

Greater Cambridge Employment Update October 2023

*UK economy at risk of recession
but corporate Cambridge is resilient*

Highlights:

Overview

- The current business environment makes it important to have timely data on employment changes. This is the ninth 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 2023 Update covers accounting year ends between December 2022 and April 2023 (the median year end is mid-February 2023). This median period captures the impact of the worsening UK's cost of living crisis on the recovery from Covid. We compare this period with the previous year, which covers the recovery from the effects of the pandemic and the impact of the early days of the ongoing conflict in Ukraine.
- 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 about 66% of corporate employment in Greater Cambridge.

Areas

- Corporate employment growth in the Greater Cambridge area increased from 6.0% in 2021-22 to 8.5% in 2022-23, suggesting that corporate employment growth continued to recover from the effects of the pandemic despite the intensification of the UK's cost of living crisis. The employment performance of the Greater Cambridge corporate economy in the year to mid-February 2023 appears to be far superior to the performance of the national economy in this period (**Figure 2.1, p9**).
- The strong performance of the Greater Cambridge corporate economy was driven by a buoyant KI economy, which saw employment grow by 11.2% in 2022-23 (7.8% in 2021-22) (**Figure 2.1, p9**).
- Overall employment growth also benefited from the robust performance of non-KI sectors. Non-KI employment growth was higher in 2022-23 (4.5%) than it was in 2021-22 (3.4%), pointing to continued recovery amongst sectors that were severely hit by lockdowns and other Covid-related restrictions (**Figure 2.1, p9**).
- Employment growth in South Cambridgeshire was high at 9.1% in 2022-23, up substantially from 4.0% in 2021-22. Employment grew considerably also in Cambridge

(7.6%), albeit at a somewhat lower rate than in the previous year (9.2%) **(Figure 2.1, p9)**.

- However, there is variation in these growth rates across both industry sectors and firm sizes.

Sectors

- This is the first time since we started our employment updates work that nearly all sectors have seen positive employment growth in the latest year **(Figure 2.2, p10 & Figure 2.4, p13)**.
- 'Life science and healthcare', the largest KI sector in Greater Cambridge, was the fastest growing sector during 2022-23 (12.8% compared with 12.6% during 2021-22) **(Figure 2.2, p10 & Figure 2.4, p13)**.
- The second-largest KI sector in Greater Cambridge, 'Information Technology and Telecoms', saw strong employment growth of 10.3% (up from 6.5% in the previous year) **(Figure 2.2, p10 & Figure 2.4, p13)**.
- 'Knowledge intensive services' exhibited much faster employment growth in 2022-23 than in 2021-22 (11.1% and 5.7%, respectively), while the 'High-tech manufacturing' sector was the KI sector that achieved the largest increase in employment growth over the past two years (8.9% and 1.3%) **(Figure 2.2, p10 & Figure 2.4, p13)**.
- All non-KI sectors but the 'Primary' sector reported positive employment growth in the year to mid-February 2023. Sectors such as 'Wholesale and retail distribution', low- and med-low-tech 'Manufacturing', 'Transport and travel' and 'Construction and utilities', some of which were severely hit by Covid lockdowns, showed higher employment growth last year than they did one year earlier **(Figure 2.2, p10 & Figure 2.4, p13)**.
- Employment in the 'Other business services' sector continued to grow at a rate above 6%. 'Property and finance' (1.2% in the latest year against 3.6% in the previous year) and 'Other services' (3.4% and 7.7%, respectively) experienced a positive yet slower growth in employment in the year to mid-February 2023 **(Figure 2.2, p10 & Figure 2.4, p13)**.

Size groups

- One-person businesses grew by 3.2% in the latest year, a rate that is lower than total employment growth across all size classes. Their small size also means that they have played a minor role in employment growth – only 70 extra employees compared with the addition of 5,902 employees by other businesses.

- Whilst 1-9 employee businesses tend to have been the fastest growing companies in sectors such as 'Life science and healthcare' and 'High-tech manufacturing', 10+ employee businesses exhibited particularly fast growth in 'Knowledge intensive services', 'Information technology and telecoms' and 'Education, arts, charities, social care' (**Figure 2.3, p12**).
- The group of 10+ employee businesses tends to dominate employment growth given its large aggregate size. These businesses are significant contributors to the growth achieved by sectors such as 'Life science and healthcare', 'Knowledge intensive services', 'Information technology and telecoms' and 'Education, arts, charities, social care' (**Figure 2.3, p12**).
- Employment of 1-9 employee businesses increased by 2.1% in 2022-23. This growth was driven primarily by KI sectors (**Figure 2.8, p19**).
- The picture looks broadly similar for 10+ employee businesses. Although both KI and non-KI employment increased much faster in this size class compared with 1-9 employee businesses, employment growth was substantially higher in KI sectors than it was in non-KI sectors (11.5% and 6.0% in the latest year, respectively). As a result, employment growth in this size class was 9.7% in 2022-23 (**Figure 2.8, p19**).
- Employment growth to 2023 was faster than employment growth to 2022 in both 1-9 employee and 10+ employee size classes (**Figure 2.8, p19**).

Comparison of employment and turnover growth

- We complement the findings from the employment update by examining a sample of 165 companies with accounting year ends between December 2022 and April 2023 which have provided both employment and turnover data for the last three years.
- We have found in recent updates that Covid affected turnover more strongly than employment due to the operation of the furlough scheme. Our October 2023 analysis shows that, with the recovery from the pandemic, normal service has been resumed and turnover growth exceeds employment growth as it does usually (**Table 4.1, p25**).
- Both KI and non-KI companies included in this sample reported a marked increase in growth rates in the latest year. Employment growth was notably stronger among the KI companies, which grew their employment by over 10% in 2022-23 (up from 7.6% in 2021-22). Non-KI companies achieved positive yet lower growth in each year reflecting the worsening economic environment (**Table 4.1, p25**).

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 in either May or June 2023. For each company we look at turnover growth in the same six-month period in 2021 and 2022.

- Within this group of companies (all knowledge intensive), total turnover increased by 7% in their latest six months (2022-23) compared with a growth of 25% in the same period last year (2021-22).
- These findings reinforce those from the employment update sample, while suggesting that conditions became more challenging in the first half of 2023. The perusal of their interim reports also offers some further insights into the impact of the recession on their business.

