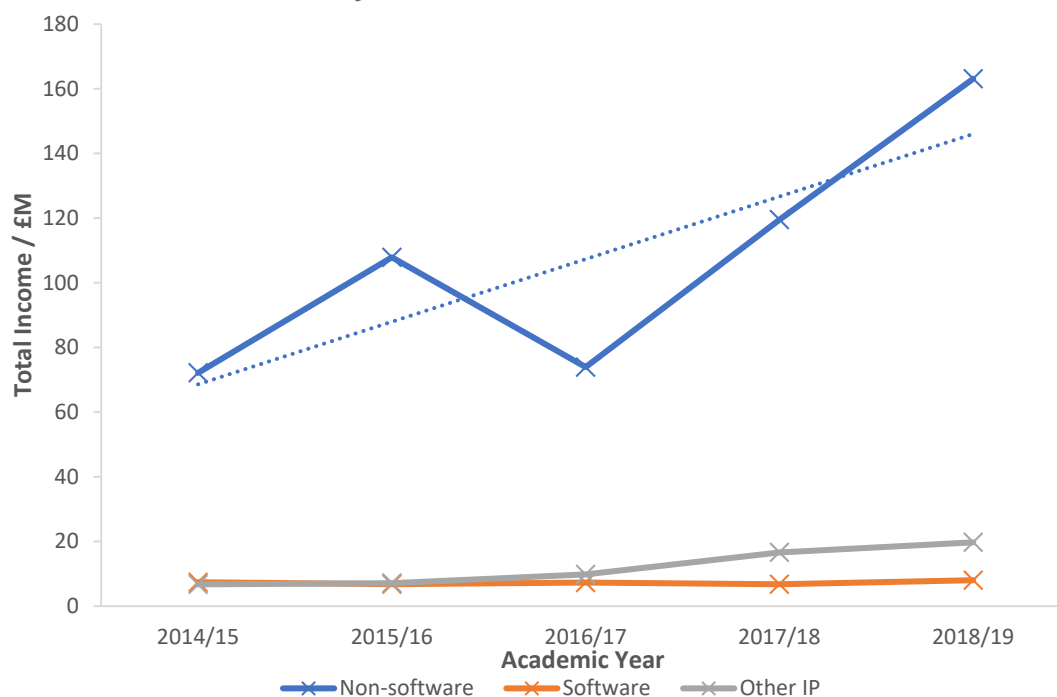


Figure 8: Proportion of IP income from different sources for each organisation type in 2018/19.



17. The income across all organisation types for each source of income was totalled is displayed in Figure 9. An increase was observed for all sources, with non-software licencing remaining the predominant source of income with 86% of the total in 2018/19 and software and other IP income contributing 4% and 10% respectively.

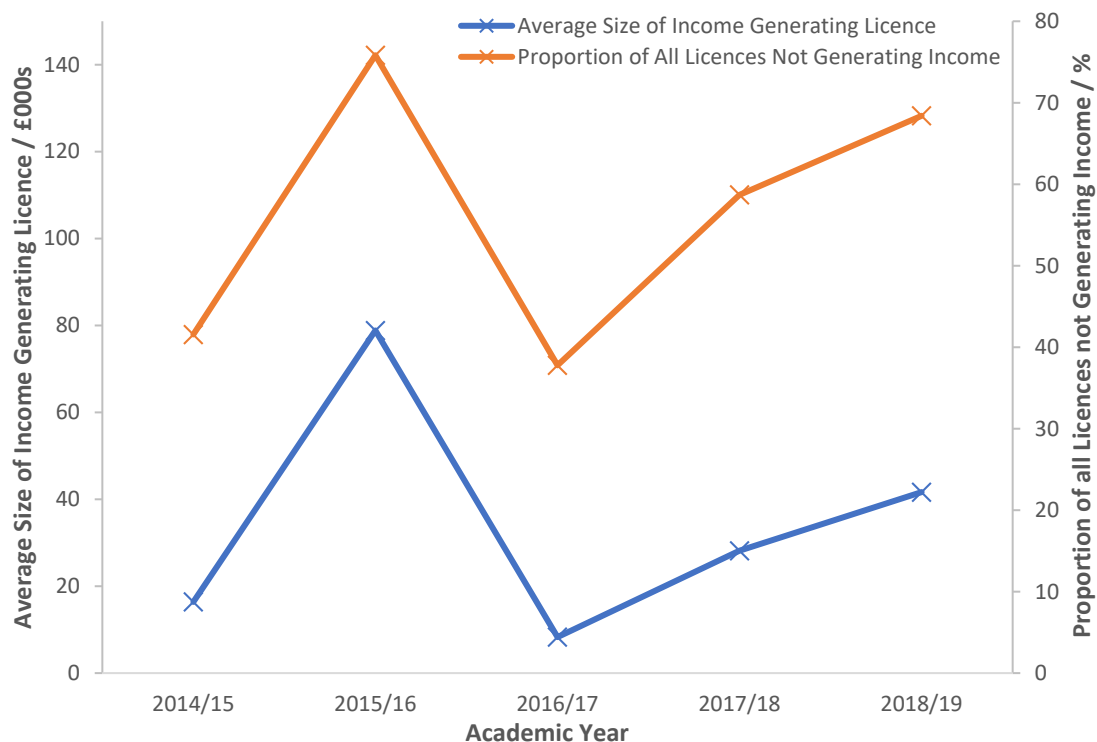
Figure 7: Total IP income across all organisation types for different sources of income for each academic year from 2014/15 to 2018/19.



Of particular note is the consistent increase in income from non-software licences since a decrease in 2016/17, as this source drives the overall trends in IP income. This increase in non-software income can be attributed to an increase in value of licensing deals rather than the total number of licenses that generated income, which in fact decreased from 8921 in 2016/17 to 3917 in 2018/19. Of the licenses that generated income, the average size of non-software licensing deals increased from £8,280 in 2016/17 to £41,600 in 2018/19, as illustrated in Figure 10. Also of note is the increase in the proportion of all non-software licences that do not generate income from 38% in 2016/17 to 68% in 2018/19, perhaps reflecting a shift to more open models of innovation, or recognition of the need to the balance income generation with impact generation. Although not covered in the 2018/19 reporting period, the rise in use of the so-called NERF (non-exclusive royalty-free) licences in response to the ongoing novel coronavirus crisis is an example of such a shift⁴, which may be reflected in future years' data.

