

Greater Cambridge Employment Update October 2022

*Recovery from the pandemic is strong
but is it a false dawn?*

Highlights:

Overview

- The current business environment makes it important to have timely data on employment changes. This is the seventh of a series of updates that bring up-to-date information about what is happening to corporate employment in the Greater Cambridge area.
- The October 2022 Update covers accounting year ends between December 2021 and April 2022 (the median year end is early March 2022). This is the first time since we started our employment updates work that we are able to compare three years: the first (2019-20) largely unaffected by Covid; the second (2020-21) including all three Covid lockdowns; and the third (2021-22) looking at post-lockdowns performance.
- This update is obtained by sampling the CBR annual corporate database of all businesses based in the wider Cambridge region. It covers a large sample of companies representing 59% of corporate employment in Greater Cambridge.

Areas

- Corporate employment growth in the Greater Cambridge area slowed down from 5.5% in 2019-20 to 2.5% in 2020-21, reflecting the impact of the three Covid lockdowns. However, this slowdown is modest considering the unprecedented disruption to business caused by the pandemic (**Figure 1, p8**).
- The lower employment growth in the area during Covid was due to a weaker performance of non-KI sectors compared with the pre-Covid period. Whilst employment growth in KI sectors remained high at 5.8%, non-KI sectors saw employment growth decline from 2.6% in 2019-20 to -2.1% in 2020-21 (**Figure 1, p8**).
- Employment growth in Cambridge in 2020-21 was strong at 4.2%, yet lower than in 2019-20 (6.8%). South Cambridgeshire exhibited a more significant slowdown from 4.7% in 2019-20 to 1.4% in 2020-21 (**Figure 1, p8**).
- The data covering the post-Covid period reveal that overall employment growth was positive and much stronger than during the Covid period. Employment growth

increased from 2.5% in 2020-21 to 6.7% in 2021-22, possibly implying that businesses discovered how to live with Covid (**Figure 2, p9**).

- The faster employment growth in the area during the most recent year was driven by a strong performance of KI sectors, which saw employment growth accelerate from 5.8% in 2020-21 to 10.0% in 2021-22. In turn, non-KI employment increased by 1.8% post Covid after declining by 2.1% during Covid. This result indicates that the impact of the pandemic on the non-KI economy has lasted longer (**Figure 2, p9**).
- Turning to the individual districts, employment growth in Cambridge was high at 7.3% in 2021-22, up from 4.2% in 2020-21. Similarly, employment growth in South Cambridgeshire was 6.4% in the last year against a 1.4% rate in the previous year (**Figure 2, p9**).
- We examine whether post-Covid growth rates have resumed their pre-Covid levels. The recovery has been helped by the robust performance of KI sectors, whilst employment growth in non-KI sectors picked up in 2021-22 but remained below its pre-pandemic levels (**Figure 3, p11**).
- Both Cambridge- and South Cambridgeshire-based companies achieved higher employment growth in the post-Covid period than in the pre-Covid period. Employment growth in Cambridge was slightly faster in 2021-22 (7.3%) compared with 2019-20 (6.8%). In South Cambridgeshire, employment growth was much stronger in the latest year (6.4%) than it was two years ago (4.7%) (**Figure 3, p11**).

Sectors

- The Covid pandemic has had a varied impact across sectors. Sectors like Life Sciences are involved in supporting the fight against the virus and future outbreaks. ICT companies have benefited as a consequence of the increase in remote communications, gaming and internet security, which have more than offset the reduction of demand in other areas. Hospitality, travel and tourism, and some retail businesses have been severely affected by lockdowns and other restrictions.
- In line with these observations, we find that 'Life science and healthcare' maintained strong growth in 2020-21 despite Covid, followed by much higher growth in the post-lockdowns period. Employment growth remained high during Covid, although somewhat lower than one year earlier, also in 'Information technology and telecoms' (**Figure 5, p14 & Figure 6, p15**).
- The results for the non-KI sectors paint a more multifaceted picture. Employment growth in the 'Other business services' and 'Other services' sectors fell in 2020-21; it then picked up in 2021-22. The results for the 'Other services' sector point to strong employment growth after Covid within a sector that was hit the hardest by Covid-

related restrictions. Nevertheless, 2021-22 employment in the sector was only slightly higher than in 2019-20 (**Figure 5, p14 & Figure 6, p15**).

- Employment growth appears to have picked up in the post-Covid period also in 'Transport and travel' and 'Property and finance'. However, it remained significantly below its pre-Covid levels, particularly in the 'Transport and travel' sector (**Figure 5, p14 & Figure 6, p15**).
- We found rather different results for the other four non-KI sectors. There are signs that 'Wholesale and retail distribution' and 'Construction and utilities' have been struggling to return to growth in the aftermath of Covid. Whilst both sectors enjoyed robust employment growth before Covid, they witnessed a drop in employment during 2020-21 that persisted into 2021-22 (**Figure 5, p14 & Figure 6, p15**).
- In turn, the 'Primary' and 'Education, arts, charities, social care' sectors showed a strong performance during Covid, followed by negative growth after Covid. This result might reflect some specificities of our October 2022 Update sample, for example the inclusion of large non-school organisations (**Figure 5, p14 & Figure 6, p15**).

Comparison of employment and turnover growth

- We complement the findings from the employment update by examining a sample of 129 companies with accounting year ends between December 2021 and April 2022 which have provided both employment and turnover data for the last four years.
- Our results show that both turnover and employment of the KI companies were strong before the pandemic struck. Growth of turnover in 2019-20 was also strong for the non-KI companies, but their growth of employment, whilst positive, was not as strong as that of the KI sector (**Table 1, p23 & Figure 10, p24**).
- Employment growth of KI companies slowed markedly during Covid, 2020-21, but their total turnover actually fell. The picture is worse for non-KI companies, which suffered a fall in employment and an even greater fall in turnover. These findings bear witness to the support provided by the furlough scheme (**Table 1, p23 & Figure 10, p24**).
- Looking at the recovery year, 2021-22, KI employment has resumed its previous vigorous growth and turnover has rebounded to its previous growth trajectory (+25% in 2021-22). By contrast, the impact of the pandemic on non-KI employment appears to have lasted longer, whilst turnover has rebounded from lockdown giving a growth of 24% for these companies (**Table 1, p23 & Figure 10, p24**).

Stop press

- We provide a snapshot of the impact of events in the Greater Cambridge corporate economy by considering a small sample of companies with interim results for the six-month periods ending between May and June 2022. For each company we look at turnover in the same six-month period in 2019-20, 2020-21 and 2021-22.
- By looking at interim reports, the snapshot is a whole year on compared with the update. The first year (2019-20) shows the pandemic effect; the second year (2020-21) the recovery from the worst impacts of the pandemic; and the final year (2021-22) examines whether Putin's war has started to impact these companies.
- Within this group of companies (all knowledge intensive), total turnover grew by 20% in their latest six months (2021-22) compared with a growth of 19% in the same period last year (2020-21) and -9% in the first six months of the pandemic (2019-20).
- Therefore, our findings suggest that the growth of these successful KI companies has remained robust into 2022. To date we cannot identify any impact of Putin's war and the associated rise in energy prices and falls in living standards.

Concluding remarks

- Overall, our comparison of the performance before, during and after the Covid lockdowns suggests that Greater Cambridge corporate employment has started to recover from the worst effects of the pandemic. Whilst the recovery is well underway for KI sectors, employment growth in non-KI sectors remains below its pre-pandemic levels despite having picked up in 2021-22.
- The results from comparing turnover and employment growth during the pandemic demonstrate the importance of the furlough scheme. However, we find no evidence that the cessation of this unprecedented support package has led to employment loss in the corporate sector.
- Our October 2022 Update covers only the very early days of the UK cost of living crisis and largely predates Putin's war. We will explore corporate employment changes over the period including the first months of the UK cost of living crisis and the start of Putin's war in our February 2023 Update.

1. Tracking Greater Cambridge corporate employment – the October 2022 Update

The Centre for Business Research (CBR) at Cambridge University has developed three methods for tracking the employment and turnover of companies based in the wider Cambridge region (for further details see Appendix A4).

The first is the **annual draw** of all companies within the region.¹ It is comprehensive and also examines company births and deaths along with company location changes. This gold standard work does suffer from being less timely. The results of the 2021-22 annual draw will be made available in February 2023 and examine employment in the accounting years ending from 6th April 2021 to 5th April 2022. Since December and, to a lesser extent, March dominate companies' choice of year ends, the modal year end for the annual draw is early December 2021. For comparison, the ONS Business Register and Employment Survey (BRES) provisional annual employment data published in October 2022 has September 2021 as its latest information (and we will have to wait another year before these are confirmed as final).

The second method involves an **update** of companies in the Greater Cambridge area achieved by sampling the annual corporate database in February, June and October. On each occasion a large sample is drawn (over 40% on average) of companies that have reported in recent months. This brings more timely information about what is happening to employment, but does not take account of births and deaths or location changes. For example, this October 2022 Update includes companies with a financial year end between December 2021 and April 2022 and has a modal year end of early March 2022. This median period captures the impact of the coming out of Covid lockdowns but precedes Putin's war. Uniquely for this update, we made our sample fit as neatly as possible into the years before, during and after Covid lockdowns (Covid hereafter). This approach allows for a useful comparison of 2021-22 with the previous two years; the first (2019-20) was largely unaffected by the pandemic, while the second (2020-21) covers all three Covid lockdowns.

We use the update sample to provide estimates of employment for those companies with a year end between December 2021 and April 2022 that have not yet reported. We then use this larger sample to compare the performance of this sample in 2021-22 with their performance in 2020-21 and 2019-20. The final sample for the October 2022 Update is 4,190 companies representing about 59% of corporate employment in the Greater Cambridge area. This figure is somewhat lower than in the previous updates, as we require companies to have four rather than just three years of employment data, yet is still large. A sample of this size, with good coverage of all sectors and company sizes, should give a very accurate picture of what is happening to continuing businesses in the region.

The third method has a much smaller sample since it examines recent changes in both turnover and employment growth. This sample is restricted to 129 companies in Greater Cambridge with accounting years ending between December 2021 and April 2022 which have provided both employment and turnover data for the last four years. Since large businesses provide both employment and turnover figures, the sample is quantitatively significant, with total employment over 16,000 and total turnover of £6.1bn. For this sample of companies, we examine their employment and turnover growth in the last year against the growth in the previous two years. The comparison between these two measures allows us to

¹ The underlying core corporate database has been established and maintained with the ongoing support of Cambridge Ahead, and is currently sponsored by Arm, Marshall of Cambridge, Mills & Reeve and the Cambridgeshire and Peterborough Combined Authority.

evaluate the impact of the furlough scheme on employment in the corporate sector in Greater Cambridge.

The fourth method is a **snapshot** of very recent growth that draws on a small sample and should be regarded as merely indicative. It considers only the largest businesses (top 100 by employment or turnover) and examines those that have filed interim reports for six-month periods ending between May and June 2022. The nine companies in the snapshot sample do not provide employment figures in their interim reports, but together they represent a combined annual turnover of about £769m. The gain from focusing on interim results is that most of the activity reported in the accounts took place in 2022. We compare turnover in this period with the same six-month period in 2019-20 and 2020-21. The first year captures the effects of the pandemic; the second year shows the recovery from the worst impacts of Covid; and the latest year examines whether Putin's war has started to impact these companies.

The remainder of this report is structured as follows. Section 2 presents the results of the October 2022 employment update, including some new charts that we developed specifically for this update. The section examines growth of Greater Cambridge-based companies by area and industry sector, for the first time comparing the Covid affected year with the performance pre and post Covid (a shorthand term for post lockdowns). Section 3 complements the findings from Section 2 by discussing the results of the October 2022 Update sample that includes both employment and turnover growth. Section 4 shows the findings of the snapshot sample, while Section 5 offers some concluding remarks. Appendices A1-A3 provide a summary of employment growth rates by sector for Greater Cambridge as a whole, as well as for Cambridge and South Cambridgeshire separately. Appendix A4 explains the methodology underpinning the Greater Cambridge Employment Update. Appendix A5 presents some additional graphical analysis drawn from our October 2022 Update sample.

2. October 2022 employment update results

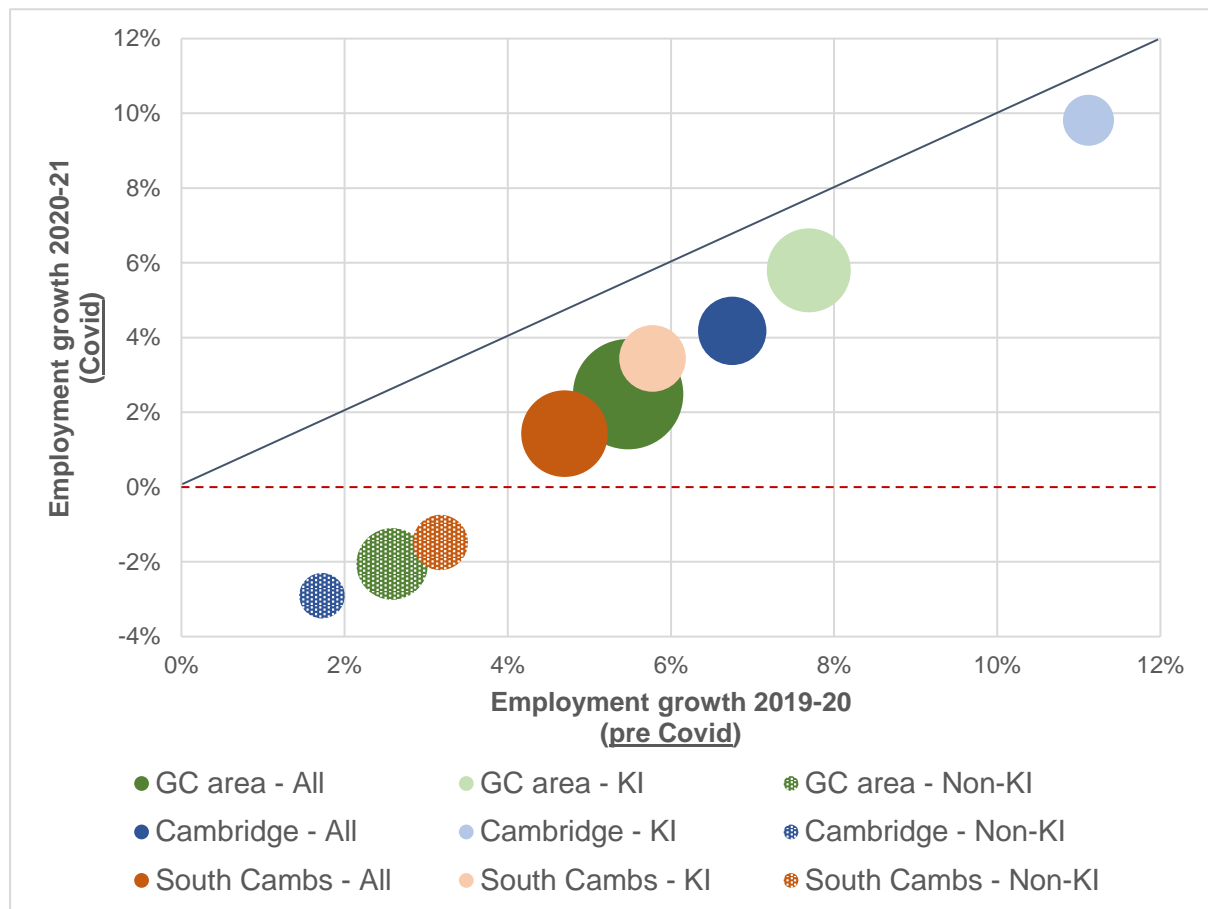
In this section, we present the results of the October 2022 employment update, the seventh of a series of updates aimed at providing a timely picture of the performance of the Greater Cambridge corporate economy. This update captures the impact of coming out of Covid lockdowns. We compare this post-lockdowns period with the performance before and during Covid, as we explain in more detail below.

