

# An Update on IP-Related and Commercialisation Activities in England in 2021/22.

Report detailing IP-related and commercialisation activities submitted as part of the HE-BCI survey, focussing on those conducted in England in 2021/22.

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# HE-BCI Survey 2021/22

To	Heads of Research England-funded higher education providers
Reference	RE-P-2023-05
Publication date	07 September 2023
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## Contents

Introduction .....	3
The UK's KE Landscape .....	4
Intellectual Property Income, Patents and Spin-Outs.....	11
IP-Related International Comparisons .....	31

# 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<sup>1</sup>. '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). All publicly funded HEPs in Wales, Scotland and Northern Ireland; and HEPs registered as Approved (fee cap)<sup>2</sup> in England are required to submit data to the HE-BCI survey. HEPs provided data for activity occurring during the academic year 2021/22.<sup>3</sup> All UK HEPs who completed the HE-BCI survey for 2021-22 have been included with the following exceptions:
4. English HEPs who are not registered as Approved (fee cap). These HEPs may also submit data to HE-BCI but they have been excluded from the data presented in this report.<sup>4</sup>
5. Furthermore, this report comments on a subset of the total providers that completed the HE-BCI survey for 2021/22, in order to maintain comparability with the data collected in previous years and analyse year-on-year trends particularly relating to IP income. Therefore, English HEPs recently added to the Office for Students (OfS) register as Approved (fee cap) are not included in these aspects of the analysis, however as these providers conduct relatively little commercialisation activity conclusions drawn in this report remain broadly representative of the sector.
6. The HE-BCI survey collects income to HEPs, which is considered a sound proxy for the impact of their KE activities<sup>5</sup>. 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

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<sup>1</sup> The 'third sector' refers to voluntary and community groups, social enterprises, charities, co-operatives and mutuals.

<sup>2</sup> FE and sixth form colleges are exempted from the requirement to submit to HE-BCI

<sup>3</sup> Data from the University of St Mark and St Johns (Plymouth Marjons) has currently been excluded due to a significant error in the financial data submitted to HESA, however this is not expected to cause notable variation in sector totals.

<sup>4</sup> Data from the University of Buckingham is excluded from this report as it is registered as 'Approved' on the OfS register.

<sup>5</sup> See '[Allocating HEIF: The suitability of knowledge exchange income as a proxy for outcome performance](#)'.

development (CPD), regeneration, and Intellectual Property (IP) income. In addition, external investment into spin-outs can also be deemed a reasonable proxy for impact<sup>6</sup>.

7. This report provides an update on similar analysis published in the 2022 report<sup>7</sup> by Research England commenting on the 2020/21 HE-BCI survey data release.
8. This report covers the academic year August 2021 to July 2022, and therefore for the first academic year since our report detailing AY2018/19 that does not include any periods of restrictions related to the Covid-19 pandemic.

## The UK's Knowledge Exchange Landscape

9. The following section of the report outlines the overall sources of KE income in the UK and England in 2021/22 as collected in the HE-BCI survey, with data for the UK illustrated in Figure 1 below. In 2021/22 the total income to UK HEPs increased by £539 million (10.4%) to £5.69 billion compared to 2020/21. This is a significant increase in growth in comparison to recent years, when the growth of total KE income within the UK Higher Education sector slowed, possibly due to the wide-ranging impact of the Covid-19 pandemic, to 3.07% and 1.52% in 2019/20 and 2020/21 respectively. This is also the largest overall annual increase in the period since 2014/15, and the 2021/22 total income is 12.5% higher than 2018/19, which is the most recent year unaffected by the Covid-19 pandemic and indicates notable recovery following a period of significant disruption.
10. Growth was seen in all KE income streams in 2021/22, ranging from a 16.8% increase in facilities and equipment income to a 6.5% increase in collaborative research income. Overall, the annual growth in total UK KE income for 2020/21 aligns more closely with the trajectory seen in 2017/18 and 2018/19 where growth rates were 6.89% and 7.63% respectively.
11. Given that the 2021/22 academic year was the first full academic year not to be impacted by restrictions relating to the Covid-19 pandemic, the substantial growth in KE income however demonstrates the UK Higher Education sector's recovery and resilience after a period of significant disruption and instability. There remains a broader trend of growth in KE income across the past 5 years, with total KE income in the UK increasing by 24.4% since 2017/18, compared to a 18.4% increase for total UK GDP in the period 2017/18-2021/22.<sup>8</sup>

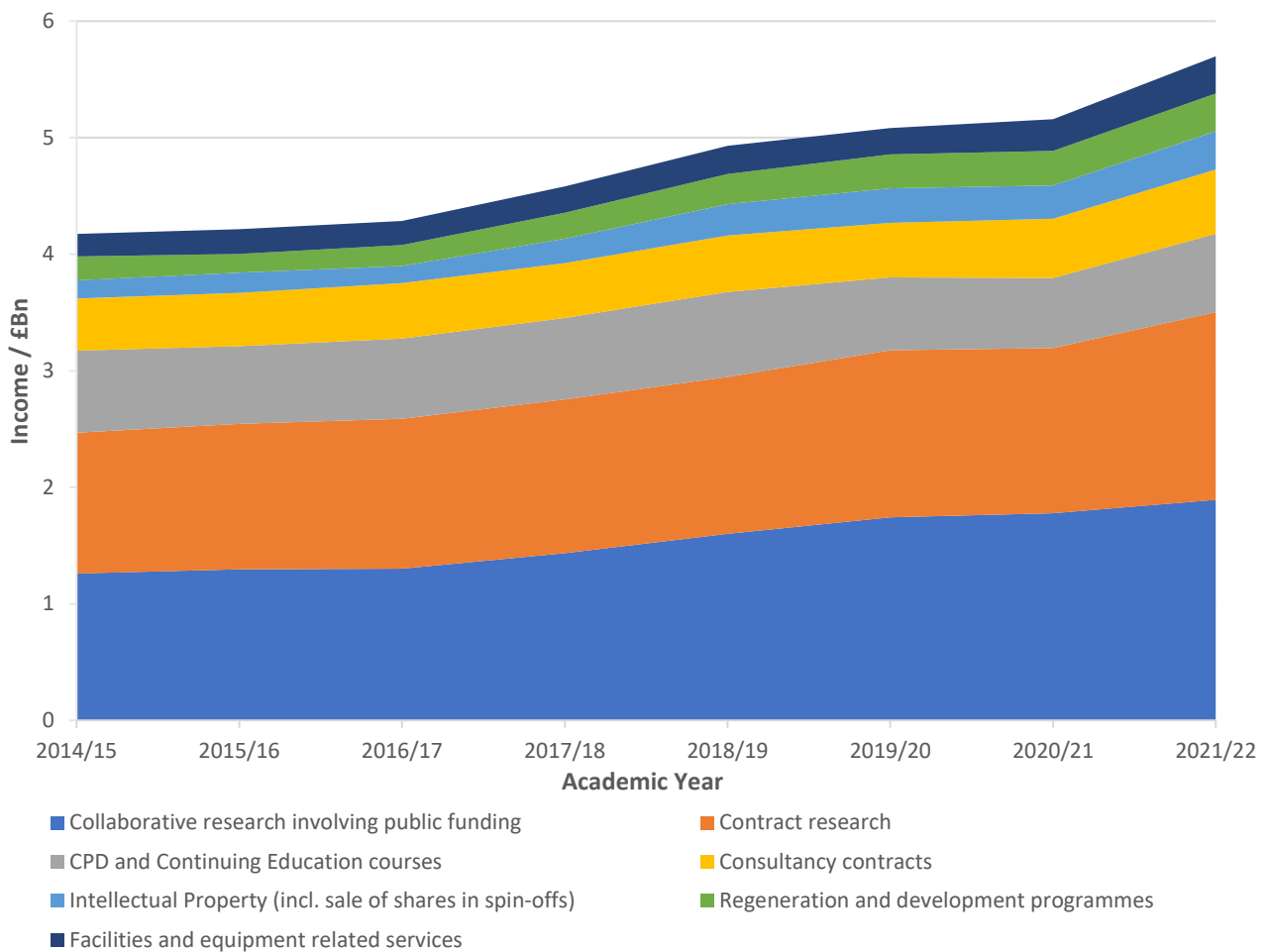
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<sup>6</sup> See 'Assessing the Gross Additional Impacts of the Higher Education Innovation Fund (HEIF)'

<sup>7</sup> See <https://www.ukri.org/publications/higher-education-business-and-community-interaction-analysis-reports/>

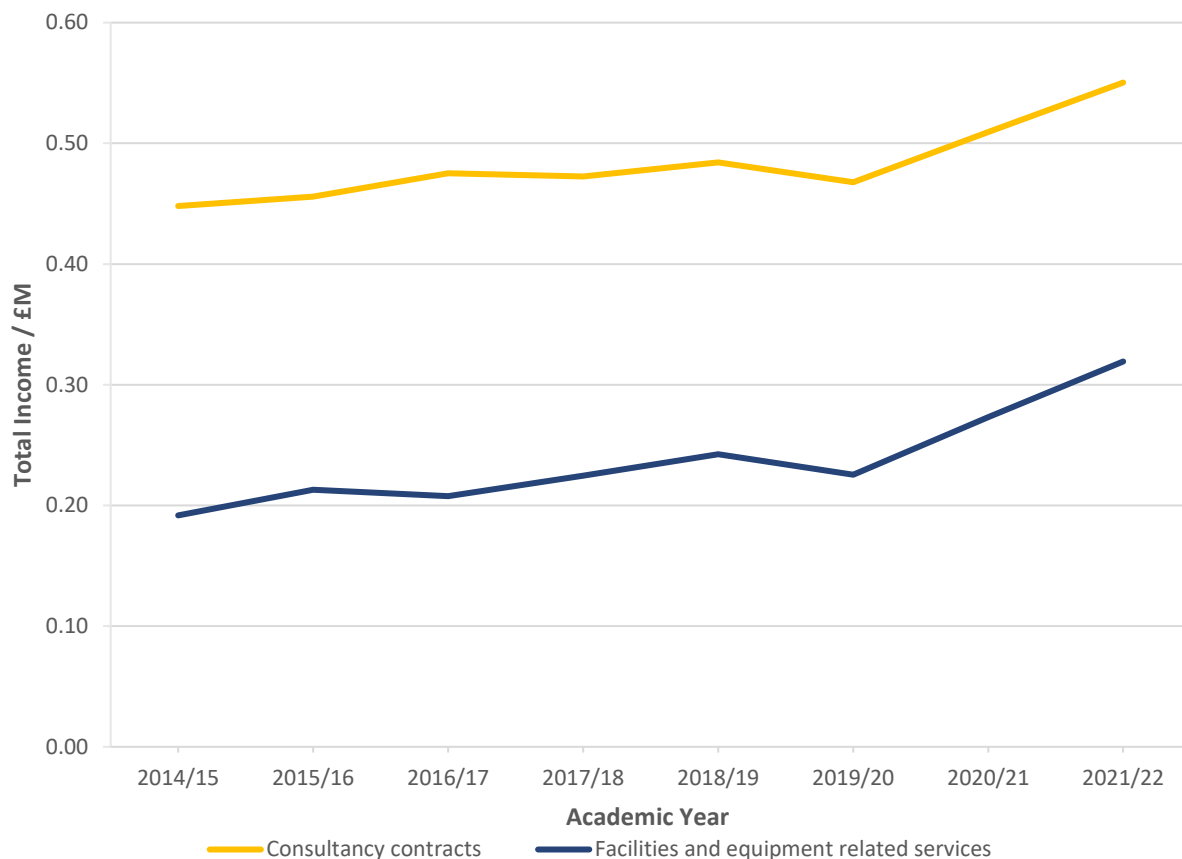
<sup>8</sup> <https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/uksecondestimateofgdpdatatables>

**Figure 1: Total income for each KE category across all UK providers stacked for each academic year from 2014/15 to 2021/22.**



12. As shown in Figure 2, significant increases in income from consultancy contracts (8.06%) and facilities & equipment (16.8%) continued in 2021/22, following relatively similar increases of 8.85% and 21.3% respectively in 2021/22. Both of these categories saw decreases in income in 2019/20, potentially reflecting areas of KE which saw immediate challenges at the start of the Covid-19 pandemic. As a result, the consistent significant increases in these fields in 2021/22 and 2020/21 are more notable and demonstrate a degree of consistent recovery.
13. This contrasts to other areas of KE where likely effects of the Covid-19 pandemic were seen in 2020/21 (a full academic year of likely disruption) rather than in 2019/20, but have also since shown indications of recovery.