Concluding remarks

- Our previous update (April 2023 Update) told a story of strong corporate resilience during a very turbulent year. Although some businesses and sectors were materially impacted by supply chain disruptions and inflationary pressures following the onset of the conflict in Ukraine, our results pointed to continued recovery of the Greater Cambridge corporate economy from the effects of the pandemic.
- Overall, the results of our October 2023 Update reveal that the recovery of the Greater Cambridge corporate economy from the effects of the pandemic continued into 2022-23. Our next update, which will cover the year to mid-October 2023, will shed further light on the impact of the cost of living crisis on Greater Cambridge businesses.

1. Tracking Greater Cambridge corporate employment – the October 2023 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 2022-23 annual draw will be made available in February 2024 and examine employment in the accounting years ending from 6th April 2022 to 5th April 2023. Since December and, to a lesser extent, March dominate companies' choice of year ends, the modal year end for the annual draw will be early December 2022. For comparison, the ONS Business Register and Employment Survey (BRES) provisional annual employment data published in October 2023 has September 2022 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 April and October. On each occasion a large sample is drawn (over 40% of the company population 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 2023 Update includes companies with a financial year end between December 2022 and April 2023 and has a modal year end of mid-February 2023. This median period captures the impact of the worsening UK's cost of living crisis on the recovery from Covid.

We use the update sample to provide estimates of employment for those companies with a year end between December 2022 and April 2023 that have not yet reported. We then use this larger sample to compare the performance of this sample of companies in 2022-23 with their performance in 2021-22. The final analysis sample for the October 2023 Update is 5,673 companies representing about 66% of corporate employment in the Greater Cambridge area. 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 165 companies in Greater Cambridge with accounting years ending between December 2022 and April 2023 which have provided both employment and turnover data for the last three years. Since large businesses provide both employment and turnover figures, the sample is quantitatively significant, with total employment of about 20,000 and total turnover of about £6.4bn. For this sample of companies, we examine their employment and turnover growth in the last year against the growth one year earlier. The comparison between these two measures allows us to provide a fuller picture of the impact of the changing business conditions on employment in the corporate sector in Greater Cambridge.

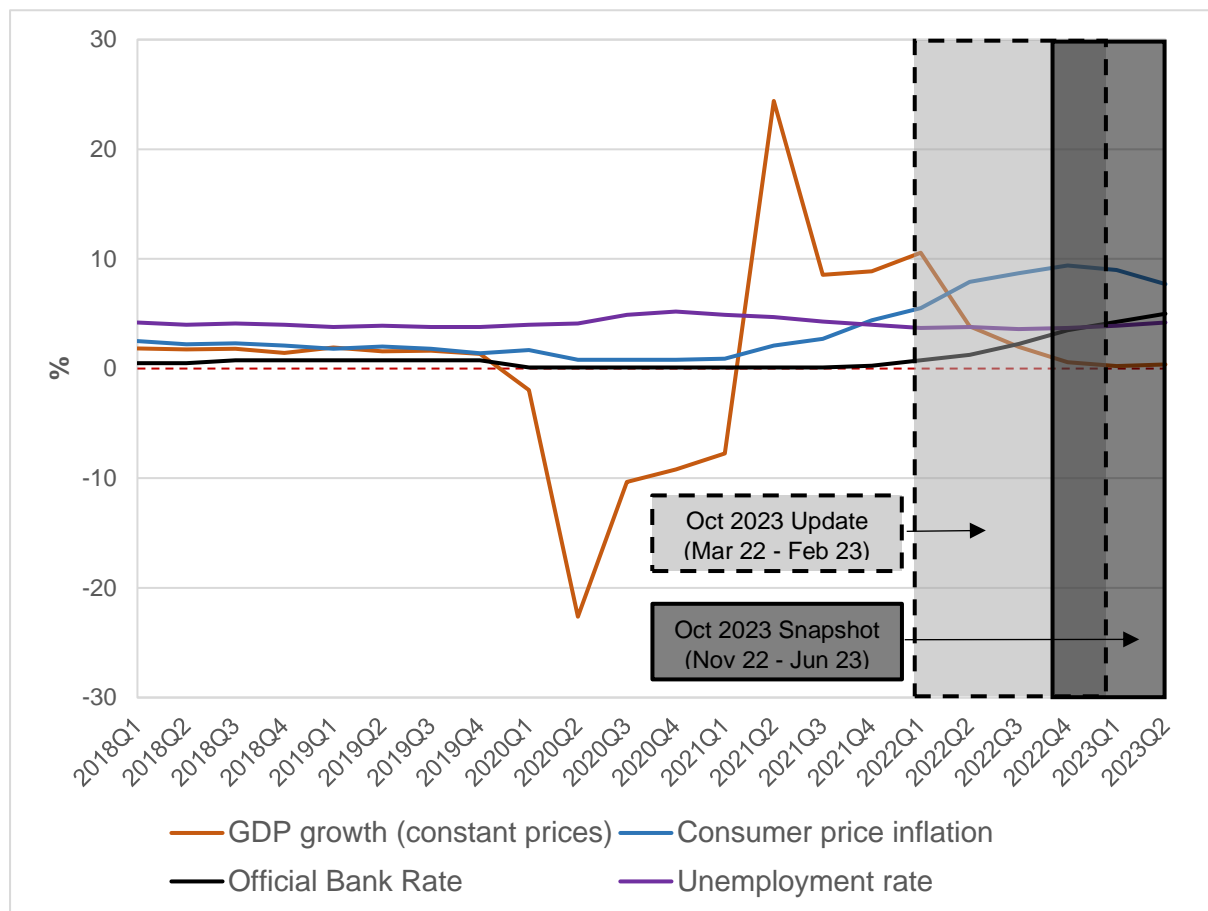
The fourth method is a **snapshot** of very recent growth that draws on a small sample and should be regarded as merely indicative. It considers only the largest businesses (top 100 by

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

employment or turnover) and examines those that have filed interim reports for six-month periods ending in either May or June 2023. 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 £413m. The gain from focusing on interim results is that most of the activity reported in the accounts took place in 2023. We compare turnover in this period with the same six-month period in 2021 and 2022.

Figure 1.1 shows where the October 2023 update and snapshot sit in relation to the national economy and graphically displays how turbulent the last three years have been in comparison with the previous decade.

Figure 1.1 UK macroeconomic indicators and the October 2023 Update period



Note: GDP growth is the percentage change of GDP in constant prices on the same quarter a year earlier. Consumer price inflation is the annual change in the Consumer Price Index. Unemployment rate is the share of people aged 16 and over who are unemployed.

Source: ONS.