2.1. Analysis by area

For the first time since we started our employment updates work, the October 2022 Update enables us to contrast three years: the first (pre Covid, 2019-20) largely unaffected by Covid; the second (Covid, 2020-21) including the bulk of the Covid impact; and the third (post Covid, 2021-22) looking at post-Covid (a shorthand term for post-lockdowns) performance. This allows not only our usual adjacent year comparisons, but also an analysis of the latest performance against what was happening before Covid struck. Our October 2022 Update sample represents 59% of corporate employment in Greater Cambridge – a sizeable figure.

Figure 1 looks at the **immediate impact** of the pandemic by examining employment growth in KI and non-KI sectors during 2019-20 (horizontal axis) and 2020-21 (vertical axis) by area. **This chart allows us to compare the performance of each area before and during Covid.** It is drawn from a large sample of 4,190 companies with accounts for the years ending between December 2021 and April 2022. The position of the area marker relative to the 45° line indicates whether a given area grew more or less fast than last year. Areas with positive growth in 2020-21 are found above the horizontal axis and those with positive growth in 2019-20 appear to the right of the vertical axis. It shows growth for KI, non-KI and all sectors for Cambridge, South Cambridgeshire and for Greater Cambridge overall. A summary of employment growth rates by sector for each area is reported in Appendices A1-A3.

**Figure 1 Employment growth by area:
2020-21 (Covid) vs 2019-20 (pre Covid)**



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale.

Source: Cosh & Caselli, CBR.

Figure 1 portrays a picture of continued but lower overall employment growth in the Greater Cambridge area during Covid. Growth in the area slowed down from 5.5% in 2019-20 to 2.5% in 2020-21, reflecting the impact of the three Covid lockdowns in England. However, this slowdown is modest considering the unprecedented disruption to business caused by the pandemic.

Our data show that the lower employment growth in the area was due to a weaker performance of non-KI sectors since the onset of Covid compared with the pre-Covid period. Whilst employment growth in KI sectors remained high at 5.8% (against a figure of 7.7% in 2019-20), non-KI sectors saw employment growth decline somewhat markedly from 2.6% in 2019-20 to -2.1% in 2020-21.

Our finding of a robust performance of KI sectors during Covid holds even if we exclude AstraZeneca (measured by its employment in the Cambridge area only) from the analysis. With over 4,000 employees in the Cambridge area, AstraZeneca dominates total employment for our sample. KI employment growth after excluding AstraZeneca would be 7.5% in 2019-20 and 5.3% in 2020-21. Overall employment growth in the area would be 5.2% and 2.0%, respectively.

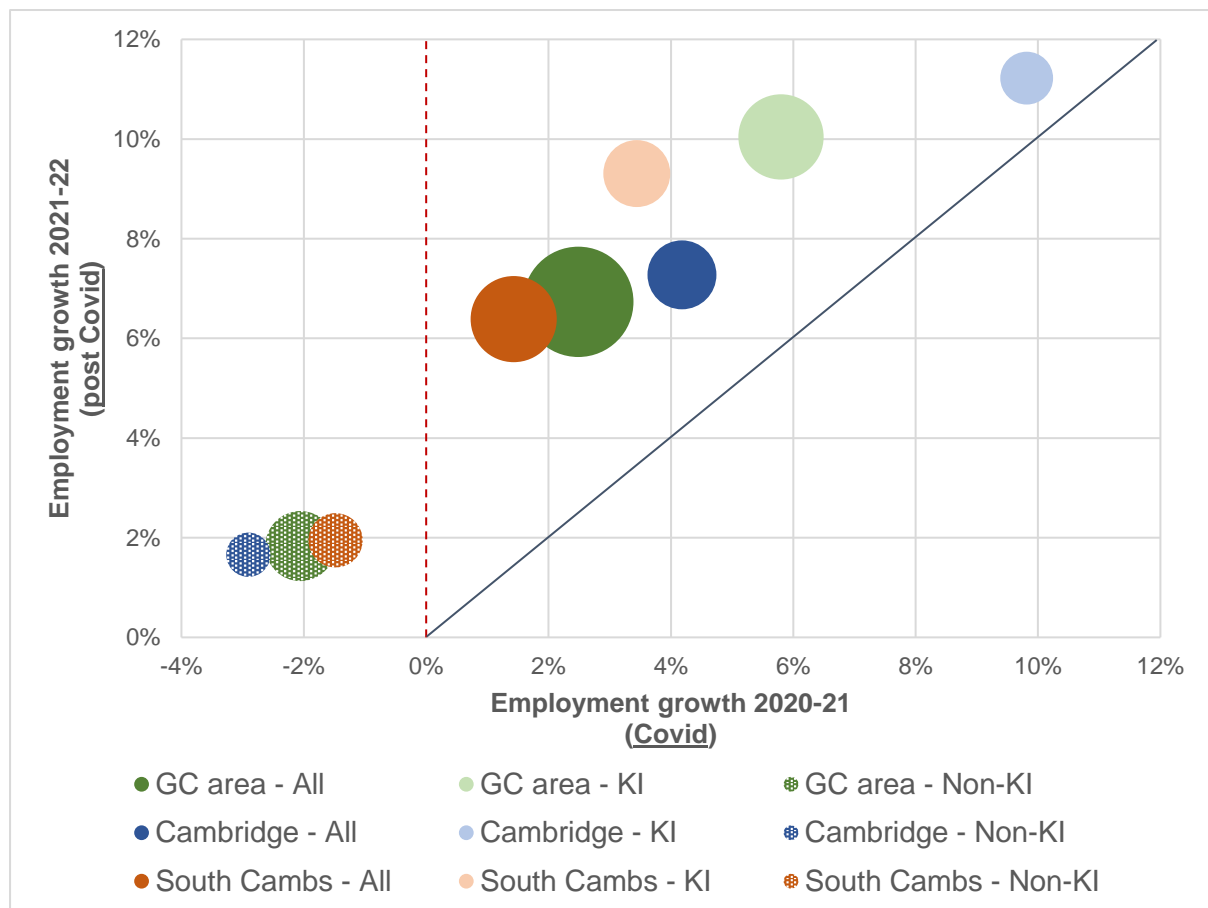
Employment growth in Cambridge in 2020-21 was strong at 4.2%, yet lower than in 2019-20 (6.8%). South Cambridgeshire exhibited a more significant slowdown from 4.7% in 2019-20 to 1.4% in 2020-21.

The KI sectors fared better in Cambridge, where KI employment growth was close to reaching a double-digit figure (9.8%) even during Covid. The growth of the KI sectors in South Cambridgeshire decreased from 5.8% in 2019-20 to 3.4% in 2020-21.

We found a rather different picture for the non-KI sectors, which suffered a fall in employment during 2020-21 in both districts despite the furlough scheme being in place. Non-KI employment growth dropped from 1.7% during 2019-20 to -2.9% during 2020-21 in Cambridge, while it showed a similar drop from 3.2% to -1.5% in South Cambridgeshire.

Figure 2 shows the **recovery** in employment growth in KI and non-KI sectors by comparing 2020-21 (horizontal axis) and 2021-22 (vertical axis) by area. **This chart allows us to compare the performance of each area during and after Covid.**

**Figure 2 Employment growth by area:
2021-22 (post Covid) vs 2020-21 (Covid)**



Note: The size of each bubble is proportionate to the number of employees in 2020-21 on a continuous scale.

Source: Cosh & Caselli, CBR.

The data covering the post-Covid period reveal that overall employment growth in the Greater Cambridge corporate economy was positive and much stronger than during the Covid period. Employment growth increased from 2.5% in 2020-21 to 6.7% in 2021-22, possibly implying that businesses discovered how to live with Covid.

The faster employment growth in the area was driven by a strong performance of KI sectors, which saw employment growth accelerate from 5.8% in 2020-21 to 10.0% in 2021-22. In turn, non-KI employment increased by 1.8% post Covid after declining by 2.1% during Covid. This result suggests that, although there seem to be signs of recovery also amongst non-KI sectors, the impact of the pandemic on the Greater Cambridge non-KI economy has lasted longer.

If we exclude AstraZeneca, KI employment growth would be 5.3% in 2020-21 and 8.8% in 2021-22. Overall employment growth would be 2.0% and 5.9%, respectively.

Turning to the individual districts, both Cambridge and South Cambridgeshire achieved faster employment growth in the latest year compared with one year earlier. Employment growth in Cambridge was high at 7.3% in 2021-22, up from 4.2% in 2020-21. Similarly, employment growth in South Cambridgeshire was 6.4% in the last year against a 1.4% rate in the previous year.

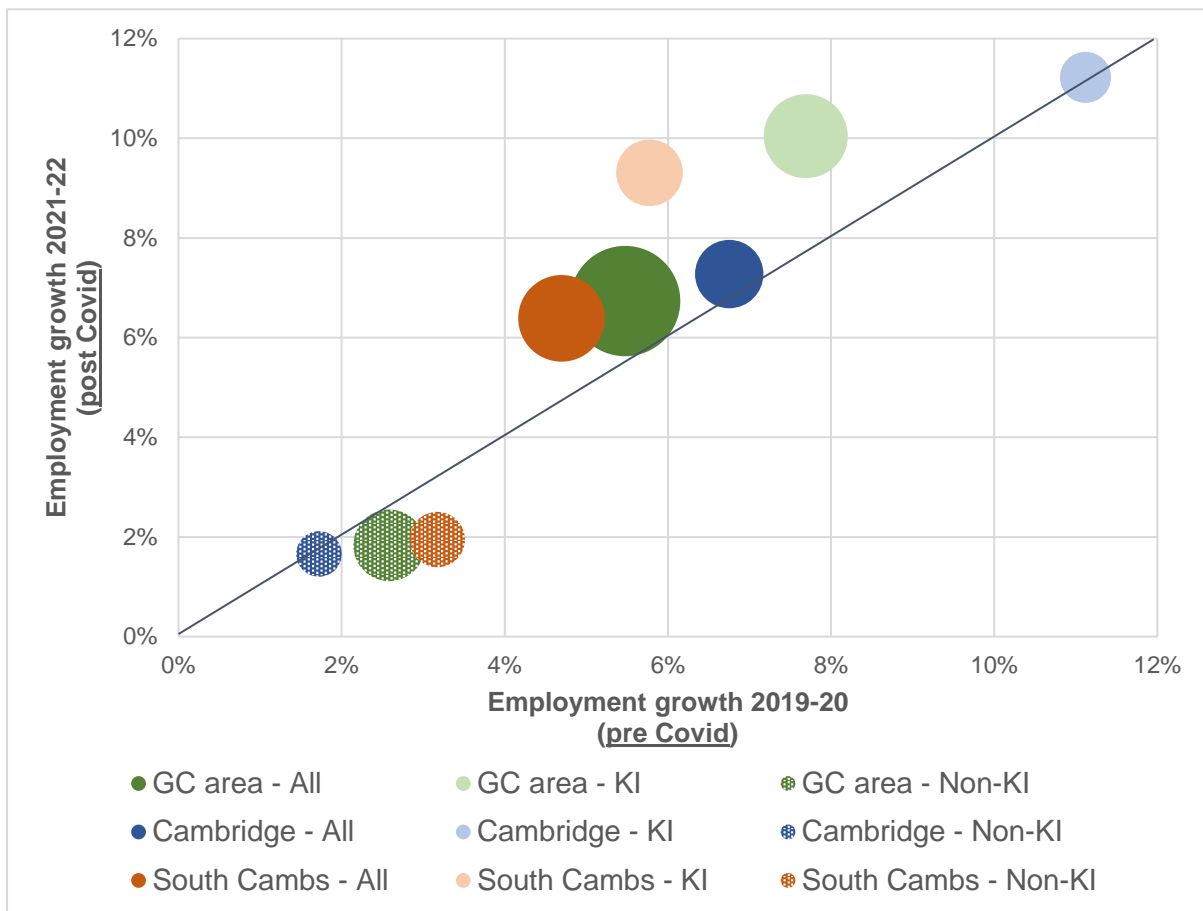
The KI economy showed a particularly high degree of dynamism in Cambridge, where KI employment growth increased from an already high figure of 9.8% during Covid to 11.2% after Covid. The increase in employment growth amongst KI sectors was even larger in South Cambridgeshire, reaching 9.3% in 2021-22 compared with 3.4% in 2020-21.

Non-KI sectors witnessed a return to growth in both districts, albeit at considerably lower rates than the KI sectors. Employment growth in non-KI sectors increased from -2.9% in 2020-21 to 1.7% in 2021-22 in Cambridge and from -1.5% to 1.9% in South Cambridgeshire.

However, it must be noted that our results might reflect the performance of a somewhat exceptional sample of companies, which did not delay publication of their latest accounts despite the ongoing uncertainty about the unfolding of Covid and the cost of living crisis. The fact that most of the sample companies did not need more time to file their accounts could suggest that they have been less impacted by the changing business environment than companies that have yet to file their latest accounts. We have attempted to mitigate selection bias by conducting another data draw a week before releasing the full version of the report, which allowed us to include the latest data for a further 525 companies.

Figure 3 examines the **lasting effect** of Covid on employment growth in KI and non-KI sectors by comparing 2019-20 (horizontal axis) and 2021-22 (vertical axis) by area. **This chart allows us to compare the performance of each area before and after Covid.**

**Figure 3 Employment growth by area:
2021-22 (post Covid) vs 2019-20 (pre Covid)**



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale.

Source: Cosh & Caselli, CBR.

The results illustrated in Figure 3 suggest that corporate employment growth in Greater Cambridge has started to recover from the effects of the pandemic. After slowing down during Covid (Figure 1), growth in the area was 6.7% in the post-Covid period compared with 5.5% in the pre-Covid period.

The recovery has been happening faster than many would have anticipated, helped by the robust performance of KI sectors. KI employment growth was higher in 2021-22 (10.0%) than in 2019-20 (7.7%), which is consistent with some KI companies (particularly in the Life Science and ICT sectors) benefiting from the opportunities brought about by the pandemic. Employment growth in non-KI sectors picked up in 2021-22 but remained below its pre-pandemic levels.

Looking at the individual districts, both Cambridge- and South Cambridgeshire-based companies achieved higher employment growth in the post-Covid period than in the pre-Covid period. While employment growth in Cambridge was slightly faster in 2021-22 (7.3%) compared with 2019-20 (6.8%), employment growth in South Cambridgeshire was much stronger in the latest year (6.4%) than it was two years ago (4.7%).