⁴ See, for example, <https://innovation.ox.ac.uk/technologies-available/technology-licensing/expedited-access-covid-19-related-ip/>

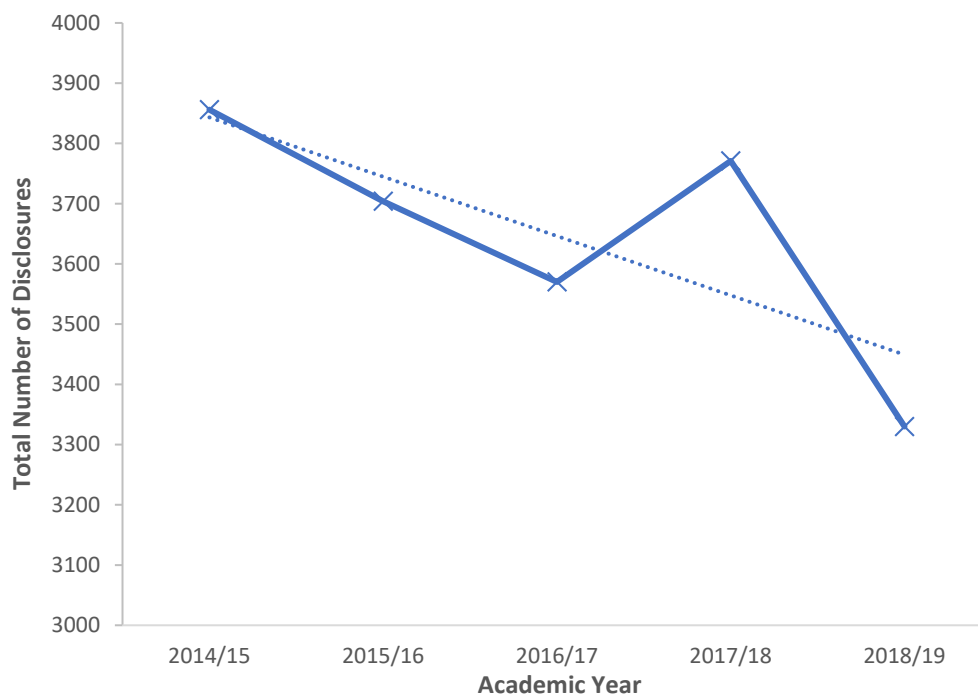
Figure 10: Average size of income generating non-software licences and the proportion of all non-software licences not generating income for each academic year from 2014/15 to 2018/19.



Disclosures and Patents

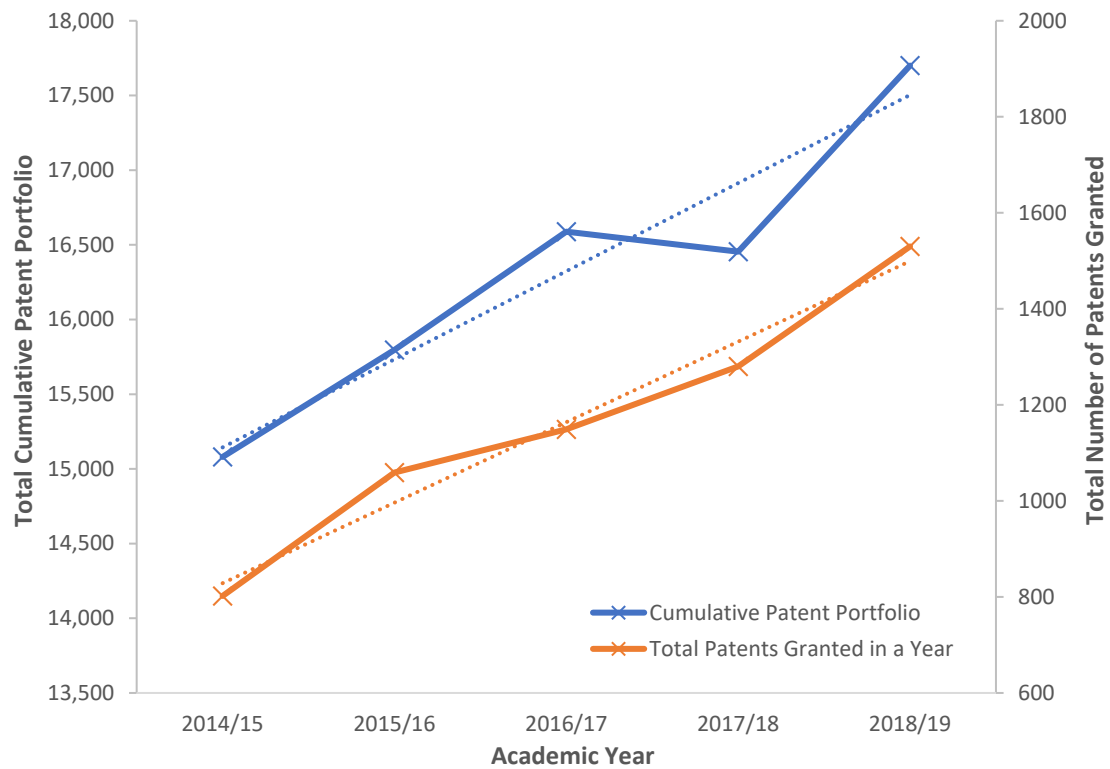
18. HE-BCI records a range of data relating to IP, including numbers of disclosures, patents filed, patents granted, cumulative patent portfolio (and patents filed by an external party), but caution should be taken when discussing trends in disclosures as there may not be a consistent definition between providers as to what qualifies as a disclosure.
19. Despite an increase in 2017/18, the total number of disclosures across all providers dropped by 12% in 2018/19 resuming the trend of decreasing disclosures as seen in previous years, illustrated in Figure 11. However, against a backdrop of increasing patenting (discussed below), it suggests that providers may simply be becoming more selective about what is counted as a disclosure, rather than the number of potentially patentable ideas decreasing.

Figure 11: Total number of disclosures for each academic year from 2014/15 to 2018/19.



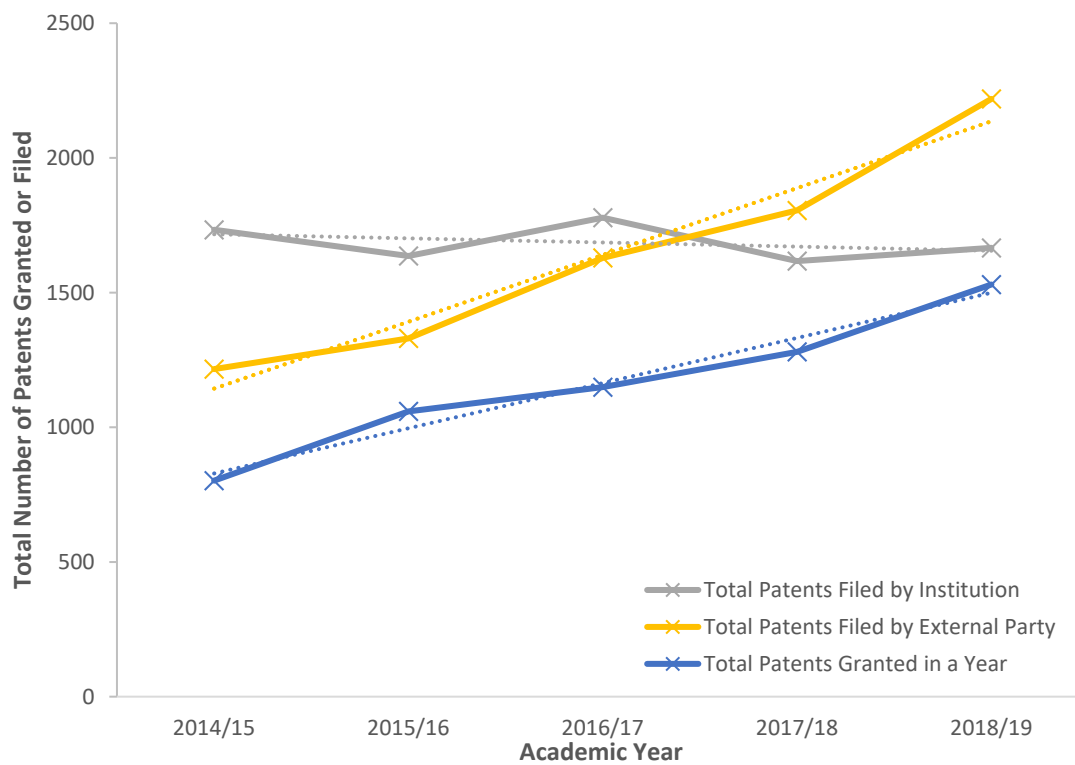
20. The trend in the sector total of number of patents granted was positive in 2018/19 and continued to increase in 2018/19 as shown in Figure 12. This growth occurred at a greater percentage increase than seen over the previous two years, at 20% compared to 11% and 9% in 2017/18 and 2016/17 respectively. The total cumulative patent portfolio across all providers also increased significantly by the greatest year-on-year growth observed in the last four reporting periods of 8%. This increase is particularly significant when compared to the decrease in the total cumulative patent portfolio of 0.8% observed in 2017/18.