**Figure 2: UK Income from consultancy contracts and facilities and equipment related services from 2014/15 to 2021/22.**



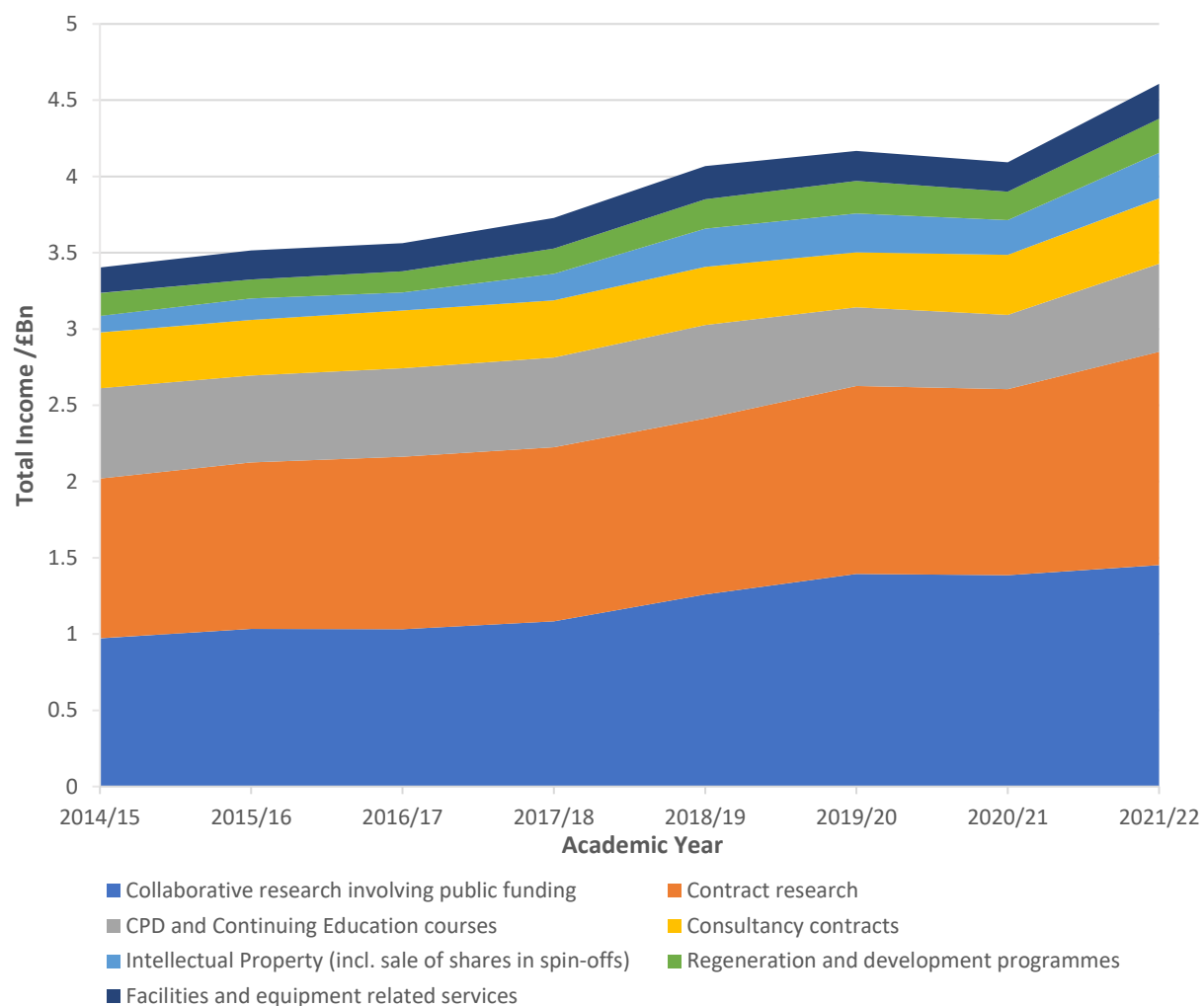
14. Collaborative research income continued to grow in 2021/22 with an increase of 6.50%. This marks a greater increase in income than in 2020/21 of 2.02%, but this growth is less than that observed in previous years prior to the Covid-19 pandemic, which saw increases of 10.0% (2017/18), 11.7% (2018/18) and 8.74% (2019/20).
15. In addition, there was a 9.50% year-on-year increase in regeneration and development income in 2021/22, which again represents a larger growth than in 2020/21 of 1.37%, but continues to mark a slowing of growth, which has been reducing from a high of 26% in 2017/18.
16. Contract research income increased by 13.6% to £1.61bn in 2021/22 from £1.42bn in 2020/21. This contrasts to the 1.03% reduction in contract research income in 2020/21 and may reflect that the sector is beginning to recover from the pandemic which has enabled more organisations to seek these services from UK providers.

17. An increase in total income was reported for CPD and Continued Education (CE) courses in 2021/22 at 11.8%. This compares to a 4.19% decrease in 2020/21, and therefore suggests that both universities and businesses are beginning to recover in the wake of the Covid-19 pandemic, as universities are better able to offer this training and as businesses are looking to build and enhance the capabilities of their staff.
18. IP income (including the sales of shares in spin-outs) has also increased by 15.7%, to £329 million in 2021/22, which is the largest annual increase in this area since 2018/19 (at 30%). This compares to the small 3.46% decrease in IP income observed in 2020/21. It is important to note that IP income is often contingent on the activities of a relatively small number of providers generating high incomes. Consequently, income in this area can fluctuate significantly, with year on year increases of 40%, 30% and 9% seen in 2017/18, 2018/19 and 2019/20 respectively. This increase is predominantly due to a significant increase in IP income in England in 2021/22 of 32.1% to £299 million, while income in the devolved nations were less stable, and there are significant fluctuations in IP income in Northern Ireland and Scotland, which will be discussed in more detail later in this report.

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

19. The total KE income for English providers in 2021/22 was £4.61 billion. This reflects a 12.6%, £514 million, increase compared to 2020/21. This is also the largest overall annual increase in the period since 2014/15, and the 2021/22 total income is 13.3% higher than 2018/19, which is the most recent year unaffected by the Covid-19 pandemic and indicates notable recovery following a period of significant disruption.
20. The significant overall increase in KE income in England can be seen in Figure 3, which also illustrates the increased performance in all categories of KE income in 2021/22. Significant growth of more than 14% was observed in most income streams, except from collaborative research and consultancy which saw growth rates of 4.80% and 8.56% respectively. It is also of note that growth in 2021/22 followed declines in income in 2020/21 for all KE categories, except for consultancy which saw a small slow in growth between 2020/21 and 2021/22

**Figure 3: Total income for each category across all English HEPs stacked for each academic year from 2014/15 to 2021/22.**



21. It is useful to utilise KE clusters<sup>9</sup> as a means of analysing the way KE income has changed across the sector, particularly to compare 2021/22 data with that of 2018/19, as the last year prior to likely impact of the Covid-19 pandemic. As has been observed in other literature, data suggests that the impact of the pandemic may have been felt in different ways across the sector<sup>10</sup>, and recovery may also have been. Four KE clusters (E J, STEM, and V) have reported higher levels of KE income in 2021/22 compared to 2018/19, the last year not impacted by the covid-19 pandemic. The STEM cluster has experienced a 24.6% increase in KE income between 2018/19 and 2021/22, and Clusters E, V and J have had increases of

<sup>9</sup> KE clusters were revised in 2023 to take into account the most recent sector information, including REF2021 [https://www.ifm.eng.cam.ac.uk/uploads/UCI/knowledgehub/documents/Ulrichsen\\_KE\\_clusters\\_update\\_2023\\_vFinal.pdf](https://www.ifm.eng.cam.ac.uk/uploads/UCI/knowledgehub/documents/Ulrichsen_KE_clusters_update_2023_vFinal.pdf)

<sup>10</sup> 'Through Crisis to Recovery: the ongoing effects of the COVID-19 pandemic on universities and their ability to drive innovation' (2022)



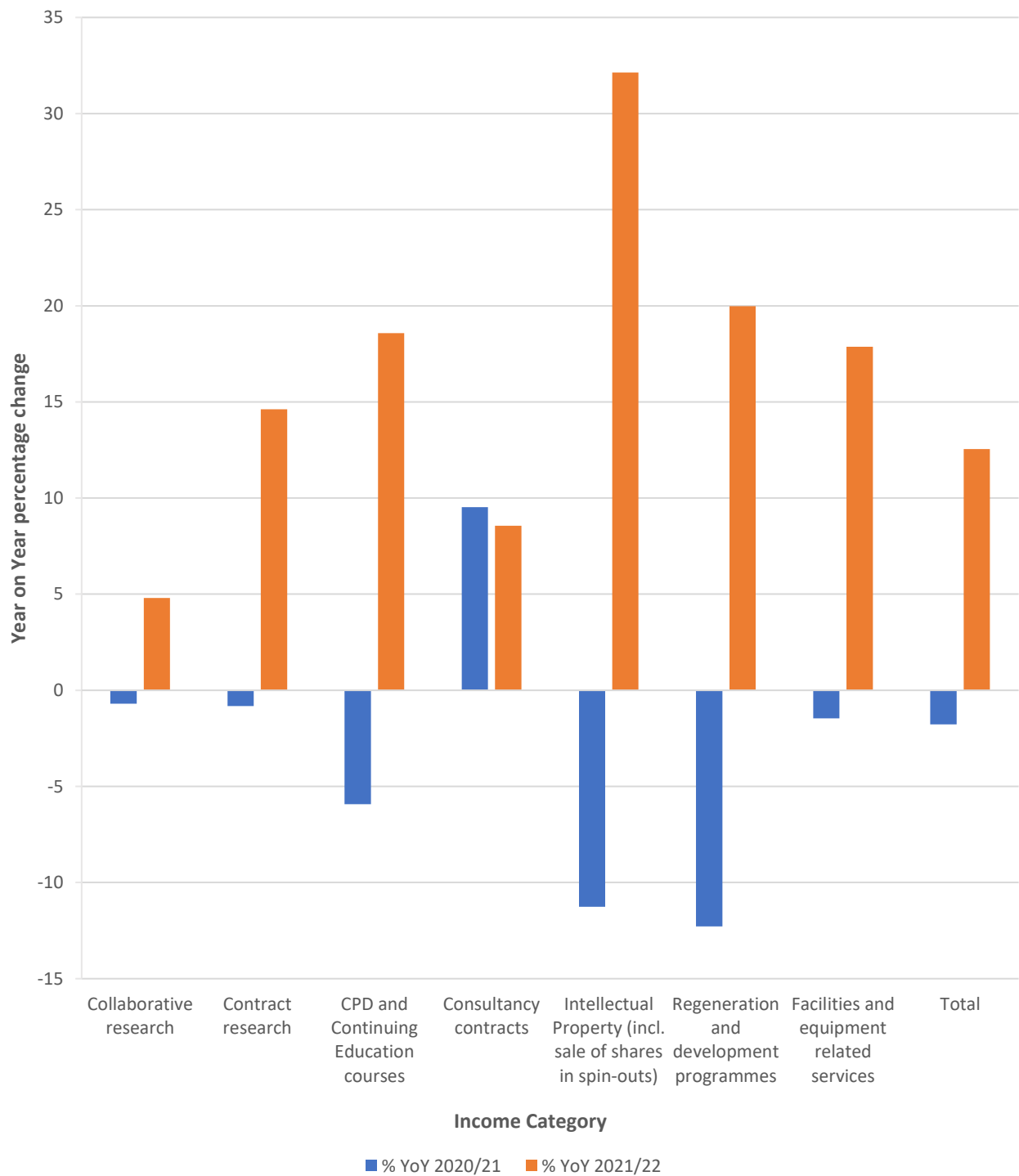
12.3%, 16.9% and 6.68% respectively. Clusters Arts, M and X have reported decreased levels of KE income compared to 2018/19 of 12.9%, 7.77% and 4.07%. However, it is also important to note that KE income for these 3 clusters has increased since 2020/21, by 17.6%, 17.2% and 8.30% respectively. This may reflect a wide array of factors, including the types of KE these clusters may focus on, the types of organisations providers in these clusters generally undertook KE activities with, and their geographical location. It will be important to continue to observe carefully the trends in KE income and recovery by cluster in the future.

22. Changes in KE income in England compared to total changes in the UK were fairly similar overall, with increases in all income streams at both England and UK level. Although the UK overall saw a larger increase in collaborative research income of 6.50% to England's 4.80% increase, in all other income streams increases in England were proportionally larger. Notably, England saw significantly larger increases in income from CPD/CE (18.6%), IP (32.1%) and regeneration (20.0%) income than the UK which saw increases of 11.8%, 15.7% and 9.50% respectively.
23. Of particular interest in 2021/22 is the relative activity of universities with different partner organisation types. KE income from commercial partners (both SME and large commercial businesses)<sup>11</sup> for contract research, facilities and equipment, intellectual property, and CPD (the HE-BCI income categories with partner type disaggregation is provided) all increased in 2021/22. This is in contrast to 2020/21 where KE income from SMEs and large commercial businesses declined in all of these income streams. Additionally, income from non-commercial partners increased across all income streams in 2021/22, apart from IP income which saw a decrease of 11.6%. This compares to 2020/21 where income from non-commercial partners grew slightly for all income streams. This sustained increase in income from all activities with SMEs and large commercial businesses and non-commercial organisations apart from IP, demonstrates that the sector is beginning to recover from the impact of the Covid-19 pandemic.

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<sup>11</sup> References to 'large commercial businesses' refer to the 'non-SME commercial businesses' category in the HE-BCI collection throughout.

**Figure 4: Year-on-year percentage change in income for each category in 2020/21 and 2021/22.**



# Intellectual Property Income, Patents and Spin-Outs

24. 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

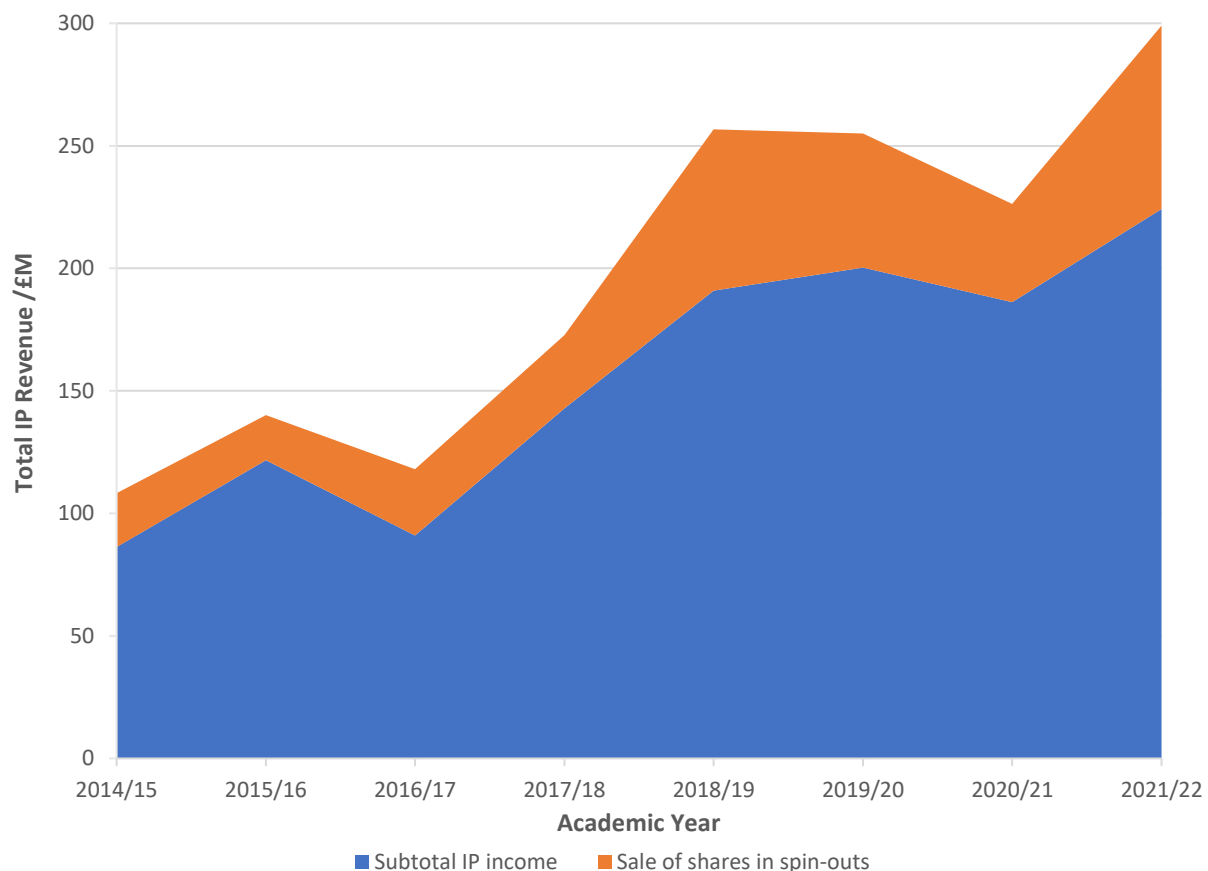
25. The HE-BCI survey collects data on the total IP income received by providers which can be divided into income due to sales of shares in spin-outs and the subtotal IP income. In addition, the subtotal income can be further categorised by the source of income (software licences, non-software licences,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

26. Income to English providers from IP increased significantly to £299 million (32.1%) after a year-on-year decrease of 11.3% in 2020/21 as illustrated in Figure 6. Although this increase represents an increase in growth compared both the decline in 2020/21 and relatively small 1.6% increase in 2019/20, growth remains lower than in previous years of 45% in 2018/19 and 46% in 2017/18.