Behind the much stronger performance of South Cambridgeshire corporate employment in 2021-22 against 2019-20 is the fast growth of KI sectors, which continued to expand at a

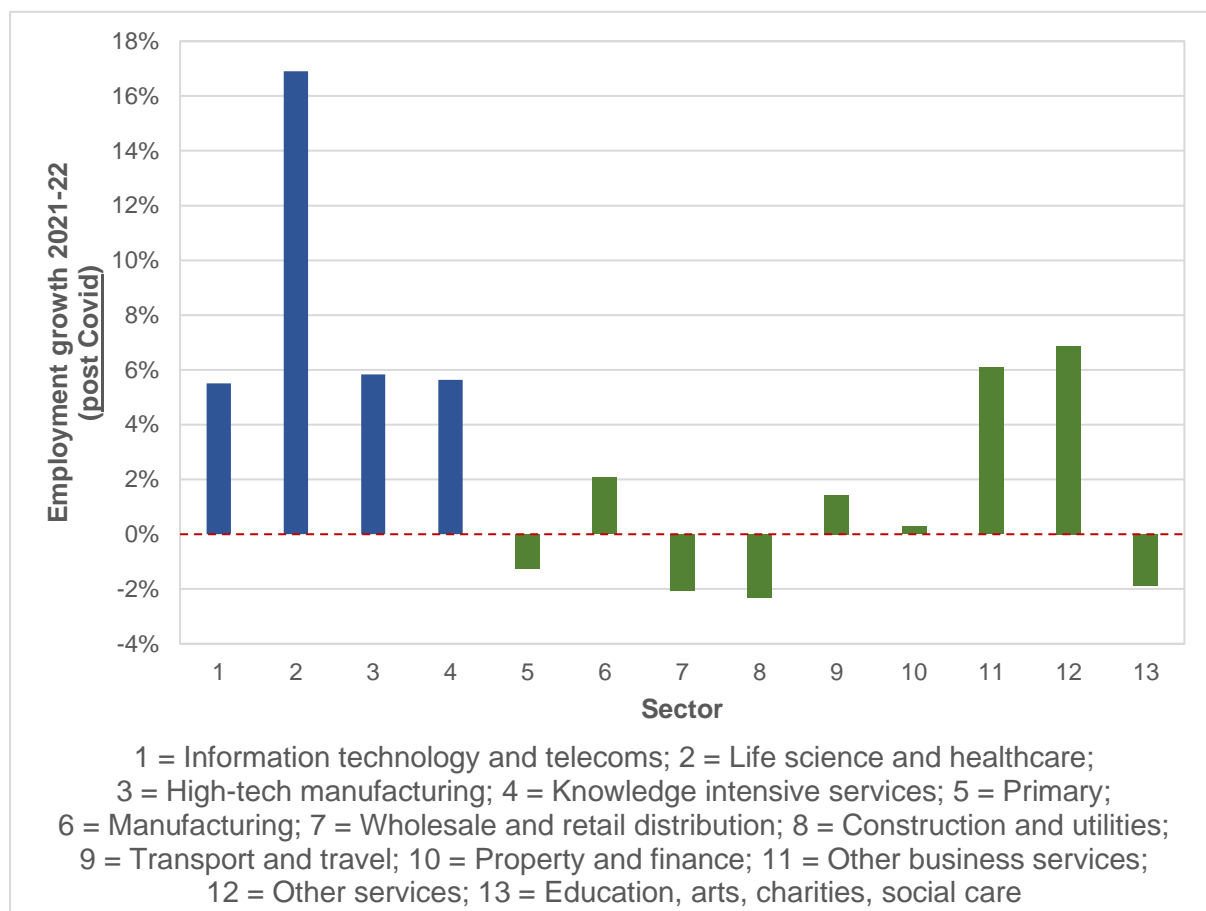
rate of 9.3% (5.8% in 2019-20). KI employment growth in Cambridge exhibited virtually the same growth in both years (11.2% and 11.1%, respectively).

The two districts also differ with respect to the speed at which the recovery has been happening amongst non-KI sectors. The Cambridge non-KI economy grew by 1.7% in 2021-22, the same rate it had in 2019-20. By contrast, non-KI employment in South Cambridgeshire showed lower growth after Covid (1.9%) than before Covid (3.2%).

2.2. Analysis by sector

Figure 4 looks more closely at differences in performance across sectors by distinguishing between 4 KI sectors and 9 non-KI sectors. It compares these 13 sectors by examining their employment growth during 2021-22 (on average the year to early March 2022), the latest year covered by this work.

Figure 4 Employment growth 2021-22 (post Covid) by sector in the Greater Cambridge area



Note: Blue bars identify KI sectors, whereas green bars are for non-KI sectors.

Source: Cosh & Caselli, CBR.

'Life science and healthcare', the largest KI sector in the Greater Cambridge area, was the fastest growing sector during 2021-22 (16.9%). Employment growth in this sector was driven by the performance of AstraZeneca, Abcam and CMR Surgical, who added over 1,000 employees combined. The 2021-22 growth in Life Science employment after excluding AstraZeneca would be 15.3%.

The second-largest KI sector in the area, 'Information technology and telecoms', saw employment growth of 5.5% in the post-Covid period. This was helped by the continued growth of some of the largest ICT companies based locally, including Amazon's EVI Technologies, Redgate Software and Raspberry Pi.

Similar growth rates were also achieved by the other two KI sectors, 'High-tech manufacturing' (5.8%) and 'Knowledge intensive services' (5.6%). The strong performance of the 'High-tech manufacturing sector' partly reflects the return to growth by Xaar following a period of divestitures and the continued increase in employee numbers by Sepura. In turn, TTP Group and Evonetix were among the fastest-growing 'Knowledge intensive services' companies.

We found mixed results for non-KI sectors.

The 'Other services' sector had the highest employment growth amongst all non-KI sectors (6.9%). The largest sub-sector within 'Other services' includes doctors, dentists and other incorporated healthcare businesses, which grew their employment by 8.5% during 2021-22. Hospitality businesses, the second largest group of businesses within the 'Other services' sector, saw a similar growth of 8.6%. Among the companies that contributed to this growth are Ieso Digital Health, a leading digital mental healthcare provider, and Gonville Hotels, which owns and operates the Gonville Hotel in central Cambridge.

The 'Other business services' sector experienced similar growth (6.1%), while 'Manufacturing' (2.1%), 'Transport and travel' (1.4%) and 'Property and finance' (0.3%) all had positive but more modest growth.

Conversely, employment fell in the 'Construction and utilities' (-2.3%), 'Wholesale and retail distribution' (-2.0%), 'Education, arts, charities, social care' (-1.9%) and 'Primary' (-1.3%) sectors.

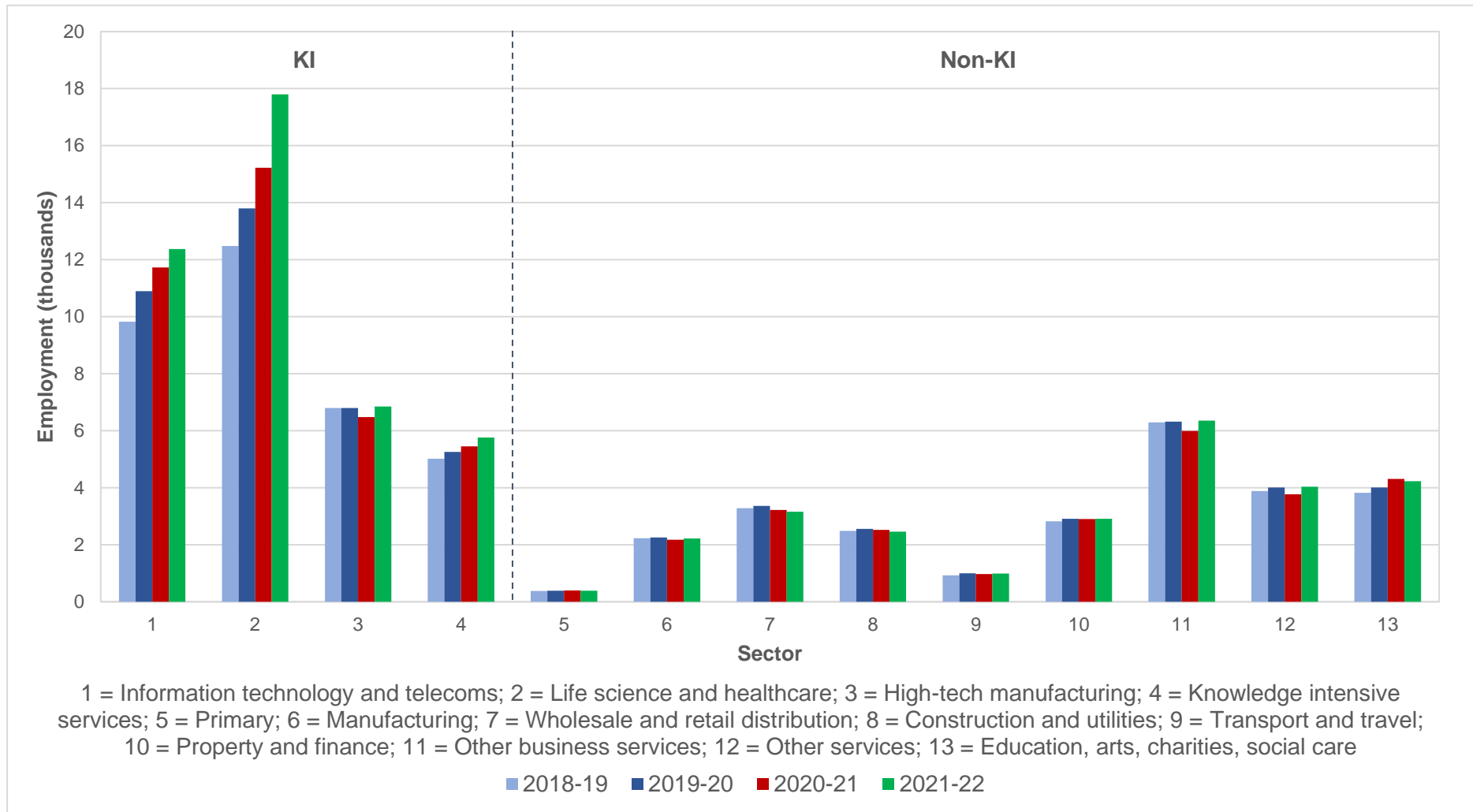
We observe that employment of the 'Education, arts, charities, social care' sample is dominated by large non-school organisations such as Fauna & Flora International (international conservation charity), Camfed International (non-profit organisation tackling poverty and inequality through girls' education) and VoiceAbility (provider of advocacy services for people with disabilities).

Therefore, we analysed the latest corporate and non-corporate employment data from the Business Register and Employment Survey (BRES), which covers the growth period to September 2021. BRES data shows a similar fall in Education employment in Greater Cambridge during the most recent year (-1.6%). However, in the past we found the comparison of CBR results with those from BRES to be rather unhelpful, due to significant volatility in BRES employment as well as large revisions to the data (e.g. -12,000 employees in the 'First-degree level higher education' sub-sector alone when revised estimates for 2020 were published in October 2022).

Although our sample covers only a limited number of schools, we expect their employment growth to have picked up slightly post Covid but to remain below its pre-pandemic levels. Growth might have picked up particularly amongst foreign schools, which saw the return of foreign language students to the Cambridge area after Covid lockdowns were lifted.

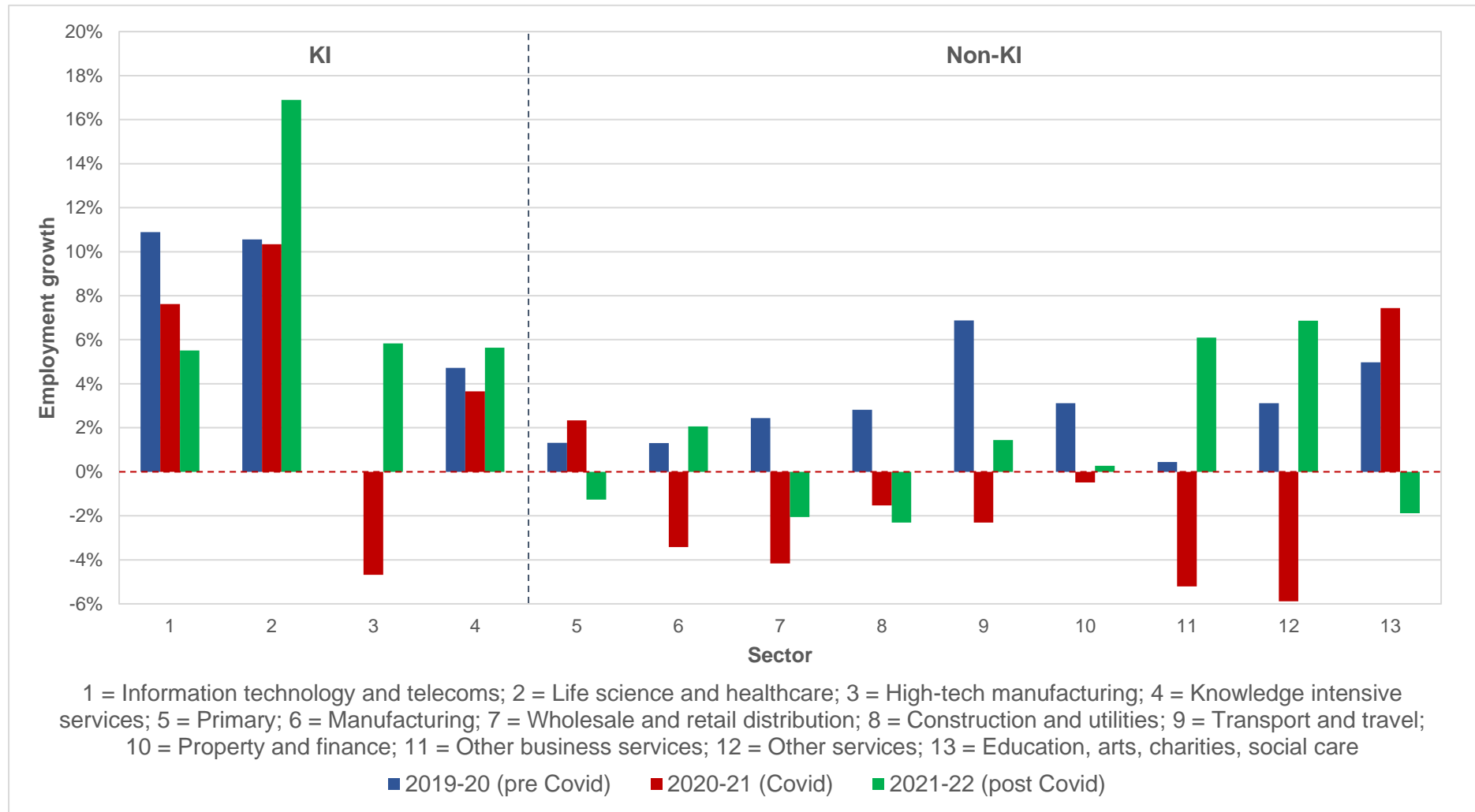
Figure 5 qualifies the results presented in Figure 4 by showing total corporate employment by sector before Covid (light and dark blue bars), during Covid (red bars) and after Covid (green bars). Figure 6 offers an alternative comparison across sectors considering employment growth rather than employment level.

Figure 5 Employment by sector in the Greater Cambridge area



Source: Cosh & Caselli, CBR.

Figure 6 Employment growth by sector in the Greater Cambridge area



Source: Cosh & Caselli, CBR.

'Life science and healthcare', 'Information technology and telecoms' and 'Knowledge intensive services' are three KI sectors that saw a continued rise in employment during the four years covered by our study.

'Life science and healthcare' and 'Knowledge intensive services' maintained strong growth in 2020-21 despite the Covid outbreak, followed by much higher growth as the economy started to recover from the worst impacts of the pandemic. The largest increase is found for 'Life science and healthcare', where employment grew by 16.9% in 2021-22 against 10.3% in 2020-21 and 10.6% in 2019-20. Employment went up by over 2,500 people during the post-Covid period alone. AstraZeneca accounted for 23% of total employment in the sector during 2021-22. Life Science employment growth excluding AstraZeneca would be 15.3%, 10.0% and 10.6%, respectively.

