RE-P-2025-03

February 2025

An Update on IP-Related and Commercialisation Activities in England in 2022-23.

Report detailing IP-related and commercialisation activities submitted as part of the HE-BCI survey, focussing on those conducted in England in 2022-23.

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HE-BCI Survey 2022-23

To	Heads of Research England-funded higher education providers
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Contents

Introduction

1. The Higher Education Business and Community Interaction (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 sizes[1]. '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.

2. 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.

3. The data is collected by the Higher Education Statistics Agency (HESA, part of JISC). All publicly funded HEPs in Wales, Scotland and Northern Ireland; and for the 2022-23 reporting period HEPs registered as Approved (fee cap)[2] in England were required to submit data to the HE-BCI survey. HEPs provided data for activity occurring during the academic year 2022-23. All UK HEPs who completed the HE-BCI survey for 2022-23 have been included with the following exception in England:

    i. English HEPs who are not registered as Approved (fee cap).

    ii. For "Intellectual Property Income, Patents and Spin-Outs" section (pages 12-30), a subset of English HEPs are included in order to maintain comparability with previous RE analysis. English HEPs recently added to the Office for Students (OfS) register as Approved (fee cap) may submit data to HE-BCI but they have been excluded from this section of the analysis. However, as these providers conduct relatively little commercialisation activity conclusions drawn in this report remain broadly representative of the wider sector.

4. The HE-BCI survey includes the collection of various sources of KE income to HEPs, which, of the data currently available, is considered the most robust metric for the impact of their KE activities, although notably, this functions as a proxy for impact[3]. The main types of KE activity for which income to HEPs reflects the market value of these resources in the economy and society are collaborative research, contract research, consultancy, equipment

[1] The 'third sector' refers to voluntary and community groups, social enterprises, charities, co-operatives and mutuals.
[2] FE and sixth form colleges are excepted from the requirement to submit to HE-BCI. The basis for requirement to return HE-BCI data in England changed from 2024-25 onwards.
[3] See 'Allocating HEIF: The suitability of knowledge exchange income as a proxy for outcome performance'.

and facilities, continuing professional development (CPD), regeneration, and intellectual property (IP) income. In addition, external investment into spin-outs can also be deemed a reasonable proxy for impact[4].

5. This report provides an update on similar analysis published in the 2023 report by Research England which commented on the 2021-22 HE-BCI survey data release.

6. To account for inflation and present the data in real terms, the nominal values of KE income were converted to 2022-23 real terms income using GDP deflators, allowing for inflation adjusted comparisons across time periods. These can be found at Annex A.

7. The section on IP-Related International Comparisons (pages 31-39) retains nominal terms comparison between the UK and the US due to notably complexities in accounting for differences in economic contexts and to maintain simplicity in the comparison in IP activity and income between the two countries, however, future iterations of this report may consider inflation adjustments.

The UK's Knowledge Exchange Landscape

8. The following section of the report outlines the overall sources of KE income in the UK and England in 2022-23 as collected in the HE-BCI survey, and as highlighted above examines how these sources of income have changed over time in real terms (adjusted for inflation based on 2023 prices). In 2022-23 the total nominal income to UK HEPs increased marginally by £989K (0.02%) to £5.7bn compared to 2021-22, and therefore was relatively stable. However, in real terms and when accounting for inflation, the total KE income in 2022-23 declined by 6.63% from a real terms value of £6.1bn in 2021-22. Real terms income for different types of KE income in the UK is illustrated in Figure 1 below.

9. The overall nominal terms stability in KE income is notable in comparison to the 1.52% increase observed in 2021-22 (likely due to postponed activity following restrictions relating to the Covid-19 pandemic across 2019-20 and 2020-21) but is reflective of a wider trend of possible stagnation of KE income since 2018-19. Notably, this is the smallest overall annual nominal increase in the period since 2014-15. Although slowing, there remains a broader trend of growth in KE income across the past 5 years, with total KE income in the UK increasing by 12.7% since 2018-19, though this compares to a 25.6% increase for total UK GDP for the same period. This general trend of stagnation indicates likely significant challenges and shocks faced in UK in recent years, including recent increasing financial pressures on universities and external partners.

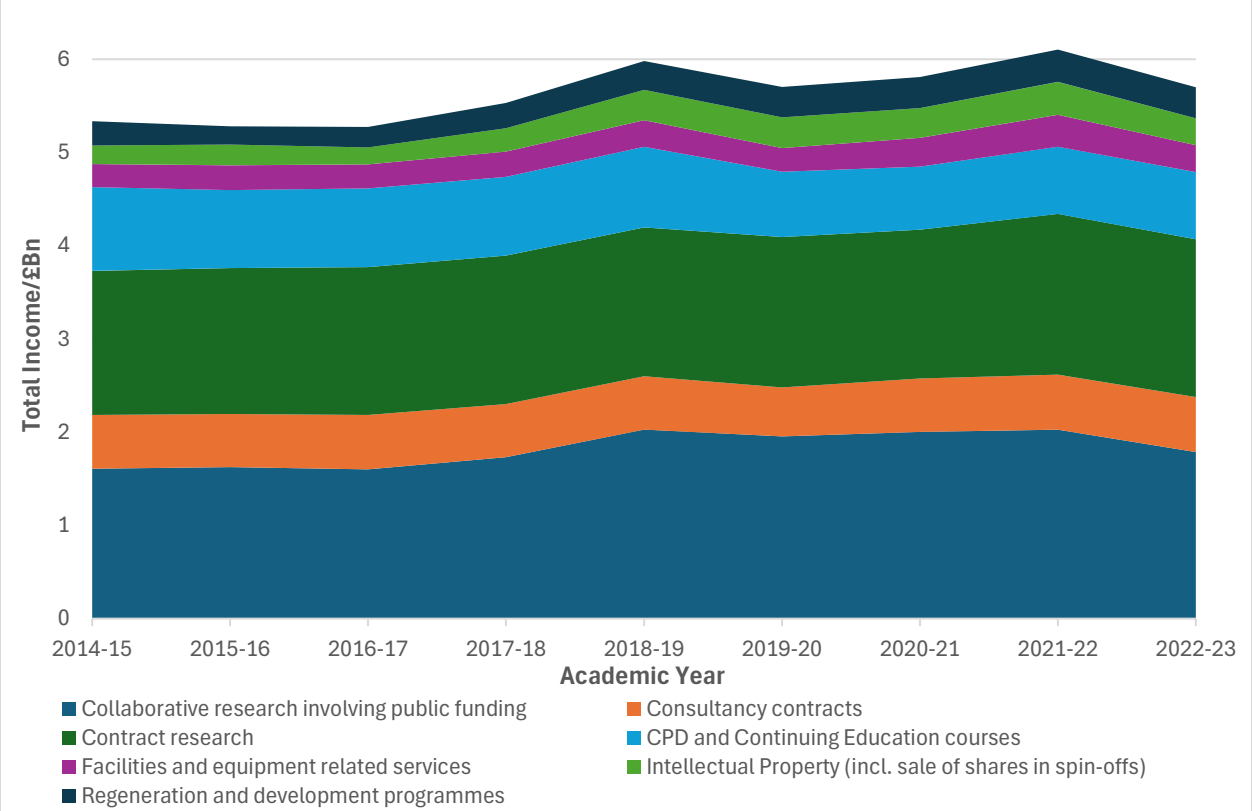
[4] See 'Assessing the Gross Additional Impacts of the Higher Education Innovation Fund (HEIF)'

10. **Further discussion in this report is adjusted for inflation i.e. presented in 2023 real terms value unless otherwise stated.**

11. The 2022-23 real terms decline in KE income of 6.63% is the largest real terms annual decrease in KE income in the period examined and therefore could be early indications of KE income transitioning from stagnation to decline, in the context of wider financial challenges. It will therefore be important to monitor whether these real terms decrease in KE income is a continued trend.

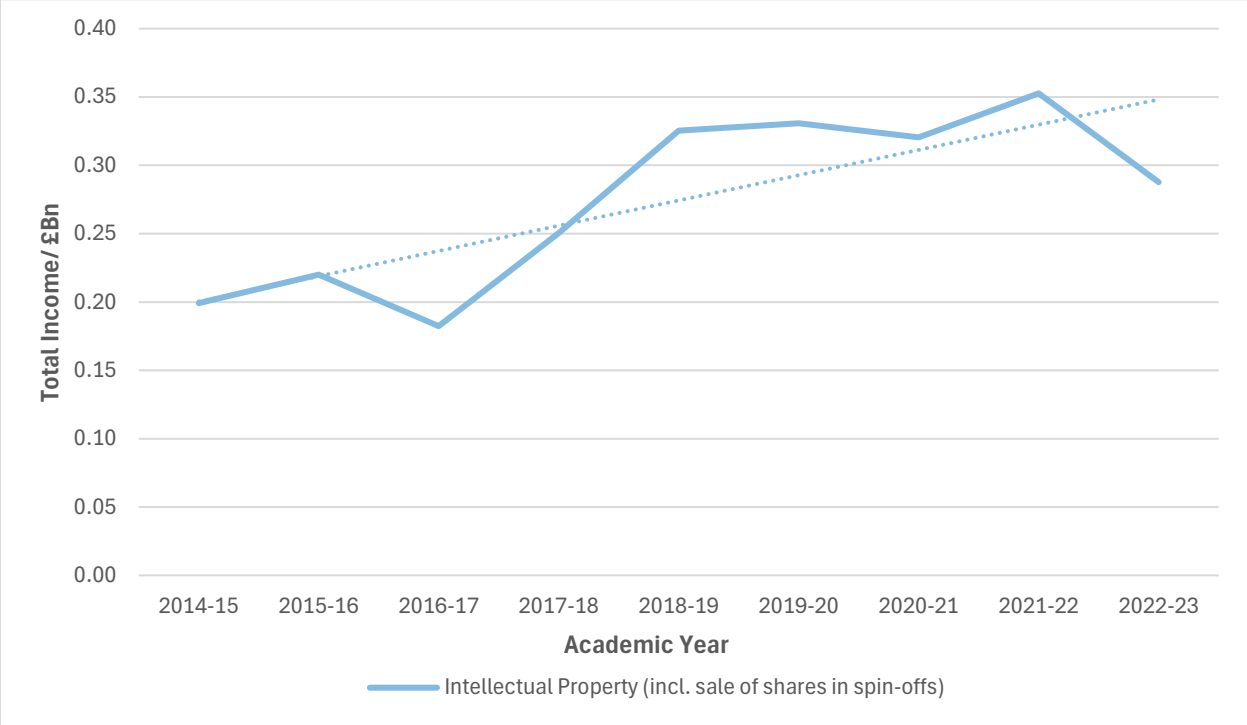
12. As shown in Figure 1 below, the overall real terms decline in KE income was driven predominantly by a large real terms reductions in income from collaborative research activities (11.96%) and compounded by notable decreases in intellectual property (18.42%), facilities and equipment related services (15.73%) and decreases were seen additionally in contract research (1.99%) and regeneration (3.88%). However, growth was maintained in two areas of KE income in 2022-23, though at notably slower rates from 2021-22. This included a 0.58% increase in income from consultancy contracts, and 0.13% increase in income from continued professional development (CPD) and continuing education (CE) activity.

Figure 1: Real terms total income for each KE category across all UK providers stacked for each academic year from 2014-15 to 2022-23.



13. As shown in Figure 1 above, collaborative research income declined in 2022-23, with a reduction of £242.6 million (11.96%) to £1.78 bn in real terms, which as the largest area of KE income is a significant driver in overall trends. Income from facilities and equipment activity decreased by 15.73% to £288 million in 2022-23, which contrasts with notable increases in income in 2020-21 (21.64%) and 2021-22 (11.12%).

Figure 2: Real terms income from IP activities by HEPs in the UK 2014-15 to 2022-23



14. As shown in Figure 2, IP income (including the sales of shares in spinouts) also saw an annual real terms decrease in 2022-23 with a decline of 18.42% to £287 million, which is the largest annual decrease in this area since 2016-17 (at 17.12%). However, it should be noted that this decline follows a notable increase of 10.07% in IP income observed in 2021-22, and therefore most likely reflective of the notable year-on-year fluctuations often observed in this area of income but may also point to early signs of growing financial challenges faced by businesses and other external partners, leading to reduced IP activity with HEPs. This high degree of year-on-year variation is also due to IP income often being contingent on the activities of a relatively small number of providers generating high incomes. The decrease in 2022-23 is predominantly a result of significant decreases in IP income in England of 18.19% to £262 million, and Scotland of 34.55% to £10.6 million. This is accompanied by fluctuations in IP income in Northern Ireland and Wales, which will be discussed in more detail later in this report at paragraphs 51-55.

15. There was a 2.97% year-on-year increase in nominal terms in regeneration and development income in 2022-23, which represents a smaller growth than in 2021-22 (9.50%). Therefore, this continues to mark a slowing of growth, which has been decreasing from a high of 26% in 2017-18 and is reflective of the ERDF funding cycle. 2022-23 marks the penultimate academic year for expenditure of 2014 to 2020 ERDF programme allocations, which between 2014-15 to 2022-23 accounted for on average 38% of all HE-BCI regeneration and development income. In 2022-23 ERDF allocations accounted for 41.3% (£138 million) of all regeneration and development income. In the coming years it will be valuable to consider how the ending of the 2014-2020 ERDF programme and the introduction of new programmes in the UK, such as the UK shared prosperity fund, will affect regeneration and development income across the sector. It is also important to note that the real terms regeneration and development income saw a decline of 3.33% from 2021-22 income.