Figure 12: Total number of patents granted and the cumulative patent portfolio across all providers for each academic year from 2014/15 to 2018/19.



21. The number of patents filed by providers has continued to be relatively consistent in 2018/19, as illustrated by Figure 13. This may suggest that providers are taking a more selective or sophisticated approach to patent applications, given the sometimes significant costs involved. The number of patents filed by external parties naming the HEP as an inventor also continued to increase in 2018/19 from 1,805 to 2,219 suggesting that the way in which providers are managing their patent portfolios may be shifting.

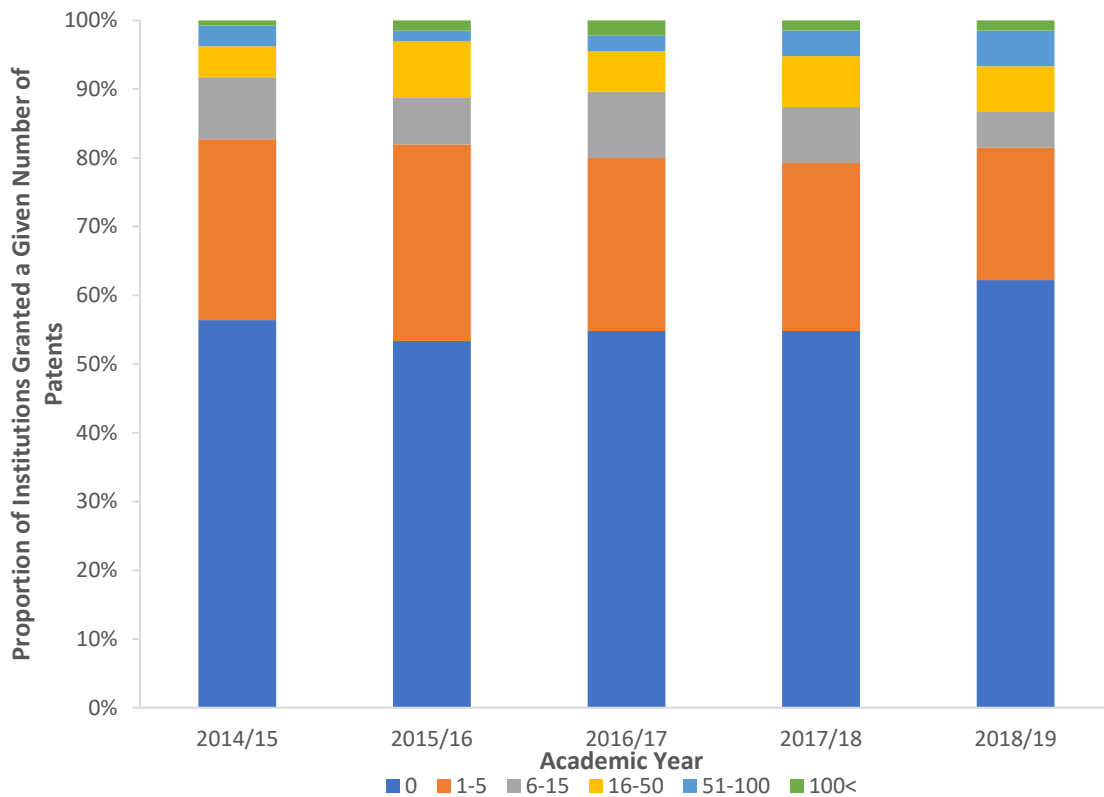
Figure 13: Total number of patents granted and the cumulative patent portfolio across all providers for each academic year from 2014/15 to 2018/19.



22. This increase in patenting activity is also consistent with the increase in the number of published patent applications observed by the Intellectual Property Office (IPO) from 2014-2017 in their 2020 report discussing the [IP Filing Habits of UK HEPs](#). However, comparisons with this dataset should be treated with caution due to differing data definitions and reporting periods and focus on English publicly funded providers.

23. The proportion of providers which had a given number of patents granted in an academic year was also calculated and is shown in Figure 14. It was observed that a relatively consistent proportion of providers had zero patents granted from 2014/15 until 2017/18 at approximately 55%, but an increase can be observed in 2018/19 to 62% of providers. In addition, slight decreases are seen in the proportion of providers that had 1-5 and 6-15 patents granted in 2018/19 relative to 2017/18 whereas an increase was seen in the proportion of providers that had 51-100 patents granted. This is potentially significant in the context of the large increase in the overall number of patents granted in 2018/19, suggesting that the increased number of granted patents are to the same providers, and that the breadth of providers having patents granted has decreased.

Figure 14: Proportion of the total number of providers that had a given number of patents granted each academic year from 2014/15 to 2018/19.



24. It is important to be mindful when discussing patent data that, in some cases, trends may be reflective of a provider’s strategic approach to IP, rather than being indicative of not producing potentially patentable IP.