Employment growth remained high during the Covid period also in 'Information technology and telecoms', although it was somewhat lower in the latest year compared with one year earlier.

The 'High-tech manufacturing' sector saw a return to growth in 2021-22 after two challenging years. After remaining unchanged between 2018-19 and 2019-20, employment in the sector dropped by 300 people during Covid. It then increased by almost 400 people during the period after Covid, exceeding its pre-pandemic levels. Our data reveal that 'High-tech manufacturing' was the only KI sector to suffer employment losses during Covid.

The picture looks different for non-KI sectors. Figures 5 and 6 reveal that none of them exhibited a continued rise in employment over the four years from 2018-19 to 2021-22.

'Manufacturing', 'Transport and travel', 'Property and finance', 'Other business services' and 'Other services' suffered a fall in employment during Covid. Employment in these sectors increased afterwards but, except for 'Other business services' and 'Other services', it was still below 2019-20 levels. Even for 'Other business services' and 'Other services', their 2021-22 employment was only slightly higher than in 2019-20. This result is not surprising, as sectors such as 'Other services' include a number of in-person service businesses (e.g. hairdressers, pubs and restaurants) that were severely impacted by the pandemic and are likely to require some time before a full recovery is achieved.

We found rather different results for the other four non-KI sectors.

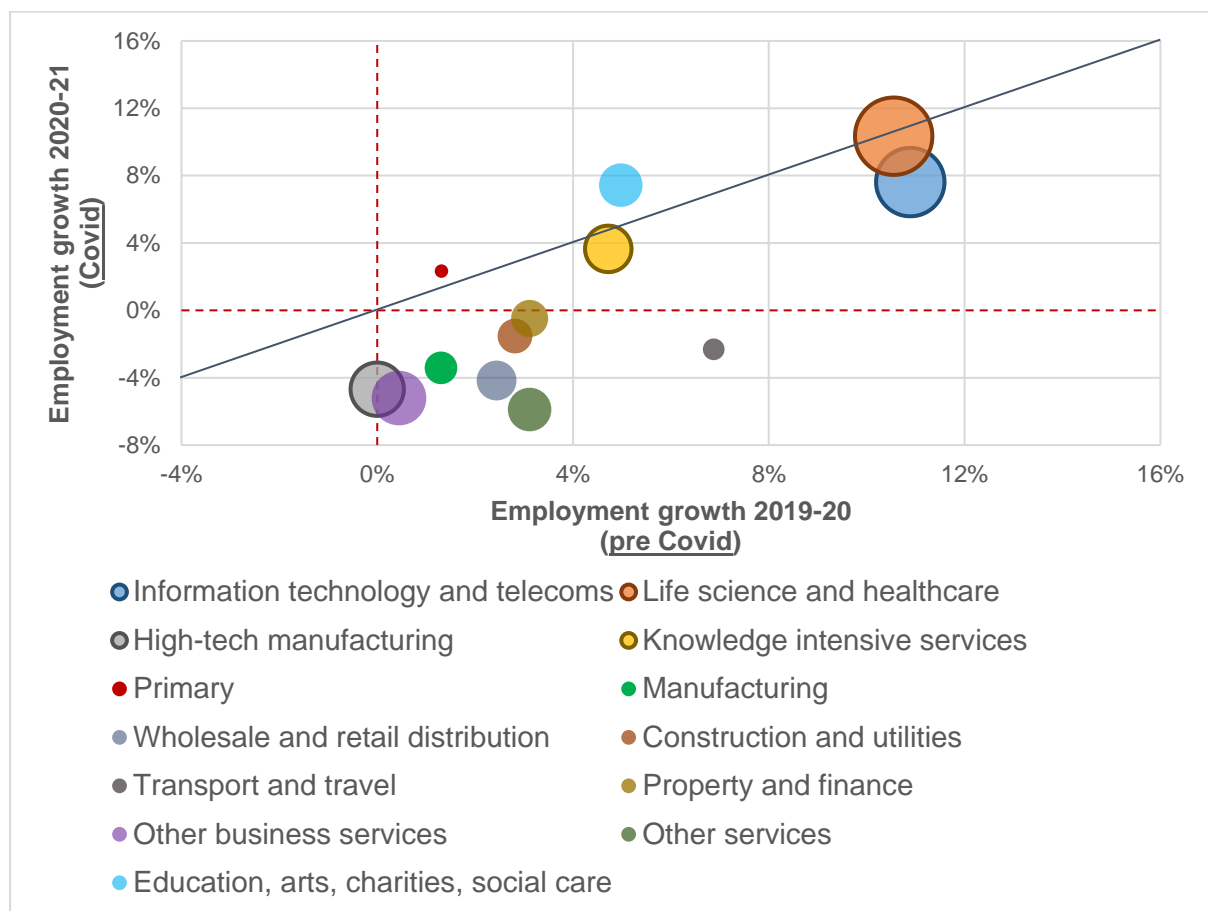
There are signs that 'Wholesale and retail distribution' and 'Construction and utilities' have been struggling to return to growth in the aftermath of Covid. Employment in both sectors increased between 2018-19 and 2019-20, before declining as the pandemic hit the UK. Since then, both sectors witnessed a steady fall in employee numbers.

In turn, the 'Primary' and 'Education, arts, charities, social care' sectors showed a strong performance during Covid, with higher employment growth than in the pre-Covid period (albeit from a relatively low base for the 'Primary' sector). Growth in these sectors turned negative after Covid, possibly reflecting some specificities of our October 2022 Update sample – which, as discussed above, includes large non-school organisations and only a limited number of schools.

Therefore, we find that Covid had little impact on KI employment, whilst several of the non-KI sectors were severely impacted. Sectors like low- and med-low-tech 'Manufacturing' seem to have managed the furlough scheme better than other non-KI sectors, possibly reflecting their effort to keep highly qualified staff for which significant investment in training had been made.

To delve deeper into the differences in employment growth across sectors, Figure 7 looks at the **immediate impact** of the pandemic by comparing the 13 industry sectors according to their employment growth during 2019-20 (horizontal axis) and their employment growth during 2020-21 (vertical axis). **This chart allows us to compare the performance of sectors before and during Covid.** The position of the sector marker relative to the 45° line shows whether the sector has grown more or less fast than last year. Sectors with positive growth in 2020-21 are found above the horizontal axis and those with positive growth in 2019-20 appear to the right of the vertical axis. This is the only chart where we can see the relative size of each sector and compare its performance relative to other sectors in the same year as well as to the same sector in the previous year. The equivalent versions of Figures 7-9 for Cambridge and South Cambridgeshire separately are presented in Appendix A5.

Figure 7 Employment growth by sector in the Greater Cambridge area: 2020-21 (Covid) vs 2019-20 (pre Covid)



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

The onset of the pandemic impacted employment growth across a variety of sectors.

'Life science and healthcare' is the only KI sector that had employment growth virtually unaffected by Covid. Employment in the Greater Cambridge Life Science cluster increased by 10.3% in 2020-21, down only marginally from 10.6% in 2019-20. Cambridge Healthcare Research (65.0%), Healx (62.1%) and CMR Surgical (44.6%) are some of the Life Science companies to have achieved fast growth during Covid.

Employment growth in 'Information technology and telecoms' remained high at 7.6%, yet not as fast as in the year before Covid struck (10.9%). Among the companies which contributed to this growth are Amazon's EVI Technologies (23.6%), Redgate Software (12.0%) and Aveva (11.1%).

A slowdown in employment growth also occurred for 'Knowledge intensive services', which includes a number of engineering and science consultancies (e.g. Cambridge Consultants, Science Group and Z-Tech Control Systems). The pandemic posed some challenges for 'Knowledge intensive services' businesses, as clients tightened their belts as a consequence of the impact of Covid on their businesses. Employment growth in the sector went down to 3.7% in 2020-21 from 4.7% in 2019-20.

By contrast, we found a considerable drop in employment growth in 'High-tech manufacturing', which was the only KI sector to experience negative growth during the Covid-affected year. This was due primarily to a drop in employee numbers by Hexcel Composites (-23.1%) – a leading supplier of composite materials for the commercial aerospace industry – who suffered from a reduction in demand from the impact of Covid on its customers.

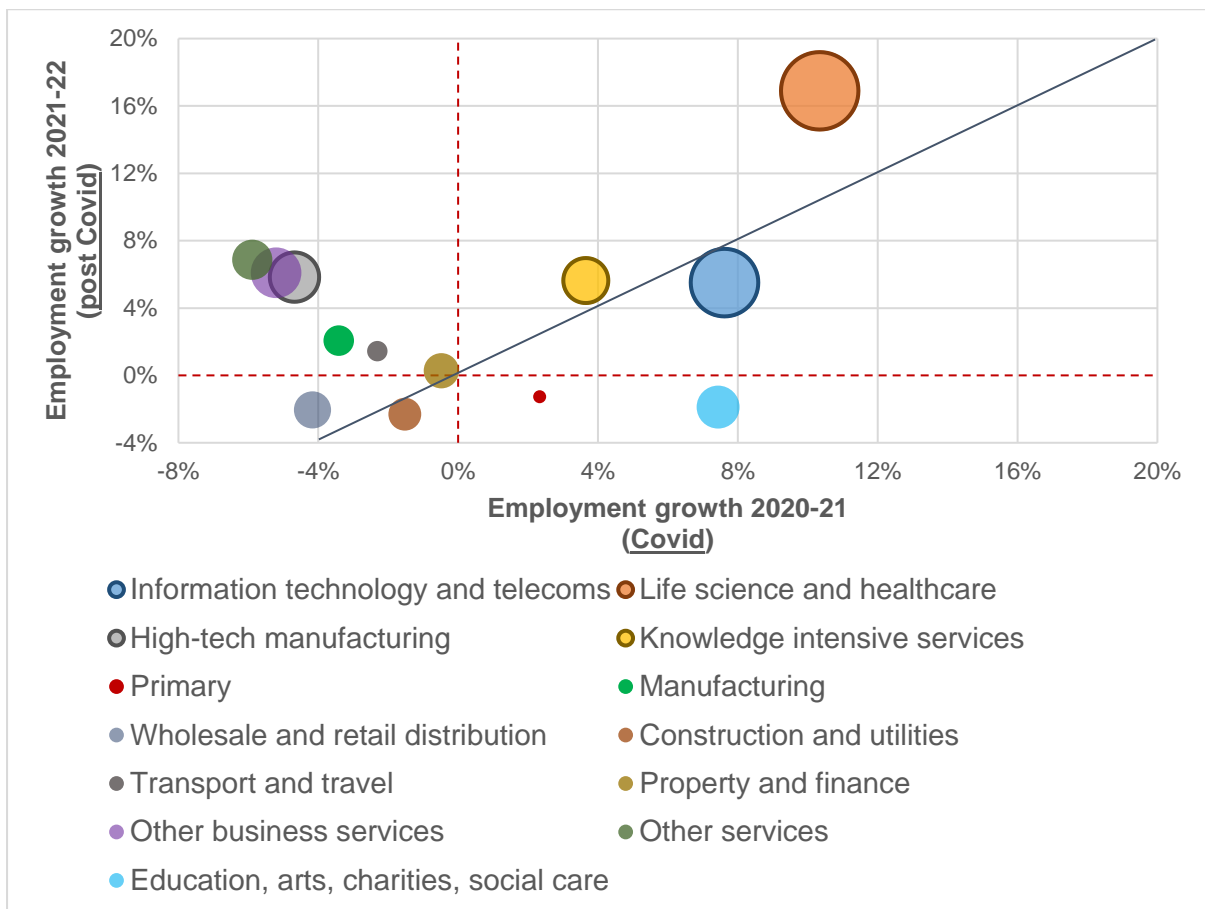
Similarly, the low- and med-low-tech 'Manufacturing' sector was one of seven non-KI sectors that showed a decline in employment growth during Covid. 'Other services', 'Other business services', 'Wholesale and retail distribution' and 'Manufacturing' witnessed the largest decline in employment growth. These results suggest that non-KI sectors have been hit the hardest by Covid restrictions.

The 'Other services' sector, which includes many hospitality businesses, was severely impacted by the pandemic. Employment growth in the sector dropped from 3.1% in the pre-Covid period to -5.9% in the Covid period, with just over one in ten companies reporting an increase in employee numbers during Covid.

The 'Education, arts, charities, social care' and 'Primary' sectors were the only sectors with positive employment growth in 2020-21. Fauna & Flora International (29.8%) and VoiceAbility (16.5%) are examples of 'Education, arts, charities, social care' companies which increased their headcount despite Covid, while the steady growth of the 'Primary' sector was helped by higher employee numbers at several farming businesses (e.g. Harrold Fruit Farming; 14.7%).

Figure 8 shows the **recovery** from Covid by comparing the 13 industry sectors based on their employment growth during 2020-21 (horizontal axis) and their employment growth during 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors during and after Covid.**

Figure 8 Employment growth by sector in the Greater Cambridge area: 2021-22 (post Covid) vs 2020-21 (Covid)



Note: The size of each bubble is proportionate to the number of employees in 2020-21 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

The results presented in Figure 8 show that employment growth picked up in a number of sectors during 2021-22 as businesses learn how to live with Covid.

'Life science and healthcare' saw employment growth accelerate from 10.3% in 2020-21 to 16.9% in 2021-22. Besides strong employment growth by some of the largest Life Science companies (e.g. AstraZeneca, Abcam and CMR Surgical), growth in the sector reflects increased employee numbers at companies such as Illumina (+95 employees), Healx (+33 employees) and Cambridge Healthcare Research (+29 employees). This result is particularly encouraging if one considers that our October 2022 Update sample covers 82% of corporate employment in the Life Science sector in Greater Cambridge (see the third data column of Appendices A1-A3).

'High-tech manufacturing' was the second fastest-growing KI sector in the post-Covid period (5.8%), which came following a drop of 4.7% during the pandemic. Some of the 'High-tech manufacturing' businesses with robust growth in 2021-22 were ION Science (14.5%), Xaar (11.5%) and Industrial Inkjet (10.2%). 'Knowledge intensive services' also reached a similar growth rate in 2021-22 (5.6%), driven by increased employee numbers at companies such as Evonetix (44.2%), Cambridge Mechatronics (15.7%) and TTP Group (14.7%).

Employment growth in 'Information technology and telecoms' was not as high in 2021-22 (5.5%) as it was in 2020-21 (7.6%), partly because of a reduction in employment by Aveva. However, many of the other large ICT companies in the area continued to exhibit strong growth in the latest year, for example Quartix Technologies (15.2%), Raspberry Pi (11.3%) and MathWorks (8.4%).

Among non-KI sectors, 'Manufacturing', 'Transport and travel', 'Property and finance', 'Other business services' and 'Other services' saw a return to growth in 2021-22 after suffering employment losses during Covid.

'Other services' achieved the fastest rate of growth amongst all non-KI sectors (6.9%), which is in stark contrast to the 5.9% drop it endured only one year earlier. Ieso Digital Health, a leading digital mental healthcare provider, Gonville Hotels, which owns and operates the Gonville Hotel in central Cambridge, and SRD Group, which runs the Clayton Hotel Cambridge, are but a few examples of 'Other services' companies with stronger growth in 2021-22.

Conversely, employment growth continued to be negative after Covid in 'Wholesale and retail distribution' and 'Construction and utilities'.