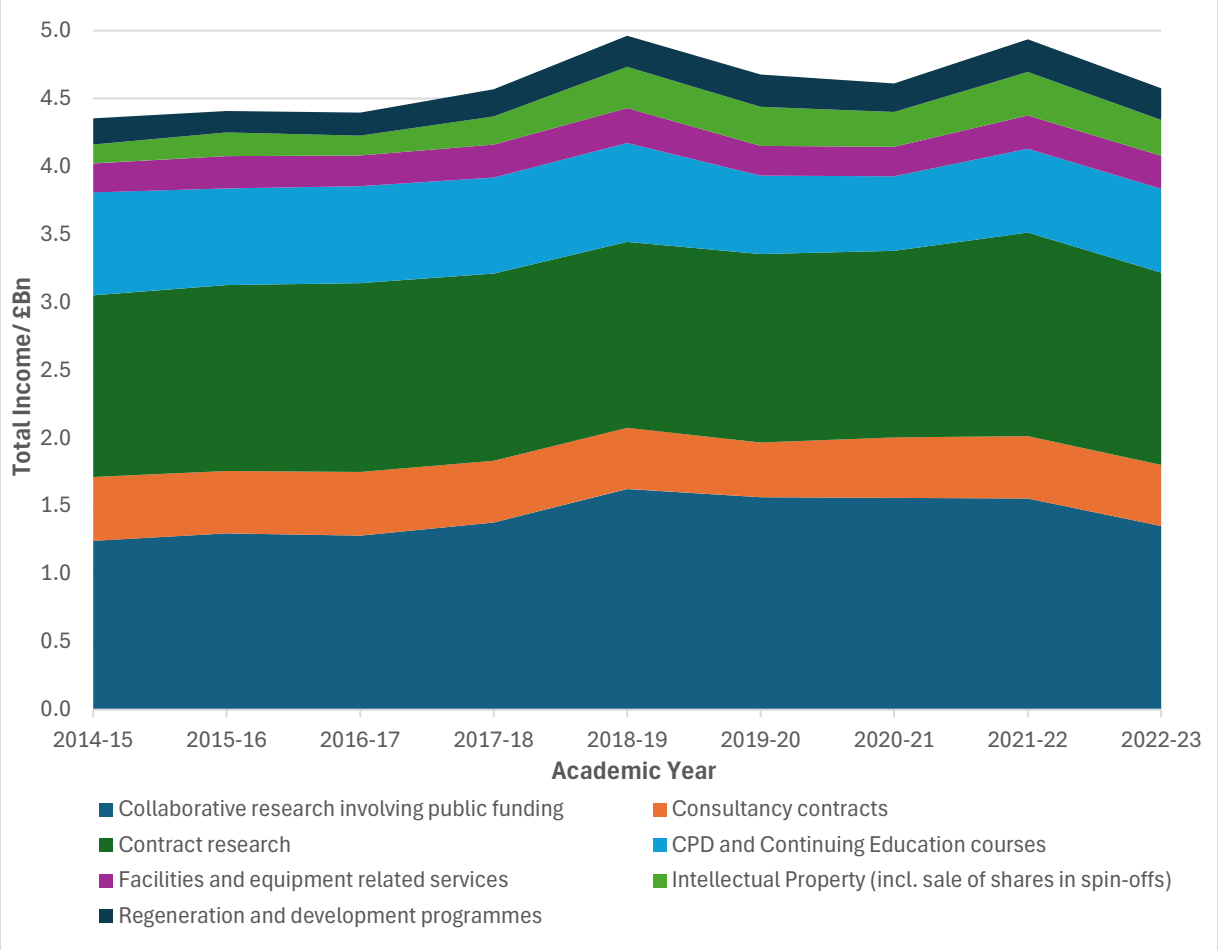
16. Income from consultancy activity increased by 0.58% to £593 million from £590 million in 2021-22. This continues a trend of year-on-year increases seen in 2020-21 (8.86%) and 2021-22 (8.06%), although at a slowing rate. An increase in total income was reported for CPD and CE courses in 2022-23 at 0.13% to £721.2million, which represents a slowing of growth compared to the 6.32% increase in income seen in 2021-22.

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

17. The total nominal KE income for English providers in 2022-23 was £4.58 bn. This reflects a 0.7% (£32 million) nominal terms decrease compared to 2021-22 and therefore relative stability in KE income, which is reflective of wider UK-level trends of stagnation of KE income since 2018-19. However, in real terms, it reflects a 7.3% (£360 million) decrease compared to 2021-22 as shown in Figure 3 below, which is still reflective of the wider UK-level trends discussed above and the significant challenges and financial pressures on both universities and external partners, resulting in a slowing of KE activity.

18. This annual decrease is primarily driven by reductions in income from collaborative research (13.07%) which is one of the proportionally largest income streams, and from intellectual property (18.19%), again mirroring UK-level trends. However, as illustrated in Figure 3, there was also decreased performance in all other categories of KE income in 2022-23 except from CPD and CE courses. It is also of note that this contrasts to the growth observed across all KE income streams in 2021-22 which followed declines in income in 2020-21 – mirroring the UK-wide trend of likely delayed activity following the Covid-19 pandemic for all KE categories other than consultancy, which had been on the downward trend since 2019-20.

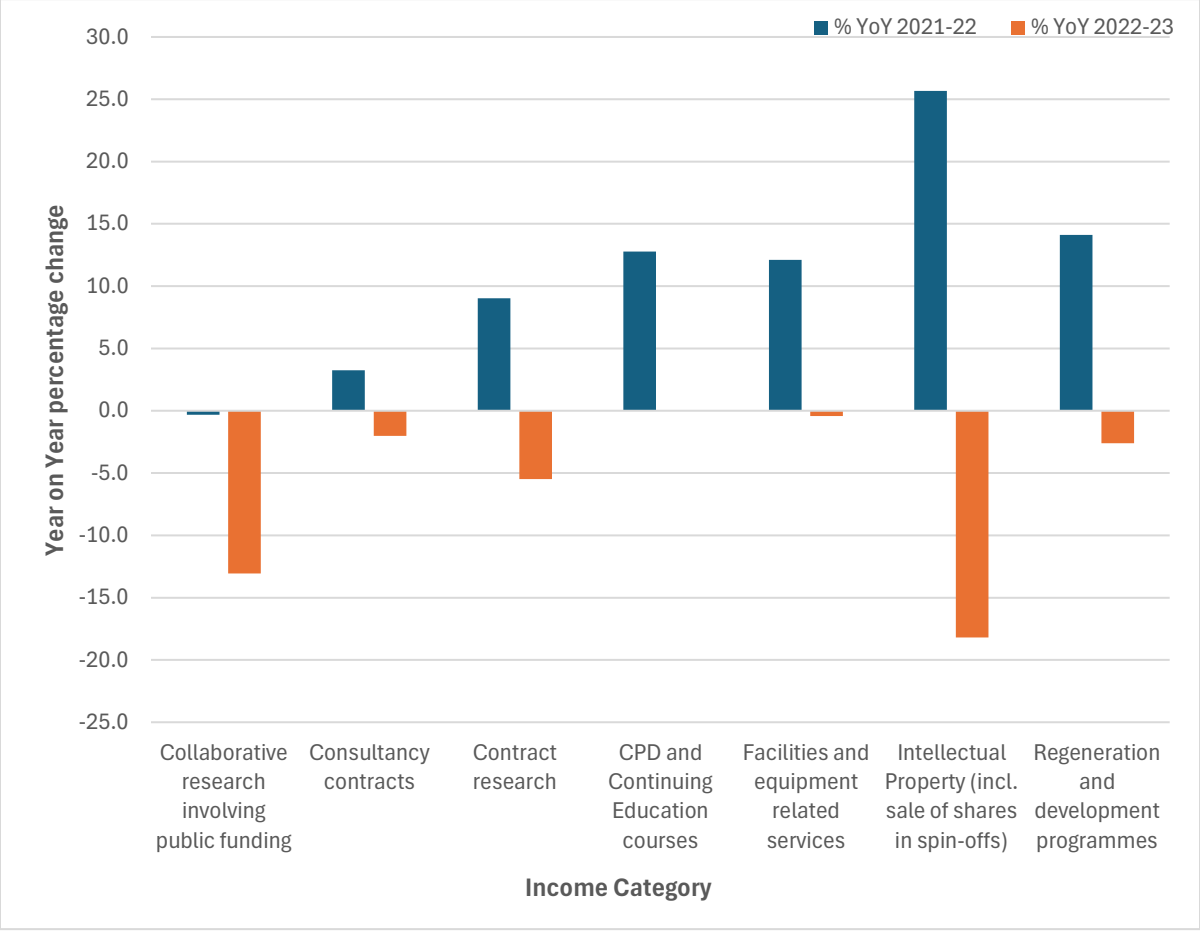
Figure 3: Real terms total income for each KE category across all English HEPs stacked for each academic year from 2014-15 to 2022-23.



19. KE clusters are a useful means of analysing the way KE activity and income has changed across the sector, particularly to consider potential effects of financial pressures on the KE activity on different types of HEPs. Several KE clusters (clusters E, J, and V) reported real terms decline in KE income in 2022-23 when compared with 2021-22 ranging from 1% to 5% declines, however, the STEM cluster reported a notable reduction of 25.95% in overall KE income, and therefore likely having a not insignificant effect on the England-wide slowing of growth (despite the relatively small membership of this cluster). This decrease for STEM HEPs was driven by notable reductions in collaborative research of £135 million (40.92%), consultancy income of £7.2 million (16.91%) and an additional decline in contract research income of £763k (1.34%), despite growth in all other income streams including significant increases in intellectual property of £10.98 million (40.69%) and regeneration income of £2.32 million (45.96%). On the other hand, the Arts, M and X cluster reported real terms increases in total KE income of (£4.45 million) 8.9%, (£3.31 million) 6.41% and (£4.65 million) 0.61% respectively.

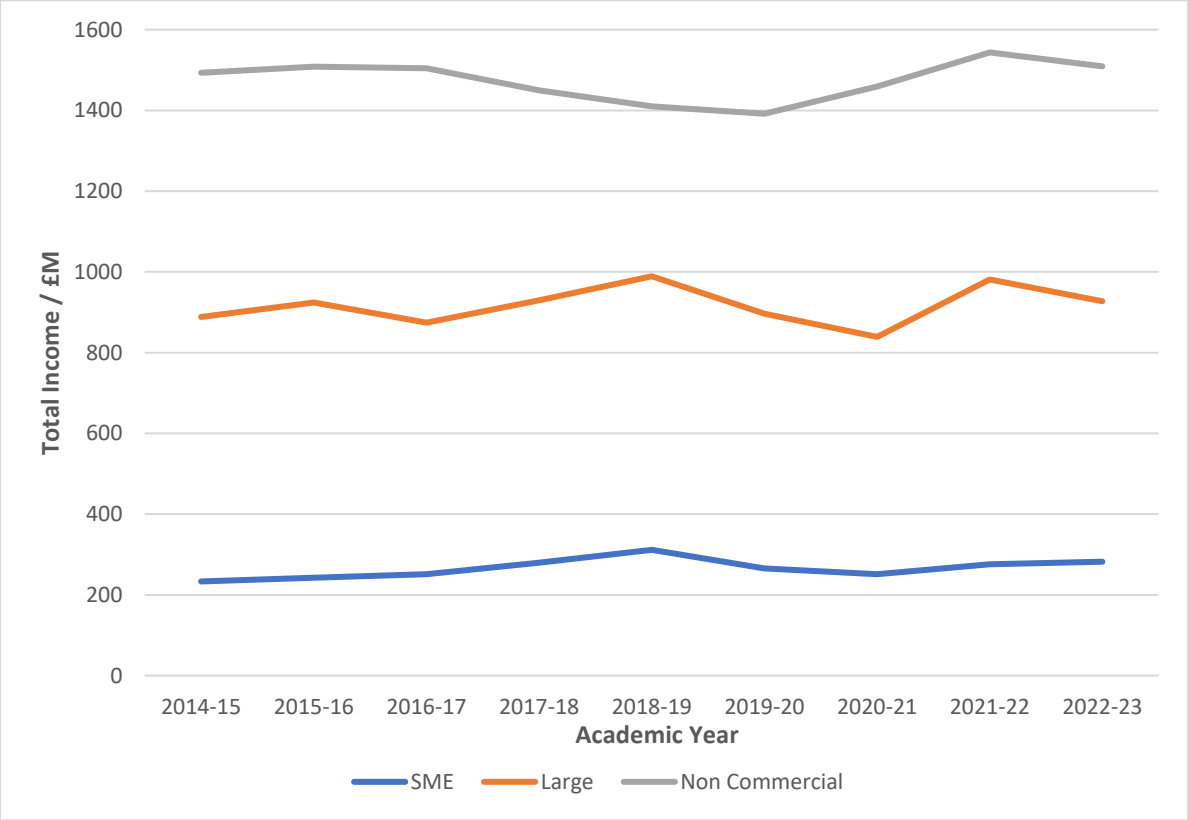
20. Changes in different types of KE income in England compared to the changes for the UK overall were once again relatively similar in 2022-23 as has been the case in recent years, and therefore driving the UK overall decrease in KE income. The reduction in income from collaborative research was slightly larger in England (13.07%) than in the UK (11.96%), while the reduction in IP income in England (18.19%) was similar to that of the UK (18.42%). Additionally, changes in CPD & CE income in both England and the UK overall were similar with a <0.01% and 0.13% increase respectively. In contrast, there was a 2.01% decrease in income from consultancy contracts in England but a 0.58% increase in the UK. In addition, there was a more significant decrease in contract research in England (5.49%) than in the UK overall (1.99%). Notably England experienced a smaller decrease in income from regeneration and development programmes (2.60%) than the UK overall (3.88%). As shown in Figure 4, England also saw relatively stable income from facilities and equipment of 0.42% while the UK overall saw a reduction of 15.73%, driven primarily by significant reductions in Scotland and Northern Ireland.

Figure 4: Year-on-year percentage change in real terms income for each category in 2021-22 and 2022-23 in England



21. Of particular interest is the relative activity of universities with different partner organisation types (see Figure 5). The total income across all KE activity types[5], from SMEs increased in real terms in 2022-23 by 2.22%, and for large businesses[6] there was a decline of 5.49%. Turning to income from non-commercial partners, this also decreased by 2.25% in 2022-23. When examining trends across individual KE activity types there was a mixed picture with increases in areas such as CPD for all partner types and total IP income for non-commercial partners, with declines for commercial partners in total IP income.

Figure 5: Total real terms KE income in England for each organisation type, 2014-15 to 2022-23.



[5] where partner type is disaggregated in HE-BCI, which is the case for contract research, consultancy, CPD, facilities and equipment, and intellectual property.
[6] References to 'large commercial businesses' refer to the 'non-SME commercial businesses' category in the HE-BCI collection throughout.

Intellectual Property Income, Patents and Spin-Outs

22. 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. **This section discusses the real terms changes in income and investment figures, unless otherwise stated.**

IP income

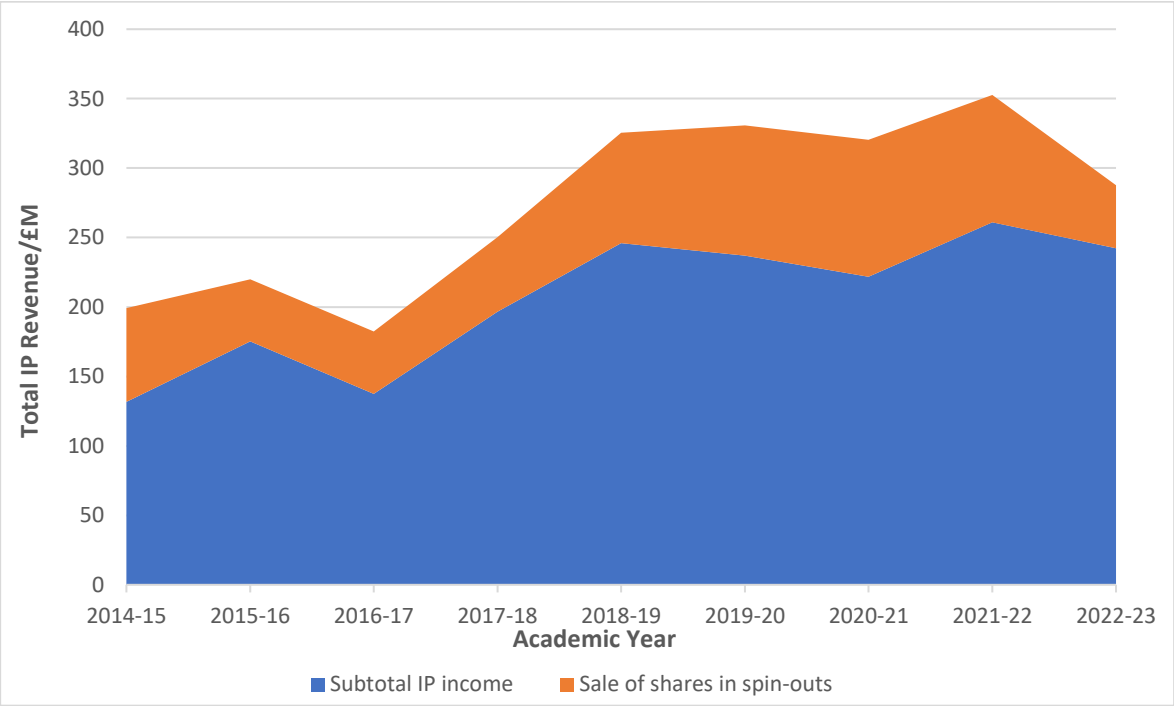
23. The HE-BCI survey collects data on the total IP income received by providers which can be divided into income due to sales of shares in spin-outs and the subtotal IP income. In addition, the subtotal income can be further categorised by the source of income (software licences, non-software licences,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

24. Income to English providers from IP decreased to £262 million which in nominal terms was a decline of 12.36%, however in the real terms, this translates to an 18.19% fall in IP income in 2022-23. This continues a period of particular real terms instability following a notable decrease in 2020-21 of 10.97%, and then a significant increase in 2021-22 of 25.68%. Changes to the sale of shares appears to be driving the decrease in 2022-23, discussed in more detail below.