27. The increase in IP income in 2021/22 can be attributed to increases in both subtotal IP income and sales of shares in spin-outs, of £37.9m (20.4%) and £34.8m (86.8%) respectively. These increases return to similar levels of growth to 2018/19, the last year unaffected by the covid-19 pandemic, where subtotal IP income increased by 33.6% and sales of shares in spin outs by 120%.

28. The proportion of IP income coming from subtotal IP income decreased from 82% in 2020/21 to 75% in 2021/22 but continues to broadly reflect the trend seen over a number of years since 2014/15 which have seen the proportion of IP income coming from subtotal IP income range from 74.3%-86.9%.

**Figure 5: Combined total of the sale of shares in spin-outs and the subtotal IP income for each academic year from 2014/15 to 2021/22.**



29. 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 2021/22 sector increase can be attributed primarily to significant increases in sales by the University of Cambridge which saw a total income of £32.6 million from the sales of shares in spin-outs, compared to £2.1 million in 2020/21; the University of Oxford which saw an income of £13.1 million compared to £4.17 million; and King's College London which saw an income of £11.1 million compared to no income from the sale of spin-out shares in 2020/21. Additional increases of more than £2 million at the University of Liverpool and the Institute of Cancer Research contributed to the overall increase. It is important to consider significant changes for individual providers may also be driven by strategic changes in institutional policy.

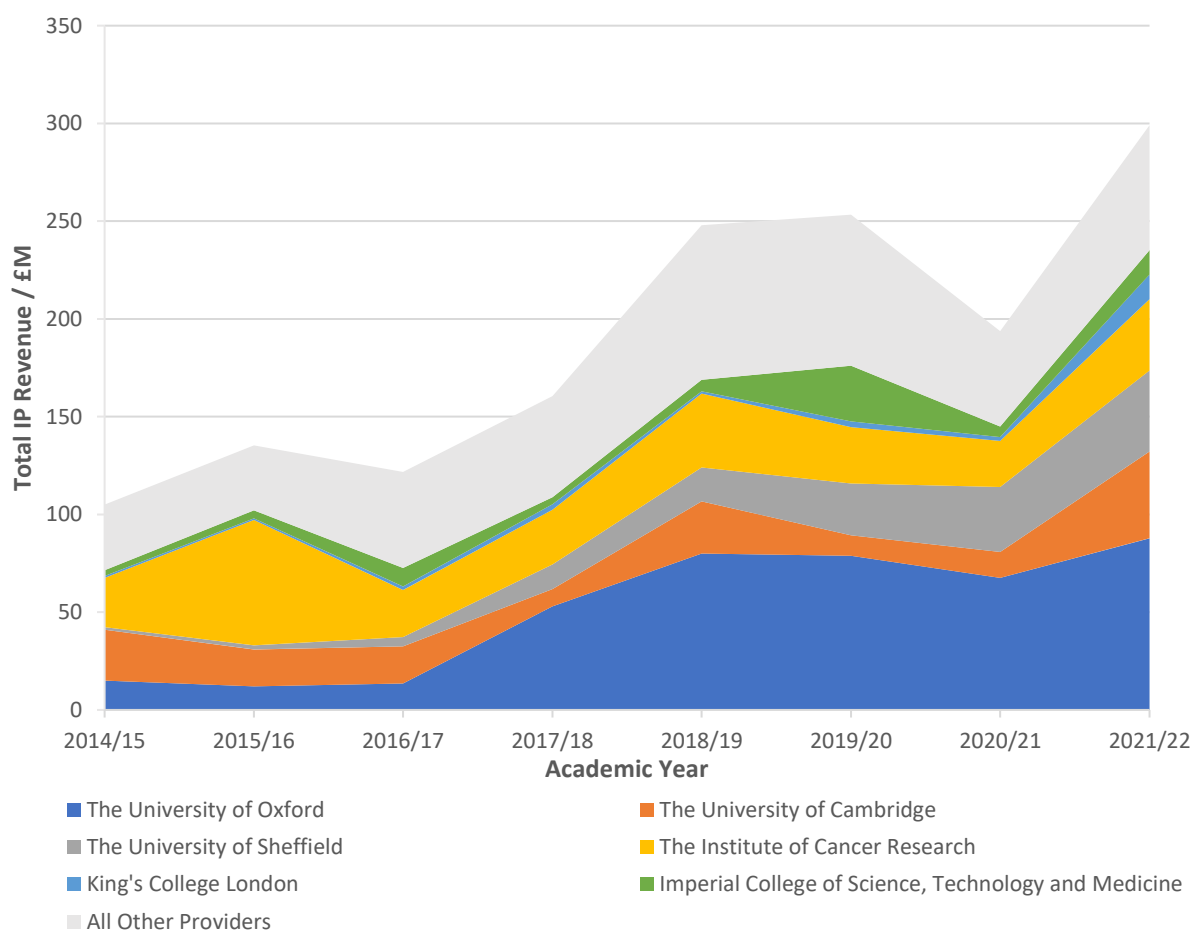
30. However, other providers saw decreases in income from the sale of shares in spin-outs that were of note, though these were balanced by the provider increases described above. For instance, sale of spin-out shares at University College London decreased by 72.8% to £6.85

million, and Imperial College of Science, Technology and Medicine and the University of Leeds also saw decreases of over £1 million.

31. 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 6, in 2021/22 IP income from just six providers represented 79% of the total income figure. This reflects a similar overall sector distribution to 2020/21 when the top 6 providers represented 78% of the total income figure.

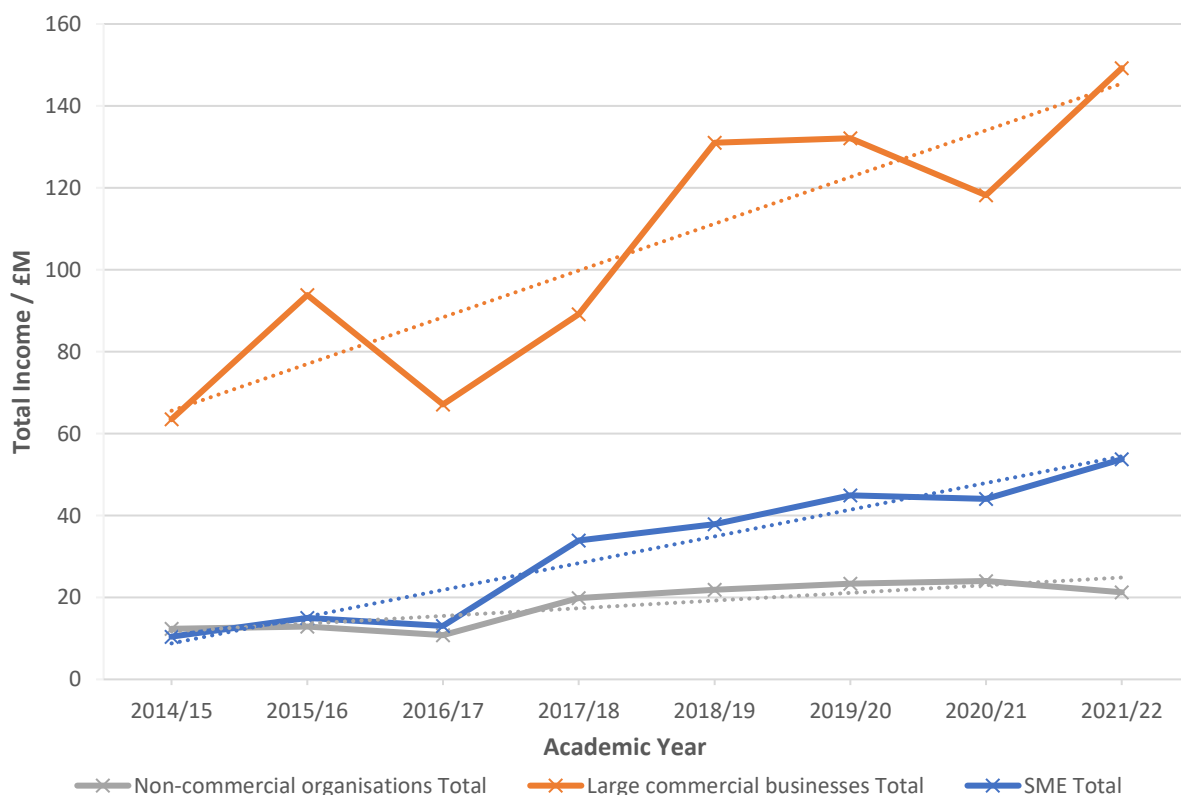
32. Notably, Figure 6 includes the sale of shares which are naturally highly variable, and that the six providers highlighted are those specifically with the greatest IP income in 2021/22 so this analysis should be considered as a snapshot rather than indicative of a long-term trend.

**Figure 6: Total IP income (including sale of shares in spin-outs) across English HEPs for each academic year from 2014/15 to 2021/22, highlighting the proportion contributed by the six providers with the greatest total IP incomes in 2021/22.**



33. Subtotal IP income can be disaggregated by the type of organisation the activity is with, and this is illustrated in Figure 7. The overall increase in subtotal IP income in 2021/22 can be attributed to the increase in income from activity specifically with large businesses as this accounts for majority of sub-total IP income, and demonstrated a 26.3% increase between 2020/21 and 2021/22. Also notable is the 22% increase in subtotal IP income from activity with SMEs between 2020/21 and 2021/22. This return to growth in income from these organisations contrasts with an 11.7% decrease in income from non-commercial organisations. This notably contrasts with sources of 2020/21 subtotal IP income which saw growth in income from non-commercial organisations and decreases in income from SMEs and large businesses.

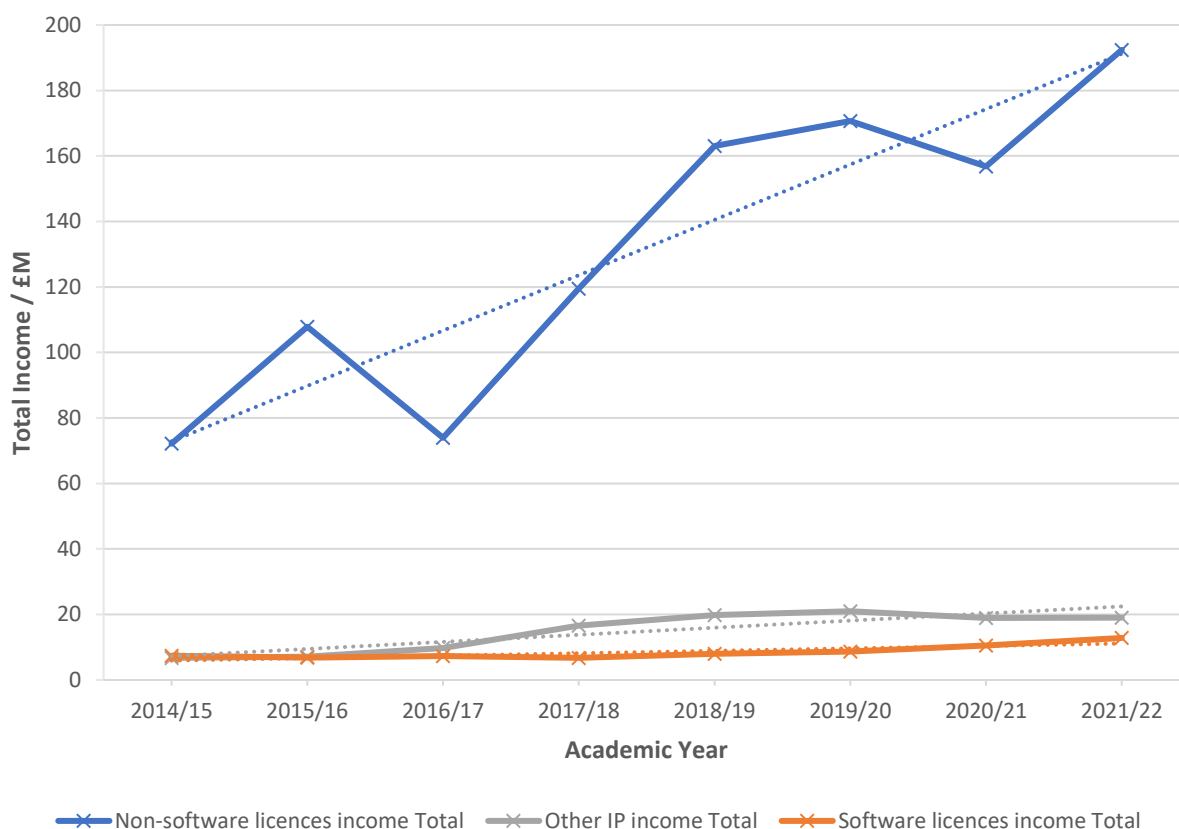
**Figure 7: Total IP income for different organisation types for each academic year from 2014/15 to 2021/22.**



34. Subtotal IP income can also be disaggregated across all organisation types by the source of IP income, and is displayed in Figure 8. The relative distribution of income between different sources remained similar to that in 2020/21 and 2019/20, with non-software licencing remaining the predominant source of income with 85.8% of the total, and software and other IP income contributing 5.7% and 8.5% respectively.