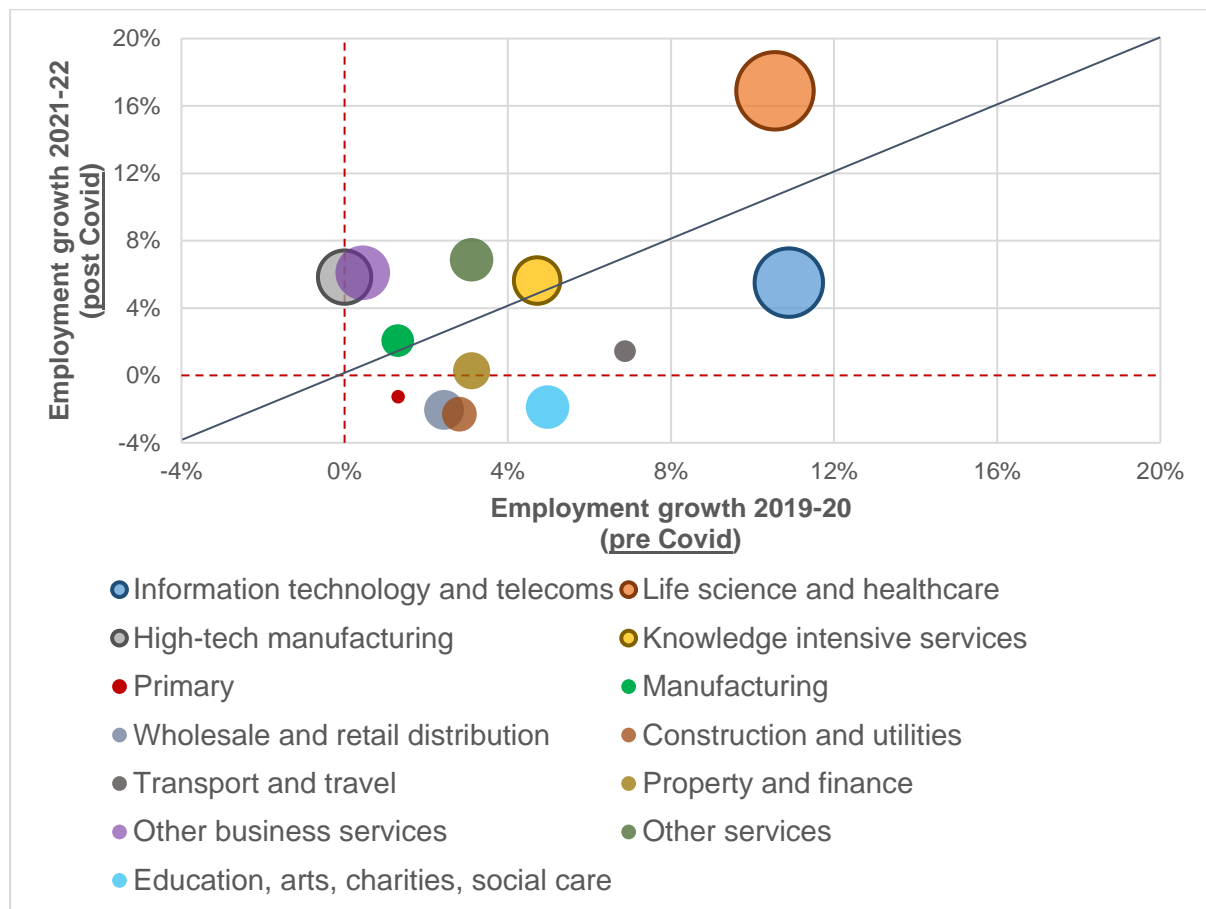
Companies in 'Wholesale and retail distribution' showed a 2.0% decline in employment during 2021-22 compared with a 4.2% decline during 2020-21. The decline in employment was similar between wholesale companies (-1.9%) and retail companies (-2.1%).

In turn, employment in the 'Construction and utilities' sector fell by 2.3% in the latest year compared with a fall of 1.5% in the previous year. Despite the steady growth by some construction companies such as CPS Building Services (10.1%), the decrease in employee numbers by several other companies (e.g. JCW Group and Coulson Group) led to a second consecutive year of negative employment growth in the sector.

The results for the 'Primary' and 'Education, arts, charities, social care' sectors are at odds with the results for the rest of the non-KI sectors. Employment growth of 'Primary' businesses dropped from 2.3% in 2020-21 to -1.3% in 2021-22, while it dropped from 7.4% to -1.9% respectively in the 'Education, arts, charities, social care' sector. As noted above, our results for the 'Education, arts, charities, social care' sector are in line with the latest results from BRES, although they are based on a sample that is dominated by large non-school organisations such as Fauna & Flora International, Camfed International and VoiceAbility.

Figure 9 examines the **lasting effect** of Covid by comparing employment growth by sector during 2019-20 (horizontal axis) and 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors before and after Covid.**

Figure 9 Employment growth by sector in the Greater Cambridge area: 2021-22 (post Covid) vs 2019-20 (pre Covid)



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.
Source: Cosh & Caselli, CBR.

Figure 9 sheds light on the extent of the recovery from the pandemic in each of the 13 sectors used in the analysis.

Businesses in ‘Life science and healthcare’, ‘High-tech manufacturing’ and ‘Knowledge intensive services’ grew their headcount faster in the post-Covid period than in the pre-Covid period. A case in point is the Life Science sector, where employment growth accelerated from 10.6% in 2019-20 to 16.9% in 2021-22. The picture is somewhat different for the other KI sector, ‘Information technology and telecoms’, which continued to grow at pace after Covid yet well below its pre-pandemic rate.

The results for the non-KI sectors paint an even more multifaceted picture.

‘Manufacturing’, ‘Other business services’ and ‘Other services’ achieved faster growth in 2021-22 than in 2019-20. This finding provides some reason to be optimistic about the speed of the recovery from Covid, since sectors such as ‘Other business services’ and ‘Other services’ include consultants, hospitality businesses and other in-person service companies that had their business severely disrupted by the pandemic. However, the ongoing cost of living crisis may well delay any return to normality.

In turn, ‘Primary’, ‘Wholesale and retail distribution’, ‘Construction and utilities’ and ‘Education, arts, charities, social care’ suffered employment losses in the latest year, whilst

they showed positive employment growth before the onset of the pandemic. Although the information provided in the company accounts does not enable us to explore this issue in more detail, it is possible that the cessation of the furlough scheme in September 2021 (our sample covers companies with accounting year ends between December 2021 and April 2022) might partly explain the fall in employment during 2021-22 captured by our data.

A final and third group of non-KI sectors includes 'Transport and travel' and 'Property and finance'. Employment growth in these sectors was positive post Covid, albeit considerably lower compared with the pre-Covid period.

The next section presents the results of the October 2022 Update sample that includes both employment and turnover growth.

3. October 2022 employment and turnover update results

So far we have examined only changes in employment because of better sample coverage, but we have turnover data for a sufficiently large subset of the companies to make turnover analysis worthwhile. We look at Greater Cambridge-based companies with four years of actual turnover and employment data, which gives us a sample of 129 companies (representing over 23% of total employment of the companies analysed in Section 2). Table 1 provides a comparison of employment and turnover growth rates over the past three years for this group of companies.

As discussed in the previous section, the first year of growth is the year before the pandemic struck; the middle year shows what happened to growth in the year the pandemic first struck and lockdowns occurred; and the latest year measures the strength of the recovery in the following year.

Table 1 Comparison of employment and turnover growth rates over the past three years in the Greater Cambridge area (October 2022 Update)

Greater Cambridge area Sample of companies with both employment and turnover for the last three years	Turnover growth %pa			Employment growth %pa		
	2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
	<i>Before</i>	<i>During</i>	<i>After</i>	<i>Before</i>	<i>During</i>	<i>After</i>
ALL COMPANIES						
Number of companies	129	129	129	129	129	129
Totals at end of each year	£5,159m	£4,891m	£6,121m	14,540	15,159	16,188
Median growth	8.0%	1.3%	10.8%	2.9%	0.0%	2.9%
Weighted average growth	5.9%	-5.2%	25.1%	6.4%	4.3%	6.8%
KI COMPANIES						
Number of companies	71	71	71	71	71	71
Totals at end of each year	£4,141m	£3,976m	£4,990m	9,969	10,699	11,709
Median growth	8.3%	1.7%	10.2%	6.3%	1.6%	7.2%
Weighted average growth	5.9%	-4.0%	25.5%	8.3%	7.3%	9.4%
NON-KI COMPANIES						
Number of companies	58	58	58	58	58	58
Totals at end of each year	£1,018m	£915m	£1,131m	4,571	4,460	4,479
Median growth	7.3%	-5.5%	12.4%	0.0%	0.0%	0.0%
Weighted average growth	6.1%	-10.2%	23.6%	2.6%	-2.4%	0.4%

Source: Cosh & Caselli, CBR.

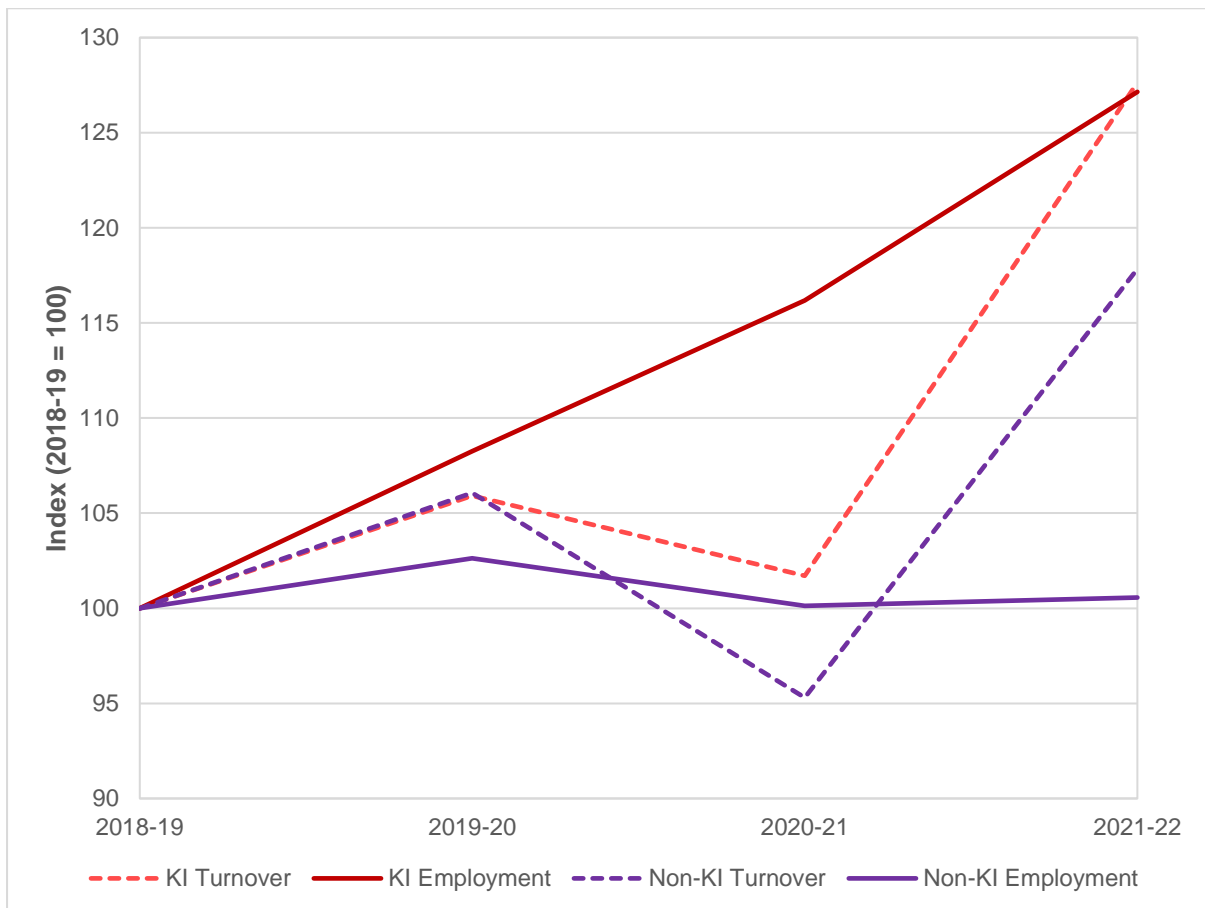
We do not analyse the 'All Companies' results since these depend upon the balance between KI and non-KI companies in this particular sample. If we look at the KI companies we see that both turnover and employment were strong before the pandemic struck. Growth of turnover in 2019-20 was also strong for the non-KI companies, but their growth of employment, whilst positive, was not as strong as that of the KI sector.

The findings for the pandemic period, 2020-21, clearly show a significant impact on performance. Employment growth of the KI companies slowed markedly, particularly if one looks at the median growth rate, but their total turnover actually fell. The picture is worse for non-KI companies which showed a fall in employment and an even greater fall in turnover. These findings have been reported before and bear witness to the support provided by the furlough scheme.

For the first time we are able to look at the performance of this same group of companies in the recovery year 2021-22. In the KI sector employment has resumed its previous vigorous growth and turnover has rebounded to its previous growth trajectory with total turnover of this group growing by 25%.

The recovery of non-KI companies has been more mixed. Employment growth has been very muted whilst turnover has rebounded from lockdown giving a growth of 24% for these companies.

Figure 10 KI and non-KI turnover and employment indices (2018-19 = 100)



Source: Cosh & Caselli, CBR.

Another way of looking at these data is shown in Figure 10. We create indices for employment and turnover in the KI and non-KI samples setting their values in 2018-19 equal to 100. This enables us to see the changes to the levels of employment and turnover from year to year.

We can see from the figure that the pandemic had little apparent effect on the growth of employment in the KI sector. By contrast, turnover was pegged back during the pandemic only to make up for lost time in the most recent year.

By contrast the impact of the pandemic on employment in the non-KI sector appears to have lasted longer. The modest growth of employment pre-Covid was reversed during Covid and has made only a modest recovery since. On the other hand, turnover suffered a steep decline during the pandemic but, like the KI sector, has roared back in the latest year. This contrast between employment and turnover growth is partly due to the exceptional turnover growth of four companies – two finance companies (Cashflows Europe and MORhomes) and two companies involved in the building industry’s post-lockdown recovery (Coulson Group and Services, Machinery & Trucks).

We now turn to the results of the October 2022 snapshot.

4. October 2022 snapshot results

This section summarises the results of the October 2022 snapshot. Having seen in Section 3 the results for employment and turnover data, this section uses just the nine companies that have presented interim results for the six-month periods ending between May and June 2022. Only turnover data is available and together they represent a combined annual turnover of about £769m.

The gain from focusing on interim results for six-month periods is that most of the activity reported in the accounts took place in 2022. For each company we look at turnover growth in the same six-month period in 2019-20, 2020-21 and 2021-22. The first year shows the pandemic effect; the second year the recovery from the worst impacts of the pandemic; and the final year examines whether Putin's war has started to impact these companies.

4.1. Turnover growth

Total turnover for this group of companies grew by 20% in their latest six months (2021-22) compared with a growth of 19% in the same period last year (2020-21) and -9% in the first six months of the pandemic (2019-20).

The findings of the previous section are reinforced for this sample and suggest that the growth of these successful KI companies has remained robust into 2022. To date we cannot identify any impact of Putin's war and the associated rise in energy prices and falls in living standards.

4.2. Companies' comments on recovery from the Covid-19 pandemic

We report below some comments from the companies' latest reports. They offer some further insights into the impact of the Covid-19 pandemic on their business. We noted above that the impact of Covid has varied across businesses in different sectors. These reports, published in recent months, appear to show a high level of business confidence despite being written in the middle of this year.