Spin-out company formation

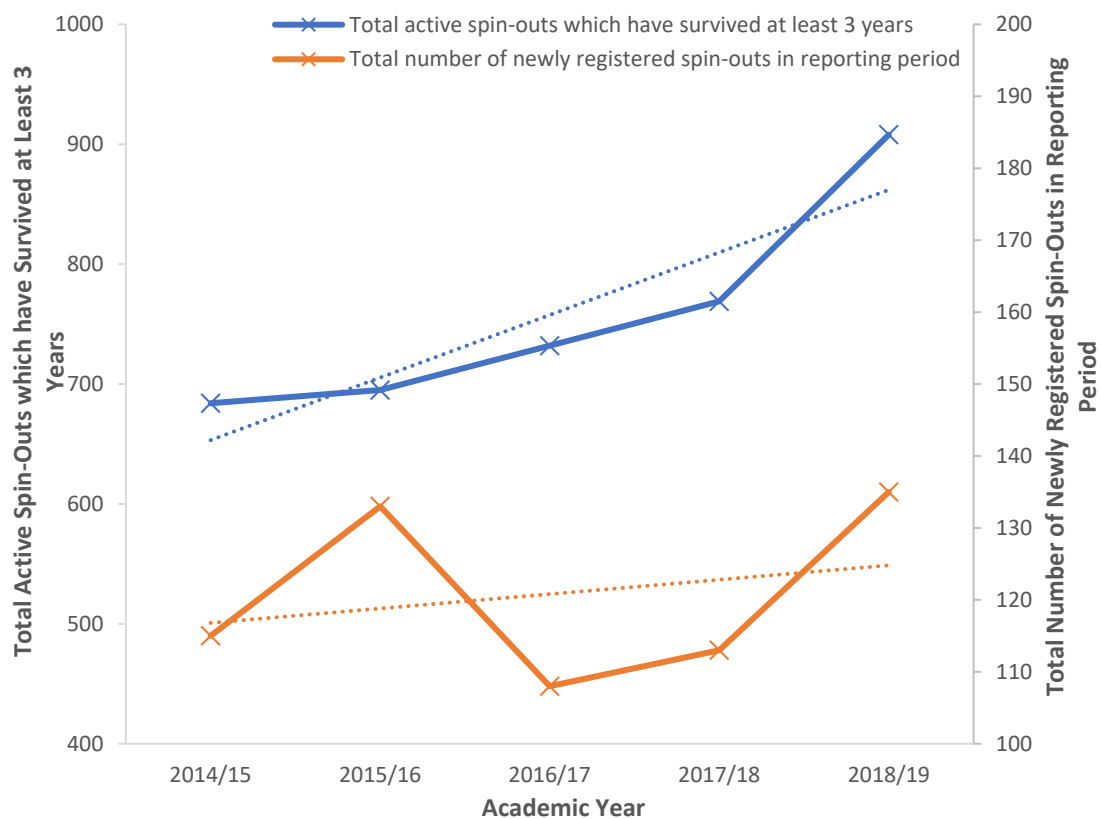
25. For the purpose of this report, a spin-out is defined as a company which exploits intellectual property arising from a university.

26. A significant observation from the 2018/19 HE-BCI data was the increase in the number of spin-outs across the sector. There was a considerable increase in 2018/19 in the total number of active spin-outs to have survived at least 3 years compared to previous years, with a growth of 18.1% compared to 5.1% in 2017/18, as illustrated in Figure 15 below. There were particularly notable increases for the Universities of Bristol, Cambridge, Oxford, Imperial College London, and University College London (UCL).

27. As shown by Figure 15, the total number of newly registered spin-outs across all providers in 2018/19 also increased, with a growth of 19.5% compared to 4.6% in 2017/18. Loughborough University and the Universities of Manchester and Newcastle saw considerable growth in the number of newly registered spin-outs

and of the six HEPs showing notable increases to the number of spin-outs surviving at least three years (listed above), the Universities of Bristol, Cambridge and UCL also exhibited significant increases in the number of newly registered spin-outs. While the University of Oxford and Imperial College London saw decreases in the number of newly registered spin-outs in 2018/19. This observation will potentially be seen to filter through into the data in future reporting periods for the number of spin-outs to have survived at least 3 years.

Figure 15: Total number of active spin-outs to have survived at least three years and the total number of newly registered spin-outs in the reporting period for English HEPs, each academic year from 2014/15 to 2018/19.

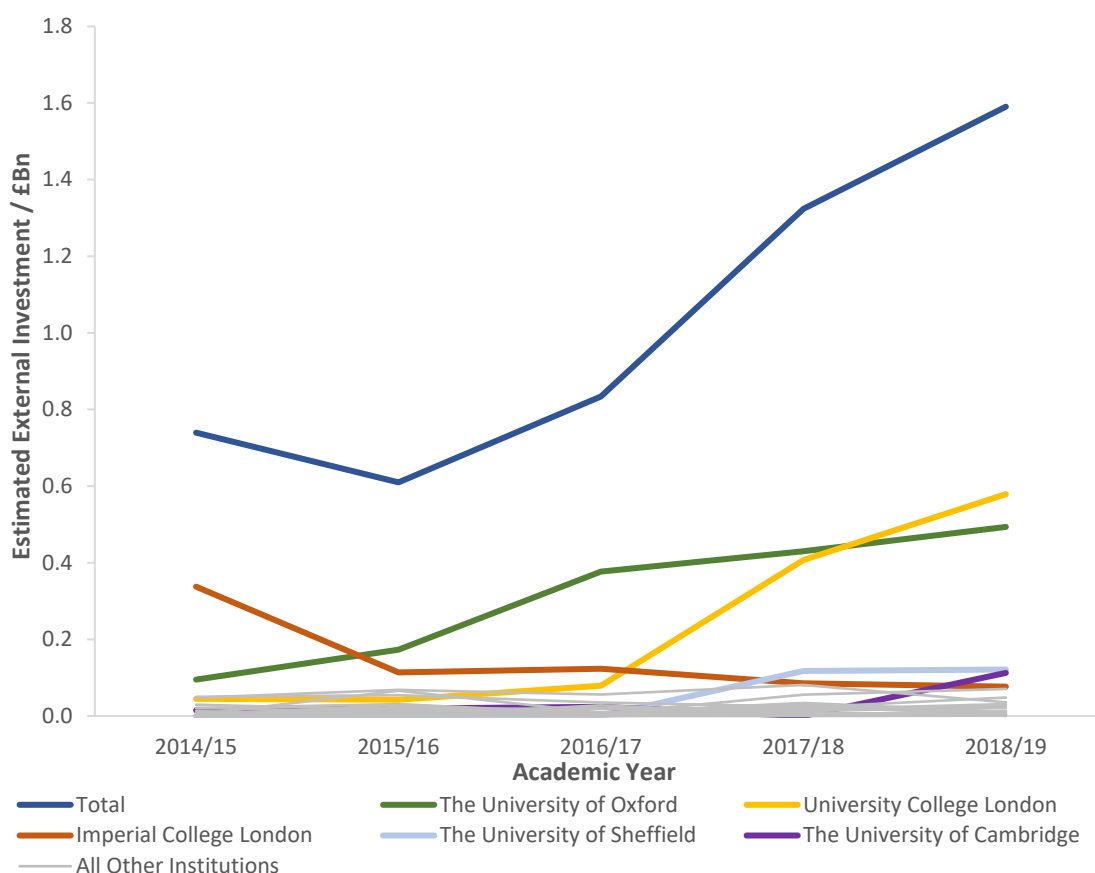


28. Although the above observations can provide indications of performance trends at an institutional level, these should be treated with caution as there is significant variance year-to-year in spin-out data. When analysing numerical spin-out data, the number that have survived at least three years can provide a better insight into performance, and the consistent increase indicates an overall increase in quality of spin-outs.

29. The estimated external investment from all sources received by all spin-outs totalled across all providers continued to increase in 2018/19, as Figure 16 demonstrates. However, this was with a lower 22.5% level of growth, compared

with 65.0% in 2017/18. The ability to attract equity investment may also be interpreted as indicator of the quality of spin-outs continuing to increase. However, it is important to note that a relatively small number of providers contribute to these figures and therefore broader trends are heavily influenced by changes at an individual provider level. For instance, in 2018/19 79.6% of the total estimated external investment was due to five providers (see those highlighted in Figure 16 below).

Figure 16: Estimated external investment received by all spin-outs totalled for all providers, and for individual providers, for each academic year from 2014/15 to 2018/19.



30. The total estimated current employment of all active firms may also be used as an indicator of the success of the spin-outs across the sector (although it must be noted that is a poorer proxy for performance due the differing staffing requirements of different types of businesses). The year-on-year change in this metric is displayed in Figure 17 alongside the total estimated external investment and total number of currently active spin-outs that have survived at least three years. While Table 1 also displays the absolute values for these three indicators for the last three reporting periods.