35. Of note is the 22.7% increase in non-software licensing income in 2021/22, which marks a return to notable growth that had been observed in this category from 2016/17-2018/19, after an 8.1% decrease in income in 2020/21 and a relatively small increase of 4.7% in 2019/20. 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 59.1% of the total income in 2021/22.

**Figure 8: Total IP income across all organisation types for different sources of income for each academic year from 2014/15 to 2021/22.**

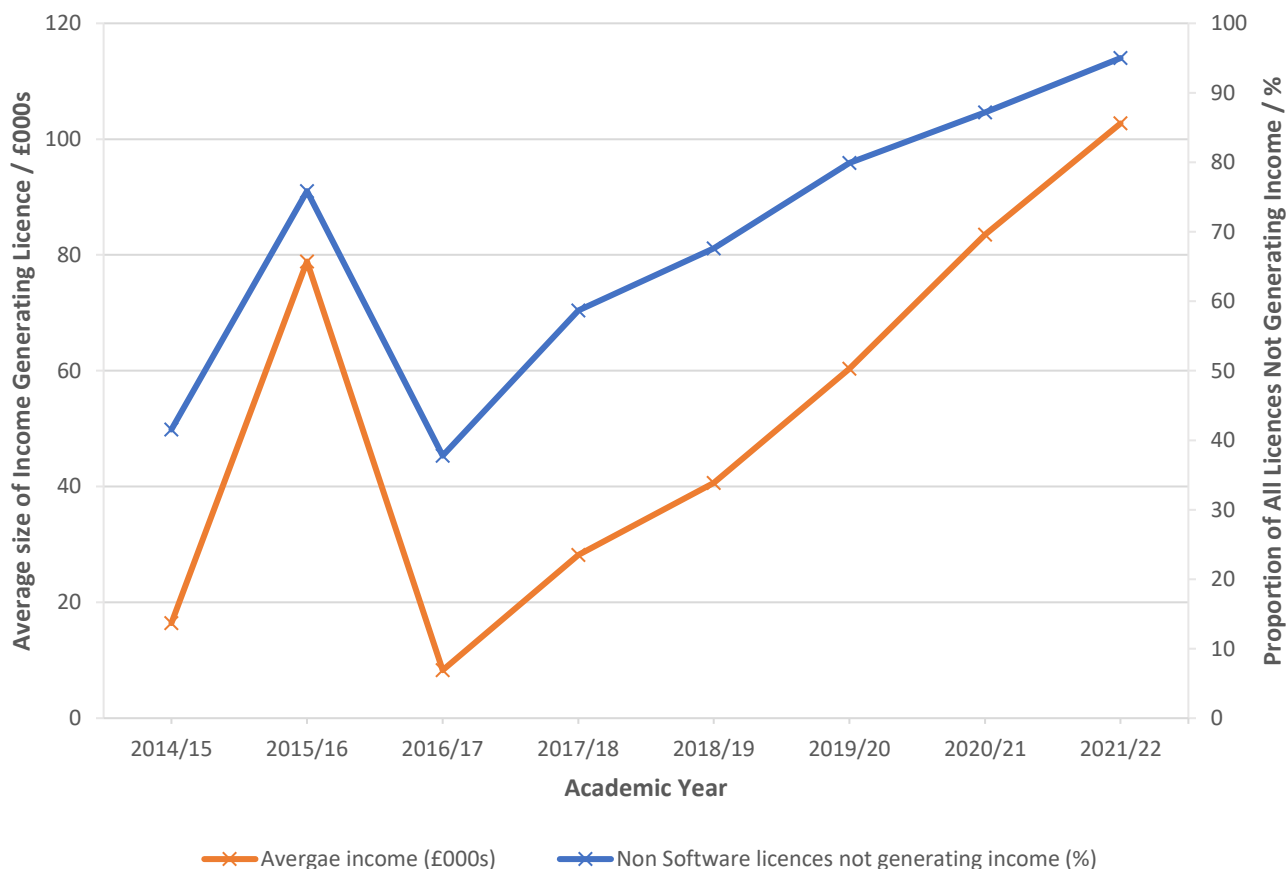


36. As shown in Figure 9, 2021/22 saw a continued increase in the average value of non-software licencing deals, which increased by 22.9% to £102,700 from £83,500 in 2020/21. This has been coupled with an increase in the proportion of all non-software licences that do not generate income longer term from 87% in 2020/21 to 95%.<sup>12</sup> This is consistent with the trends previously observed, including a potential shift to more open models of innovation, or recognition of the need to the balance income generation with impact generation. For instance, the rise in use of the so-called NERF (non-exclusive royalty-free) licences in

<sup>12</sup> Data for one provider relating to licence numbers has been omitted due to a data anomaly.

response to the Covid-19 pandemic could be an example of such a shift, and be one contributing factor to the decrease in reported licences generating income.<sup>13</sup>

**Figure 9: 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 2021/22.**

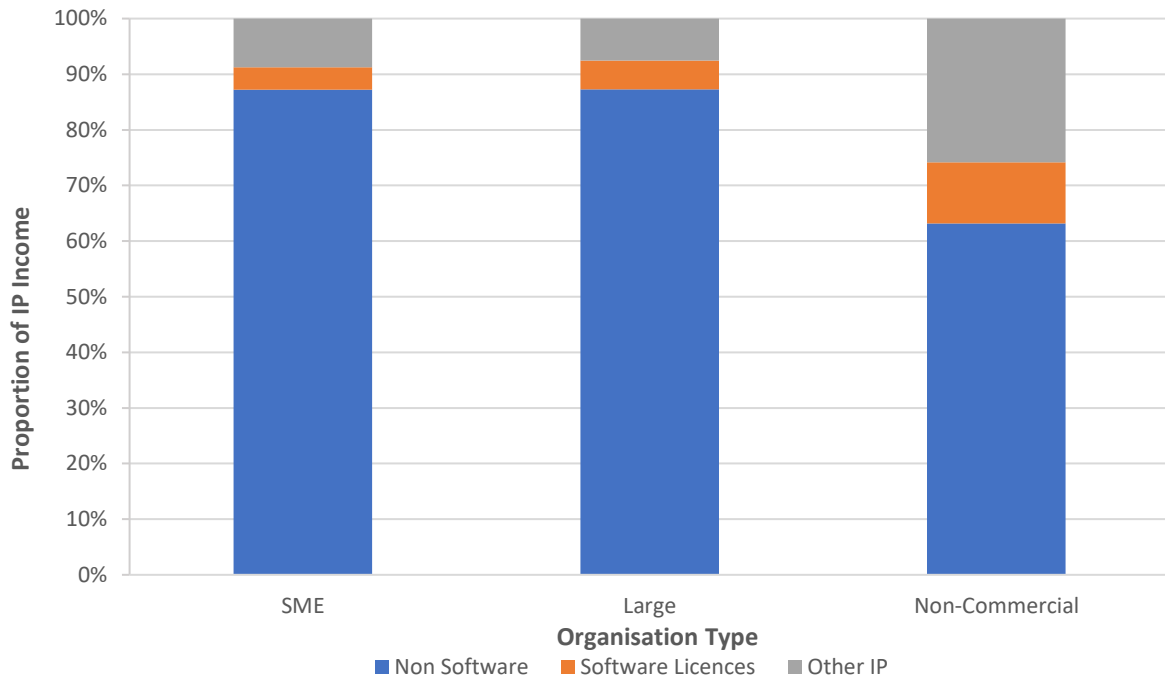


37. Furthermore, Figures 10 and 11 below compare the sources of IP income for each organisation type. Between 2020/21 and 2021/22 for IP income relating to non-software sales, the proportion with both large commercial businesses and non-commercial organisations increased slightly, and with SMEs decreased slightly. The proportion of IP income with non-commercial partners and large businesses relating to other IP declined, while for SMEs and large businesses it increased. For income from software licences, the proportion of income from SMEs decreased slightly, but from large businesses and non-commercial organisations it increased.

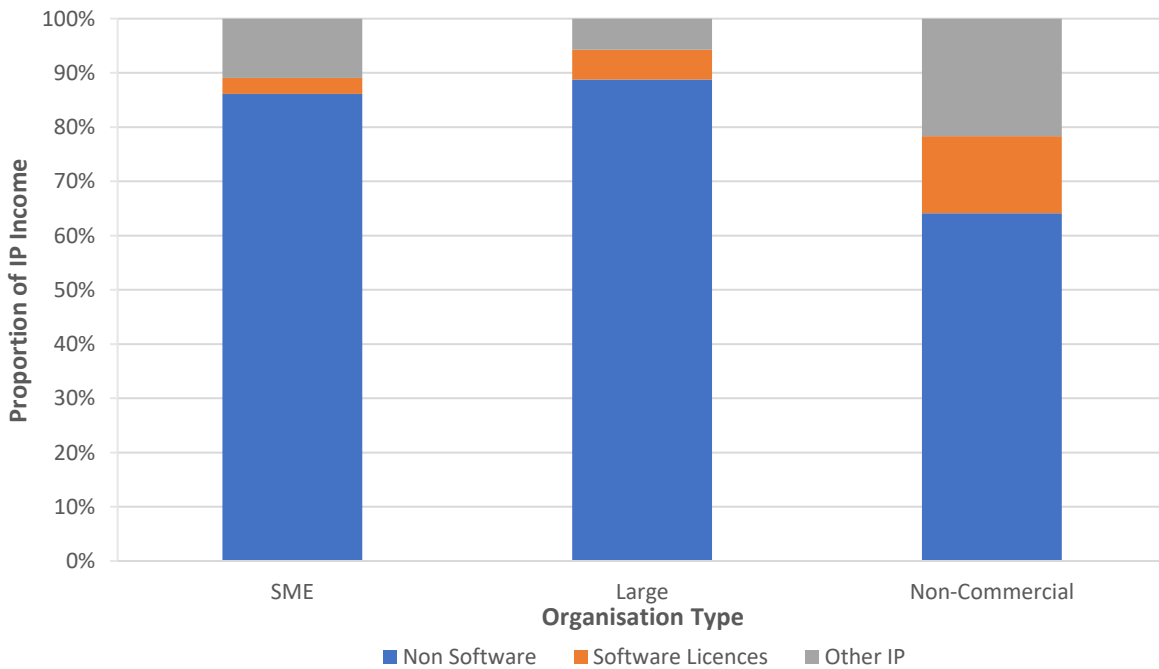
<sup>13</sup> See, for example, <https://innovation.ox.ac.uk/technologies-available/technology-licensing/expedited-access-covid-19-related-ip/>



**Figure 10: Proportion of IP income from different sources for each organisation type in 2020/21.**



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

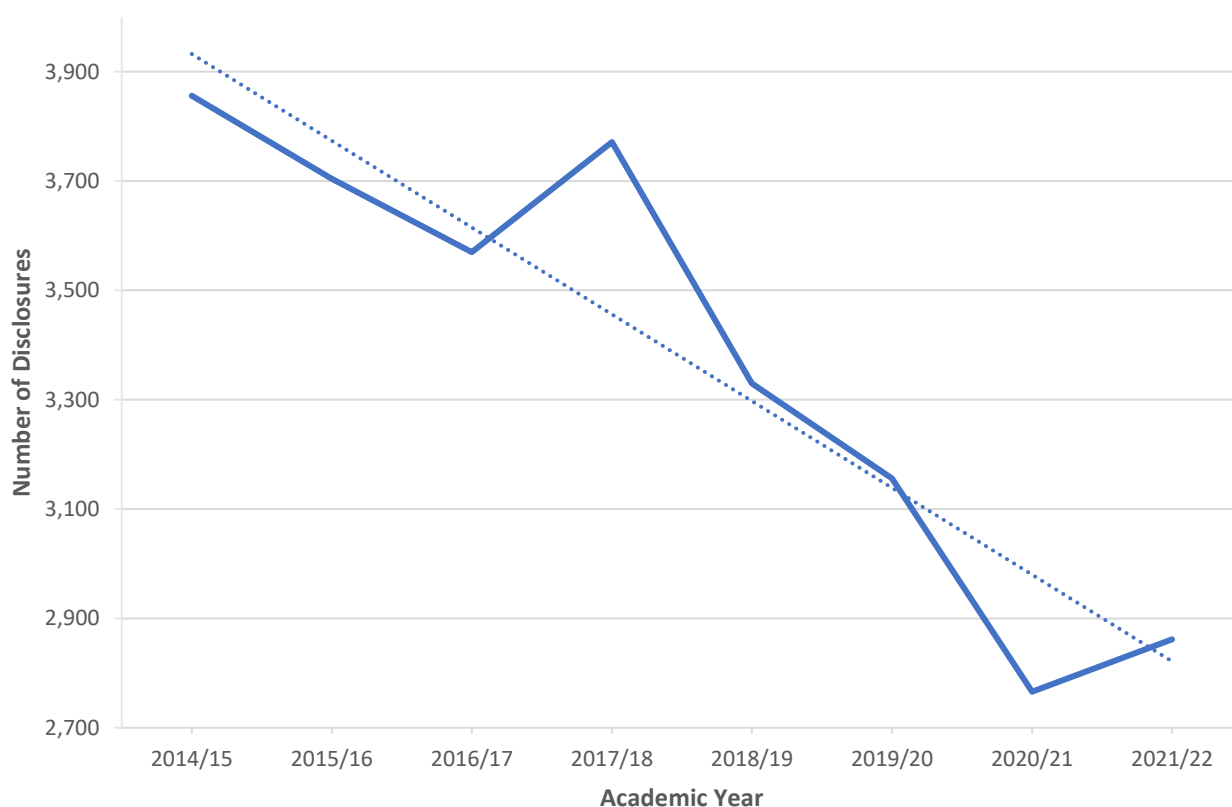


## Disclosures and patents

38. 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.