Though the U.S. Dollar continues to be unusually strong relative to Darktrace's other operating currencies, its key FX rates have recovered somewhat from the lows experienced in late September. On this basis, Darktrace is maintaining its expectation for FY 2023 year-over-year revenue growth of between 30% and 33%, though it will continue to monitor FX rates, and their potential impacts on revenue, for downside movement relative to rates at this reporting date.

Darktrace: Global leader in cyber security AI

Since the period end, CyanConnode has won five orders, including the largest-ever order from India. In addition, CyanConnode's business has continued on its growth path and is currently integrating with a further nine meter models, giving access to a larger number of opportunities. We look forward to further order announcements during this financial year as the Indian smart metering market continues to mature, and to delivering the backlog of orders won in current and previous periods.

CyanConnode Hldgs: Delivers Wi-Fi solutions for utility metering and lighting control

In summary, the first half of 2022 has continued the Group's track record of resilient performance, delivering results slightly ahead of the Board's expectations. The Group is experiencing increases in materials, energy and staff costs but has to date managed to offset the effects. The macroeconomic environment is unpredictable with global inflationary pressures and destabilising geo-political events, now combined with an uncertain UK political direction and economic policy. Economic performance in some of the Group's markets is anticipated to deteriorate in the months ahead as consumer spending slows. While the Group is not immune to macroeconomic factors, the revenue streams are well diversified with little reliance on individual customers, or sectors, and therefore is well positioned with solid foundations. As a result, the Board remains cautiously optimistic for the remainder of the year.

Science Group PLC: Science and technology consultants

I am delighted to report on continued excellent trading momentum across all business units, reflecting the widespread demand for our products, the depth and resilience of our customer relationships and our success in navigating the challenging supply environment. The strength of trading in the first half, combined with ongoing healthy order intake gave us confidence to upgrade our full year expectations for 2022 in July. These trading results support the decision to commit capital to the strategic stock purchase programme in January 2021, which we believe continues to give us a competitive advantage, despite resulting in a cash outflow during the first half. A strong start to the second half combined with our strength of order coverage gives us a high degree of confidence in meeting the upgraded full year market expectations and we continue to see compelling opportunities for long-term growth in the business through disciplined execution of our strategy.

Quixant PLC: Makes products for the global gaming and broadcast industries

Total revenue for the first six months of 2022 up 23% to £185.2m from the same period last year.

Abcam PLC: Provides biological and tools for drug discovery

The IQGeo business performed very well in the first half of the year notwithstanding the uncertain global backdrop. This success reflects sustained investment in network modernisation from both telecommunication and utility operators worldwide, and the success of our investments in our products and organisation. We continue to expand our customer base through direct organic sales and our strategy of M&A driven market growth. The successful acquisition of Comsof NV gives us a strong list of new customers and industry-leading network planning technology, both of which will increase our market momentum. This performance and the platform that we have established gives us the confidence in achieving our expectations for this year. We remain very positive about the outlook for our target markets in the telecommunication and utility industries.

IQGeo Group PLC: Provides geospatial software for the telecoms and utilities

Revenue for the period was £36.6 million, representing an increase of 39% compared to H1 2021. We are confident we have secured all critical components to enable us to fulfil customer orders for the remainder of the year and into 2023. Where possible we have passed cost increases on to our customers through increased sales prices. We are conscious of the continuing impact arising from the economic consequences of wider global issues, particularly with cost inflation, and COVID-19, particularly in China. Whilst we expect this to continue in the short to medium term, we remain on track to report adjusted profit for the full year and look forward to the future with confidence.

Xaar PLC: Digital inkjet printing technology

In 2021 Quartix was impacted by the global supply shortage in component parts increasing the equipment costs. Given this shortage, the Company took the decision to terminate the supply of new installations for its main insurance client in order to prioritise its fleet operations. Under a new agreement Quartix will only continue to provide tracking systems for the customer's existing policy holders and will provide data and warranty services for a contractually agreed monthly service fee until September 2022. The Group has made a strong start to the second half, in line with management's expectations. The high levels of recurring revenue and opportunities to grow our operations in the UK, USA, France and the rest of Europe underpin our confidence for the rest of the year and beyond.

Quartix Technologies PLC: Vehicle GPS tracking

Work to support the successful relocation of the Marshall Aerospace (MA) and Marshall Land Systems (MLS) businesses remains firmly on track. Having identified Cranfield as a preferred location for MA and with an option agreement signed in September 2020, we are preparing to submit an outline planning application for a new facility during Q3 of this year.

Marshall Aerospace: Servicing and parts manufacture for aircraft

We step into the second half of this year with an Annual Recurring Revenue some 14% higher than this time last year. This is an achievement of which all our colleagues should be proud. Now, nearly three months into Q3, we continue to have confidence in our second half prospects. We are seeing improved availability of components in the second half, unwinding delays seen in H1. With the acquisition of The Filter now complete we have an even more compelling offering for our customers. The increasing quality of engagement we are able to have with current and prospective customers underpins my view that Aferian is well positioned to not only benefit from global growth in streaming, but also shape the way this dynamic market evolves for years to come.

Aferian (Amino Technologies) PLC: Global media and entertainment technology

Revenue has grown by 9% in the first half of this year. Bango has a strong balance sheet with no bank debt and a high margin platform business that means top line growth drops straight to the bottom line. In 2021, and continuing in 2022, we will use this profit to reinvest and power our future growth.

Bango PLC: Technology and services helping global businesses to grow

Against this challenging backdrop, the performance of the Group in 2021 against its formulary targets has been positive and has continued to position the business well for growth over the longer term. Net revenues for FY21 were US\$1.2 million, cash as at 31 December 2021 was US\$21.6 million and the cash runway, consistent with what has previously been communicated, would continue to finance the Group until mid-2022 as the Group has managed its cash accordingly. However, in light of the continued delay in achieving significant revenues, Acacia now expects it would require a minimum of approximately US\$115 million of additional cash to fund operations to break even (estimated to be by early FY25). Following consideration of the available proposals, and having regard to the advice provided by the board's advisors and in view of Acacia's available resources, the directors of Acacia unanimously believe the proposed transaction with Eagle Pharmaceuticals Inc announced on 28 March 2022 is the best available option for Acacia Shareholders to maximize the value of their Acacia Shares.

Acacia Pharma Group: Develops products to help patients having invasive treatment

The Company followed its strong performance in 2021 with a 31% growth in revenues to £5.9million in the first half of 2022 (H1 2021: £4.5 million). Order intake was in line with the Board's expectations at £7.2 million, up 44% on a like-for-like basis on H1 2021 (H1 2021: £8.6 million, including £3.6 million of one-off orders) and the Company has a growing, qualified pipeline of opportunities for the second half of 2022. The contracted order book was £18.6 million at 30 June 2022 increasing from £17.1m at 31 December 2021. The order book provides the Company with visibility over future revenues and provides a solid foundation from which the Company can continue to invest in product and commercial development to further expand the business.

Cambridge Cognition Hldgs PLC: Digital solutions to assess brain health

The increase in consumables revenue in the current period was driven by a general increase in demand for both microarray and sequencing consumables. This increase is in part driven by a bounce back from the prior period which was negatively impacted by COVID-19 pandemic, in addition to a general increase in awareness and demand in the genetics sphere.

Illumina Cambridge Ltd: Development of novel techniques for the analysis of DNA

The successful release of Jurassic World Evolution 2, together with the ongoing performance of our established portfolio of genre-leading games and our Foundry titles, delivered record revenue in FY22 of £114.0 million (growth of 26% over £90.7 million in FY21). Over the medium term, the Board expects Frontier to continue to grow revenue by around 20% on average per annum, with any annual growth rate variability largely driven by the timing and scale of new releases in each year.

Frontier Developments PLC: Developer and publisher of videogames

5. Concluding remarks

The October 2022 Update is the seventh of a series of updates that provide timely data on corporate employment changes in the Greater Cambridge area. The findings in this report are drawn from a sample of 4,200 Greater Cambridge-based companies with accounting year ends between December 2021 and April 2022. This sample, which covers almost two-thirds of corporate employment in the area, has a modal year end of early March 2022. Therefore, it captures the impact of the coming out of Covid lockdowns but precedes Putin's war. Uniquely for this update, we compare this post-lockdowns period with the performance before and during Covid.

The results for the pandemic period show a significant impact on performance. Employment growth of Greater Cambridge-based businesses slowed down during Covid, largely reflecting a weaker performance of non-KI sectors. KI employment continued to grow at pace despite Covid-related restrictions, testifying to the resilience of the Greater Cambridge KI economy. We find positive and much stronger overall employment growth in the post-Covid period, driven by large increases in employee numbers by KI companies – particularly in the Life Science sector. Our comparison of the performance before and after the lockdowns suggests that corporate employment has started to recover from the worst effects of Covid. Whilst the recovery is well underway for KI sectors, employment growth in non-KI sectors remains below its pre-pandemic levels despite having picked up in 2021-22.

We complement these findings by studying the performance of a smaller sample of companies for which we have both employment and turnover data over the past four years. The results of this analysis unveil little apparent effect of the pandemic on employment growth amongst KI sectors. By contrast, turnover was pegged back during Covid only to make up for lost time in the latest year. The picture looks different for non-KI sectors, where the impact of the pandemic on employment appears to have lasted longer. The modest growth of non-KI employment prior to the pandemic was reversed during Covid and there has been only a modest recovery since. At the same time, non-KI turnover suffered a steep decline during the pandemic but, like the KI sector, has roared back in the most recent year.

Taken together, the results for employment and turnover bear witness to the important role played by the furlough scheme, which supported employment in sectors that experienced a fall in turnover in the aftermath of Covid. Importantly, we also find no evidence that the cessation of this unprecedented support package in September 2021 has led to employment loss in the corporate sector.

Finally, we qualify the results for turnover by providing a snapshot for companies with interim accounts ending between May and June 2022. These companies are all knowledge intensive and showed robust turnover growth during 2021-22 (which covers the first months of Putin's war) and 2020-21 (which includes the recovery from the worst impacts of the pandemic). This growth is in stark contrast to the 9% drop in turnover during the first six months of the pandemic (2019-20). The perusal of their interim reports points to a high level of business confidence despite being written in the middle of a very turbulent year. These findings reinforce those from the employment update sample and suggest that the growth of these successful KI companies has remained robust into 2022 despite the rising levels of inflation.

Therefore, to date we cannot yet identify any material impact of Putin's war and the ensuing recession and cost of living crisis on the performance of Greater Cambridge-based businesses. However, our October 2022 Update covers only the very early days of these events. We have to defer any further considerations until the February 2023 Update, which

will examine corporate employment changes over the period including the first months of the UK cost of living crisis and Putin's war.

Andy Cosh

Giorgio Caselli

Centre for Business Research, University of Cambridge

October 2022

Appendix A1. Employment growth by sector in the Greater Cambridge area

October 2022 Update	Number of companies	Total empl 2021-22	% of GC total 2020-21	Empl growth 2019-20	Empl growth 2020-21	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	599	12,371	66.6%	10.9%	7.6%	5.5%
Life science and healthcare	183	17,799	81.9%	10.6%	10.3%	16.9%
High-tech manufacturing	156	6,853	76.9%	0.0%	-4.7%	5.8%
Knowledge intensive services	178	5,757	79.9%	4.7%	3.7%	5.6%
TOTAL KI SECTORS	1,116	42,780	75.6%	7.7%	5.8%	10.0%
OTHER SECTORS						
Primary	78	390	14.9%	1.3%	2.3%	-1.3%
Manufacturing	175	2,223	57.2%	1.3%	-3.4%	2.1%
Wholesale and retail distribution	347	3,155	49.9%	2.4%	-4.2%	-2.0%
Construction and utilities	417	2,460	51.1%	2.8%	-1.5%	-2.3%
Transport and travel	75	986	53.4%	6.9%	-2.3%	1.4%
Property and finance	424	2,908	48.2%	3.1%	-0.5%	0.3%
Other business services	851	6,354	49.8%	0.4%	-5.2%	6.1%
Other services	468	4,031	43.2%	3.1%	-5.9%	6.9%
Education, arts, charities, social care	239	4,225	33.8%	5.0%	7.4%	-1.9%
TOTAL NON-KI SECTORS	3,074	26,732	44.3%	2.6%	-2.1%	1.8%
TOTAL ALL SECTORS	4,190	69,512	58.9%	5.5%	2.5%	6.7%

Source: Cosh & Caselli, CBR.

Appendix A2. Employment growth by sector in Cambridge

October 2022 Update	Number of companies	Total empl 2021-22	% of Camb total 2020-21	Empl growth 2019-20	Empl growth 2020-21	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	247	7,872	79.8%	11.9%	8.7%	5.8%
Life science and healthcare	61	6,791	82.3%	12.4%	13.4%	19.2%
High-tech manufacturing	29	484	35.4%	-3.7%	-1.3%	5.4%
Knowledge intensive services	70	1,454	70.0%	8.2%	5.7%	9.2%
TOTAL KI SECTORS	407	16,601	76.8%	11.1%	9.8%	11.2%
OTHER SECTORS						
Primary	12	108	54.1%	4.0%	9.7%	-4.4%
Manufacturing	37	264	37.5%	1.1%	0.7%	-4.3%
Wholesale and retail distribution	119	731	28.8%	2.5%	-8.2%	-3.4%
Construction and utilities	98	419	46.1%	1.6%	-6.3%	-2.1%
Transport and travel	20	163	32.4%	3.1%	-29.2%	-2.4%
Property and finance	160	1,658	50.8%	2.9%	0.1%	-0.1%
Other business services	321	3,010	43.6%	-3.1%	-8.8%	6.2%
Other services	189	1,543	37.1%	6.3%	-7.6%	7.2%
Education, arts, charities, social care	107	2,769	37.5%	4.1%	8.9%	-1.7%
TOTAL NON-KI SECTORS	1,063	10,665	40.1%	1.7%	-2.9%	1.7%
TOTAL ALL SECTORS	1,470	27,266	55.7%	6.8%	4.2%	7.3%

Source: Cosh & Caselli, CBR.

Appendix A3. Employment growth by sector in South Cambridgeshire

October 2022 Update	Number of companies	Total empl 2021-22	% of S Cambs total 2020-21	Empl growth 2019-20	Empl growth 2020-21	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	352	4,499	51.7%	9.3%	5.9%	5.0%
Life science and healthcare	122	11,008	81.7%	9.5%	8.6%	15.5%
High-tech manufacturing	127	6,369	84.4%	0.3%	-4.9%	5.9%
Knowledge intensive services	108	4,303	83.7%	3.7%	3.0%	4.5%
TOTAL KI SECTORS	709	26,179	74.8%	5.8%	3.4%	9.3%
OTHER SECTORS						
Primary	66	282	11.6%	0.4%	-0.4%	0.0%
Manufacturing	138	1,959	61.9%	1.3%	-4.0%	3.0%
Wholesale and retail distribution	228	2,424	64.2%	2.4%	-2.8%	-1.6%
Construction and utilities	319	2,041	52.3%	3.1%	-0.5%	-2.3%
Transport and travel	55	823	61.7%	8.1%	6.1%	2.2%
Property and finance	264	1,250	45.1%	3.5%	-1.2%	0.8%
Other business services	530	3,344	57.1%	4.1%	-1.7%	6.0%
Other services	279	2,488	48.0%	1.2%	-4.8%	6.6%
Education, arts, charities, social care	132	1,456	28.4%	6.6%	4.7%	-2.2%
TOTAL NON-KI SECTORS	2,011	16,067	47.7%	3.2%	-1.5%	1.9%
TOTAL ALL SECTORS	2,720	42,246	61.1%	4.7%	1.4%	6.4%

Source: Cosh & Caselli, CBR.