25. The decrease in IP income in 2022-23 can be attributed to decreases in sales of shares in spin-outs, of £46.3m (50.52%). This is the largest decline in income from the sale of shares observed in the period since 2015-16, although there was a significant year-on-year increase of 47.38% in 2018-19. In addition to the decrease in sale of shares, there was a decrease of 7.14% or £18.64m in subtotal IP income in 2022-23, after a substantial increase of 17.69% in 2021-22 (following a decline during the Covid-19 pandemic). It can be interpreted that this decrease in IP income in part may be reflective of the notable ‘lumpiness’ of spin-out success and sale of shares, but may also point to early signs of growing financial challenges faced by businesses and other external partners, leading to reduced IP activity with HEPs. However, it should be noted that IP income can be particularly variable year-on-year and is driven by the activity of relatively small numbers of institutions. It will be important to continue to observe future changes in IP income, particularly in the context of significant growth that has been seen previously.

26. The proportion of total IP income coming from subtotal IP income increased from 74% in 2021-22 to 84% in 2022-23. This is the highest proportion observed since 2014-15 where proportion of IP income coming from subtotal IP income ranged from 66%-80%.

Figure 6: Combined real terms total of the sale of shares in spin-outs and the subtotal IP income for each academic year from 2014-15 to 2022-23.

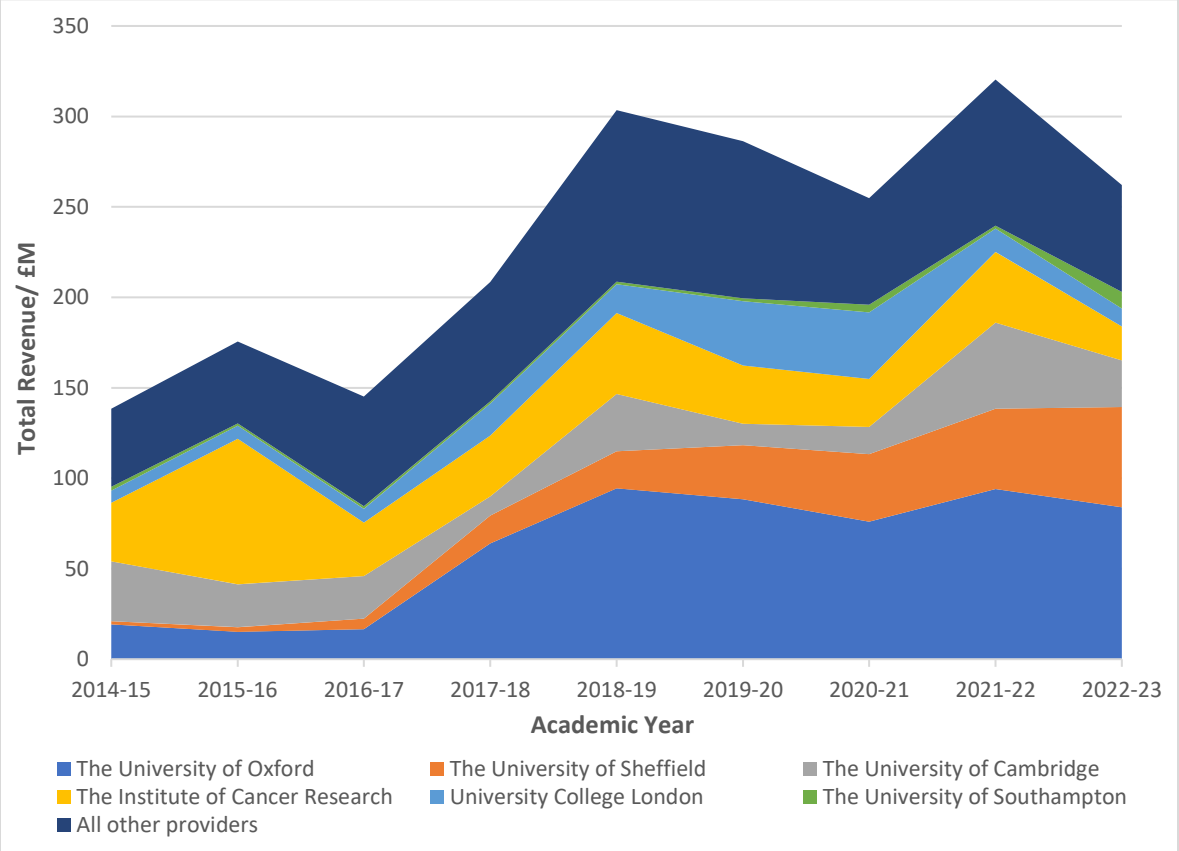


27. It is important to note that sales of shares are highly variable in nature and due to activity being relatively concentrated in a small proportion of the sector, overall sector trends can be highly dependent on fluctuating year-on-year activity of individual providers. The 2022-23 decrease can be attributed primarily to significant decreases in sales by the University of Cambridge which saw a nominal 69.4% (71% in real terms) decrease in income to £9.99 million from the sales of shares in spin-outs, compared to £32.6 million (£34.9 million in real terms) in 2021-22; the University of Oxford which saw a 34.8% (39% in real terms) decrease in income to £8.56 million compared to £13.1 million (£14.1 million in real terms); and University College London a 69.7% (72% in real terms) decrease in income to £2.1 million from £6.85 million (£7.33 million in real terms). Additionally, King's College London, the University of Liverpool and the Institute of Cancer Research recorded no income from the sale of spin out shares in 2022-23 after reporting incomes of between £2-11 million (in nominal terms) in 2021-22, contributing to the overall sector decrease. It is important to consider significant changes for individual providers may also be driven by strategic changes in institutional policy.

28. Although sector-level changes in income from the sale of shares in spin-outs were driven by the institutional decreases described above, other providers did see increases that were of note. For instance, sale of spin-out shares by Imperial College of Science, Technology and Medicine increased by 310% to £3.78 million (283% in real terms), and the University of Southampton reported sales of £6.76 million and the University of Leicester reported sales of £2.72 million, after recording no income from the sale of spin-out shares in 2021-22.

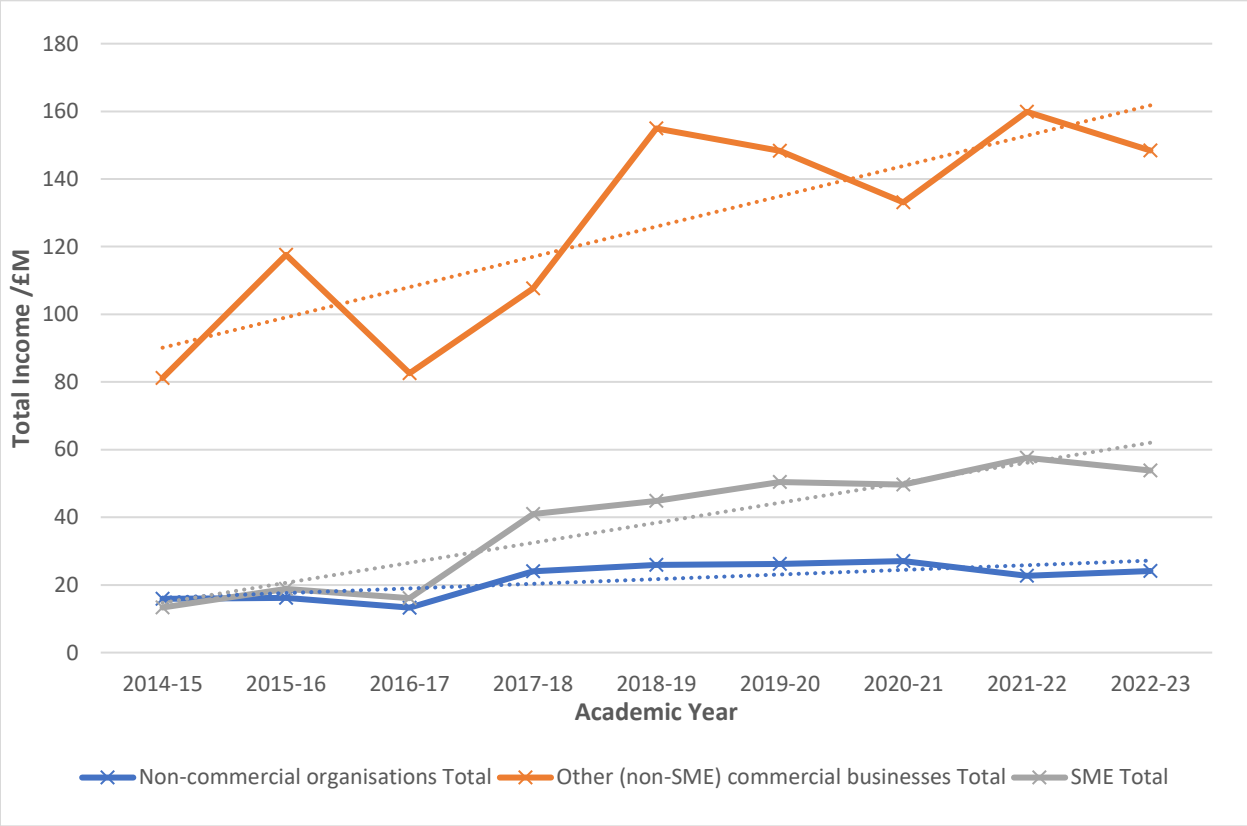
29. Similarly, it is also important to note that trends observed in the total IP revenues, similar to sales of shares in spin-outs, are highly dependent on changes in a small number of providers (though fluctuate less year-on-year). As illustrated by Figure 7, in 2022-23 IP income from just six providers represented 78% of the total income figure. This reflects a similar overall sector distribution to 2021-22 when the top six providers represented 79% of the total income figure. Therefore, although the degree of concentration of activity across the sector is relatively consistent, the identity of the six providers with greatest total IP income varies year-on-year and so Figure 7 should be considered as a snapshot rather than indicative of a long-term trend.

Figure 7: Total real terms IP income (including sale of shares in spin-outs) across English HEPs for each academic year from 2014-15 to 2022-23, highlighting the proportion contributed by the six providers with the greatest total IP incomes in 2022-23.



30. Subtotal IP income can be disaggregated by the type of organisation the income is from, and this is illustrated in Figure 8. Subtotal IP income is predominantly driven by interactions with commercial partners, which contributed 84.2% of income in 2022-23 and which reduced to £242 million from £261 million in 2021-22. This is underpinned by a reduction of 7.18% in the income recorded from large businesses to £148 million, and a reduction in activity with SMEs of 6.52% to £54 million in 2022-23. However, income from activity specifically with non-commercial organisations increased by 6.09% from £22.7 million to £24.1 million.

Figure 8: Total real terms IP income for different organisation types for each academic year from 2014-15 to 2022-23.

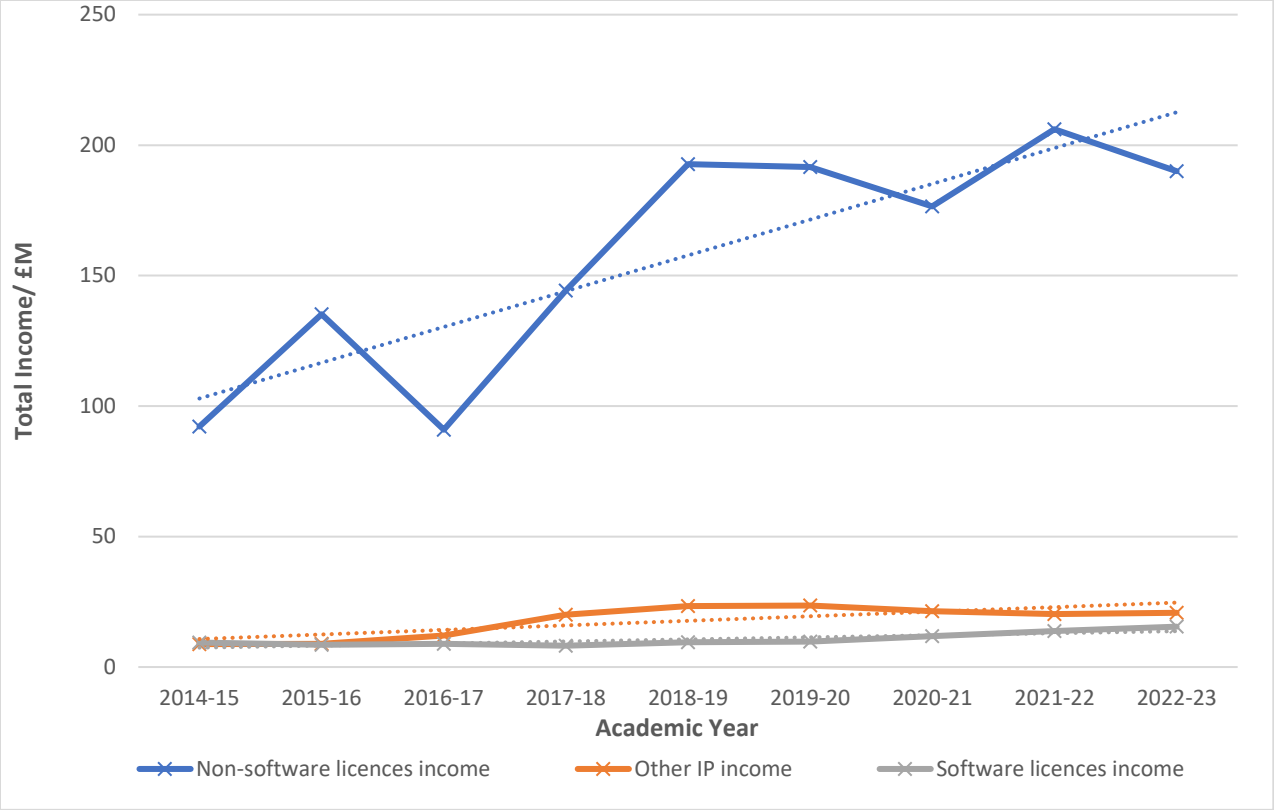


31. Subtotal IP income can also be disaggregated across all organisation types by the source of IP income and is displayed in Figure 9. The relative distribution of income between different sources has remained consistent since 2019-20, with non-software licencing remaining the predominant source of income with 83.9% of the total in 2022-23, and software and other IP income contributing 6.8% and 9.2% respectively.