The remainder of this report is structured as follows. Section 2 presents the results of the October 2023 employment update, drawing on a set of charts that we developed specifically for this study. The section examines growth of Greater Cambridge-based companies by area, industry sector and firm size. Section 3 delves deeper into Greater Cambridge’s sectoral strengths by providing a shift-share analysis of corporate employment growth in the area, which we present for the first time in this report. Section 4 complements the findings from Section 2 by discussing the results of the October 2023 Update sample that includes both employment and turnover growth. Section 5 shows the findings of the snapshot sample, while Section 6 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 further results from our shift-share analysis.

2. October 2023 employment update results

In this section, we present the results of the October 2023 employment update, the ninth of a series of updates aimed at providing a timely picture of the performance of the Greater Cambridge corporate economy. This update covers the unfolding of the UK's cost of living crisis during the second half of 2022. We compare this year against the previous year, which captures the recovery from the effects of Covid and the impact of the early days of the ongoing conflict in Ukraine.

2.1. Analysis by area

Our previous update (April 2023 Update) told a story of strong corporate resilience during a very turbulent year. Although some businesses and sectors were materially impacted by supply chain disruptions and inflationary pressures following the onset of the conflict in Ukraine, our results pointed to continued recovery of the Greater Cambridge corporate economy from the effects of the pandemic. The October 2023 Update allows us to examine whether this robust performance of Greater Cambridge-based businesses continued into the Autumn of 2022, when the UK's cost of living crisis worsened as inflation peaked at 11.1% (a 41-year high).

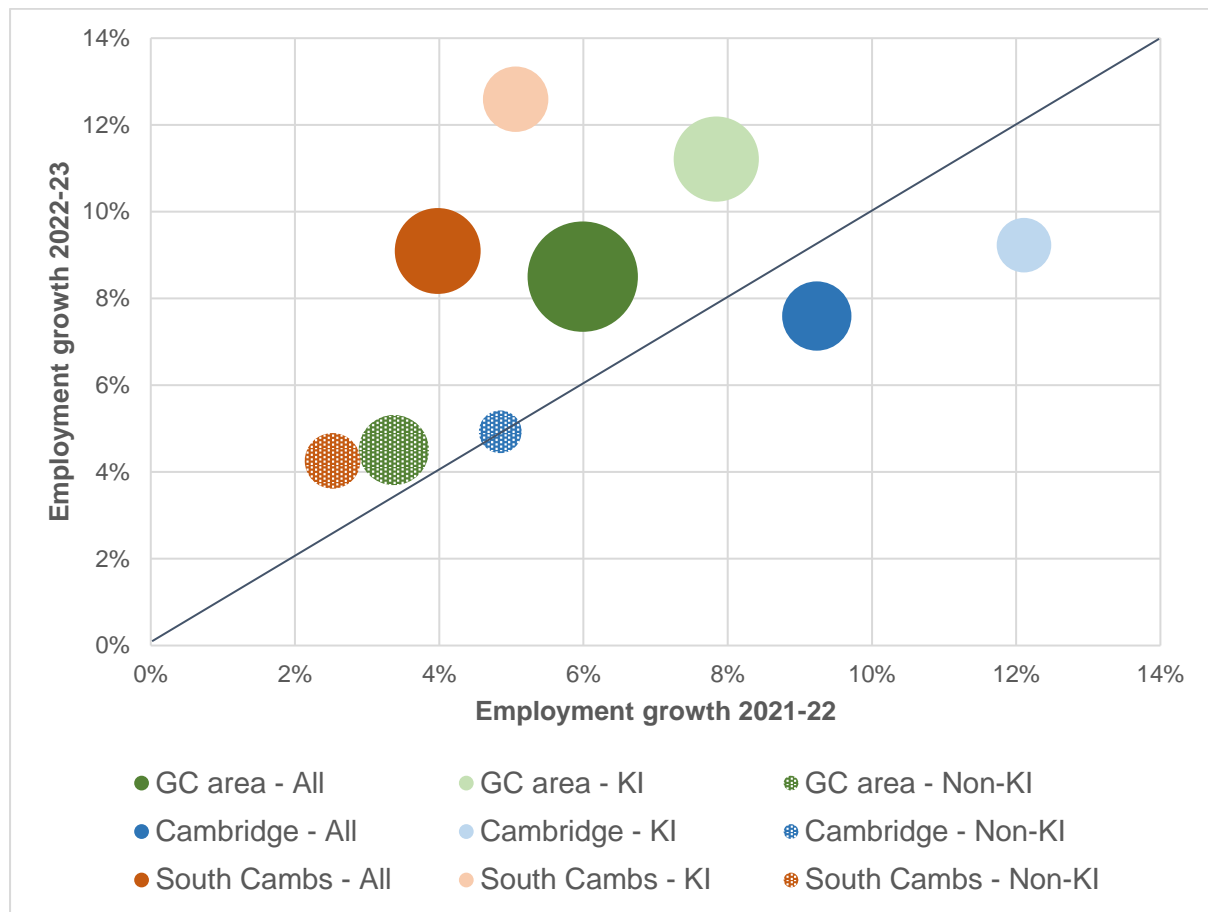
Figure 2.1 depicts employment growth in KI and non-KI sectors during 2021-22 (horizontal axis) and 2022-23 (vertical axis) by area. This chart allows us to compare the performance of each area over time. It is drawn from a large sample of 5,673 companies with accounts for the years ending between December 2022 and April 2023. 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 2022-23 are found above the horizontal axis and those with positive growth in 2021-22 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 2.1 portrays a picture of continued and faster overall employment growth in the Greater Cambridge area during the year to mid-February 2023. Growth in the area increased from 6.0% in 2021-22 to 8.5% in 2022-23, suggesting that corporate employment growth continued to recover from the effects of the pandemic despite the worsening of the UK's cost of living crisis. The employment performance of the Greater Cambridge corporate economy in the year to mid-February 2023 appears to be far superior to the performance of the national economy in this period.

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 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 waiting until the second half of October before drawing the data for this update.

The 8.5% employment growth over the median period to mid-February 2023 (October 2023 Update) is higher than the 6.2% growth to mid-October 2022 (April 2023 Update), which captures the impact of the ongoing conflict in Ukraine on the recovery from Covid. However, there are considerable differences across both sectors and areas.

Figure 2.1 Employment growth by area – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale.

Source: Cosh & Caselli, CBR.

Our data show that the strong performance of the Greater Cambridge corporate economy during 2022-23 was driven by a buoyant KI economy, which saw employment grow by 11.2% in 2022-23 (7.8% in 2021-22). In each of the charts the size of the bubble is proportional to total employment in that area or sector. The bubble that identifies KI sectors is to the right of the bubble for non-KI sectors – showing that KI sectors grew faster than non-KI sectors.