Figure 17: Year-on-year % change in the three spin-out metrics from 2015/16 to 2018/19.

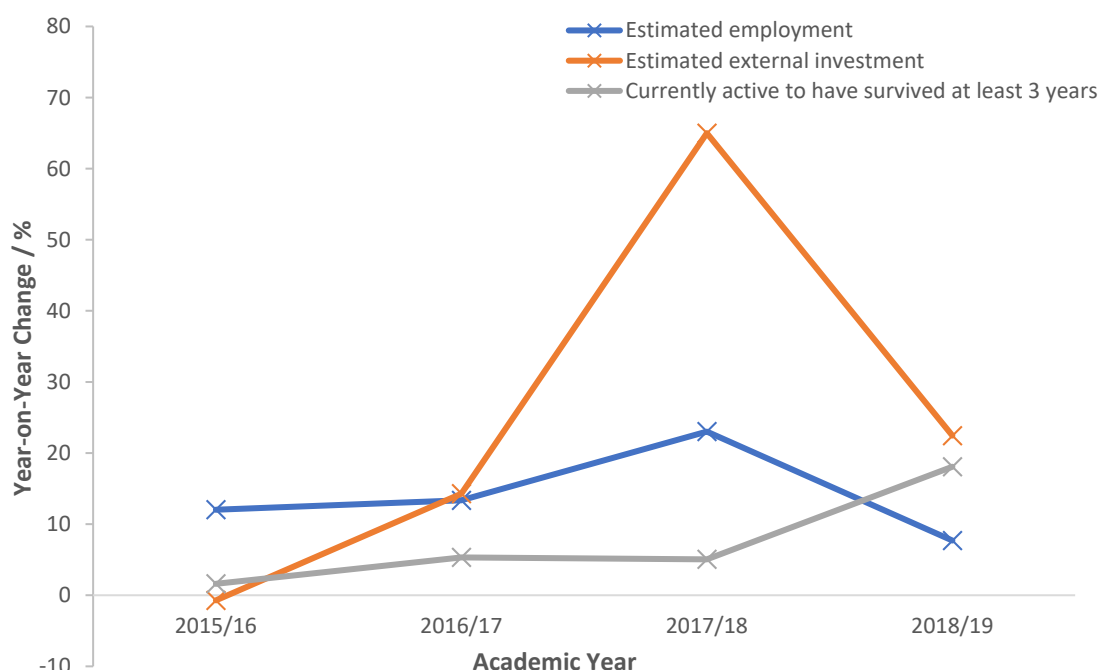


Table 1: Estimated employment, estimated external investment, and number of currently active spin-outs to have survived at least three years

Spin-Out Metric	2016/17	2017/18	2018/19
Estimated Employment	13,490	16,595	17,872
Estimated External Investment / £Bn	0.86	1.42	1.74
Currently Active Spin-Outs to have Survived at Least 3 Years	732	769	908

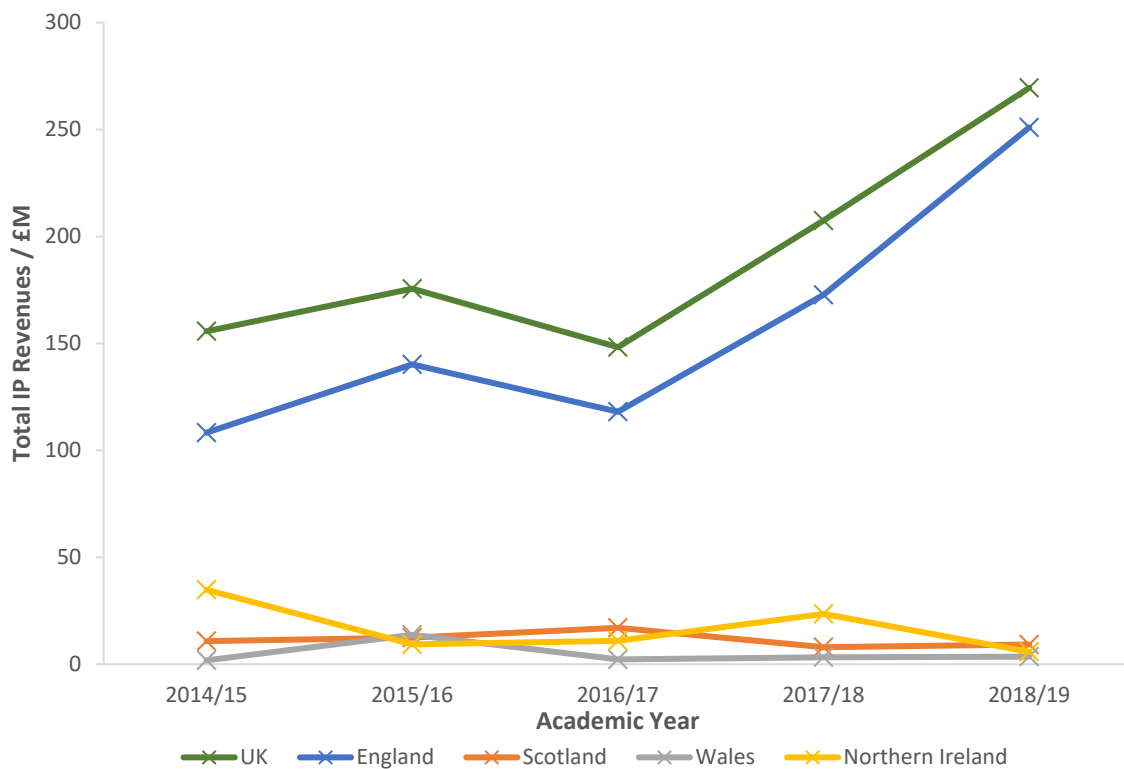
31. All three indicators have exhibited growth since 2015/16 which confidently suggests an increase in overall spin-out quality. These can indicate that that more spin-outs are surviving longer, employing more people, and creating more jobs. However, the rate of growth in total estimated employment and total estimated external investment in spin-outs slowed in 2018/19. It should be noted that as with external investment discussed above, both measures are highly influenced by institutional changes as only a few providers account of the bulk of these trends.

Comparison of England with the UK

32. The total income received by English HEPs increased to a similar extent to that of the UK overall in 2018/19 with a growth of 7.5% compared to 7.6% for the UK.