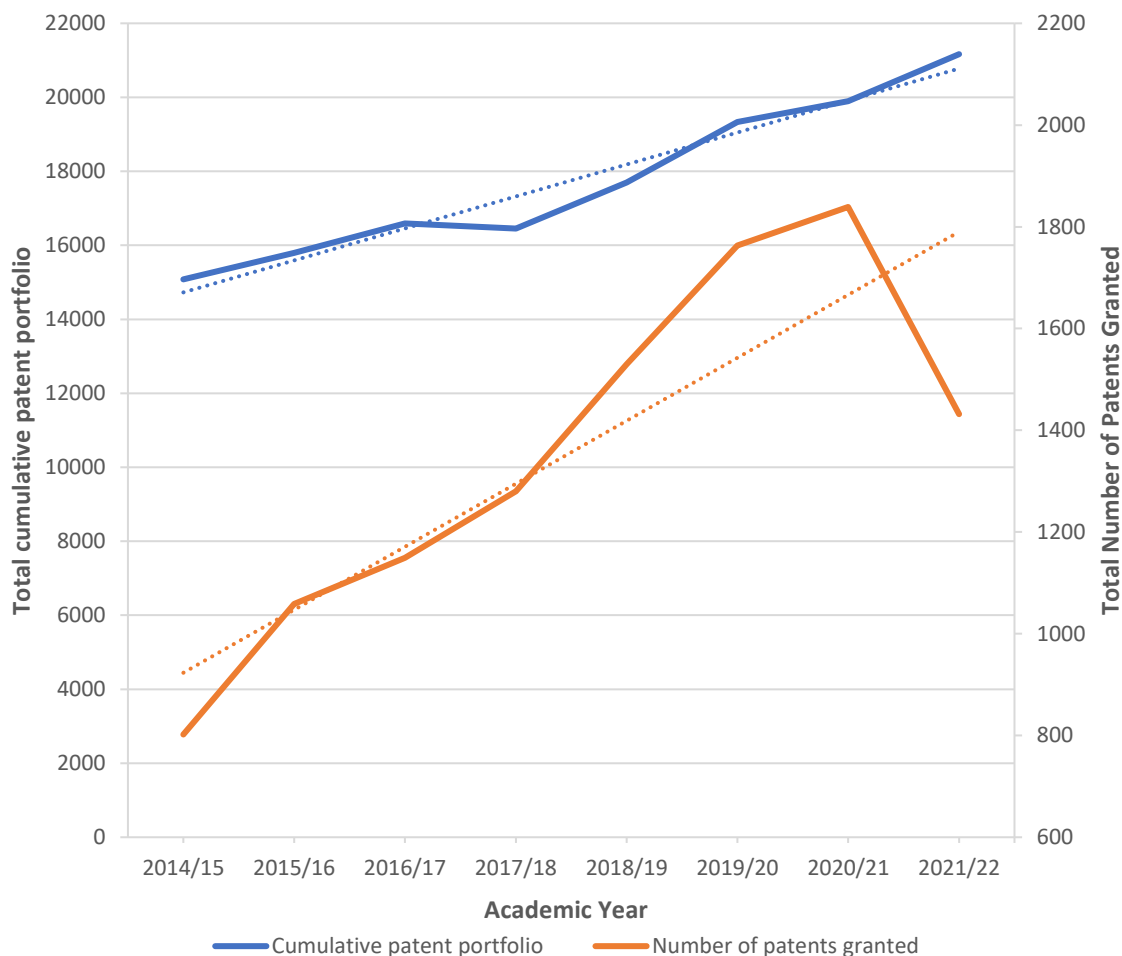
39. In 2021/22 the number of disclosures increased for the first time, at a rate of 3.47%, since 2016/17. Following a significant decrease of 12.4% in 2020/21, this increase perhaps returns the number of disclosures to where they may have been anticipated to be should the trend observed prior to any Covid-19 related effects have continued.

**Figure 12: Total number of disclosures for each academic year from 2014/15 to 2021/22.**



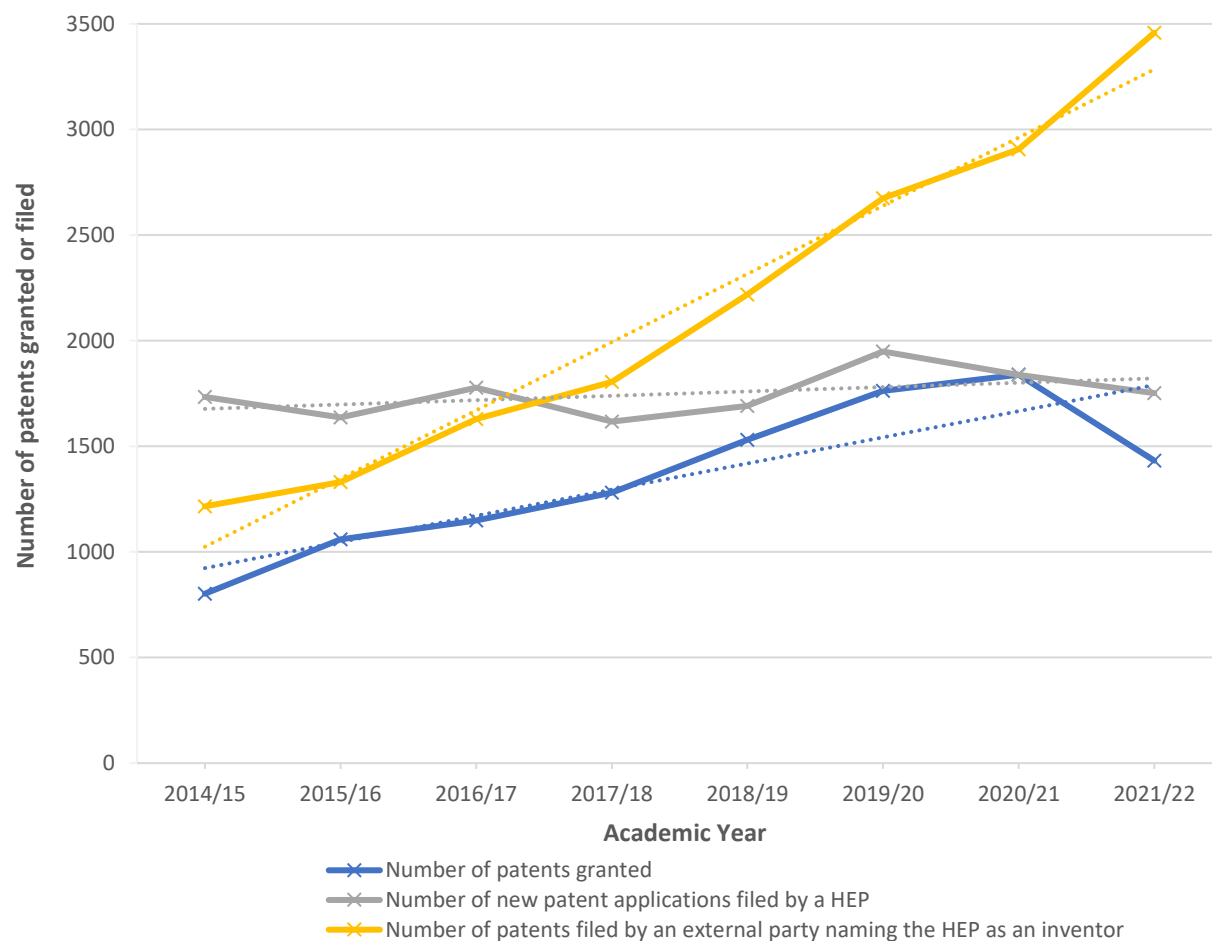
40. As shown in Figure 13, patenting activity sharply decreased in 2021/22. For the first time the total number of patents granted across the sector decreased by 22%. It is likely that such a significant change in activity is a response to Covid-19 related effects in 2020/21, as activity to develop products and ideas was limited resulting initially in a greater decrease in disclosures in 2020/21, followed by a decrease in granted patents in 2021/22. The total sector cumulative patent portfolio remained stable with a 6.34% increase.

**Figure 13: Total number of patents granted and the cumulative patent portfolio across all providers for each academic year from 2014/15 to 2021/22.**



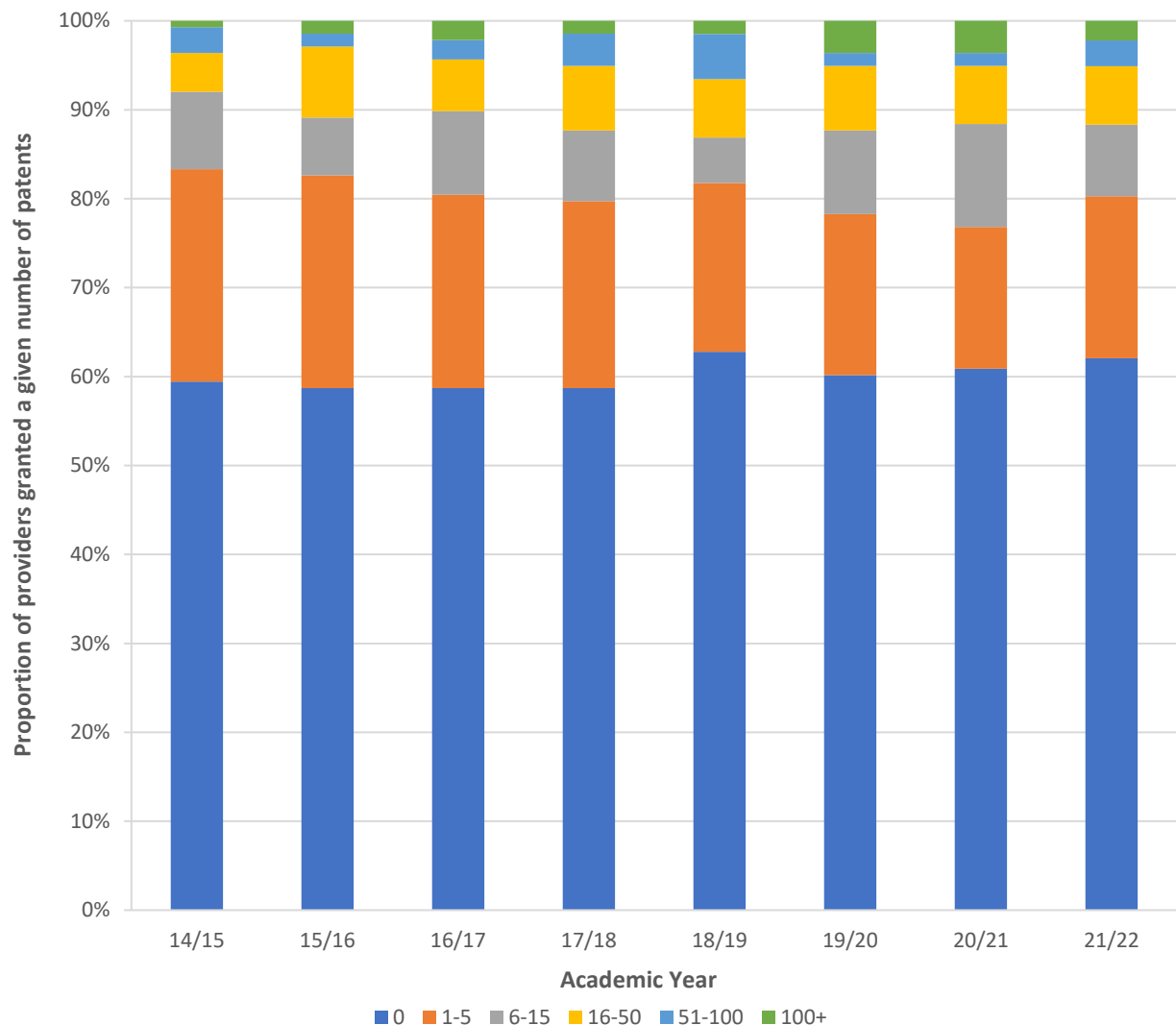
41. Consideration of the identity of the party filing the patents is also of interest and is illustrated in Figure 14. The number of patents filed by external parties naming the HEP as an inventor continued to increase in 2021/22 with a growth of 18.9% to 3,458 compared to 2020/21. Despite an overall decrease in the number of patents filed by providers in 2020/21, 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 14: Total number of patents granted, and total patents filed by providers and by external parties for each academic year from 2014/15 to 2021/22.**



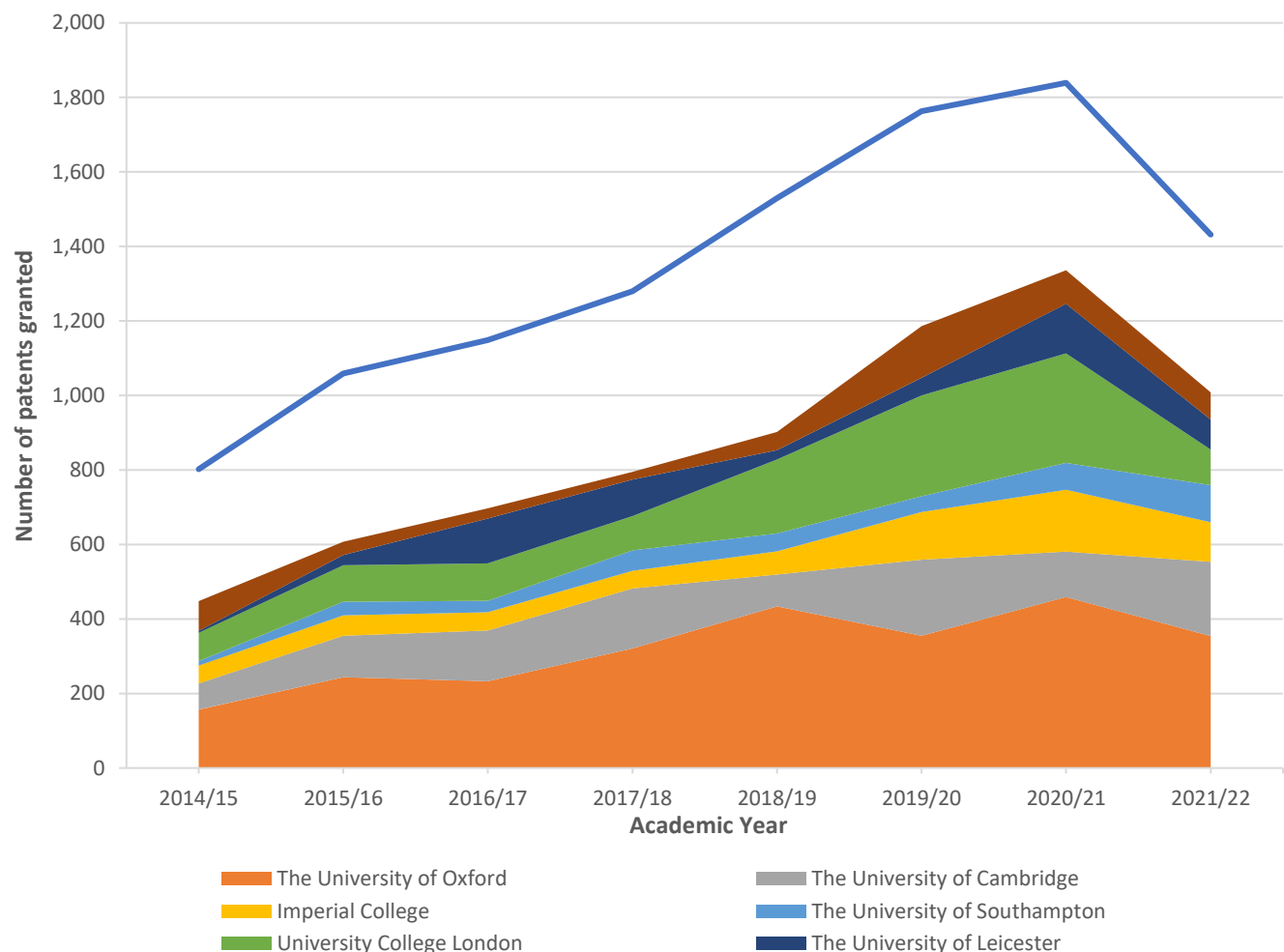
42. The proportion of providers which had a given number of patents granted in an academic year was also calculated and is shown in Figure 15. In 2021/22 the proportion of providers with zero patents was relatively stable at 62%. There was a 13.6% increase in the number of providers reporting 1-5 patents, returning to the level previously seen in 2019/20, primarily due to significant reductions in patents granted to the Universities of Bath, Sheffield, East Anglia, Lancaster, West of England, Royal Holloway and the Institute of Cancer Research. There was a 100% increase in the total number of providers (4) granted 51-100 patents due to significant decreases in patents granted to UCL and the University of Leicester, who were granted 100+ patents in 2020/21. Although a consistent number of providers were granted 16-50 patents, there was substantial movement between this group and the 6-15 patents granted group. Although there are internal fluctuations within the sector, given that there have been no significant changes across the sector, it is not unexpected that the sector's patenting profile has also been relatively stable in the short to medium term.