Overall employment growth to 2023 also benefited from the robust performance of non-KI sectors. Non-KI employment growth was higher in 2022-23 (4.5%) than it was in 2021-22 (3.4%), pointing to continued recovery amongst sectors that were severely hit by lockdowns and other Covid-related restrictions.

Turning to the individual districts, employment growth in South Cambridgeshire was high at 9.1% in 2022-23, up substantially from 4.0% in 2021-22. Employment grew considerably also in Cambridge (7.6%), albeit at a somewhat lower rate than in the previous year (9.2%).

The KI sectors showed a particularly high degree of dynamism in South Cambridgeshire, where KI employment growth increased from 5.1% in 2021-22 to 12.6% in 2022-23. This was helped by the performance of PPD Global, CMR Surgical and Illumina, which added over 700 employees combined. It is this considerable increase in KI employment growth that is behind the stronger performance of South Cambridgeshire-based businesses in 2022-23 relative to Cambridge-based businesses.

The growth of the KI sectors was strong also in Cambridge (9.2% in 2022-23 compared with 12.1% in 2021-22), reflecting the additions of 212 employees by AstraZeneca and 142 employees by Abcam.

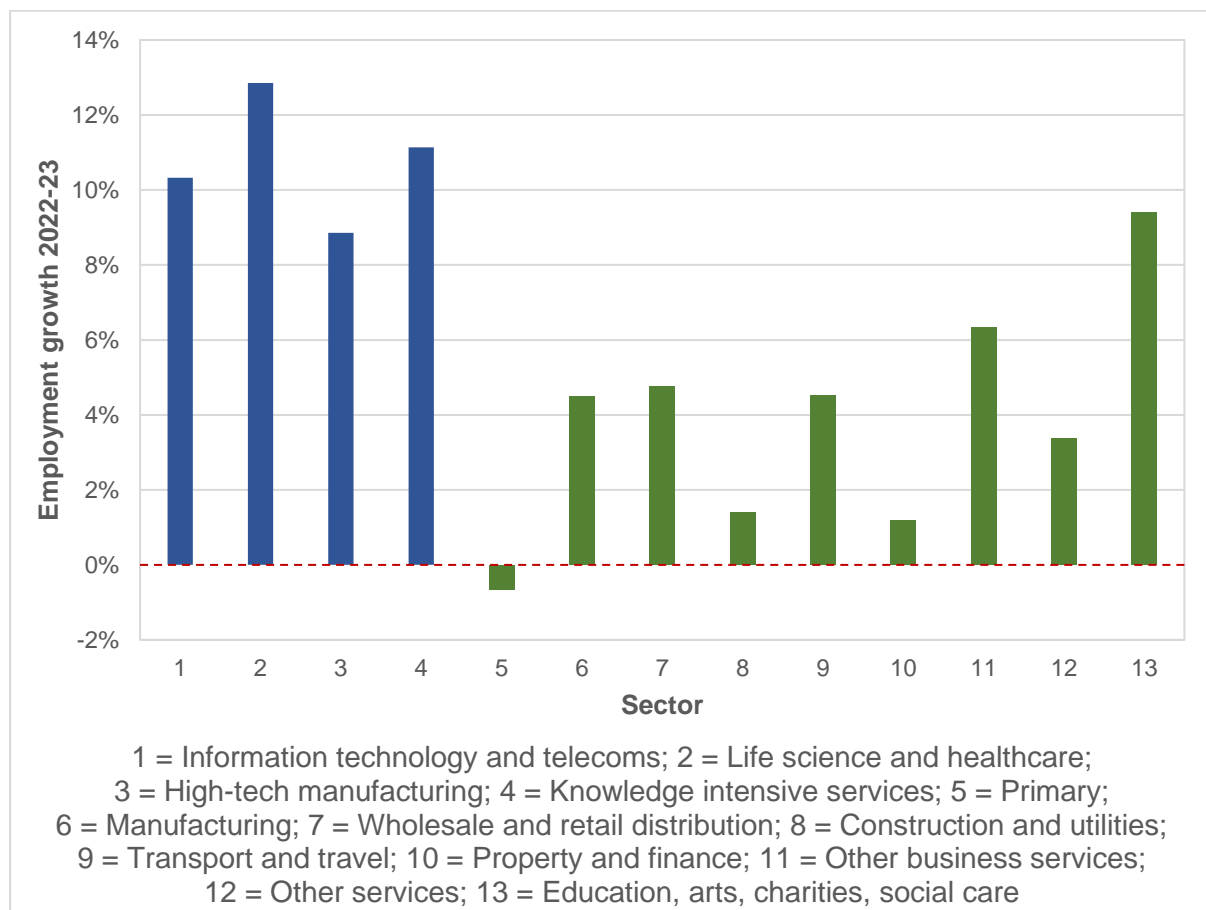
Non-KI sectors witnessed robust growth in both districts. Employment growth in non-KI sectors increased from 2.5% in 2021-22 to 4.3% in 2022-23 in South Cambridgeshire, whilst it remained virtually unchanged in Cambridge (4.9% in the latest year against 4.8% in the previous year).

2.2. Analysis by sector

Greater Cambridge

Figure 2.2 looks more closely at differences in performance across industry sectors by distinguishing between 4 KI sectors and 9 non-KI sectors. It compares these 13 sectors by examining their employment growth during 2022-23 (on average the year to mid-February 2023), the latest year covered by this work.

Figure 2.2 Employment growth 2022-23 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 Greater Cambridge, was the fastest growing sector during 2022-23 (12.8%). This rate of growth happened after an equally exceptional performance in the previous year (12.6%). Among the companies contributing to

the growth of the Life Science sector in 2022-23 are CMR Surgical (33.0%), Illumina (21.3%) and PPD Global (17.9%).

The second-largest KI sector in Greater Cambridge, 'Information Technology and Telecoms', saw strong employment growth of 10.3%. Growth in the sector benefited from a continued increase in employee numbers by some of the largest ICT companies based locally, for example Redgate (9.5%) and Amazon's EVI Technologies (7.6%).

Employment in 'Knowledge intensive services' grew by 11.1%, helped by the performance of Evonetix (34.7%), Cambridge Consultants (9.8%) and Z-Tech Control Systems (7.5%) to name a few. This is the first time since the start of the pandemic that we report a double-digit growth rate in employment for 'Knowledge intensive services' businesses, which had experienced a slowdown in employment growth as clients had tightened their belts due to the impact of Covid on their business.