32. Of note however is the 7.79% decrease in non-software licensing income in 2022-23, after a significant 16.7% increase in 2021-22, which had shown a return to the growth that had been observed in this category from 2016-17 to 2018-19. It is not unexpected that the trends

in non-software licencing income and that from large commercial businesses mirror the overall trends in subtotal IP income as income from non-software licences with large businesses contributed 55.9% of the total income in 2022-23.

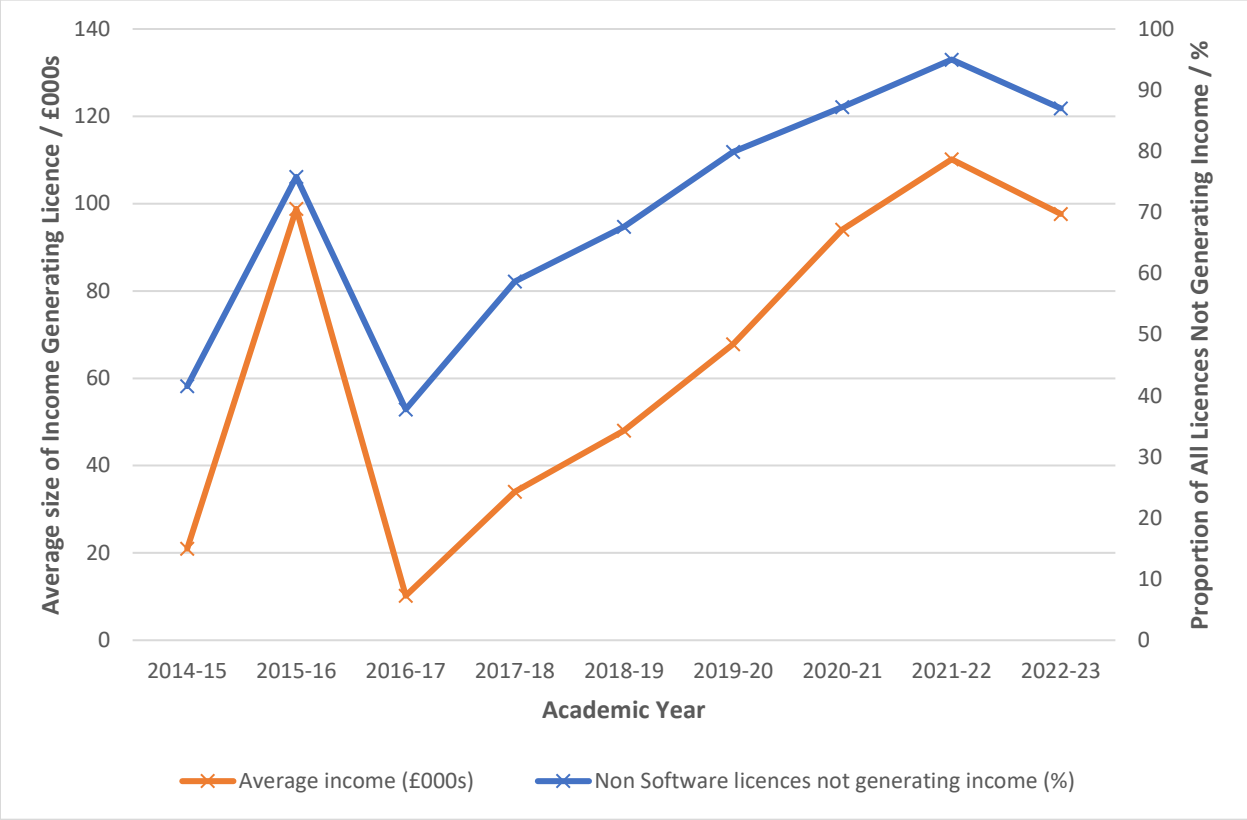
Figure 9: Total real terms IP income across all organisation types for different sources of income for each academic year from 2014-15 to 2022-23.



33. As shown in Figure 10, 2022-23 saw a notable decrease in the average value of non-software licencing deals, which decreased in real terms by 11.4% to £97,605 from £110,148 in 2021-22. This has occurred alongside a longer term decrease in the proportion of all non-software licences that do not generate income from 95% in 2021-22 to 87% in 2022-23.[7] It is therefore of note that the overall decrease in non-software income has been coupled with an increase in the number of licences generating income, and therefore indicating a greater number of deals generating incoming but these being of relative lower value. This contrasts with the annual increases in both metrics previously observed since 2016-17, indicating the increase in the relative number of higher value deals driving an increase in income.

[7] One provider's data in relation to licence numbers has been omitted in the 2021-22 data due to a data reporting anomaly.

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 2022-23.



34. Furthermore, Figures 11 and 12 below compare the sources of IP income from each organisation type. Between 2021-22 and 2022-23, of the IP income relating to non-software sales, the proportion with both SME and non-commercial organisations increased slightly, and with large commercial businesses decreasing. Of the income relating to other IP, the proportion with large businesses increased, while for SMEs and non-commercial businesses it decreased. For all organisation types the proportion of their income derived from software licences increased in 2022-23.

Figure 11: Proportion of IP income from different sources for each organisation type in 2021-22.

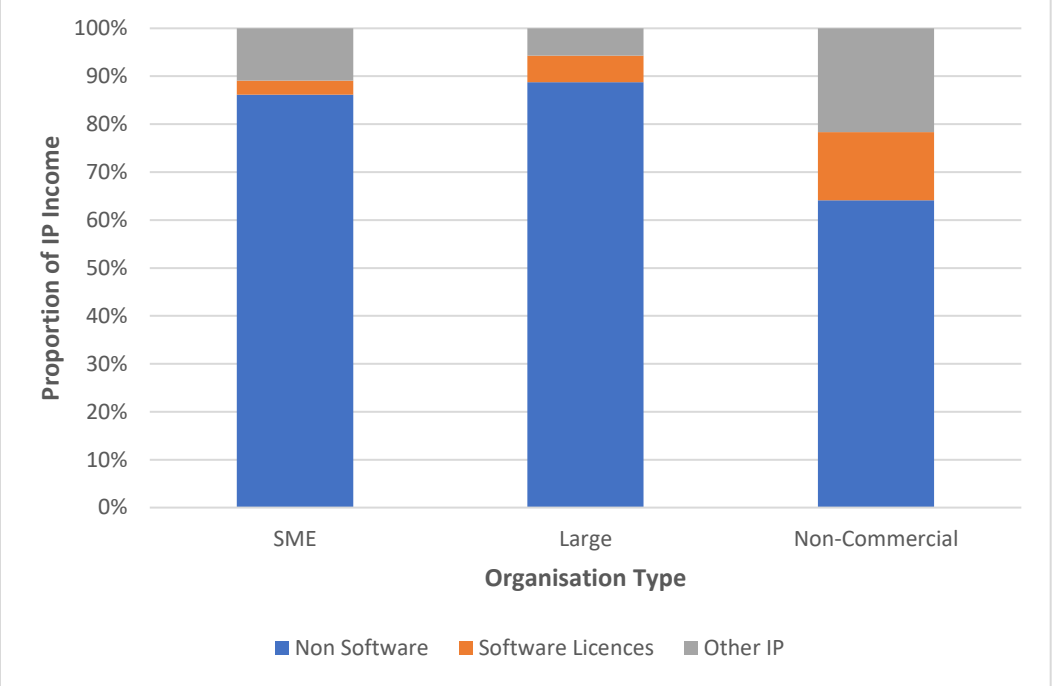
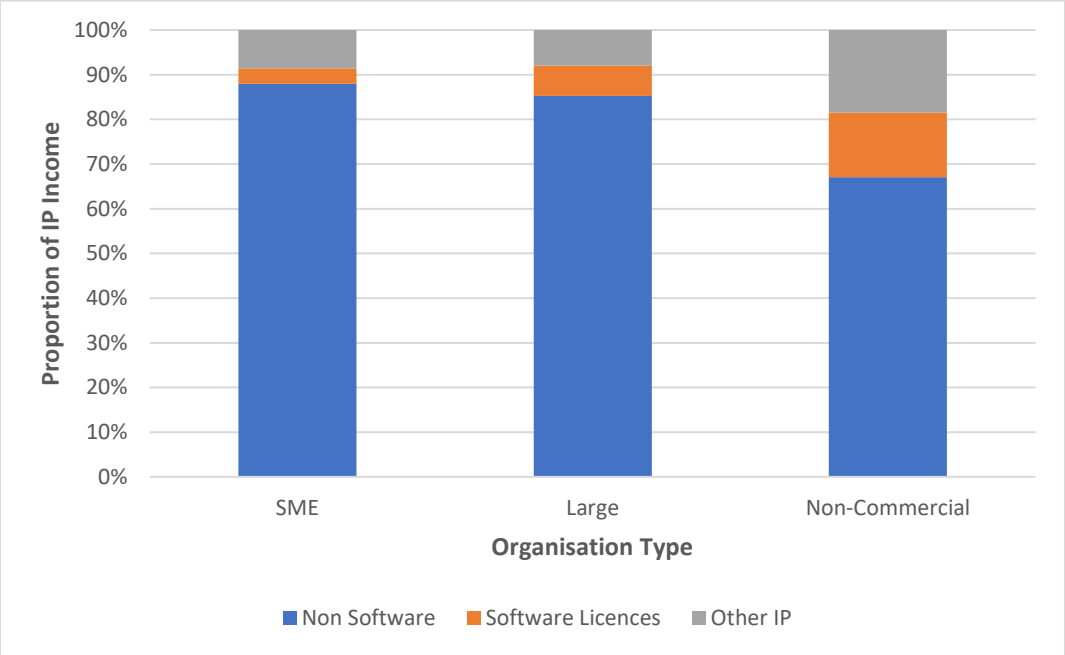


Figure 12: Proportion of IP income from different sources for each organisation type in 2022-23.

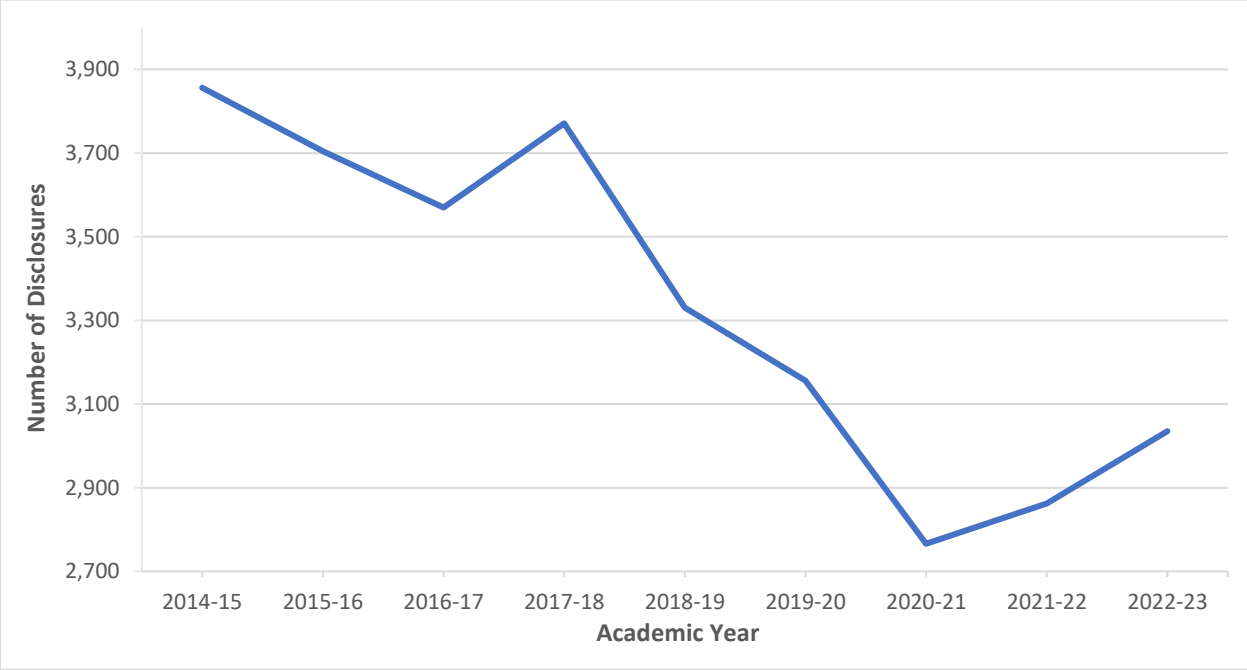


Disclosures and patents

35. The HE-BCI survey 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). However, 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.

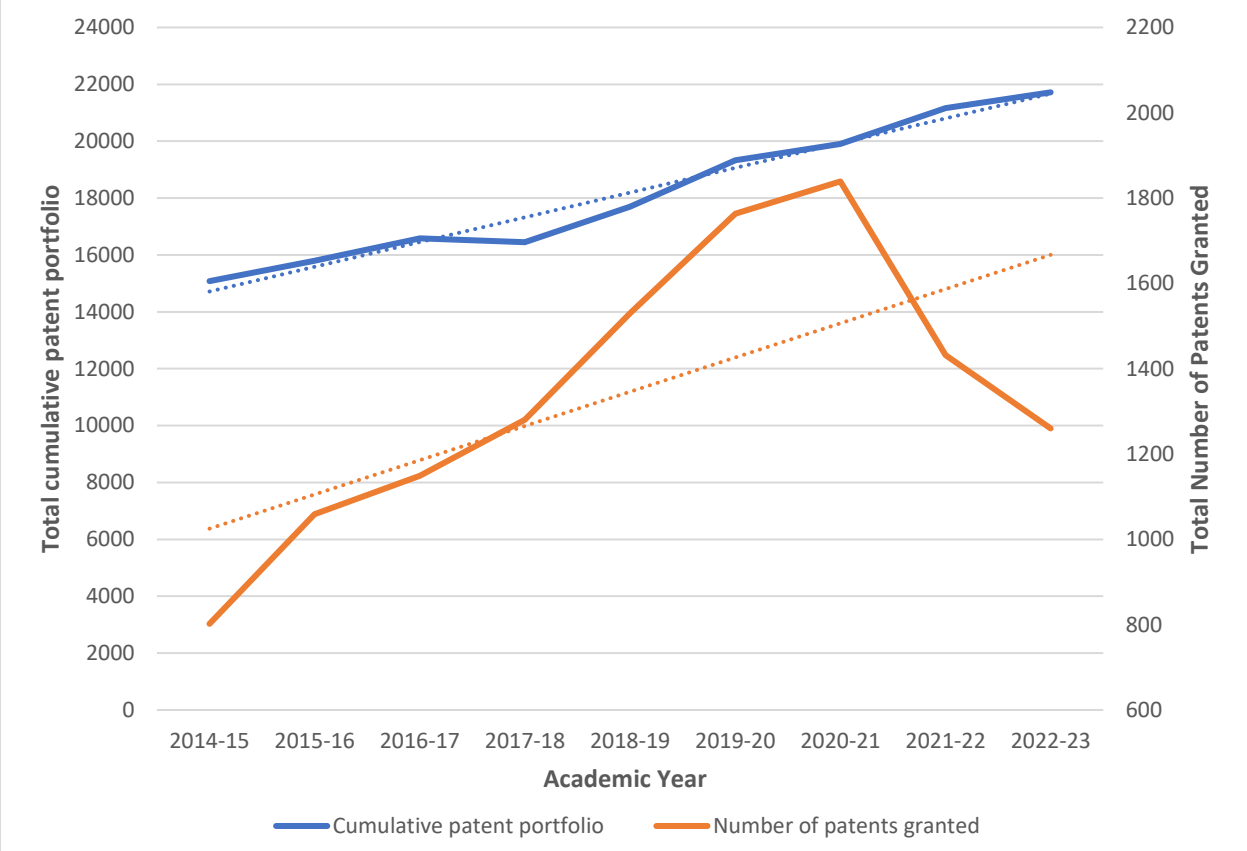
36. As shown in Figure 13, in 2022-23 the number of disclosures increased by 6.05%, representing a continuation and increase in growth from 2021-22 where the number of disclosures grew by 3.47%. This continued growth is notable as it is contrary to the wider trend of a decrease in the number of disclosures over the period since 2014-15.