**Figure 15: Proportion of the total number of providers that has a given number of patents granted each academic year from 2014/15 to 2021/22.**



43. However, of note is that of the seven providers granted the greatest number of patents in 2021/22 (Universities of Oxford, Cambridge, Southampton and Leicester, King's College, University College London, and Imperial College), only the University of Cambridge (63.1%) and the University of Southampton (37.5%) saw increases in patents granted between 2020/21 and 2021/22. The remaining five providers (University College London, University of Leicester, Imperial College, University of Oxford and King's College London) saw significant decreases in the number of patents granted of 67.3%-18.9%. 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 16.

**Figure 16: Total number of patents granted across the whole sector, and for individual providers, for each academic year from 2014/15 to 2021/22.**



44. 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

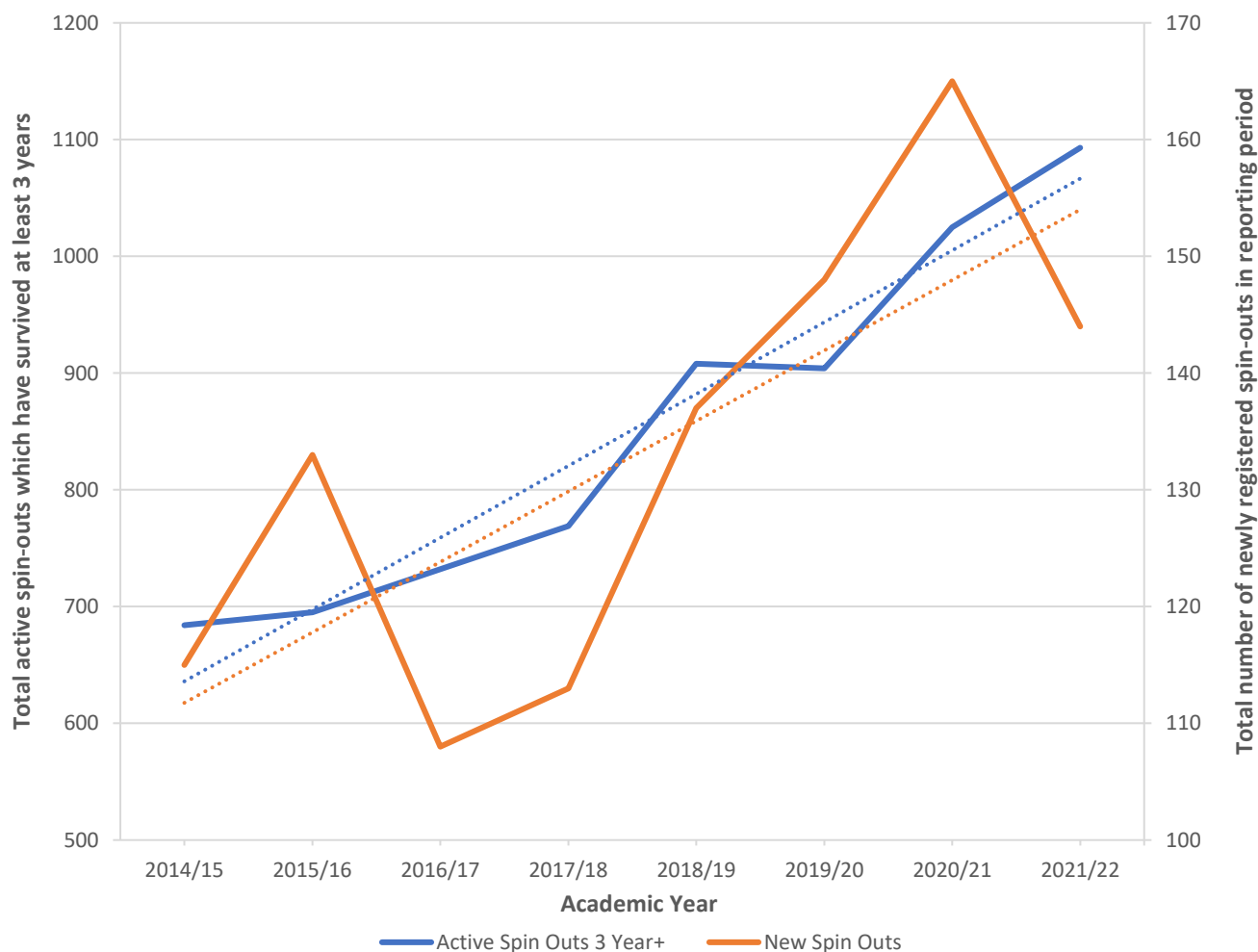
45. For the purpose of this report, a spin-out is defined as a company which exploits intellectual property arising from a university.

46. In 2021/22, a decrease of 12.7% (144 spin-outs) was observed in the number of newly registered spin-outs, and an increase of 6.65% (1093 spin-outs) in the number surviving for at least 3 years, as demonstrated in Figure 17. This increase is also notable following the

larger increase in spin-outs surviving at least 3 years in 2020/21 of 13.9% (121 spin-outs). These changes indicate decreasing spinning out activity and slowing survival rates in 2021/22 likely due to Covid-19 related effects as a result to a decreased pipeline of activity (as observed in patenting activity at paragraph 40). However, this trend in the English sector reflects wider challenges felt during this disrupted period by UK and internally in US, as detailed at paragraphs 59-72.

47. 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 despite slower, performance in this indicator remained strong with 6.65% growth in 2021/22.

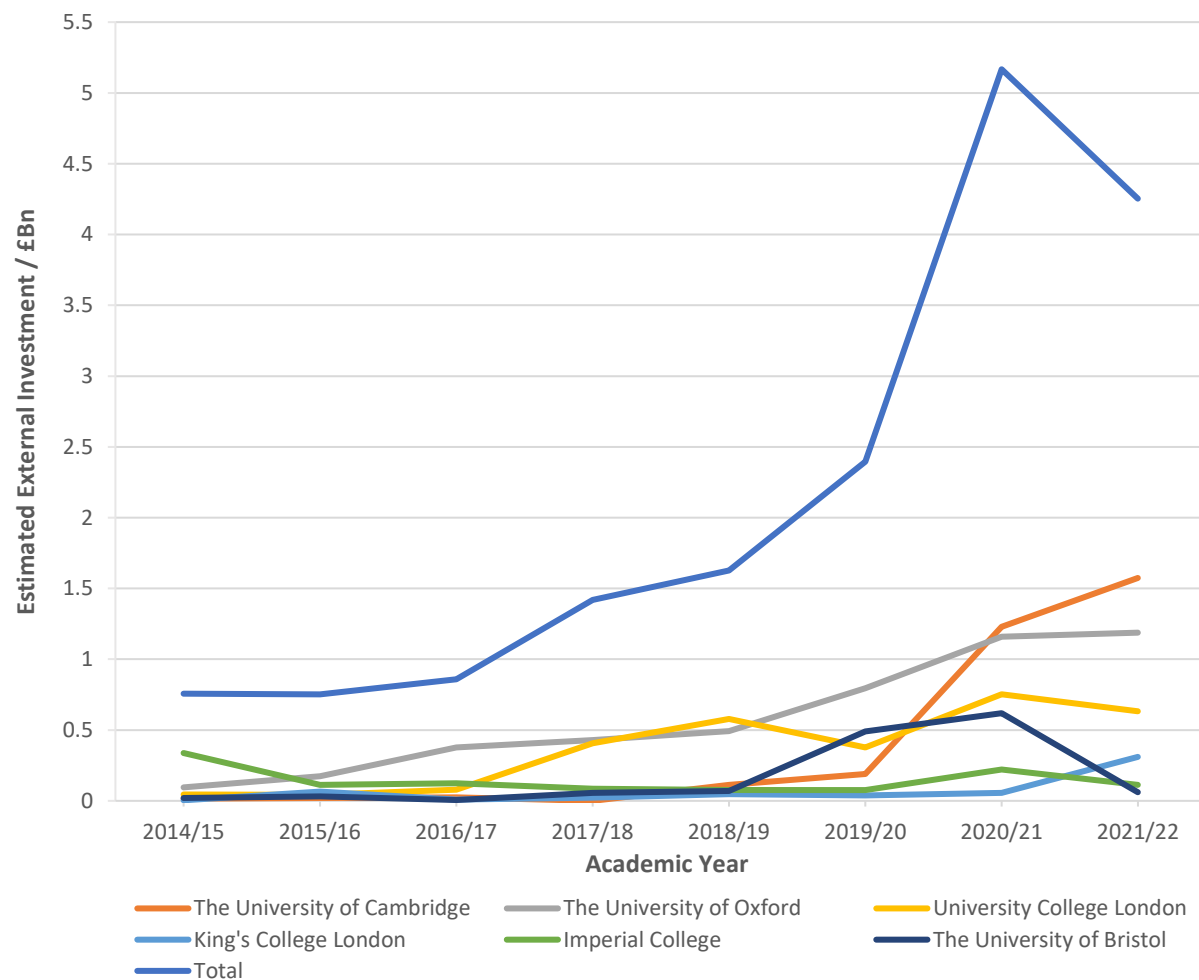
**Figure 17: Total number of active spin-outs to have survived at least three years and the total number of newly registered spin-outs in the reporting periods for English HEPs, each academic year from 2014/15 to 2021/22.**



48. The estimated external investment from all sources received by all spin-outs totalled across the sector decreased by 17.7% in 2021/22, resulting in external investment of £4.25bn. This compares with the £5.17bn of external investment in 2020/21, which represented a 116% increase on 2019/20. Therefore, it is important to consider the 2021/22 data noting that the previous year saw exceptionally high growth as a result of particularly large data returned by the University of Cambridge. The total estimated external investment for 2021/22 demonstrates a 77.4% increase compared to total investment in 2019/20, as shown in Figure 18.
49. The ongoing ability to attract investment can also be interpreted as indicative of the quality of spin-outs across the sector despite increasingly pressured economic outlook. 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, as demonstrated in Figure 18. The decrease growth rate was driven by consistent decreases in external investment associated with a range of providers, including 3 of the top 6 performing providers.
50. There was an increase in 2021/22 in the proportion of total estimated external investment due to the highest six providers (see Figure 18) which accounted for 91% in 2021/22 compared to 83% in 2020/21 and 85% 2019/20 from the highest six providers for those years. However, of these six high performing providers, it is also notable that the estimated external investment received by spin-outs at University College London (15.8%), Imperial College and the University of Bristol decreased by 15.8% (£119m), 49.5% (£254m) and 90.1% (£558m) in 2021/22. The University of Oxford had an increase in external investment of 2.46% (£29m), and only King's College London and the University of Cambridge substantially increased, with growths of 450% (£254m) and 28% (£345m) respectively. 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.