The other KI sector, 'High-tech manufacturing', achieved a growth in employment of 8.9%. Thin-film semiconductor manufacturer Pragmatic (60.2%) and leading producer of composite materials for the commercial aerospace industry Hexcel Composites (10.1%) are two examples of fast-growing companies in this sector.

All non-KI sectors but the 'Primary' sector achieved positive employment growth in the year to mid-February 2023.

'Education, arts, charities, social care' was the fastest-growing non-KI sector. Employment in the sector grew by 9.4%, partly due to the return of language students to Cambridge – e.g. The Bell Foundation (21.6%) – and partly due to an increase in staff numbers at several non-school organisations such as provider of services to people with learning disabilities The Edmund Trust (14.3%) and conservation charity Fauna & Flora International (5.4%).

Other non-KI sectors with robust employment growth in 2022-23 are 'Other business services' (6.3%), 'Wholesale and retail distribution' (4.8%), low- and med-low-tech 'Manufacturing' (4.5%) and 'Transport and travel' (4.5%). Some of the companies behind this growth are commercial cleaning company Quality Care Cleaning ('Other business services'), bakery and coffee shop Fitzbillies ('Wholesale and retail distribution'), manufacturer of dairy products and ingredients Woodford Holdings / Volac ('Manufacturing') and tour operator GTi Travel Group ('Transport and travel').

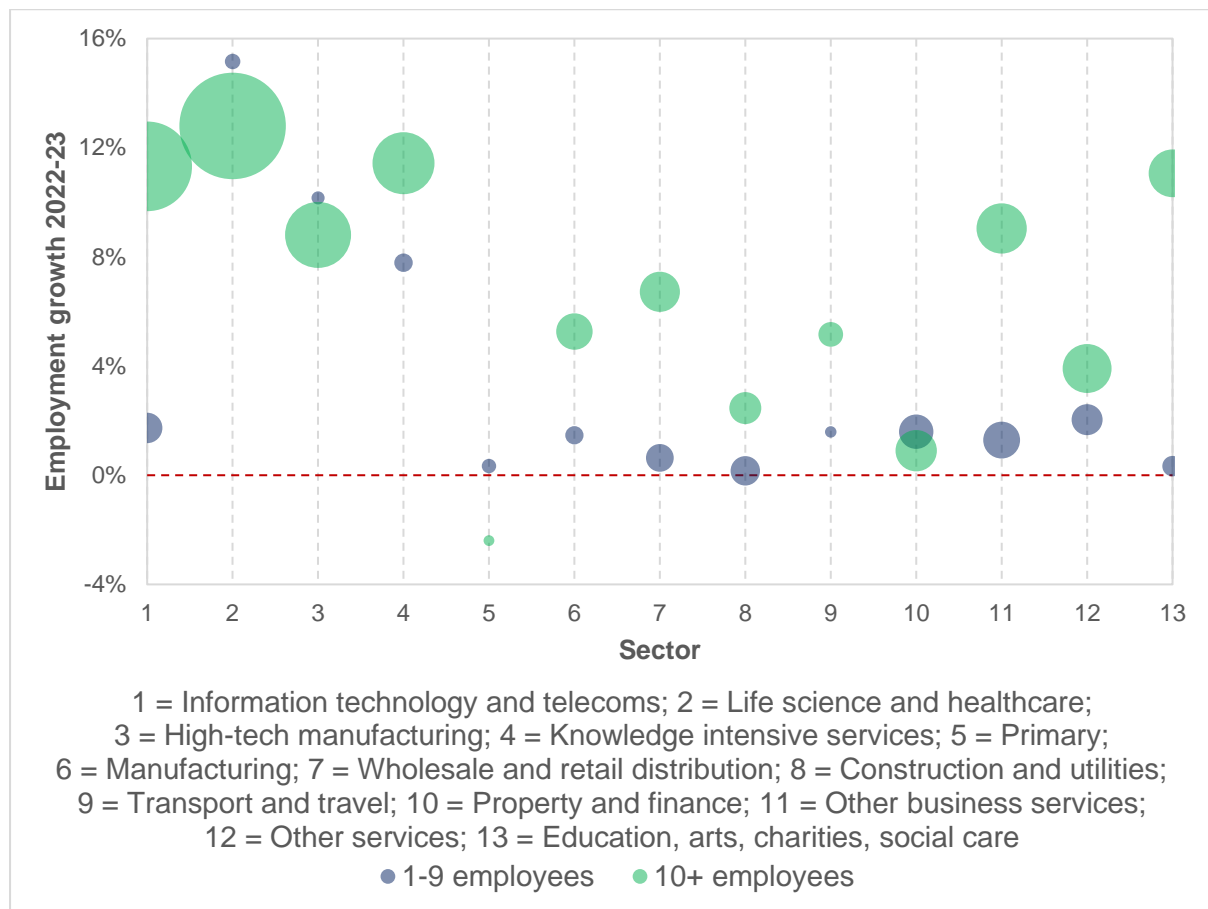
Employment increased, although less strongly, also in 'Other services' (3.4%), 'Construction and utilities' (1.4%) and 'Property and finance' (1.2%), whilst it remained practically unchanged in the 'Primary' sector (-0.6%).

Figure 2.3 expands on the results from Figure 2.2 presented above by providing a breakdown of employment growth to 2023 by both industry sector and firm size. Companies were assigned to two size classes: 1-9 employees; 10+ employees. Further analysis by firm size with individual sectors grouped into KI and non-KI sectors is presented in Section 2.3 below.

The results from Figure 2.2 pointed to robust employment growth across the KI sectors as well as most of the non-KI sectors. Figure 2.3 augments these results by suggesting that there is variation in employment growth rates across both industry sectors and firm sizes.

Looking at percentage growth rates for small businesses can be problematic. Most small businesses do not grow and the median growth is uninformative at 0%. However, a few small businesses can grow very fast in percentage terms (e.g. from 2 to 8 employees). It is these rare businesses that create the overall growth of smaller businesses.

Figure 2.3 Employment growth 2022-23 by sector and firm size in the Greater Cambridge area



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale.

Source: Cosh & Caselli, CBR.

Businesses with 1-9 employees tend to have been the fastest growing companies in sectors such as ‘Life science and healthcare’ and ‘High-tech manufacturing’. However, the relatively small size of their bubbles shows that their impact on total employment growth was somewhat limited.