Figure 13: Total number of disclosures for each academic year from 2014-15 to 2022-23.



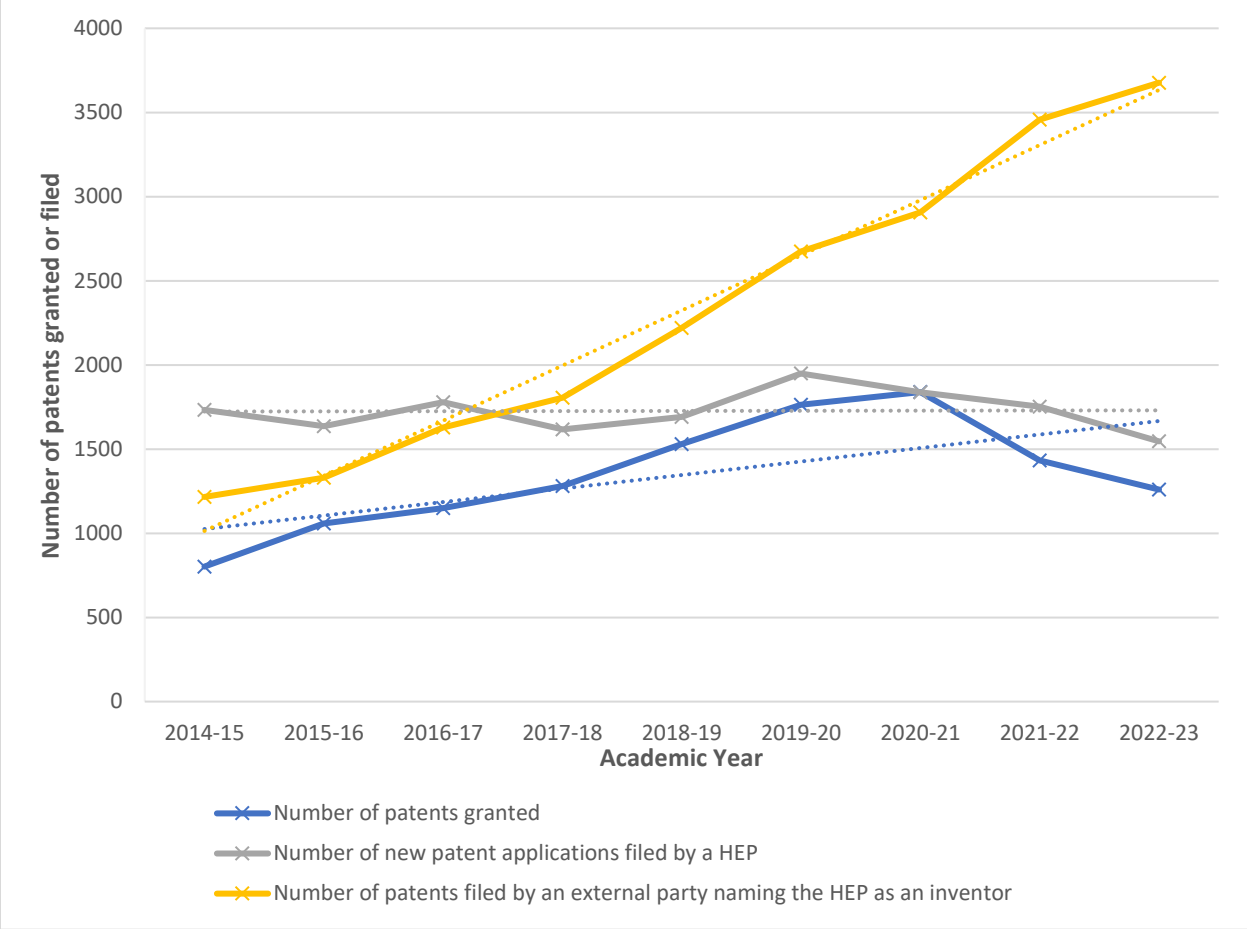
37. As shown in Figure 14, patenting activity decreased for a second consecutive year in 2022-23. The total number of patents granted across the sector decreased by 12.0%, though this represents a slow in rate of decline compared to the decrease of 22.1% in 2021-22 (which was previously attributed to Covid-19 related effects, as activity to develop products and ideas was restricted). This initially resulted in a notably greater decrease in disclosures in 2020-21, which could potentially be resulting in the subsequent decrease in granted patents in 2021-22 and 2022-23. The total sector cumulative patent portfolio continued to grow steadily, increasing by 2.61%.

Figure 14: Total number of patents granted and the cumulative patent portfolio across all providers for each academic year from 2014-15 to 2022-23.



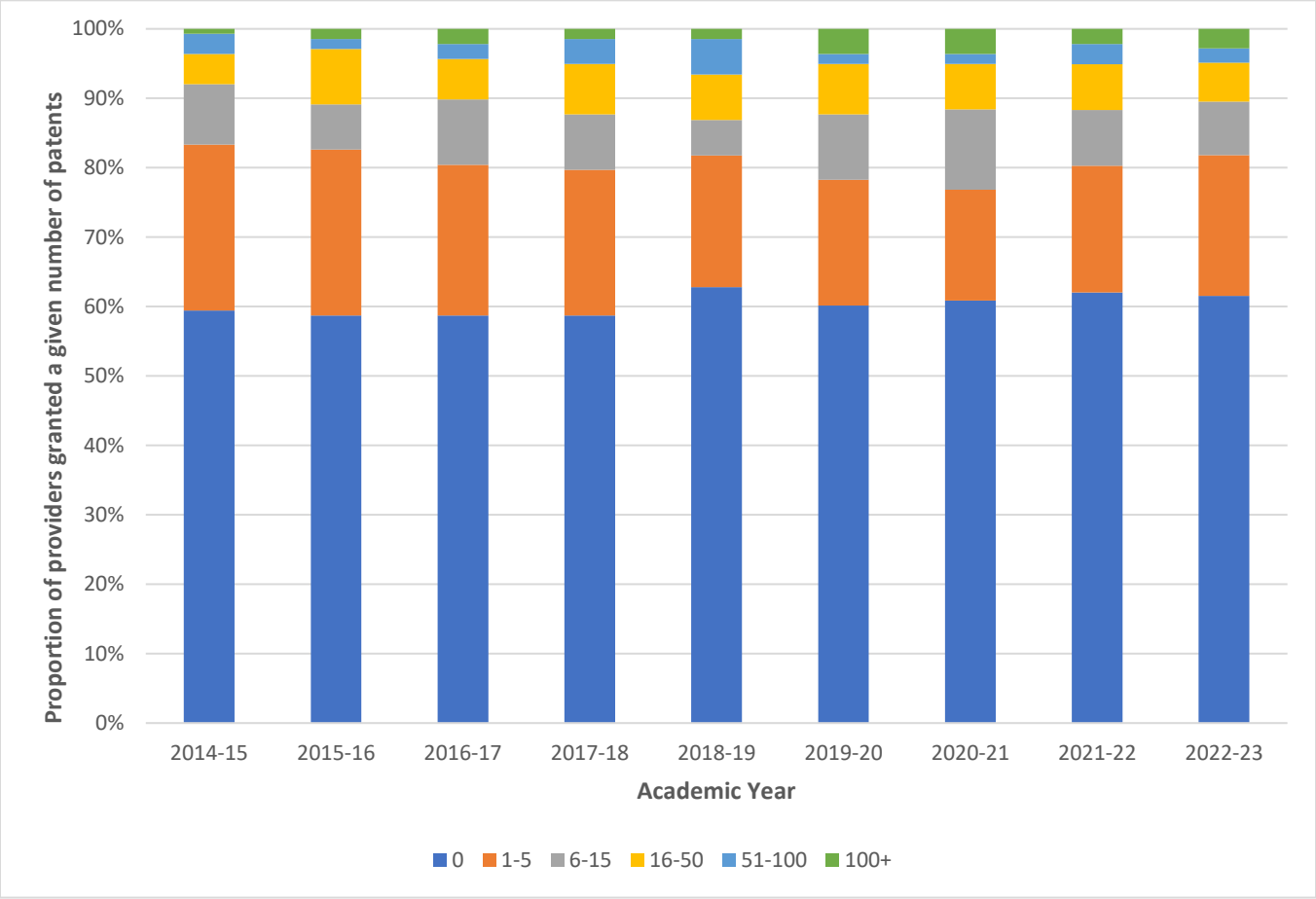
38. Consideration of the identity of the party filing the patents is also of interest and is illustrated in Figure 15. The number of patents filed by external parties naming the HEP as an inventor continued to increase in 2022-23 with a growth of 6.3% to 3,677 compared to 2021-22. Despite an overall decrease in the number of patents filed by providers in 2022-23, the broader trend across all reporting periods examined indicates that strategic filing activity by HEPs may be remaining relatively consistent. These observations continue to suggest the way in which providers are managing their patent portfolios may be shifting, with a greater emphasis on filings by external parties.

Figure 15: Total number of patents granted, and total patents filed by providers and by external parties for each academic year from 2014-15 to 2022-23.



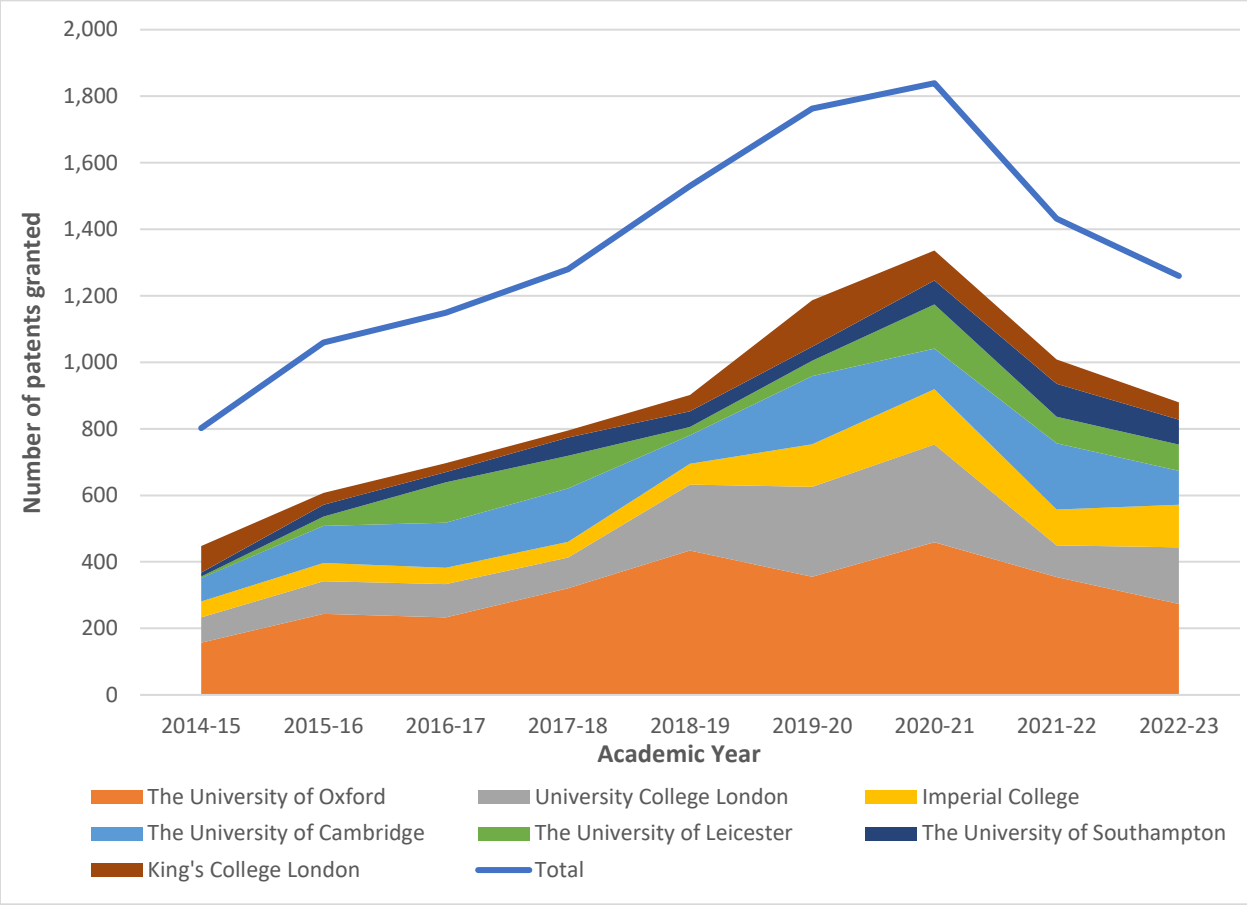
39. The proportion of providers which had a given number of patents granted in an academic year was also calculated and is shown in Figure 16. In 2022-23 the proportion of providers with zero patents was relatively stable at 64.2%. There was a 16% increase in the number of providers reporting 1-5 patents and a 25% increase in the number reporting 100+ patents, with decreases in the total number of providers reporting 16-50 and 51-100 patents (11.1% and 25% respectively). Compared to 2021-22 there was therefore a marginal shift in the concentration of patenting activity become more polarised with increases in the 1-5 and 100+ groups, however over the medium to long term the sector's patenting profile has also been relatively stable.

Figure 16: Proportion of the total number of providers that has a given number of patents granted each academic year from 2014-15 to 2022-23.



40. However, of note is that of the seven providers granted the greatest number of patents in 2022-23 (Universities of Oxford, Cambridge, Southampton and Leicester, King's College, University College London, and Imperial College), only the University College London (78.1%) and the Imperial College (19.6%) saw increases in patents granted between 2021-22 and 2022-23. The remaining five providers (Universities of Oxford, Cambridge, Southampton and Leicester and King's College) saw decreases in the number of patents granted ranging from 48.7%-1.25%. This significant decrease in patents awarded to these top performing providers accounts for the overall decline in patents granted seen across the sector, as displayed in Figure 17.

Figure 17: Total number of patents granted across the whole sector, and for individual providers, for each academic year from 2014-15 to 2022-23.



41. 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 a provider not producing potentially patentable IP.