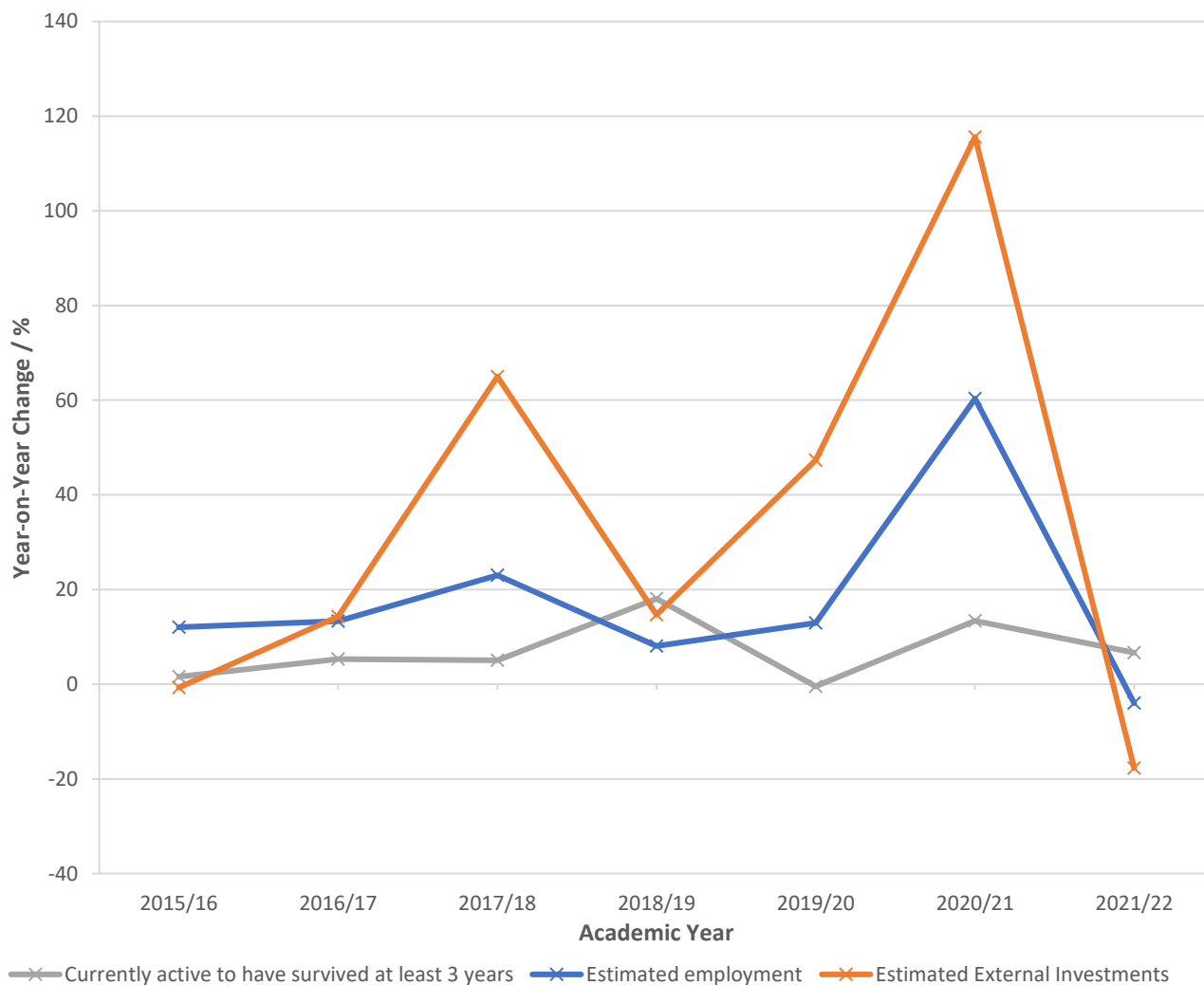
**Figure 18: Estimated external investment received by all spin-outs totalled for all providers, and for individual providers, for each academic year from 2014/15 to 2021/22.**



51. 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 a slight decrease in 2021/22 of 3.99%, though this likely to be a reflection of slightly delayed impacts of the Covid-19 pandemic (mirroring the decline in external investment).

52. The year-on-year changes in this metric is depicted in Figure 19 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 19: Year-on-year % change in the three spin-out metrics from 2015/16 to 2021/22.**



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

Spin-Out Metric	2019/20	2020/21	2021/22
Estimated Employment	20,260	32,481	31,183
Estimated External Investment / £Bn	2.39	5.17	4.25
Currently Active Spin-Outs to have Survived at Least 3 Years	904	1025	1093

53. Estimated employment and estimated external investment declined in 2021/22, however this comes after extremely high growth in 2020/21, predominantly attributed to very large increases at the University of Cambridge (which are partially a reflection of significant changes in data collection practices). Performance in estimated employment and external investment remains significantly higher than recorded in 2019/20. 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. 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 than in 2019/20.

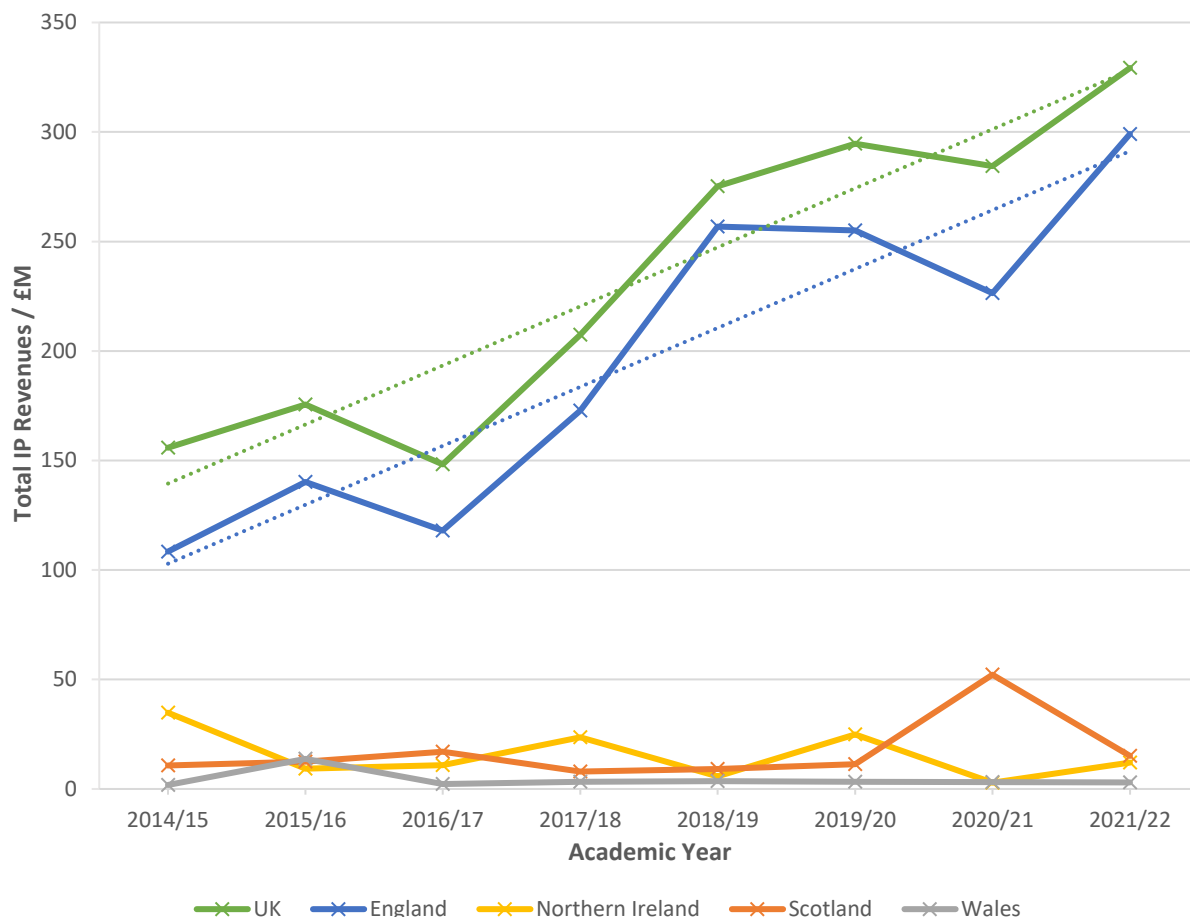
## Comparison of England with the UK

54. It is also of interest to compare trends in IP income in the England to that of the UK and other devolved nations in more detail. There was a notable difference between the year-on-year changes in IP income for England and that of the UK, as displayed in Figure 20, which displays total IP income for the UK as a whole, and each nation individually. Although both England and the UK observed increases in IP income in 2021/22, this was more significant for England with an increase of 32.1% compared with 15.7% in the UK in total.

55. The difference between trends in IP income in England and in UK is driven predominantly by a contrasting decrease in IP income in Scotland in 2021/22 of 71% (£15.1m) compared to 2020/21. This is primarily due to the significant increase in sale in shares in spin-outs for the University of Dundee in 2020/21, which contributed to the 361% increase in income in 2020/21. Overall IP income in Scotland in 2021/22 remains higher than in 2019/20, and is consistent with the long-term growth trend seen between 2017/18 and 2019/20. The recent fluctuating changes in IP income in Scotland, highlights that the sale of shares in spin-outs can be highly variable and does not necessarily reflect the broader shifts in overall IP income.

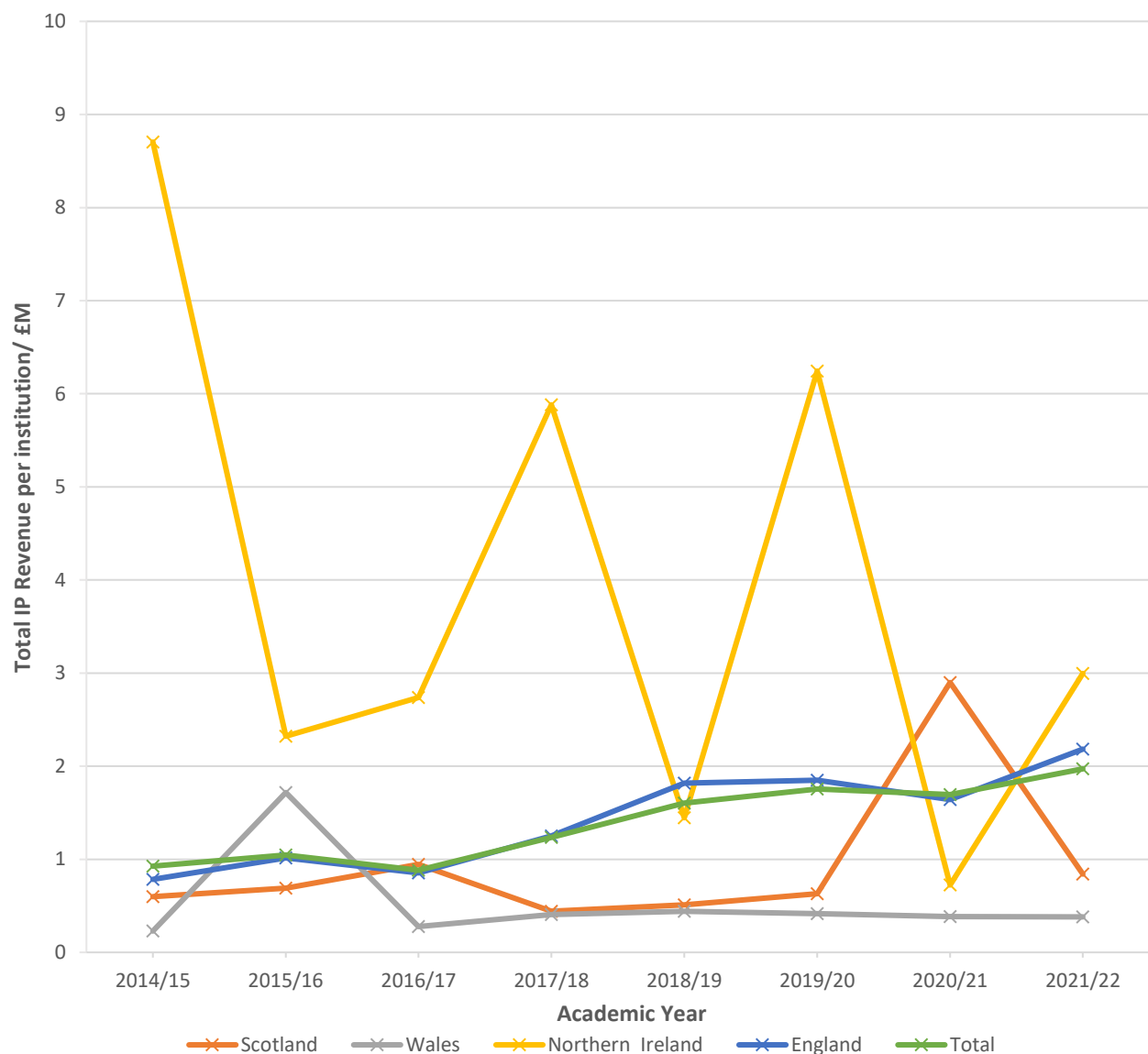
56. The overall trend in IP income in England and the UK since 2014/15 is broadly very similar as depicted by the trendlines in Figure 20. This could be argued to be the more representative measure of IP income due to the large fluctuations that can occur at an institutional level year-on-year as a result 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 20: Total IP revenue for the UK and the devolved nations for each academic year from 2014/15 to 2021/22.**



57. 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 21. The significant increase in total IP income per provider in Northern Ireland in 2021/22 is predominantly distorted by the significant sale of shares activity at the University of Queen's University Belfast, which increased by 333% to £11.4m. 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).

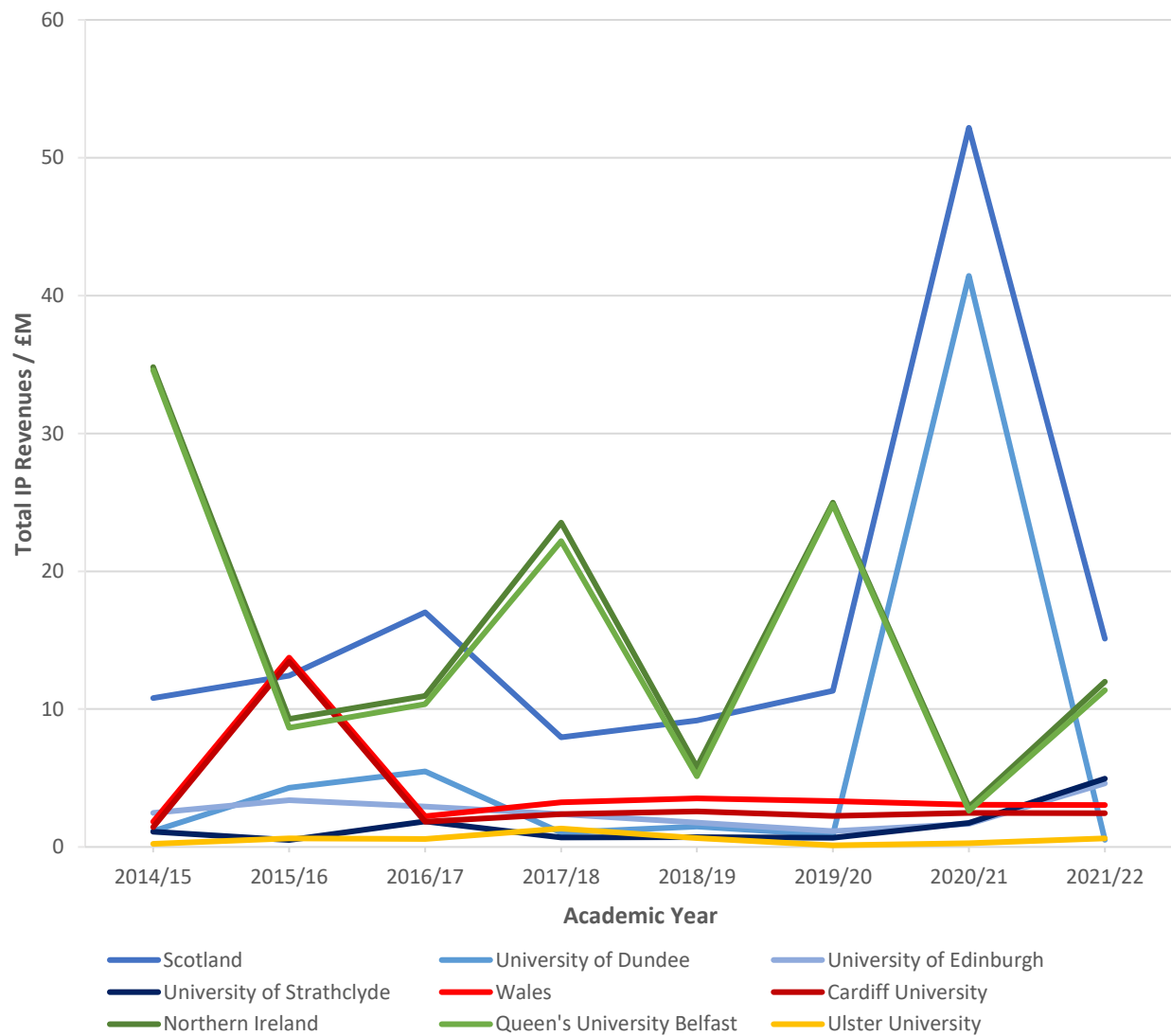
**Figure 21: Total IP revenue per provider for the UK and the devolved nations for each academic year from 2014/15 to 2021/22.**