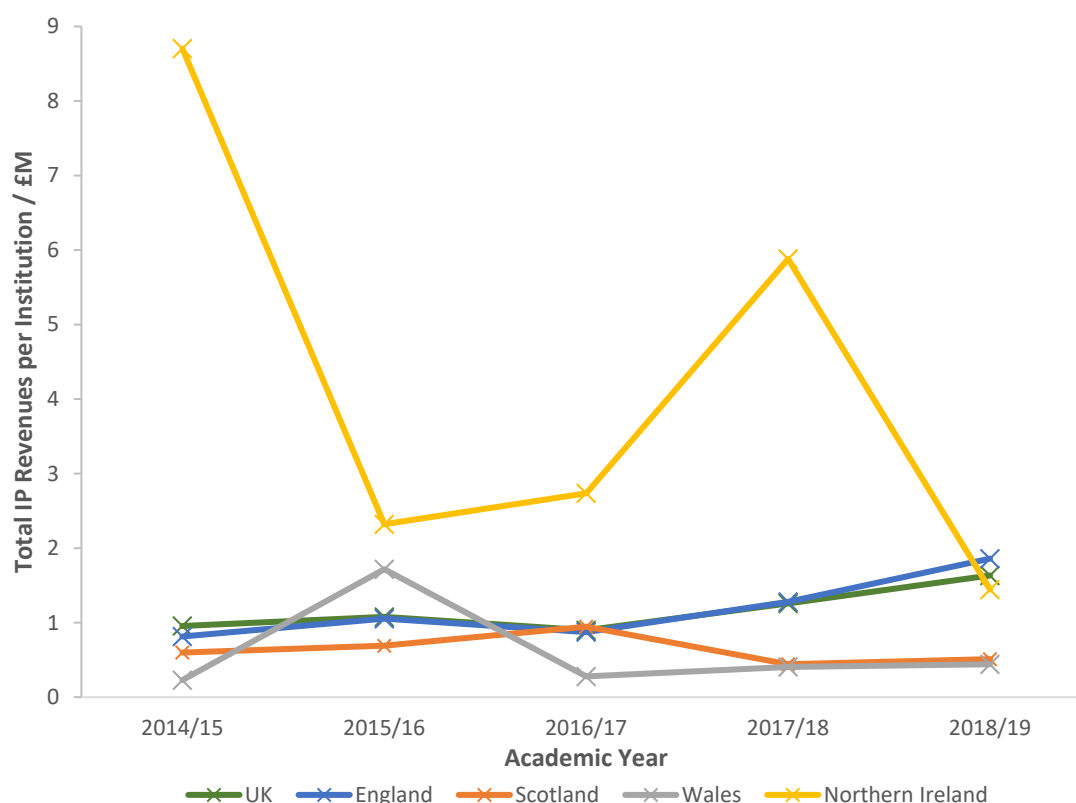
33. For both the UK and England the year-on-year changes in the total income are predominantly driven by income from collaborative and contract research. In 2018/19 income from these two sources comprised 60% and 59% of the total income overall for the UK and England respectively.
34. The only notable difference between the year-on-year trends for England and that of the UK were the changes in IP income, as displayed in Figure 18. In 2018/19 an increase of 45% was observed in England in comparison with 30% for the UK overall. This growth in IP income in England is consistent with the 2017/18 year-on-year increase of 46%, whereas the growth in IP income in the UK as a whole in 2018/19 had decreased from 40% in 2017/18. This is most likely due to a significant decrease of £18m (75%) in Northern Ireland in 2018/19 compared to 2017/18, which can be attributed to the 77% decrease in the IP income for Queen's University Belfast. However, it should be noted that the decrease for Queen's University Belfast was largely due to an exceptionally large sale in shares in 2017/18 and so such a dramatic year-on-year decrease would not be expected to be repeated.

Figure 18: Total IP revenue for the UK and the devolved nations for each academic year from 2014/15 to 2018/19.



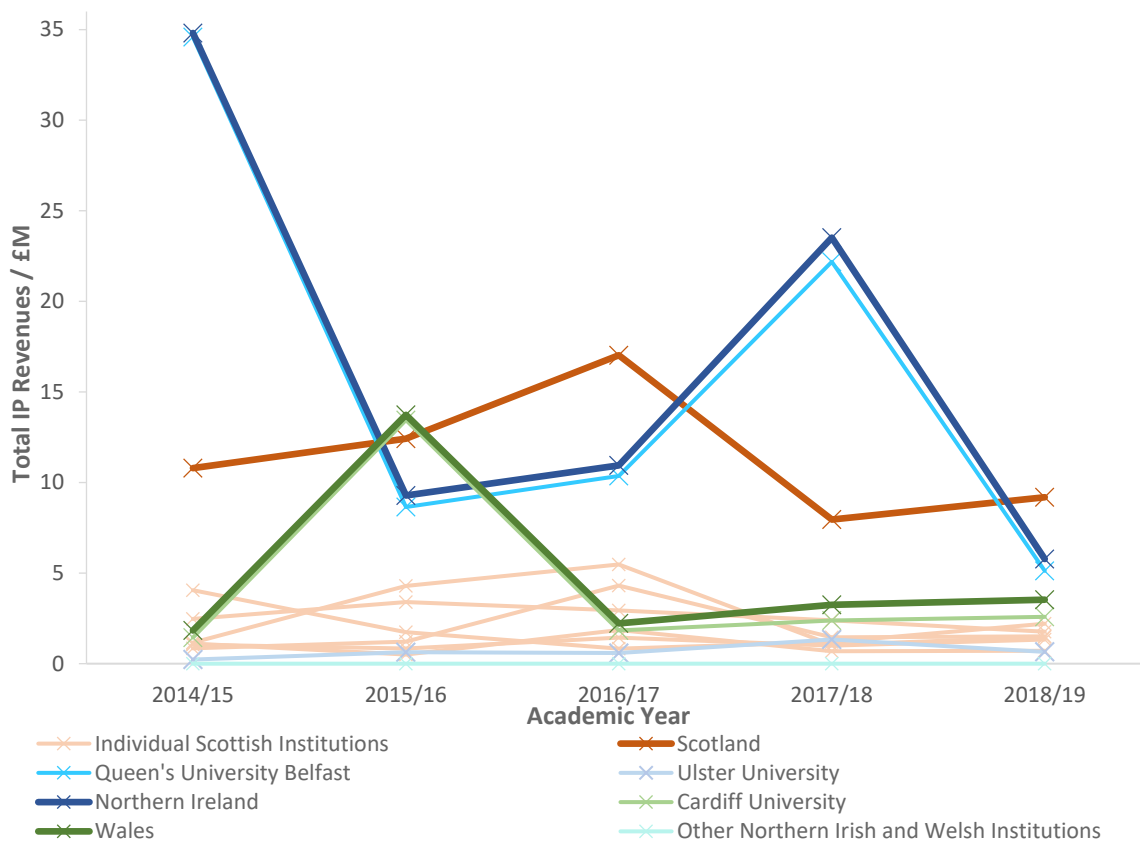
35. While this figure does show differences between the nations of the UK, it is important to be mindful of the relatively small number of providers outside of England. When the total IP income for each nation is normalised by their respective total number of providers, similar trends are observed but performance in Scotland and Wales is more akin to that of the UK (and therefore England) as illustrated in Figure 19. However, the total IP income per provider in Northern Ireland was significantly greater than that of any other nations and the UK for all reporting periods, except 2018/19 where a single provider, Queen’s University Belfast, accounted for the majority of the income.

Figure 19: Total IP revenue per provider for the UK and the devolved nations for each academic year from 2014/15 to 2018/19.



36. The relatively small number of providers outside of England also means that institutional changes have a greater effect on the broader trends in the devolved nations. This is demonstrated in Figure 20 where the total IP income for Queen’s University Belfast is almost equal that of the Northern Irish total, and similarly the total IP income for Wales is predominantly that of Cardiff University. Changes in total IP income are often highly variable in nature due to the effect of year to year sales of shares, however individual providers have less of an individual impact in England due to the greater total number that generate revenue through IP.

Figure 20: Total IP revenue for Scotland, Wales, Northern Ireland, and the relevant providers for each devolved nation for each academic year from 2014/15 to 2018/19.