Good examples of fast growth in the 1-9 employee businesses are CS Genetics, a biotechnology research company developing a new technology for single cell genomics, and Porotech, a microLED pioneer spun out of the University of Cambridge which aims to revolutionise the display and semiconductor industries.

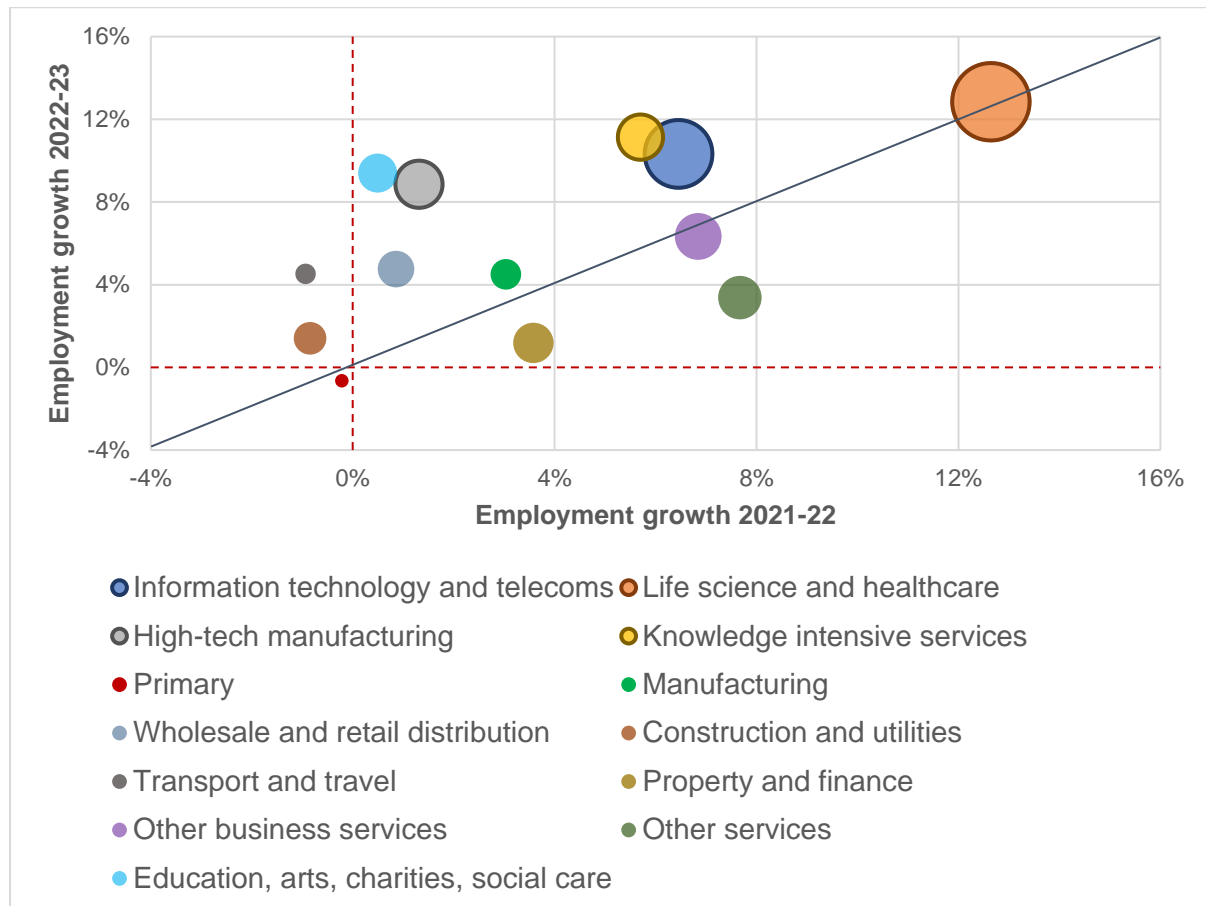
In turn, 10+ employee businesses exhibited particularly fast growth in ‘Knowledge intensive services’, ‘Information technology and telecoms’ and ‘Education, arts, charities, social care’.

The group of 10+ employee businesses tends to dominate employment growth given its large aggregate size. These businesses are significant contributors to the growth achieved by sectors such as ‘Life science and healthcare’ (e.g. AstraZeneca), ‘Knowledge intensive services’ (e.g. Cambridge Consultants), ‘Information technology and telecoms’ (e.g. EVI Technologies) and ‘Education, arts, charities, social care’ (e.g. Fauna & Flora International).

Figure 2.4 compares the 13 industry sectors according to their employment growth during 2021-22 (horizontal axis) and their employment growth during 2022-23 (vertical axis). This

chart allows us to compare the performance of sectors over time. The position of the sector marker relative to the 45° line shows whether the sector grew more or less fast than last year. Sectors with positive growth in 2022-23 are found above the horizontal axis and those with positive growth in 2021-22 appear to the right of the vertical axis.

Figure 2.4 Employment growth by sector in the Greater Cambridge area – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

The 'Life science and healthcare' sector stands out when examined with a bubble chart. Employment growth in the sector during 2022-23 was high at 12.8%, up slightly from an already exceptional 12.6% during 2021-22. Among the companies contributing to this growth are CMR Surgical (33.0%), Illumina (21.3%) and PPD Global (17.9%). This result is particularly encouraging if one considers that our October 2023 Update sample covers about 84% of corporate employment in the Life Science sector in Greater Cambridge (see the fourth data column in Appendices A1-A3).

'Information technology and telecoms' saw employment growth accelerate in the latest year (10.3% compared with 6.5% in the previous year). This result was driven by a buoyant performance of some of the largest ICT companies in the area, including Redgate (9.5%), Huawei Technologies Research & Development (8.7%) and Amazon's EVI Technologies (7.6%).

'Knowledge intensive services' exhibited much faster employment growth in 2022-23 than in 2021-22 (11.1% and 5.7%, respectively). This was helped by the robust growth of several large consulting companies based locally, for example Cambridge Consultants (9.8%), Z-Tech Control Systems (7.5%) and Science Group (5.1%).

The KI sector that achieved the largest increase in employment growth between 2021-22 and 2022-23 is 'High-tech manufacturing' (1.3% and 8.9%, respectively). Pragmatic (60.2%), Industrial Inkjet (24.1%) and Aixtron (12.9%) are some of the companies behind this growth. The sector's performance in the last year also benefited from the return to growth by leading high-tech manufacturer Hexcel composites after two challenging years due to Covid.

Five out of nine non-KI sectors showed faster employment growth in 2022-23 relative to 2021-22.