Spin-out company formation

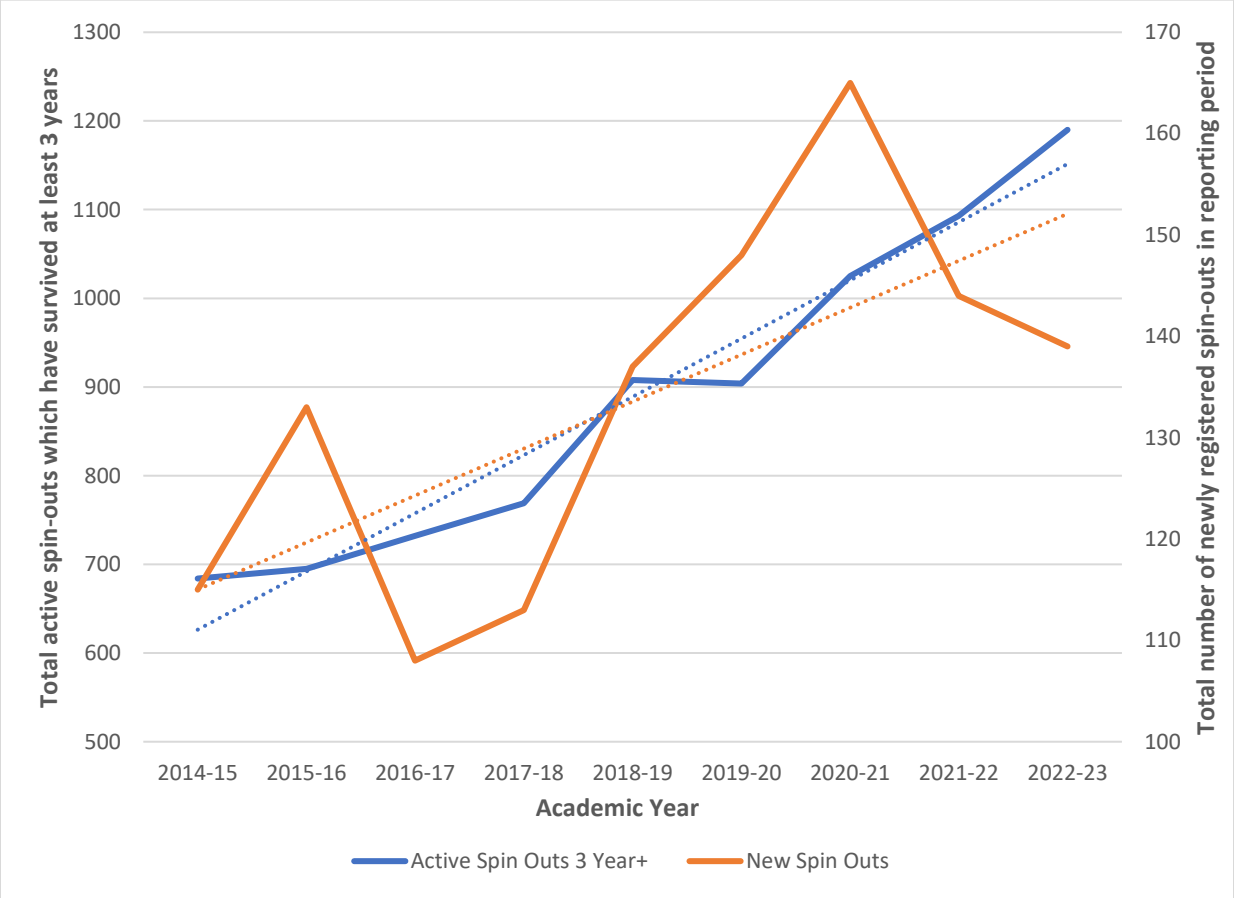
42. For the purpose of this report, a spin-out is defined as a registered company set-up to exploit IP that has originated from within the university (noting the definition of spin-out in HESA data collection has been updated for future data collection).

43. In 2022-23 a decrease of 3.47% (5 spin-outs) was observed in the number of newly registered spin-outs, and an increase of 8.88% (97 spin-outs) was observed in the number surviving for at least 3 years, as demonstrated in Figure 18. These changes are notable as they represent a slower rate of decline in newly registered companies compared to 2021-22 (12.7%), and an increased rate in growth in spin-outs surviving at least 3 years compared to

2021-22 (6.63%, 68 spin-outs). It appears that activity in this area is stabilising due to a return to levels more similar to those prior to the Covid-19 pandemic, following a spike in spinning out activity in 2020-21 potentially likely due to increased ability of HEPs to focus on exploitation of existing activities during the pandemic when research itself was more challenging. However, as this is an area of KE where activity fluctuates year on year, it is more valuable to focus on long-term trends rather than year on year changes.

44. In addition, 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 this indicator remained strong with 8.88% growth in 2022-23.

Figure 18: 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 periods for English HEPs, each academic year from 2014-15 to 2022-23.



45. The quality of spin-outs across the sector, despite increasingly pressured economic outlook, can also be indicated by the ongoing ability of the companies to attract investment. The estimated external investment from all sources received by all spin-outs across the sector increased in real terms by 571% in 2022-23, resulting in external investment of £30.6bn. This compares with the £4.55bn of external investment in 2021-22 and £5.81bn in 2020-21. In both 2020-21 and 2022-23 the high growth was a result of particularly large data returned by the University of Cambridge, who recorded an 1,577% increase in 2022-23 (from £1.69bn to £28.3bn) and accounted for 92.6% of the total sector estimated external investment.

46. This contrasts significantly with the 30% reduction in the totalled external investment recorded by the next five highest providers, who returned a combined estimated external investment of £1.7bn compared with a total of £2.44bn in 2021-22. It is important to note that although it is expected that a relatively small number of providers contribute to total sector figures and therefore broader trends are heavily influenced by changes at an individual provider level, this is particularly acute in 2022-23 and is demonstrated in Figure 19.

47. There was an increase in 2022-23 in the proportion of total estimated external investment due to the highest six providers (see Figure 19 and Figure 19a) which accounted for 98.1% in 2022-23 compared to 91% in 2021-22 and 83% in 2020-21 from the highest six providers for those years. Though again this notable increase in concentration of sector activity is driven by the very large increase for the University of Cambridge. However, of these six high performing providers, it is also notable that the estimated external investment received by spin-outs from the University of Oxford, University College London and King's College London decreased by 41.2% (£524m), 24.5% (£166m) and 66.2% (£220m) respectively in 2022-23. Imperial College had an increase in external investment of 37.9% (£45.5m), and the University of Manchester had a significant increase of 348% (£126m). However, some caution should be taken using external investment as a value proxy when differentiating activity across the sector due to the investment needs across types of spin-outs varying significantly depending on their sector.

Figure 19: Estimated real terms external investment received by all spin-outs totalled for all providers, and for individual providers, for each academic year from 2014-15 to 2022-23.

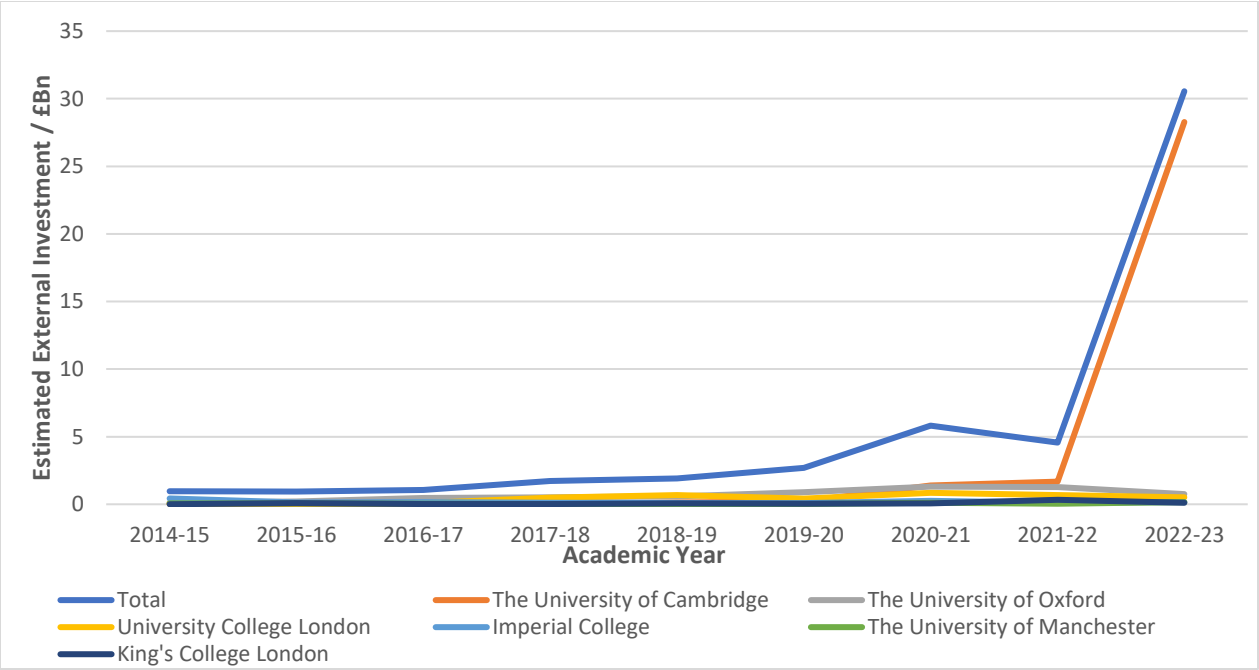
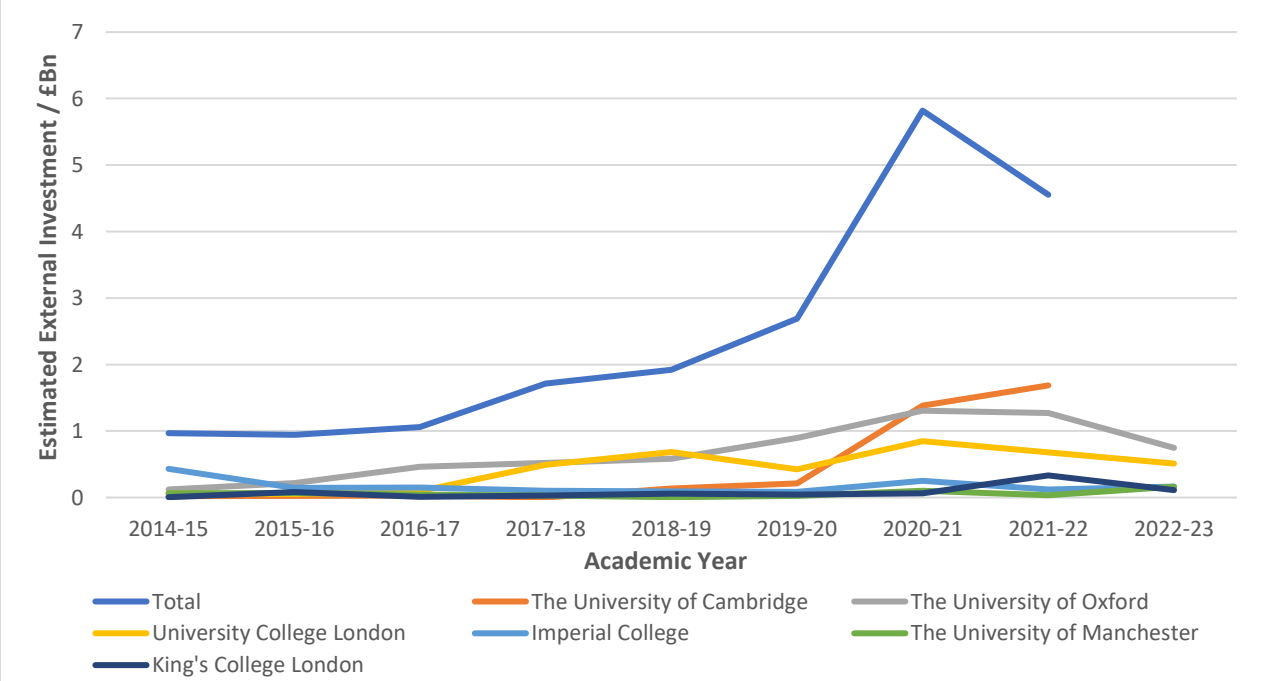


Figure 19a: Estimated real terms external investment received by all spin-outs totalled for all providers, and for individual providers, for each academic year from 2014-15 to 2022-23. (Extract from Figure 19 at a smaller scale, omitting the sector total and University of Cambridge for 2022-23).



48. The total estimated current employment of all active firms may also be used as a partial indicator of the success of the spin-outs across the sector (although it should be noted that it is a poorer proxy for performance due the differing staffing requirements of different types of businesses). Total estimated current employment also exhibited an increase in 2022-23 of 34.4% following a slight decrease in 2021-22 of 3.99%. This increase in 2022-23 is again predominantly attributed to very large increases at the University of Cambridge. It should also be noted that large swings in this data should be anticipated as spin-outs are acquired or cease to be eligible for return. It should be noted that this area is dominated by a small number of companies and therefore it is more valuable to consider long term trends, rather than year-on-year changes.

49. The year-on-year changes in this metric is depicted in Figure 20 below, alongside that for the total estimated external investment and total number of currently active spin-outs that have survived at least three years. While Table 1 displays the absolute values for these three indicators for the last three reporting periods.

Figure 20: Year-on-year % change in the three spin-out metrics from 2015-16 to 2022-23.

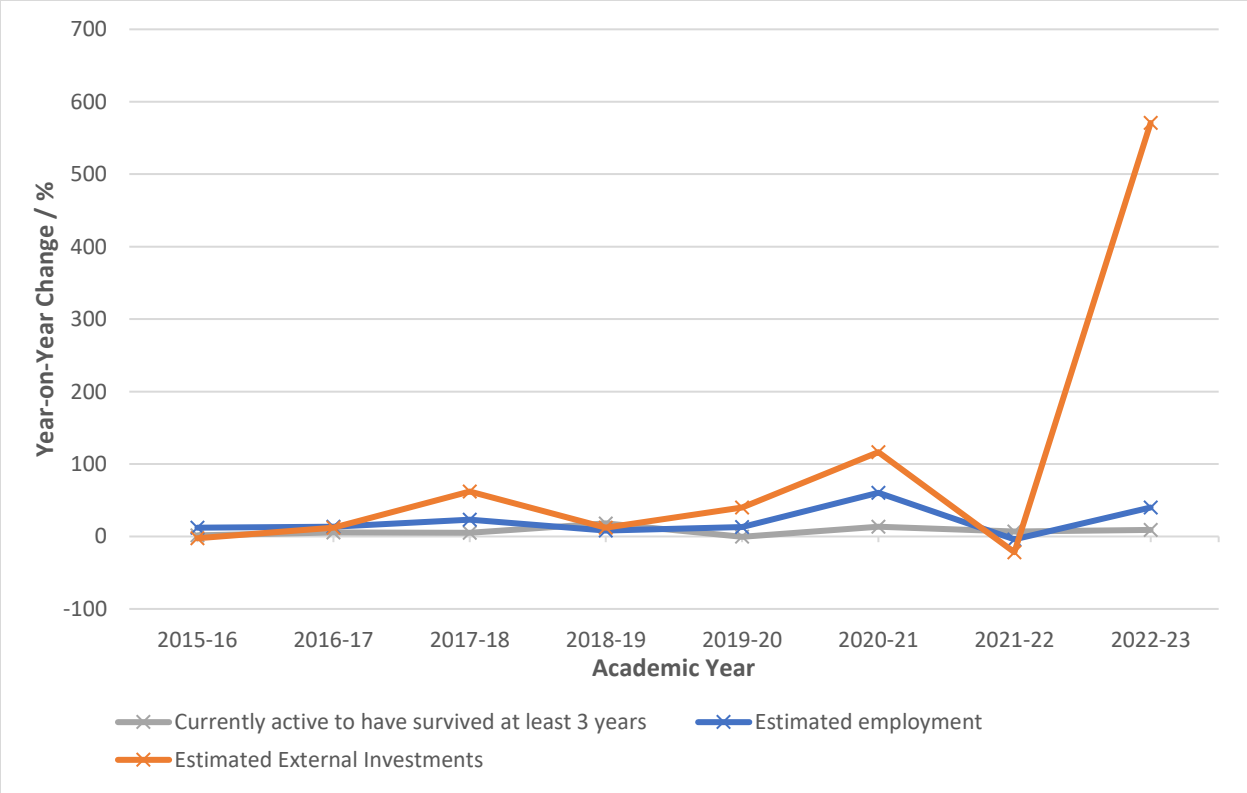


Table 1: Estimated employment, estimated external investment (real terms), and number of currently active spin-outs to have survived at least three years, for the most recent three reporting periods.