IP-Related International Comparisons

37. Commercialisation activities in the UK can be compared with that in the US by comparing HE-BCI data and elements of the HESA finance return, with the US Association of University Technology Managers (AUTM) Licensing Survey. Whilst we have taken every care to select the most comparable indicators, some caution must still be taken when comparing this data, because the US AUTM, UK HESA finance return and HE-BCI surveys are not identical, with somewhat different definitions and accounting periods employed.

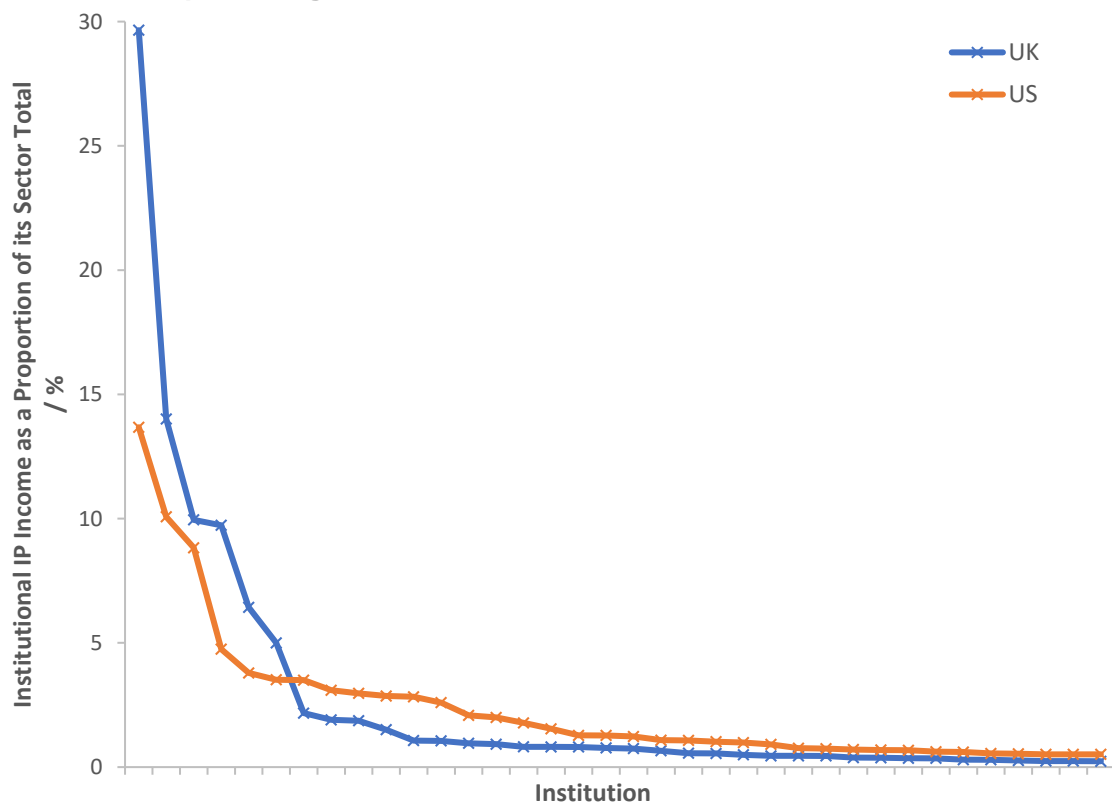
38. As the number and size of higher education providers varies between nations, some indicators are normalised using a measure of 'total research resource' (income from all sources to undertake research, or expenditure on research). For example, the total research resource available is divided by the number of patents granted to give an indication of the research resource required per patent granted.

39. UK data are collected by an official body, HESA. These data undergo a more comprehensive validation than data collected from the USA, which are submitted to sector-representative bodies.
40. With these caveats in mind, it is nonetheless clear from Table 2 that the UK continues to perform well when compared with the USA. The total research resource for the UK has grown at a greater rate than in the US over the four years analysed (UK 9.9% vs US 7.8%), due to in part the significant year-on-year growth of 5.1% in 2018/19 for the UK compared to 2.5% for the US.
41. In addition, the number of spin-outs formed in the UK increased by 14% in 2018/19 relative to 2017/18, compared to an increase of 1.6% in the US, which is of particular significance given the previous reduction in spin-out formation between 2015/16 and 2017/18 in the UK. This is perhaps an indicator of growth following a time lag between research and commercialisation activity. This growth in spin-out numbers has resulted in the relative decrease in research resource per spin-out in the UK in 2018/19.
42. In 2018/19 the UK has continued to see a growth in the number of patents granted and a greater rate than in the US, although the research resource per patent for the UK is unchanged from 2017/18 due to the particularly large increase in the total research resource. The research resource per patent of £4.6m is considerably more favourable than the £6.4m per patent for the US. The UK continues to compare well with USA on industry collaboration and there are also positive trends in the UK data on IP income particularly due to the increased sales of shares in spin-outs.
43. Whilst comparisons of the concentration of IP income in the US and UK are not straightforward, below is our attempt at analysing the two datasets. There are a number of caveats to this analysis which are discussed in more detail below. There may be also be further alternative ways of doing this not discussed here, such as comparing groups of universities with similar characteristics
44. Comparisons of the UK and US data should be treated with caution. Firstly, the HESA data represents the entire UK sector whereas the AUTM data consists of a self-selected group, potentially representing more providers that conduct a larger amount of IP-related activity and therefore are more likely to opt to submit data to the AUTM licencing survey (165 of the approximate 1,400 that comprise the whole sector). However, assuming that most institutions with significant IP incomes have opted to report to AUTM, this has minimal effect when comparing an absolute number of institutions in the UK versus US. More generally, the US institutions discussed may be considered to be a good representative sample of the sector as

there will be institutions with significant income who not submit but also institutions that do submit but who do not have significant IP revenue. In addition, the University of California System, which contributes 14% the US' total IP income submitted to AUTM, submits as one system rather than being considered as multiple entities (ten institutions) contributing separate incomes. Finally, the differing size and nature of research funding in the UK and US should also be considered. For example, the University of California system has a research income approx. four times greater than the University of Oxford, although IP income is only circa 70% greater.

45. Whilst IP income in both countries is generally concentrated in large, research-intensive institutions, initial analysis suggests it is more highly concentrated in the UK, with a smaller number of institutions accounting for a larger proportion of the total, as illustrated by Figure 21. For 2018/19, 75% of the UK's total IP income was from six institutions. This compares to 20 institutions contributing 75% of the US' reported total IP income, with the six largest institutions accounting for 45% of the reported total.