A case in point is the 'Wholesale and retail distribution' sector, where employment grew by 4.8% in the latest year against 0.9% in the previous year. Among the wholesale and retail distribution companies with accelerated employment growth are bakery and coffee shop Fitzbillies (42.1%) and fruit and vegetable supplier Kale & Damson (34.9%).

The faster growth in 'Education, arts, charities, social care' in 2022-23 relative to 2021-22 was driven by a return to growth by The Bell Foundation, The Edmund Trust and the Association for Cultural Exchange, although it also benefited from stronger employment growth by Fauna & Flora International.

Employment growth in the low- and med-low-tech 'Manufacturing' sector increased from 3.0% in 2021-22 to 4.5% in 2022-23, mainly reflecting continued growth in staff employed by manufacturer of dairy products and ingredients Woodford Holdings / Volac (11.8%). Employment went up by 4.5% in the latest year also in 'Transport and travel', after falling by 0.9% in the previous year. GTi Travel Group (60.0%) and Welch Group (3.5%) are two companies which contributed to this growth. Another sector that returned to growth is 'Construction and utilities', where employment grew by 1.4% in 2022-23 following a drop of 0.8% in 2021-22.

Employment in the 'Other business services' sector continued to grow at a rate above 6%, helped by a steady increase in employee numbers by several cleaning services and professional business services companies.

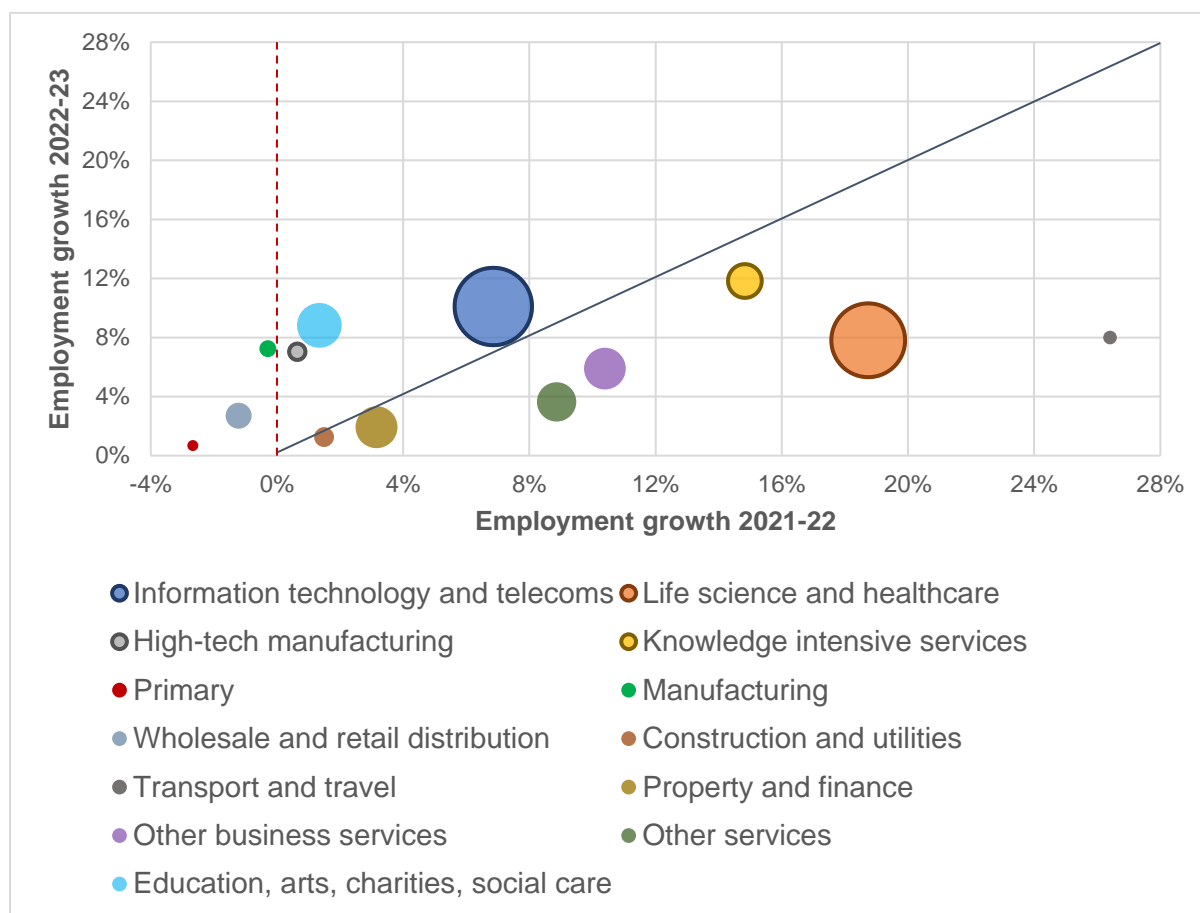
'Property and finance' (1.2% in the latest year against 3.6% in the previous year) and 'Other services' (3.4% and 7.7%, respectively) experienced a positive yet slower growth in employment in the year to mid-February 2023. However, it should be noted that growth in these sectors was somewhat exceptional in the previous year, as it came after a drop in employment during the pandemic period.

Brexit, Covid and the ongoing conflict in Ukraine have made it difficult for agricultural businesses to source labour, particularly experienced and skilled workers. Consistent with these observations, we find that employment growth to 2023 remained negative within the 'Primary' sector (-0.6%).

Cambridge

Figure 2.5 compares sectors based on their employment growth during 2021-22 (horizontal axis) and their employment growth during 2022-23 (vertical axis), this time focusing on Cambridge.

Figure 2.5 Employment growth by sector in Cambridge – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Employment growth of Cambridge-based businesses was particularly fast in ‘Information technology and telecoms’, where it reached 10.1% in 2022-23 (up from 6.9% in 2021-22). This growth benefited from the strong performance of Riverlane (66.7%), IQGeo (33.7%) and 1Spatial (24.0%).

Last year’s employment growth in ‘Life science and healthcare’ and ‘Knowledge intensive services’ was strong (7.8% and 11.8%, respectively), albeit lower than one year earlier (18.7% and 14.8%). AstraZeneca (‘Life science and healthcare’) and Evonetix (‘Knowledge intensive services’) were key drivers of this growth.

‘High-tech manufacturing’ saw employment growth accelerate from 0.6% in 2021-22 to 7.0% in 2022-23.