Spin-out Metric	2020-21	2021-22	2022-23
Estimated Employment	32,481	31,183	43,644
Estimated External Investment / £Bn	5.81	4.55	30.6
Currently Active Spin-Outs to have Survived at Least 3 Years	1,025	1,093	1,191

50. Estimated employment and estimated external investment both increased in 2022-23 after a decline in 2021-22. It should be noted that all three of these indicators are highly influenced by institutional changes as only a few providers account for the bulk of these trends, particularly noting significant changes in investment for the University of Cambridge. However, these observations are indicative of overall spin-out quality as they are attracting substantial business investment suggesting confidence from business, employing more people, and creating more jobs.

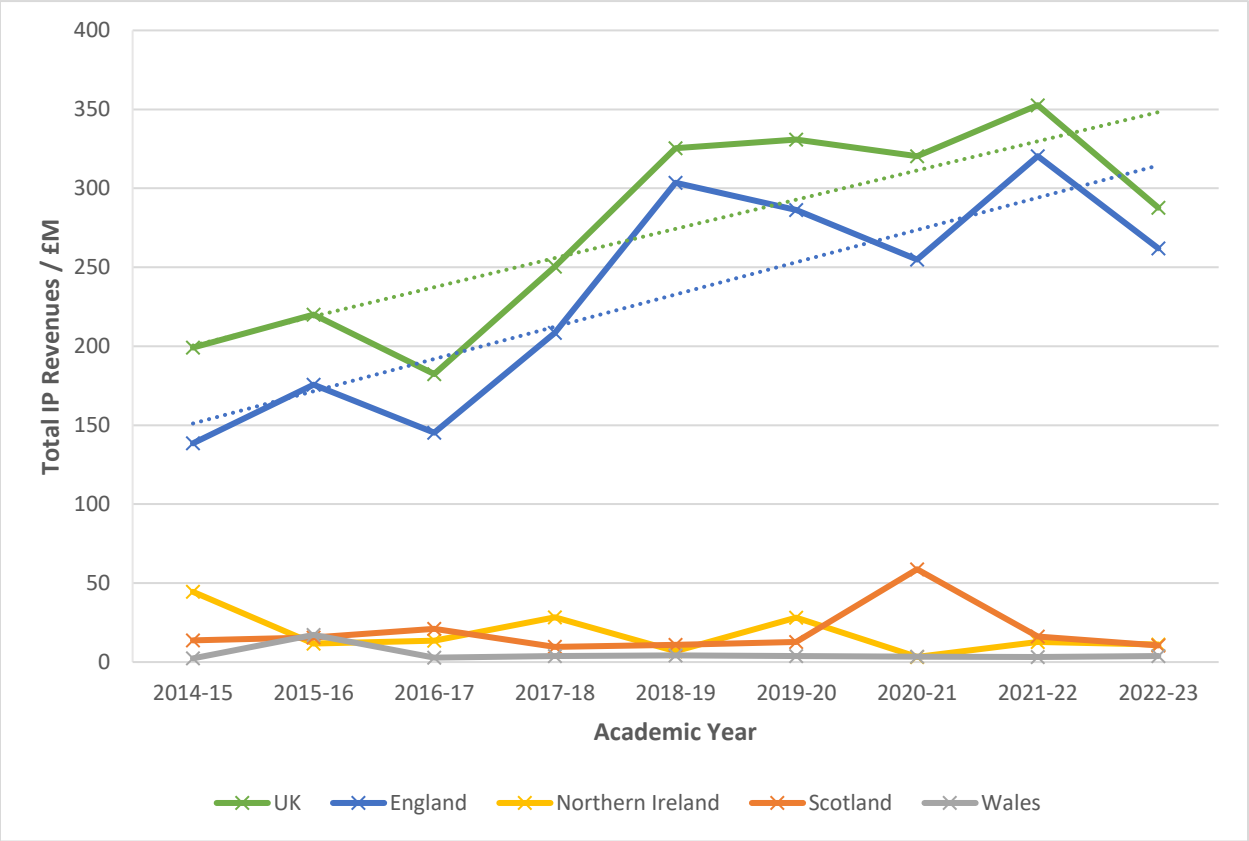
Comparison of England with the UK

51. It is also of interest to compare trends in IP income in England to that of the UK and the devolved nations in more detail. Although IP income decreased for both England and for the UK as a whole and on a similar scale (decreases of c.18% in both), there was a notable difference between the year-on-year changes in IP income for England and that of the other nations within the UK. Figure 21 displays total IP income for the UK as a whole, and each nation individually.

52. This comparability between England and the UK as a whole contrasts with more notable differences observed in previous years, as a result of more similar and less significant year-on-year changes observed in other nations in 2022-23. For instance, IP income in Scotland decreased by 35% in 2022-23, in contrast with 72% decrease in 2021-22. The recent fluctuating changes in IP income in Scotland, highlights again that the sale of shares in spin-outs can be highly variable and does not necessarily reflect the broader shifts in overall IP income.

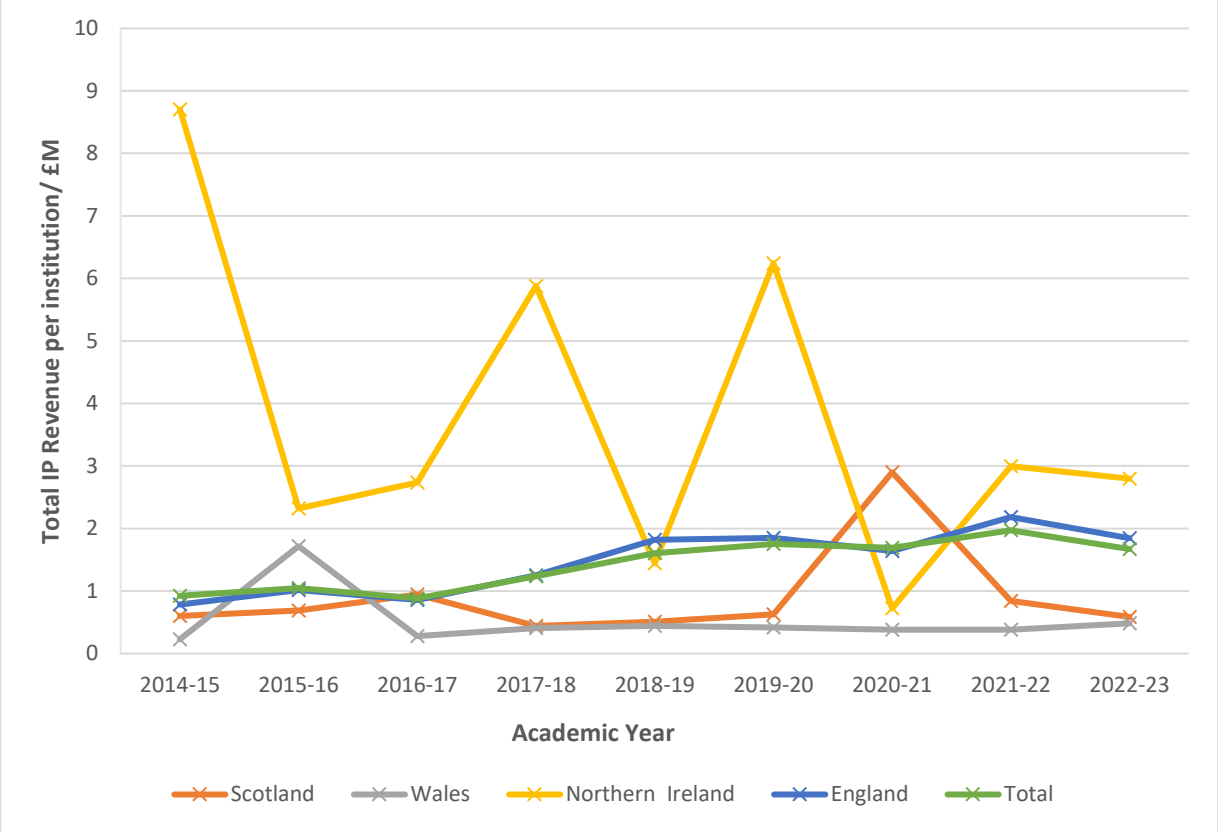
53. The overall trend in IP income in England and the UK since 2014-15 is broadly very similar as depicted by the trendlines in Figure 21. This could be argued to be the more representative measure of IP income due to the large fluctuations that can occur at an institutional level year-on-year as a result of the sale of shares in spin-outs, and following slightly differing effects during the Covid-19 pandemic in 2019-20 and 2020-21.

Figure 21: Total real terms IP revenue for the UK and the devolved nations for each academic year from 2014-15 to 2022-23.



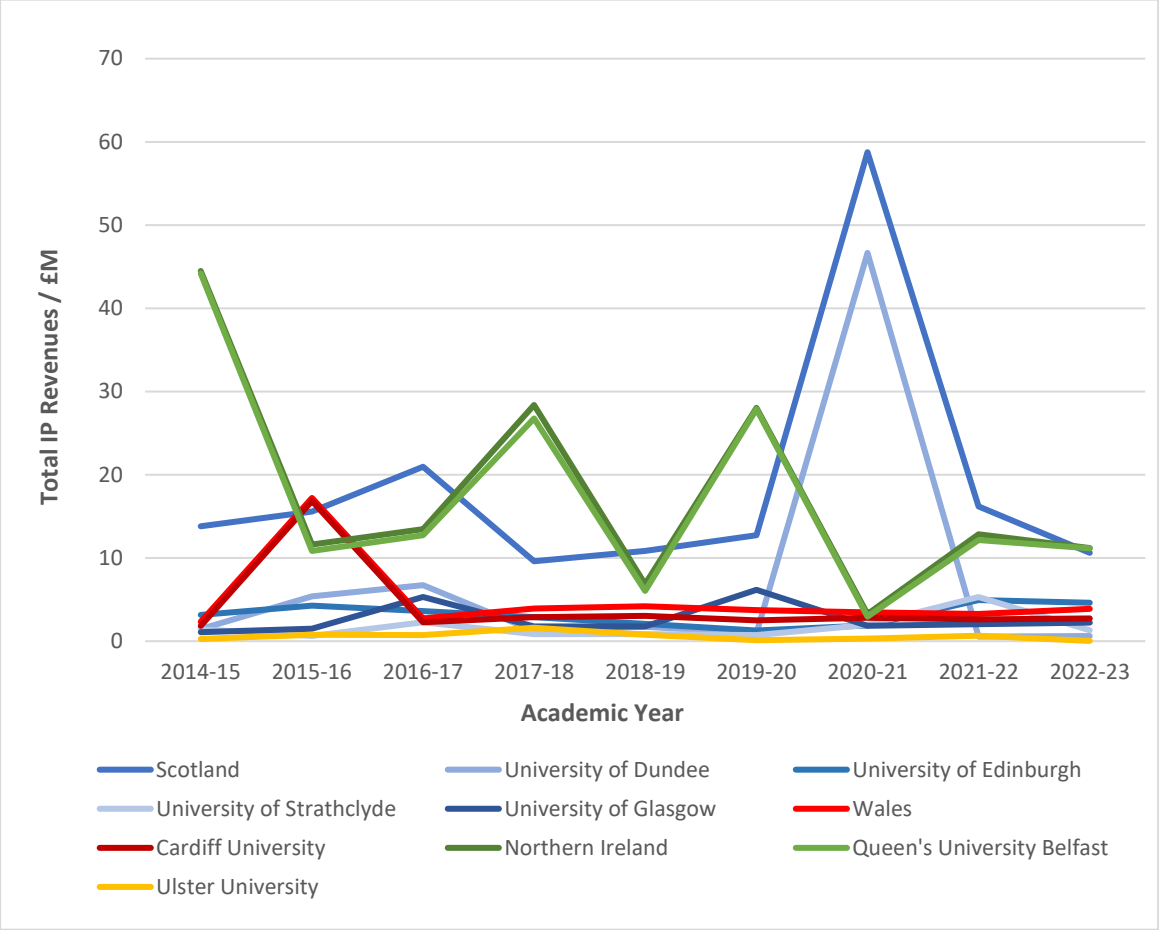
54. While these figures do show differences between the nations of the UK, it is important to be mindful of the relatively small number of providers outside of England. When the total IP income for each nation is normalised by their respective total number of providers, similar trends and therefore performance is observed across England, Wales, and Scotland and therefore are more similar to that of the UK overall, as illustrated in Figure 22. Total IP income per provider in Northern Ireland is generally significantly greater than that of any other nation and the UK, other than in 2020-21 and 2018-19 and has previously been dictated by fluctuating income to Queen's University Belfast (see below).

Figure 22: Total real terms IP revenue per provider for the UK and the devolved nations for each academic year from 2014-15 to 2022-23.



55. 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 as demonstrated in Figure 23. 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. The total IP income for Scotland is less dependent on individual institutional changes, with the exception of the driving effect of the significant increase in income for the University of Dundee in 2020-21. Whereas in England individual providers has *relatively* a smaller impact on total compared to elsewhere in the UK due to the greater total number that generate revenue through IP.

Figure 23: Total real terms IP revenue for Scotland, Wales, Northern Ireland, and a selection of providers for each devolved nation for each academic year from 2014-15 to 2022-23.



IP-Related International Comparisons

56. Commercialisation activities in the UK can be compared with that in the US by comparing HE-BCI data and elements of the OfS Annual Finance Return, with the US AUTM Licensing Survey. Reasonable caution should be taken when comparing this data, because the US AUTM surveys, UK OfS Annual Finance Returns and HE-BCI surveys are not identical, where different definitions and accounting periods are used.

57. UK data are collected by official bodies, HESA and the OfS. These data undergo a more comprehensive validation than data collected from the US, which are submitted to sector-representative bodies.

58. As the number and size of higher education providers (HEPs) varies between nations, some indicators are normalised using a measure of 'total research resource' (income from all sources to undertake research in the UK, or expenditure on research in the US). 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.