Appendix A4. Greater Cambridge Employment Update methodology

This appendix describes the purpose and methodology of regular updates of the corporate database.

Annual draw

Dr Cosh and Dr Caselli at the CBR hold a corporate database of local companies with data going back eleven years. The current database goes from 2010-11 to 2020-21 audited company data and covers the accounting periods of companies ending in the 2020-21 financial year. The results of the 2021-22 annual draw will be made available in February 2023. The reasons for the delay in publication relative to the accounting periods are:

- The need to wait until most companies have filed their accounts at Companies House.
- The incorporation of all company births and deaths.
- The careful checking of any changes in ownership, or corporate structure.
- The investigation of changes of location by companies into and out of the area.

This yields a comprehensive picture each year of the total employment of all companies that are based in the Cambridgeshire and Peterborough Combined Authority, Greater Cambridge, or Cambridge Ahead (Cambridge City Region) areas. It enables us to analyse the composition of growth split into growth of continuing businesses, less the decline due to companies dying or moving out of the area, plus the contribution to growth of company births and businesses moving into the area.

A full description of the methodology used can be found at:

<https://www.cbr.cam.ac.uk/wp-content/uploads/2022/03/11-cbr-database-methodology.pdf>

Various analyses can be found at:

<https://www.cbr.cam.ac.uk/research/research-projects/the-cambridge-corporate-database-regional-growth/#item2>

Updates

Timings

The current circumstances for business make it important to attempt to have more timely data. This can be achieved by using a sampling approach drawing upon the most recently published accounts.

We carry out an update every four months, spread evenly over the year and this can be seen in Table A1. If we look at 2023, we propose February, June and October updates which will yield estimates of growth for the years to end April 2022, August 2022 and early December 2022. These periods will capture: the effects of the first months of the UK cost of living crisis that started in late 2021 (February update); the impact of the worsening cost of living crisis in the aftermath of Putin's war and the ensuing recession (June update); and the effects of the unfolding cost of living crisis and any further developments. However, it must be remembered that the update takes no account of births or deaths, or of changes in location.

Table A1 Summary of Greater Cambridge Employment Updates

Draw Name	Sample or All	Accounting year ends within:	Median growth period	Release date	Insight into:
<i>Update October 2022*</i>	Sample	December 2021 to April 2022	Year to early March 2022	November 2022	Performance before, during and after Covid lockdowns
<i>Annual draw 2021-22**</i>	All companies	6 th April 2021 to 5 th April 2022	Year to early December 2021	February 2023	Recovery from worst impacts of Covid
<i>Update February 2023</i>	Sample	March 2022 to August 2022	Year to end April 2022	March 2023	Impact of first months of cost of living crisis
<i>Update June 2023</i>	Sample	April 2022 to December 2022	Year to August 2022	July 2023	Impact of worsening cost of living crisis following Putin's war
<i>Update October 2023</i>	Sample	October 2022 to April 2023	Year to early December 2022	November 2023	Impact of unfolding cost of living crisis and further developments

Notes: * commissioned and sponsored by the Greater Cambridge Partnership and Cambridge Ahead; ** commissioned and sponsored by Cambridge Ahead, Arm, Marshall of Cambridge, Mills & Reeve and the Cambridgeshire and Peterborough Combined Authority.

Update Sample (using October 2022 Update example)

We download data from FAME for any company in Cambridge, South Cambridgeshire, Huntingdonshire, or East Cambridgeshire that has available Accounts for the periods ending between December 2021 and April 2022. We then check 2020-21 and 2021-22 employment data against the existing figures on the database. Differences can occur for a number of reasons and are corrected to ensure that consistency and accuracy are maintained across the years under review.

We eliminate companies from the update sample that do not have actual employment data for the last two years. Finally, we create a file with the following information for those remaining in the update sample (**3,073** companies this time representing total employment of **45,762**):

- Company name
- Company registration number
- LA District
- Sector
- KI or non-KI
- Size class in 2020-21 – 1 = 1 employee, 2 = 2-9 employees, 3 = 10 or more employees
- Latest employment 2021-22 (on average early March 2022)
- Employment 2020-21 (on average early March 2021)
- % change in employment over last year (i.e. on average to early March 2022)

Next, we produce a table showing the number of companies in each of the four KI sectors and nine non-KI sectors and their total employment in the latest and previous year. This table is then reproduced separately for our three size classes.

We then create three measures of growth over the latest year: the unweighted arithmetic mean, the median and the weighted mean. The first suffers from extreme values and also attaches the same importance to a large company as that for a small company. The second will often have the values of zero since a large proportion of companies do not change size. Therefore, it is the latter that we use for the next stage of the work.

Updating the corporate database for the Greater Cambridge area

We take from our corporate database all companies currently alive that are based in Cambridge or South Cambridgeshire. We select a sample of those companies that have accounting periods ending between December 2021 and April 2022 (whether, or not, they have yet reported). For companies that were included in the update sample we enter their employment data for the last four years. For the remaining companies that have not yet reported in 2021-22 we next download the latest FAME data and check employment data for the last four years against the existing figures on the database. Following this, we create a file with all the companies based in the Greater Cambridge area (**4,190** companies representing total employment of **69,512**) with the following information:

- Company name
- Company registration number
- Local Authority District
- Sector
- KI or non-KI

- Size class in 2020-21 (as above)
- Employment 2018-19
- Employment 2019-20
- Employment 2020-21
- Employment 2021-22
- % change in employment between 2020-21 and 2021-22

We now use the estimates of growth by size and sector from the update sample to create an estimate of the size of each company and sector in 2021-22. This allows us to compare the most recent growth of each sector and size class over the most recent year 2021-22 in comparison with the years 2020-21 and 2019-20 for this sample of companies. The resulting sample is shown in Appendices A1-A3 and these tables highlight how significant these companies are, representing about 59% of corporate employment in Greater Cambridge.

The sample has a somewhat lower (yet still large) coverage of total employment in this update because we require companies to have four years of employment data (and not three as in the previous updates).

Analyses

Using the methodology described above we can compare the performance of our sectors over time and identify those sectors most impacted by Covid. A powerful tool for doing this is one that has as the horizontal axis the sector's employment growth rate in the year 2019-20 and as the vertical axis the annual growth shown in the update sample for 2020-21 – see Figure 7 above for an example. The position of the sector marker relative to the 45° line shows those growing more or less fast than last year. Sectors with positive growth in 2020-21 are found above the horizontal axis and those with positive growth in 2019-20 appear to the right of the vertical axis. This can be shown more informatively by having the size of the marker related to the total employment in that sector. Similarly, we can identify those sectors with the strongest post-Covid performance by way of a bubble chart that compares employment growth in 2021-22 against employment growth in 2020-21 – see Figure 8 above.

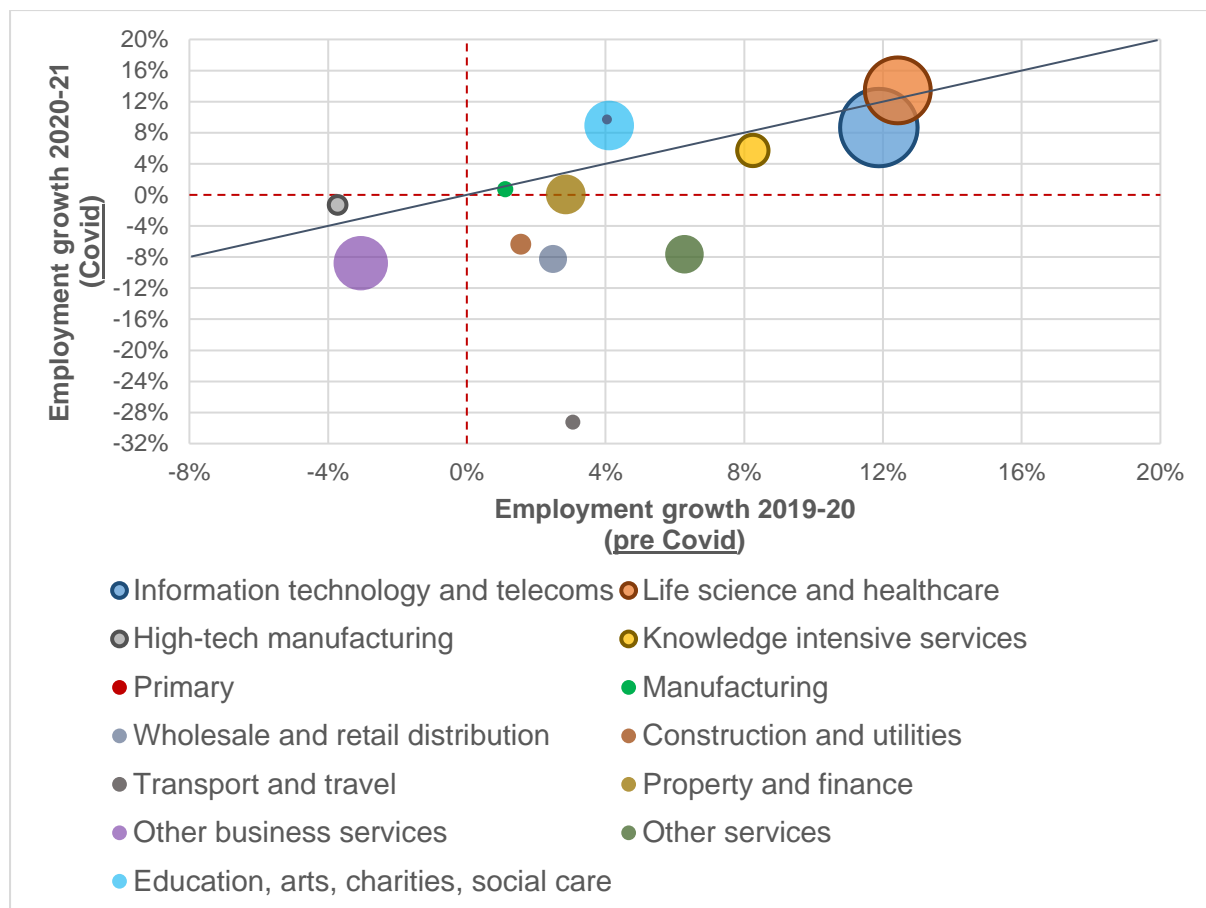
This type of chart can be used to examine different sectors, districts or company sizes. It is reinforced by an appendix that provides detailed tables (see Appendices A1-A3).

Appendix A5. Employment growth by sector in Cambridge and South Cambridgeshire

This appendix includes further graphical analysis drawn from our October 2022 Update sample. It provides a comparison of employment growth by sector for Cambridge and South Cambridgeshire separately, distinguishing between the periods before, during and after Covid. The equivalent charts for Greater Cambridge as a whole are shown in Figures 7-9 above.

Figure A1 compares the 13 industry sectors based on their employment growth during 2019-20 (horizontal axis) and their employment growth during 2020-21 (vertical axis), this time focusing on Cambridge. **This chart allows us to compare the performance of sectors before and during Covid.** It is drawn from a sample of companies with accounts for the years ending between December 2021 and April 2022. The position of the sector marker relative to the 45° line shows whether the sector has grown more or less fast than last year. Sectors with positive growth in 2020-21 are found above the horizontal axis and those with positive growth in 2019-20 appear to the right of the vertical axis.

Figure A1 Employment growth by sector in Cambridge: 2020-21 (Covid) vs 2019-20 (pre Covid)

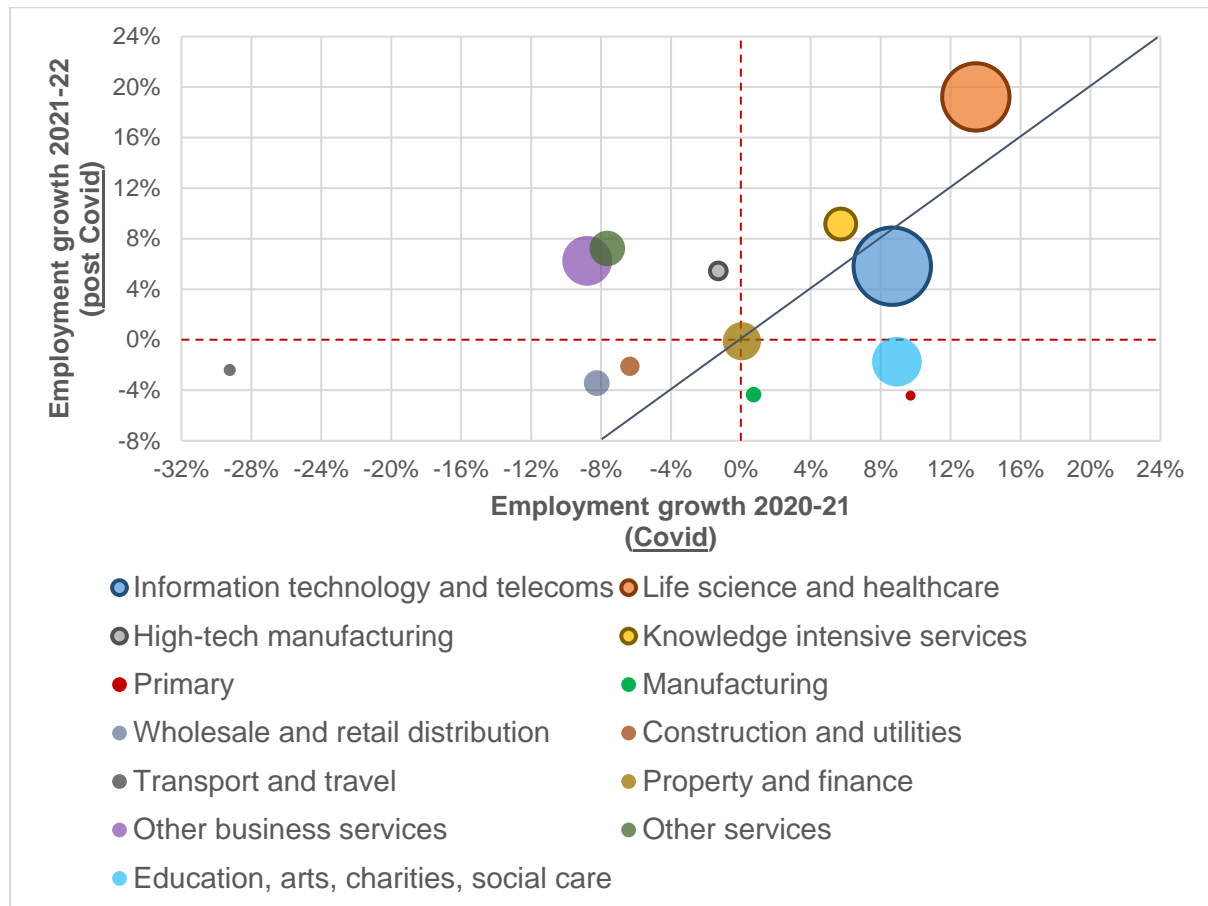


Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Figure A2 provides a comparison of the 13 industry sectors in Cambridge according to their employment growth during 2020-21 (horizontal axis) and their employment growth during 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors during and after Covid.**

Figure A2 Employment growth by sector in Cambridge: 2021-22 (post Covid) vs 2020-21 (Covid)