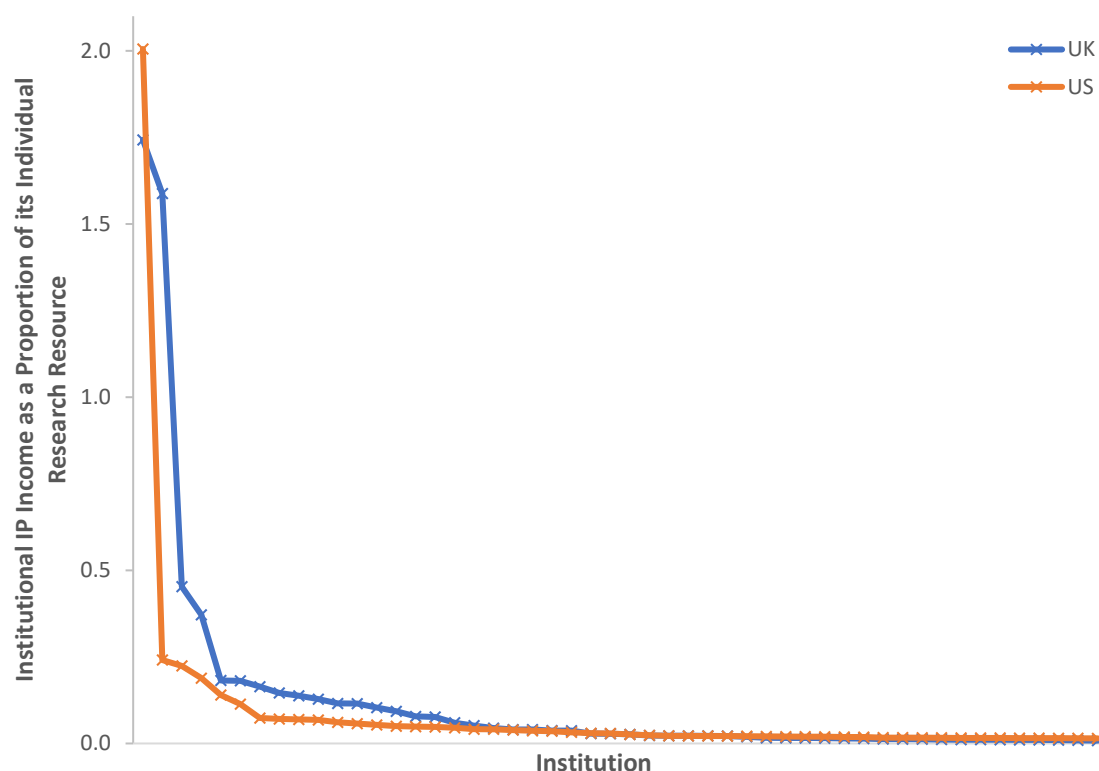
Figure 21: IP income per institution, for the 75 institutions with the greatest IP incomes, as a percentage of its sector total for the UK and the US.



46. Normalising the IP income for each institution by its individual research resource can provide a more balanced comparison of the concentration of IP income in the

UK and US⁵. Figure 22 suggests that when the structural differences of institutions are taken into account, the concentration of IP income is considerably more similar, and generally more UK institutions achieve a greater return in IP income for the available research resource compared to the US.

Figure 22: IP income per institution normalised by its individual research resource, for the 50 institutions with the greatest normalised IP incomes, the UK and the US.



47. Additional and more detailed information on, for example, US-UK comparisons on investment income raised by spin-outs is in the recent data report published as part of the Mike Rees review⁶.

⁵ Of the US institutions that returned IP income data to AUTM, Stanford University, the University of Louisiana at Lafayette, and the University of Rhode Island, did not return a figure for their research resource. For these institutions research resource data has been sourced from [NCSES](#) specifically for Figure 22.

⁶ See <https://re.ukri.org/sector-guidance/publications/independent-advice-on-university-investor-links-mike-rees-report/>.

Table 2: Commercialisation activity for the US and UK 2015/16, 2016/17, 2017/18 and 2018/19

	US (AUTM)				UK (HE-BCI and HESA finance record)			
	FY 2018	FY 2017	FY 2016	FY 2015	AY 2018/19	AY 2017/18	AY 2016/17	AY 2015/16
Total research resource (£M)	43,252	42,188	41,768	40,132	8,624	8,203	7,894	7,845
IP income including sales of shares in spin-outs (£M)	1,812	1,345	1,248	1,240	269	207	148	176
IP income as percentage of total research resource	4.2%	3.2%	3.0%	3.1%	3.1%	2.5%	1.9%	2.2%
Spin-out companies formed	1,007	991	950	946	162	142	143	171
Research resource per spin-out (£M)	43.0	42.0	43.3	42.4	53.2	57.8	55.2	45.9
Patents granted	6,761	6,751	6,385	6,124	1,867	1,770	1,386	1,219
Research resource per patent (£M)	6.4	6.2	6.4	6.6	4.6	4.6	5.7	6.4
Industrial contribution (£M)	2,904	2,868	2,909	3,000	699	651	635	604
% industrial research	6.7%	6.8%	7.0%	7.5%	8.1%	7.9%	8.0%	7.7%
US cashed-in equity/UK Sale of spin-out shares (£M)	51.1	45.9	158.7*	45.9	61.4	44.6	36.4	35.8

'FY' = 'Financial year'; 'AY' = 'Academic year'; 'IP' = 'intellectual property'.

*This figure is due to a single institution reporting a significantly increased equity for this year only.

Further notes on Table 2 data

48. The institutions that return data varies both year-on-year, and between the HESA/OfS Finance Returns and HE-BCI records. There has been no adjustments to exclude individual institutions for any year as it is deemed these fluctuations do not have a significant impact to the sector level totals. The 2018-19 Annual Finance Return is collected by the OfS for England and HESA for the rest of the UK.
49. The exchange rate used is the Purchasing Power Parity (PPP) adjusted exchange rate published by the OECD (see <https://www.oecd.org/sdd/prices-ppp/> for more information). The US dollar (\$) to GB Pound (£) conversions for 2015 - 2018 are summarised below:
- 2015: \$1.444 to £1
 - 2016: \$1.452 to £1
 - 2017: \$1.465 to £1
 - 2018: \$1.455 to £1.
50. Note that the previous international comparisons published by Research England provided US data calculated using different PPP adjusted exchange rates as since these publications, the OECD have updated their reference year and therefore the exchange rates used also differ.
51. Also note that previous international comparisons published by HEFCE in 2017 used a different methodology and as such, the published numbers for AY15-16 will differ slightly from those presented here.
52. We use data from the AUTM Statistics Access for Technology Transfer database, for US universities only (AUTM category 5U).
53. AUTM allows for confidential returns, which have been excluded from the figures presented here. Their exclusion has no significant effect on the key indicators.
54. The HESA data collection is compulsory for higher education providers in receipt of public funding in the UK and so represents the whole of the funded UK HE sector. Whereas the AUTM data returns are not and so only represents a fraction of the US sector.
55. The start-up companies defined in the AUTM survey are those dependent on institutions' technology for initiation and so are equivalent to the spin-out companies recorded in the HE-BCI survey. Research expenditure is taken over the fiscal years and is taken as being the available resource for US universities.

56. Income from cashed-in equity is recorded in the AUTM survey and is assumed to be broadly equivalent to the income from the sale of shares in spin-out companies collected in the UK HE-BCI survey. For further information about the AUTM survey see <https://autm.net/surveys-and-tools/databases/statt>
57. The total number of UK HEP spin-out companies in Table 2 is derived from the HE-BCI survey, including those companies with some HEP ownership and those that use HEP-generated IP (formal spin-outs).
58. UK HEPs are free to use their total (research and teaching) block grant funds from funding councils for either research or teaching as they feel appropriate. Since full expenditure details for the block grant are not collected, it is assumed in this calculation that all of the research block grant funds and other research income are spent on research.
59. For the UK, HESA data on research income from industry, commerce and public corporations from UK and overseas sources is used to give the industrial contribution. For US universities, expenditure from industry is used.