59. Comparisons of the UK and US data should be treated with caution. HESA/OfS data included in our analysis represents the entire UK HEP sector whereas the AUTM data used consists of a self-selected group (in 2022-23, 148 of the approximate 1,400 that comprise the whole sector). Consequently, the identity of the providers contributing data varies each year, including providers with high volumes of activity and can make not insignificant contributions to the data. Thus, comparisons year-on-year should be treated as approximations.

60. With these caveats in mind, Table 2 below demonstrates that the UK continues to remain broadly comparable with the US when research resource is taken into account. Total research resource for the UK increased in 2022-23, compared to a decrease in research resource in the US in 2022. In both nations there has been a decrease in the numbers of spin-out companies formed and the numbers of patents granted.

61. There was a 6% decrease in the number of new spin-outs in the UK in 2022-23, following a 9.3% decrease in 2021-22 (which was the first decrease observed since 2017-18). This was mirrored by a 10.9% decrease in the US (also following a decrease of 5.45% in 2021-22). This continued decline in both nations may reflect the return to levels more similar to those prior to the Covid-19 pandemic, following a spike in spinning out activity in 2020-21, as discussed in paragraph 43 above.

62. The UK's patenting activity decreased by 8.5% in 2022-23 and by 12.6% in the US. This is the second year which saw a decrease in patenting activity (following decreases of 21.9% and 1.4% in the UK and US respectively in 2021-22) after consistent growth in both nations since 2014-15. Again, this may reflect the challenging economic conditions, alongside the tail of impacts on the IP pipeline from the Covid-19 pandemic. The research resource per patent of £6.7 million remains lower in the UK than the £7.6 million for the US – although changes from 2018-19 should be considered in light of the changes in research resource in both sectors. As a proportion of total research resource, industrial contribution in the UK continues to compare well with the US, and UK has seen stability in the proportion of research resource from industry which remained stable at 8% in 2022-23. The US proportion of research resource from industry has remained static at 6.5% since 2019.

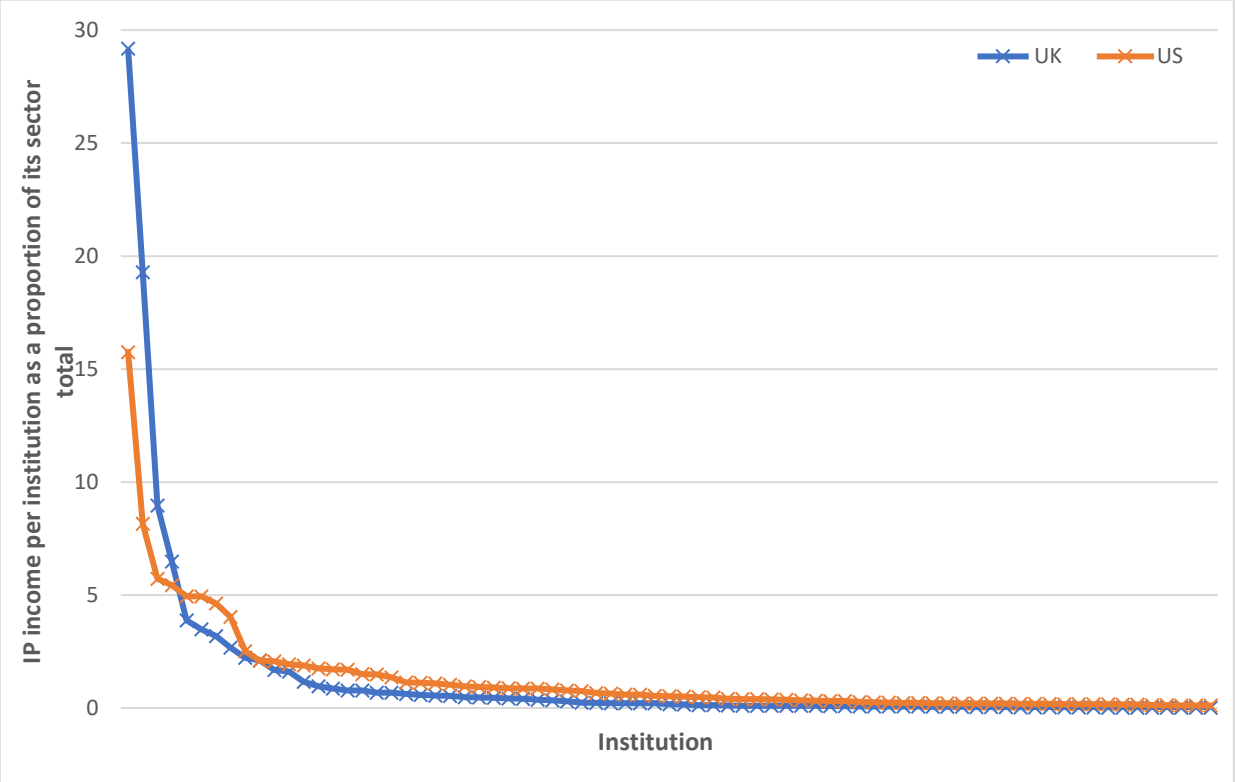
63. Although IP related activities are similar in the UK and US, there is a notable difference in their overall IP income. There was a 12.5% decrease in overall IP-related income in the UK in 2022-23 while the US recorded a significant increase of 51.5%, following increases of 15.4% in the UK and 15.1% in the US in 2021-22. Although the decrease in IP income in the UK can predominantly be attributed to sale of shares in spinouts, the decrease in cashed in equity in the US suggests that the increase in IP income reflects growth in other routes to monetising IP exploitation. It will be important to continue to monitor trends in US IP income in future years. This is in the context of the UK seeing an increase in total research resource in 2022-23 by 7% to £9.94bn, however the US' research resource decreased by 5% to £48.5bn.

64. 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. There may also be further alternative ways of doing this not discussed here, such as comparing groups of universities with similar characteristics.

65. One consideration is again the self-selection of institutions that report to AUTM, as this sample potentially represents more providers that conduct a larger amount of IP-related activity and therefore are more likely to opt to submit data. However, it is a reasonable assumption that most institutions in the US sector with significant IP incomes will have opted to report to the AUTM licensing survey, and therefore comparing an absolute number of institutions in the UK and the US serves as a reasonable approximation for comparing the distribution of activity amongst those who are likely to be active in this area. In addition, the differing size and nature of research funding in the UK and US should be considered. The distribution of IP income in both countries is generally concentrated in large, research-intensive institutions.

66. When considering an equal sized sample from each country, Figure 24 below demonstrates that this concentration of IP income is more apparent in the UK. In 2022-23, 85.6% of the UK's IP income was attributed to 13 institutions, compared with the top 13 institutions contributing 76.3% to the national total in the US. This is more concentrated than in 2021-22 when the top 13 institutions in the US contributed 65.0% to the national total, driven by increased 40.5% contribution of the University of Pennsylvania. Similarly, the concentration of IP income in the UK continues to be apparent when looking at a smaller sample of the most active providers, as 63.9% of the UK's IP income was attributed to 4 institutions in 2022-23 compared with 57.2% in the US. This is again an increase in concentration in the US (up from 33.6% in 2021-22), driven by the income reported by the University of Pennsylvania. It should be noted that this sample reflects only a small proportion of the US sector, in comparison to the UK, and therefore overall, it is likely that the concentration of IP income across the whole sector in the US is more pronounced than in the UK.

Figure 24: 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 in 2022-23.



67. The IP income for each institution can be normalised by its research resource in order to provide a more balanced comparison of the concentration of IP income in the US and UK sectors. Figure 25 suggests that when the structural differences of institutions are taken into

account, IP income in 2022-23 remained slightly more concentrated in the UK than the US based on the institutions submitting data (particularly when looking beyond the couple of highest contributing institutions). IP income as a proportion of research resource has decreased for many of the most IP-active institutions in the UK but increased for US institutions compared to 2021-22 data.

68. When comparing this analysis to that in our previous publication, it is important to emphasise that the identity of the institutions submitting to AUTM varies year-on-year and therefore can contribute to any changes in trends. Although there are a few outlying institutions in the UK sector, overall, more UK institutions achieve a greater return in IP income for the available research resource compared to the US.

Figure 25: IP income per institution normalised by its individual research resource in 2022-23, for the 50 institutions with the greatest normalised IP incomes, in the UK and the US.

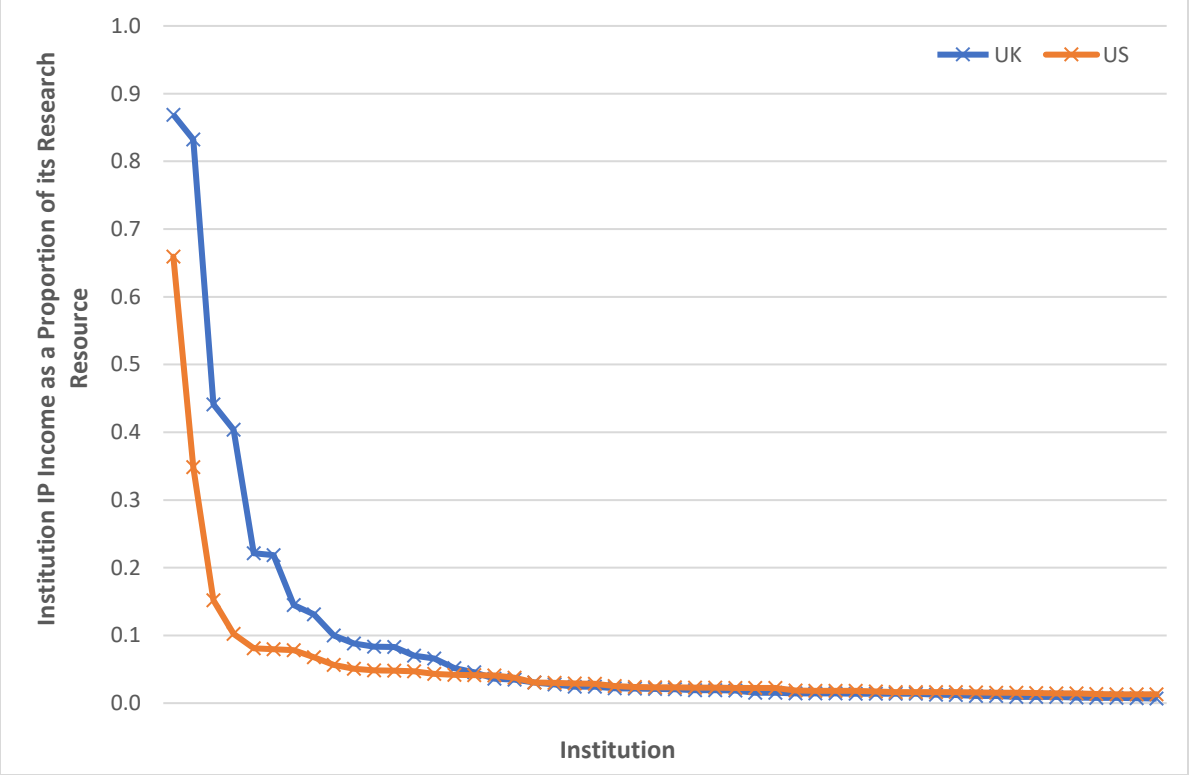


Table 2: Commercialisation activity for the US and UK 2015/16-2022/23[8]

	US Financial Year (AUTM)								UK Academic Year (HE-BCI and OfS Annual Finance Record)							
	2022	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2022/23**	**2021/22**	**2020/21**	**2019/20**	**2018/19**	**2017/18**	**2016/17**	**2015/16**
Total research resource (£M)	48,541	50,901	48,262	45,033	43,252	42,188	41,768	40,132	**9,937**	**9,325**	**8,837**	**8,511**	**8,639**	**8,203**	**7,894**	**7,845**
IP income including sales of shares in spin-outs (£M)	2,025	1,337	1,162	919	995	1,345	1,248	1,240	**288**	**329**	**285**	**295**	**275**	**207**	**148**	**176**
IP income as percentage of total research resource	4.2%	2.6%	2.4%	2.0%	2.3%	3.2%	3.0%	3.1%	2.9%	3.5%	3.2%	3.5%	3.2%	2.5%	1.9%	2.2%
Spin-out companies formed	850	955	1,010	954	1,007	991	950	946	165	176	194	175	167	142	143	171
Research resource per spin-out (£M)	57.1	53.3	47.8	47.2	43	42	43.3	42.4	60.2	53.0	45.6	48.6	51.7	57.8	55.2	45.9
Patents granted	6,417	7,343	7,450	6,659	6,761	6,751	6,385	6,124	1,484	1,622	2,078	2,027	1,867	1,770	1,386	1,219

[8] Values in the table for a given year may vary from that included in this report in previous years, as the table is reflecting the most recently updated published data.

	US Financial Year (AUTM)								UK Academic Year (HE-BCI and OfS Annual Finance Record)							
Research resource per patent (£M)	7.6	6.9	6.5	6.8	6.4	6.2	6.4	6.6	6.7	5.7	4.3	4.2	4.6	4.6	5.7	6.4
Industrial contribution (£M)	3,134	3,284	3,139	2,931	2,904	2,868	2,909	3,000	790	749	650	684	697	651	635	604
% industrial research	6.5%	6.5%	6.5%	6.5%	6.7%	6.8%	7.0%	7.5%	8.0%	8.0%	7.4%	8.0%	8.1%	7.9%	8.0%	7.7%
US cashed-in equity/ UK Sale of spin-out shares (£M)	174.8	274.6**	125.2*	82.3	51.1	45.9	158.7*	45.9	45.4	85.6	87.6	83.5	67.1	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. **This figure reflects the particularly high performance by a number of providers.

Further notes on Table 2 data

69. AUTM data used in Table 2 was extracted on 21 March 2024.

70. 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 - 2022 are summarised below:

    - 2015: $1.444 to £1
    - 2016: $1.452 to £1
    - 2017: $1.465 to £1
    - 2018: $1.455 to £1
    - 2019: $1.462 to £1
    - 2020: $1.451 to £1
    - 2021: $1.477 to £1
    - 2022: $1.536 to £1

71. 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.

72. We use data from the AUTM Statistics Access for Technology Transfer database, for US universities only, AUTM category 5U excluding hospitals and institutes that appeared in this category for 2019 only in order to maintain reasonable consistency with previous years.

73. AUTM allows for confidential returns, which have been excluded from the figures presented here. Their exclusion does not have a significant effect on the key indicators.

74. 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.

75. 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

76. The total number of UK HEI spin-out companies in Table 2 is derived from the HE-BCI survey, including those companies with some HEI ownership and those that use HEI-generated IP (formal spin-outs).

77. UK HEIs 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.

78. 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.

Annex A: GDP deflator data

79. A series for the GDP deflator in index form is produced by the Treasury from data provided by the Office for National Statistics (ONS), in this report the following GDP deflator rates (28 March 2024)[9] were used.

- 2015: 78.255
- 2016: 79.791
- 2017: 81.273
- 2018: 82.836
- 2019: 84.588
- 2020: 89.074
- 2021: 88.789
- 2022: 93.352
- 2023: 100

[9] Calendar years 2015 to 2023 taken from ONS series MNF2 in data tables: Table O. https://www.ons.gov.uk/file?uri=/economy/grossdomesticproductgdp/datasets/uksecondestimateofgdpdatatables/quarter4octtodec2023quarterlynationalaccounts/quarterlynationalaccountsdatatables.xlsx