58. 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 22. 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 usually less dependent on individual institutional changes, but Figure 22 demonstrates the significant decrease and therefore driving effect of income for the University of Dundee following a significant increase in 2020/21. 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 22: Total IP revenue for Scotland, Wales, Northern Ireland, and the relevant providers for each devolved nation for each academic year from 2014/15 to 2021/22.**



## IP-Related International Comparisons

59. 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.
60. 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.
61. 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.
62. 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 2021/22, 134 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.
63. With these caveats in mind, Table 2 below demonstrates that the UK remains broadly comparable with the US when research resource is taken into account. Total research resource for the UK and US increased in 2021/22. In both nations there has been a decrease in the numbers of spin-out companies formed and the numbers of patents granted.<sup>14</sup>
64. There was a 9.27% decrease in the number of spin-outs in the UK (the first decrease observed since 2017/18), which was mirrored by a decrease of 5.45% in the US, and may reflect the impact of the Covid-19 pandemic on the IP pipeline, as discussed in paragraph 39 above. This contrasts with 11.5% growth in the number of spin-outs in the UK in 2020/21, and a 5.9% increase in the US in the same year.

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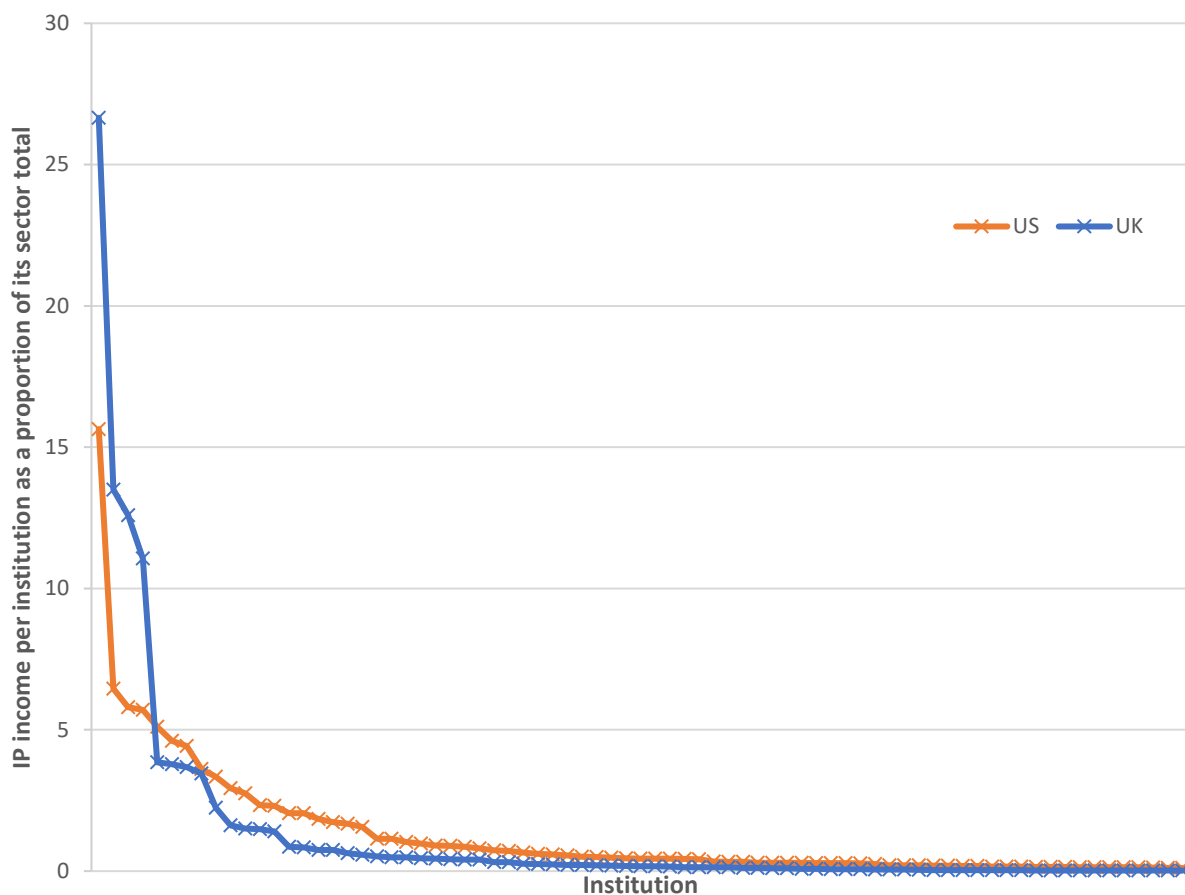
<sup>14</sup> A small number of providers are omitted from this analysis due to a delay in the submission of their Office for Students Annual Finance Return. This includes one provider previously included in the analysis of the top 75 providers.

65. The UK's patenting activity decreased by 22.3% in 2021/22, compared with a 1.44% decrease in the US. In both nations this is the first decrease in patenting activity since 2014/15, and may reflect the impact of the Covid-19 pandemic on the IP pipeline, as discussed in paragraph 39 above. The research resource per patent of £5.7 million remains lower in the UK than the £6.9 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 an increase in the proportion of research resource from industry from 7.2% in 2020/21 to 7.9% in 2021/22. The US proportion of research resource from industry has remained static at 6.5% since 2019.
66. There was an 15.4% increase in overall IP-related income in the UK in 2021/22, and similarly an increase of 26.4% in IP income was seen in the US. The comparison of IP income is discussed in more detail below. However, it will be important to continue to monitor the continued relative performances of the two nations due to the lag between research and commercialisation activities that can often occur. Both nations saw an increase in total research resource in 2021/22, with the UK's research resource increasing by 4.44% to £9.215bn, and the US's research resource increasing similarly by 5.47% to £50.9bn. Although there was a decrease in research resource in the UK in 2019/20, it is unlikely that this will have yet resulted in a material change in commercialisation activity.
67. 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.
68. 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.
69. 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 2021/22, 86.8% of the



UK's IP income was attributed to 13 institutions, compared with the top 13 institutions contributing 65.0% to the national total in the US. 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 63.8% of the UK's IP income was attributed to 4 institutions in 2021/22 compared with 33.6% in the US. 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 2021/22.<sup>15</sup>**



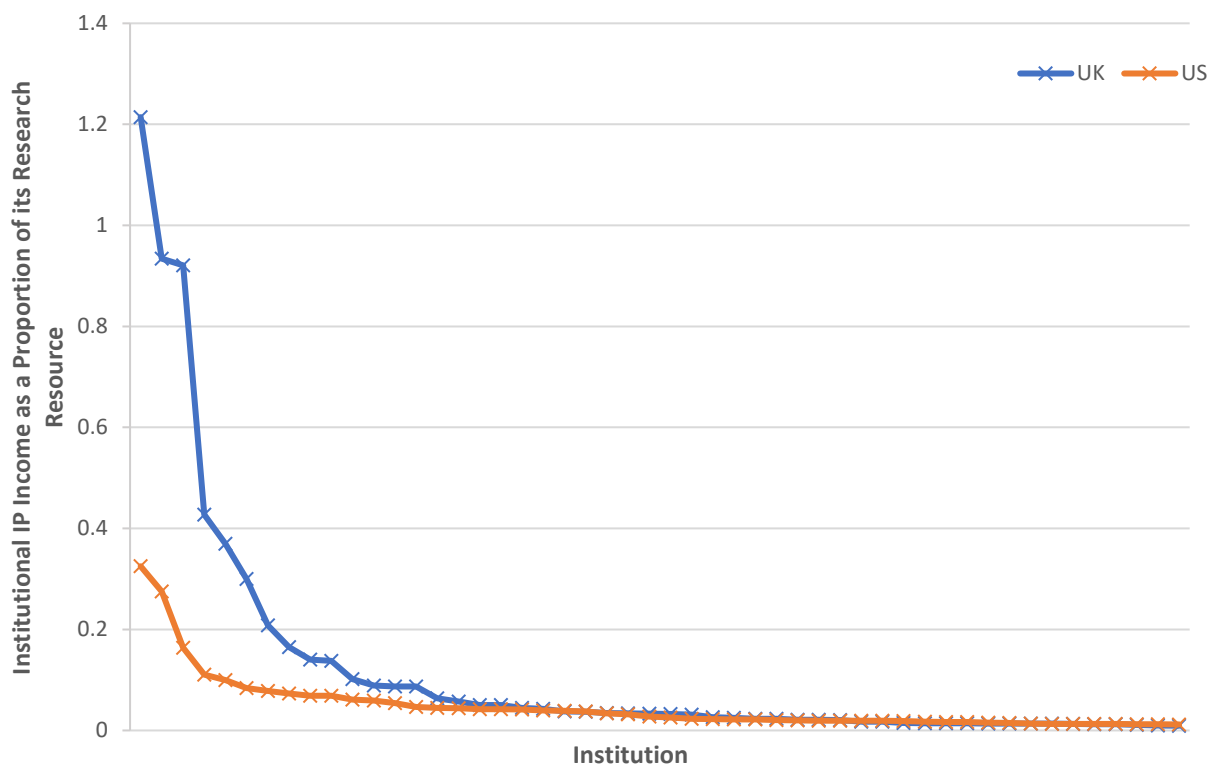
70. The IP income for each institution can be normalised by its research resource in order to provide a more balanced comparison of the concentration of IP income in the US and UK sectors. Figure 25 suggests that when the structural differences of institutions are taken into

<sup>15</sup> A number of providers are omitted from their analysis due to a delay in the submission of their Office for Students Annual Finance Return. This includes one provider previously included in the analysis of the top 75 providers.

account, IP income in 2021/22 remained slightly more concentrated in the UK than the US based on the institutions submitting data. This is despite providers in the UK with the highest IP when normalised by their research resource accounting for a significantly lower proportions of the sector's IP income in 2021/22 than in 2020/21 and for the US the figures remain relatively unchanged.

71. 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 2021/22, for the 50 institutions with the greatest normalised IP incomes, in the UK and the US.**



72. Additional and more detailed information, for example, on US-UK comparisons on investment income raised by spin-outs is in the data report to the [Mike Rees review](#).

**Table 2: Commercialisation activity for the US and UK 2015/16-2021/22.**

	US Financial Year (AUTM)							UK Academic Year (HE-BCI and OfS Annual Finance Record)						
	2021	2020	2019	2018	2017	2016	2015	2021/ 22	2020/ 21	2019/ 20	2018/ 19	2017/ 18	2016/ 17	2015/ 16
<b>Total research resource (£M)</b>	50,901	48,262	45,033	43,252	42,188	41,768	40,132	9,215	8,823	8,495	8,624	8,203	7,894	7,845
<b>IP income including sales of shares in spin-outs (£M)</b>	1,337	1,162	919	995	1,345	1,248	1,240	329	285	295	269	207	148	176
<b>IP income as percentage of total research resource</b>	2.6%	2.4%	2.0%	2.3%	3.2%	3.0%	3.1%	3.6%	3.2%	3.5%	3.1%	2.5%	1.9%	2.2%
<b>Spin-out companies formed</b>	955	1,010	954	1,007	991	950	946	176	194	174	162	142	143	171
<b>Research resource per spin-out (£M)</b>	53.3	47.8	47.2	43.0	42.0	43.3	42.4	52.4	45.5	48.8	53.2	57.8	55.2	45.9
<b>Patents granted</b>	7,343	7,450	6,659	6,761	6,751	6,385	6,124	1,614	2,078	2,027	1,867	1,770	1,386	1,219
<b>Research resource per patent (£M)</b>	6.9	6.5	6.8	6.4	6.2	6.4	6.6	5.7	4.2	4.2	4.6	4.6	5.7	6.4
<b>Industrial contribution (£M)</b>	3,284	3,139	2,931	2,904	2,868	2,909	3,000	737***	638	685	699	651	635	604
<b>% industrial research</b>	6.5%	6.5%	6.5%	6.7%	6.8%	7.0%	7.5%	7.9%	7.2%	8.1%	8.1%	7.9%	8.0%	7.7%
<b>US cashed-in equity/UK Sale of spin-out shares (£M)</b>	274.6**	125.2*	82.3	51.1	45.9	158.7*	45.9	87.6	87.6	83.5	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. \*\*This figure reflects particularly high performance by a number of providers. \*\*\*For 21/22 there are a number of HEPs who did not contribute to the industrial contribution data or the research resource data and therefore this table is presented without their contribution in any field, though this is not anticipated to have a material effect on the above trends.*

## Further notes on Table 2 data

73. AUTM data used in Table 2 was extracted on 14 June 2023.

74. 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 - 2021 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

75. 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.

76. 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.

77. 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.

78. 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.

79. 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>

80. 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).
81. 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.
82. 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.