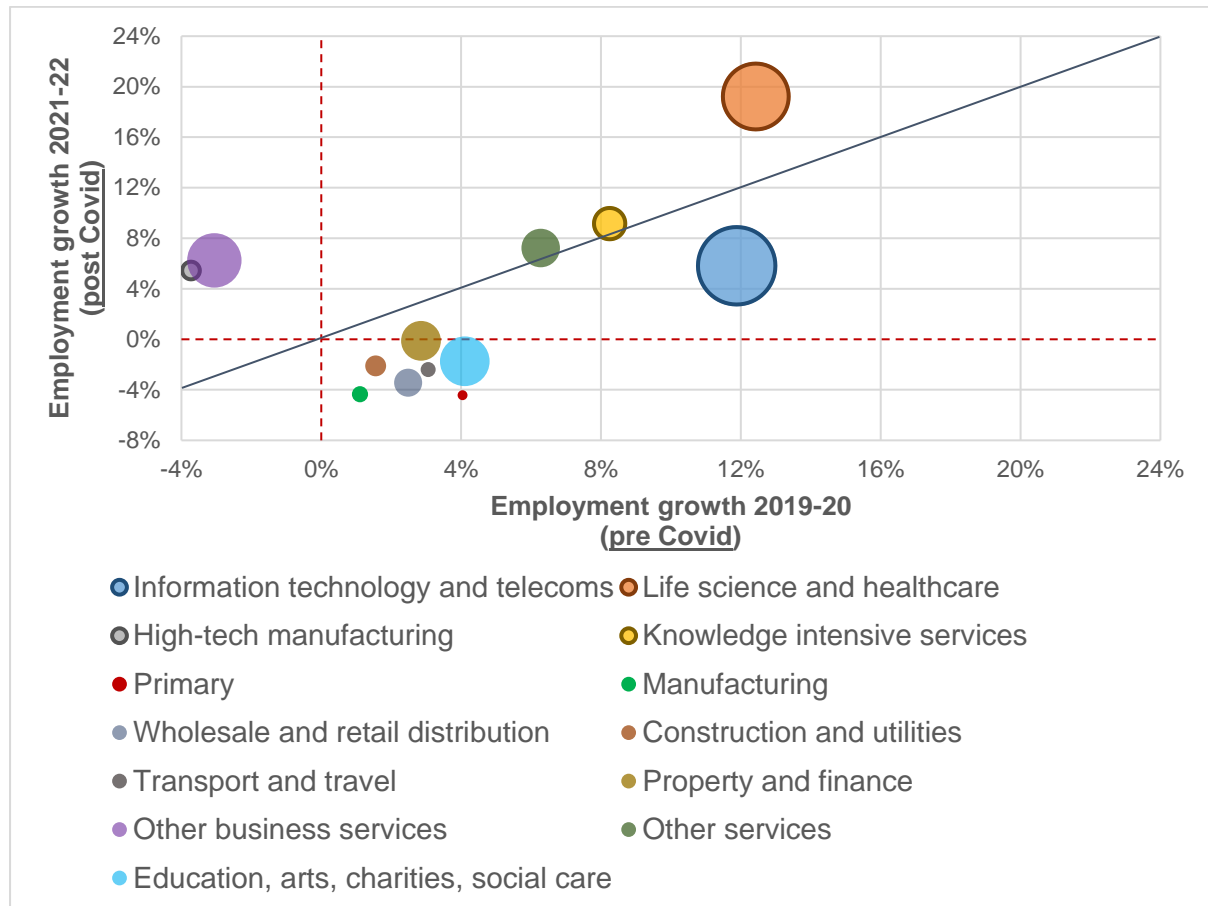


Note: The size of each bubble is proportionate to the number of employees in 2020-21 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Figure A3 compares employment growth by sector in Cambridge during 2019-20 (horizontal axis) and 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors before and after Covid.**

Figure A3 Employment growth by sector in Cambridge: 2021-22 (post Covid) vs 2019-20 (pre Covid)

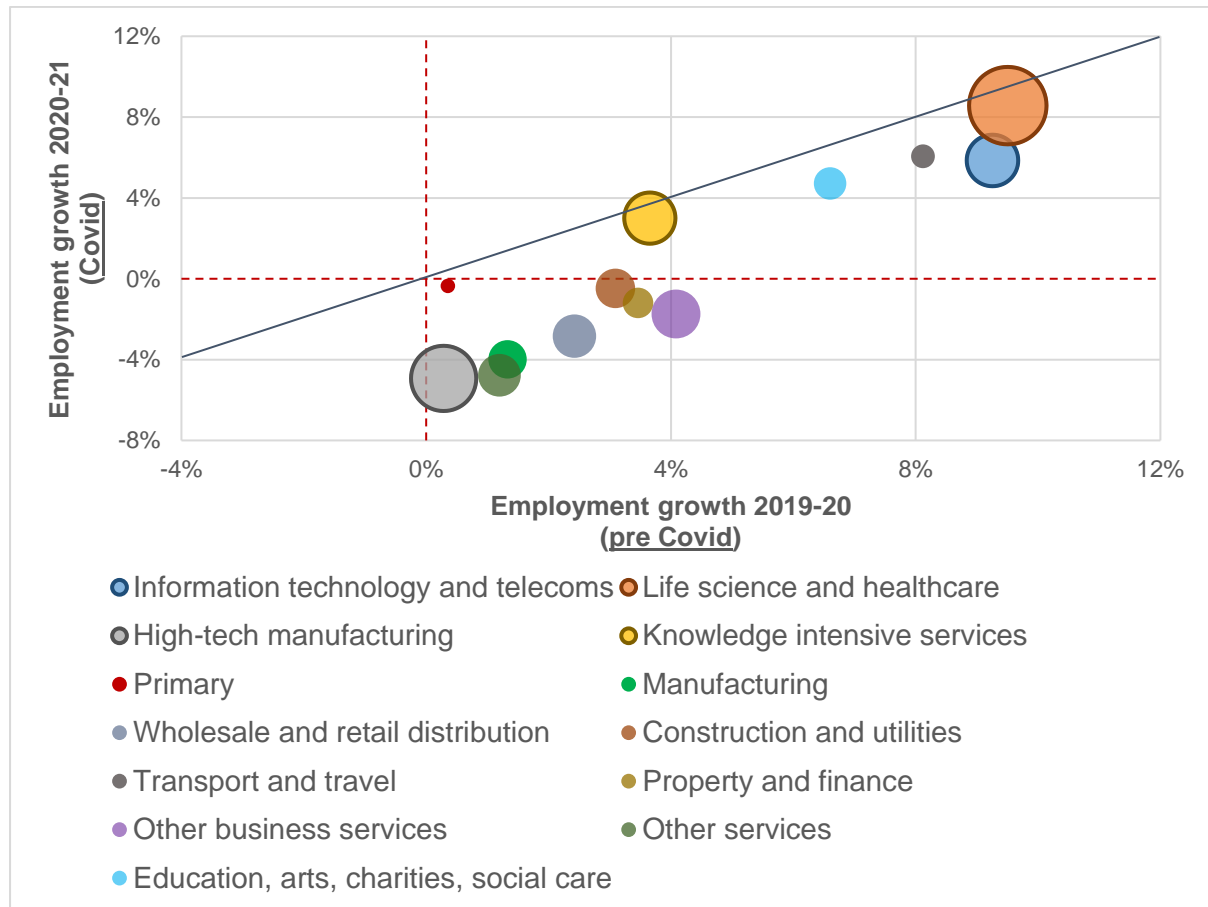


Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Figure A4 focuses on South Cambridgeshire and compares the 13 industry sectors according to their employment growth during 2019-20 (horizontal axis) and their employment growth during 2020-21 (vertical axis). **This chart allows us to compare the performance of sectors before and during Covid.** It is drawn from a sample of companies with accounts for the years ending between December 2021 and April 2022. The position of the sector marker relative to the 45° line shows whether the sector has grown more or less fast than last year. Sectors with positive growth in 2020-21 are found above the horizontal axis and those with positive growth in 2019-20 appear to the right of the vertical axis.

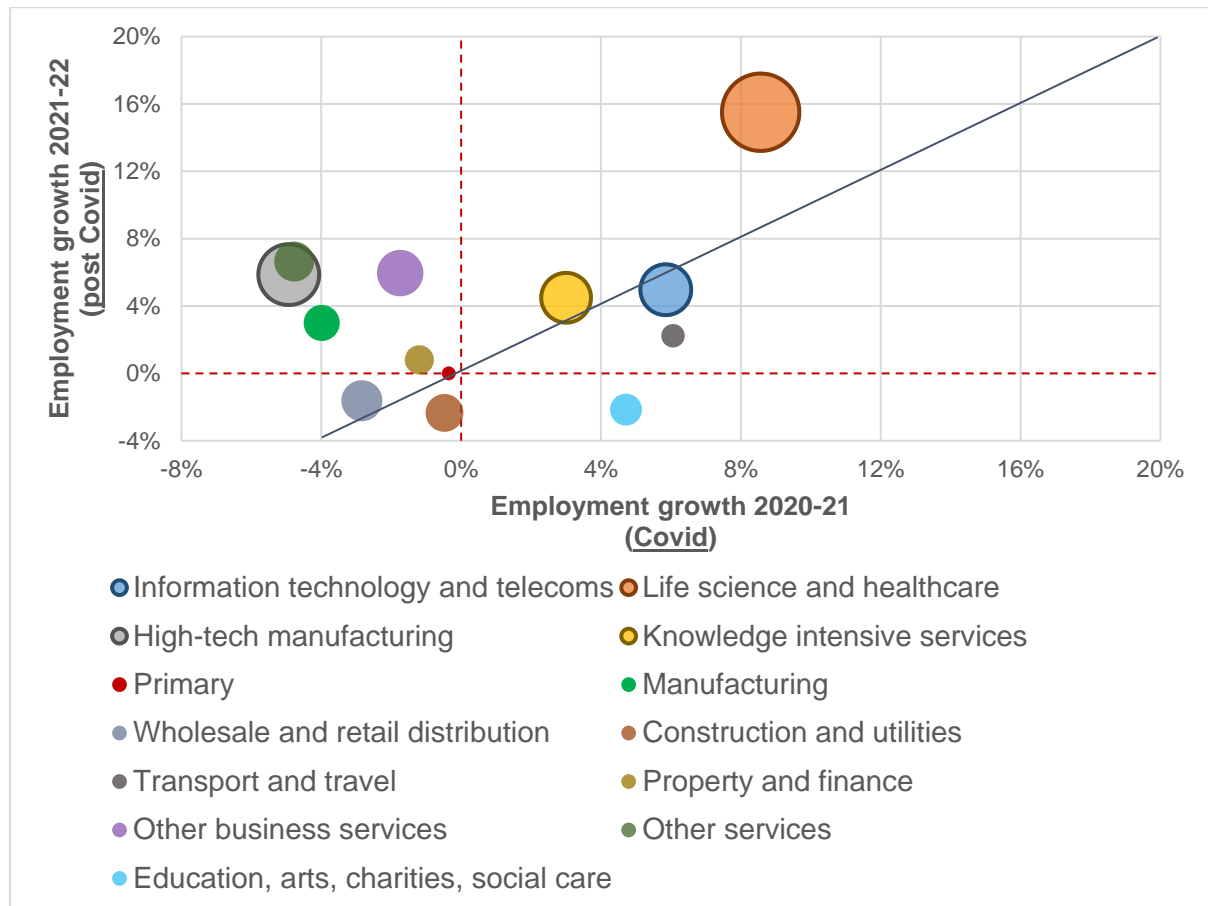
Figure A4 Employment growth by sector in South Cambridgeshire: 2020-21 (Covid) vs 2019-20 (pre Covid)



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.
Source: Cosh & Caselli, CBR.

Figure A5 provides a comparison of the 13 industry sectors in South Cambridgeshire based on their employment growth during 2020-21 (horizontal axis) and their employment growth during 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors during and after Covid.**

Figure A5 Employment growth by sector in South Cambridgeshire: 2021-22 (post Covid) vs 2020-21 (Covid)

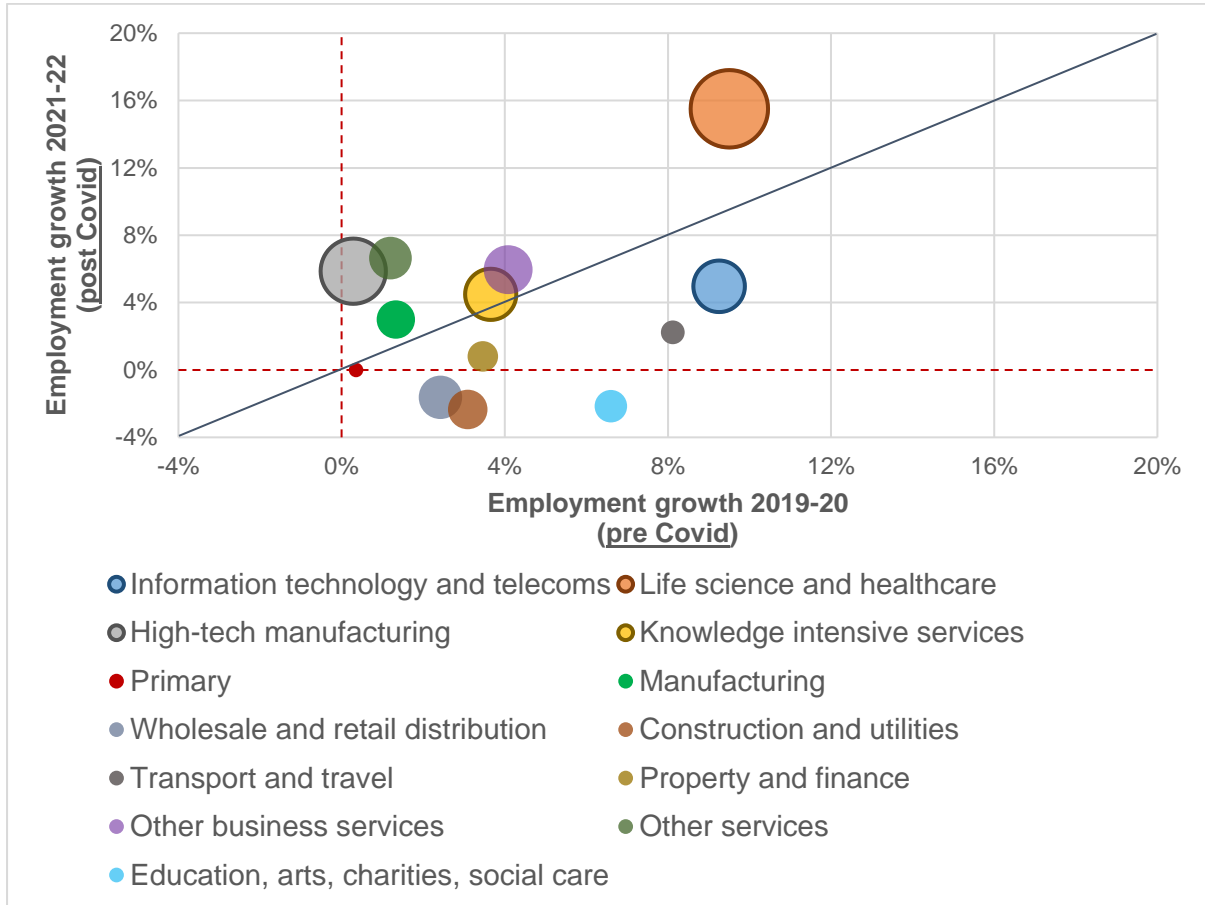


Note: The size of each bubble is proportionate to the number of employees in 2020-21 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Figure A6 compares employment growth by sector in South Cambridgeshire during 2019-20 (horizontal axis) and 2021-22 (vertical axis). **This chart allows us to compare the performance of sectors before and after Covid.**

Figure A6 Employment growth by sector in South Cambridgeshire: 2021-22 (post Covid) vs 2019-20 (pre Covid)



Note: The size of each bubble is proportionate to the number of employees in 2019-20 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.