Amongst non-KI sectors, employment growth was higher in 2022-23 than in 2021-22 for ‘Education, arts, charities, social care’ (8.8% and 1.3%, respectively), low- and med-low-tech ‘Manufacturing’ (7.2% and -0.3%), ‘Wholesale and retail distribution’ (2.7% and -1.2%) and ‘Primary’ (0.7% and -2.7%).

By contrast, ‘Transport and travel’ (8.0% and 26.4%, respectively), ‘Other services’ (3.6% and 8.9%), ‘Other business services’ (5.9% and 10.4%) and ‘Property and finance’ (1.9% and 3.2%) saw employment growth slow down in the latest year compared with the previous year.

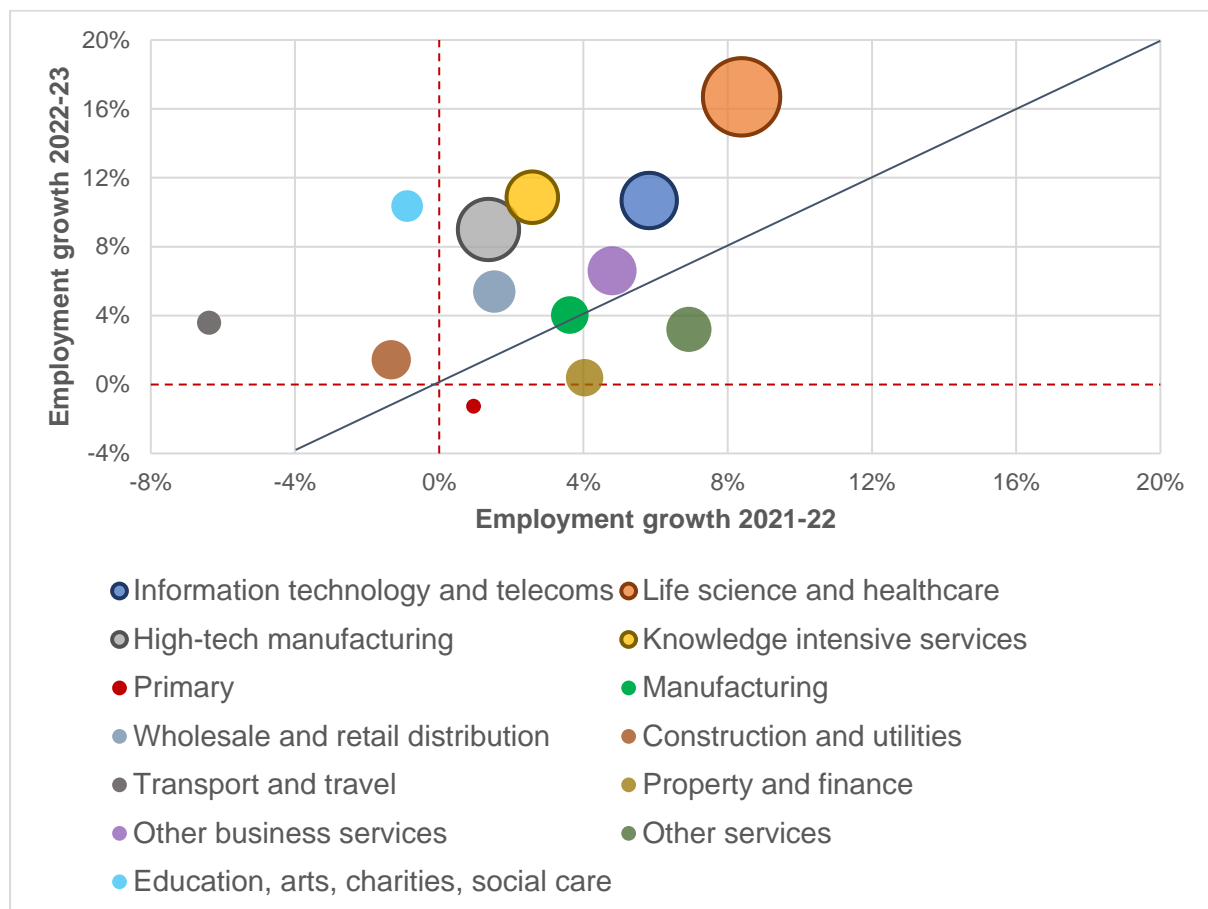
Some of the businesses in these sectors appear to have been adversely impacted by the unfolding cost of living crisis.

Employment in 'Construction and utilities' grew by 1.3% in 2022-23, up slightly from 1.5% in 2021-22.

South Cambridgeshire

Figure 2.6 focuses on South Cambridgeshire and compares sectors based on their employment growth during 2021-22 (horizontal axis) and their employment growth during 2022-23 (vertical axis).

Figure 2.6 Employment growth by sector in South Cambridgeshire – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Similar to Cambridge, South Cambridgeshire-based companies in 'Information technology and telecoms' showed fast employment growth in the latest year. Employment growth in the sector accelerated from 5.8% in 2021-22 to 10.7% in 2022-23, driven by a considerable increase in the number of staff employed by Bango (112.5%) and Speechmatics (61.2%).

'Life science and healthcare', the largest sector in South Cambridgeshire, reached an exceptional growth of 16.7% in 2022-23 (8.4% in 2021-22). Behind this growth is a fast increase in employee numbers by various companies such as Bicycle Therapeutics (91.1%),

Novogene (64.3%) and Endomag (40.6%). Importantly, the sample for our October 2023 Update represents over 75% of corporate employment in the Life Science sector in South Cambridgeshire.

Employment growth to 2023 was faster than employment growth to 2022 also in 'High-tech manufacturing' (9.0% and 1.4%, respectively) and 'Knowledge intensive services' (10.9% and 2.6%). Some examples of fast-growing companies in these sectors are Xaar and Pragmatic ('High-tech manufacturing') and Cambridge Consultants and Z-Tech Control Systems ('Knowledge intensive services').

Six out of nine non-KI sectors in South Cambridgeshire had higher growth in 2022-23 than in 2021-22.

Like Cambridge, South Cambridgeshire saw employment growth in low- and med-low-tech 'Manufacturing' (4.0% in 2022-23 compared with 3.6% in 2021-22), 'Wholesale and retail distribution' (5.4% and 1.5%) and 'Education, arts, charities, social care' (10.4% and -0.9%) accelerate in the latest year. Unlike Cambridge, however, employment growth in South Cambridgeshire also increased in 'Construction and utilities' (1.4% and -1.3%), 'Transport and travel' (3.6% and -6.4%) and 'Other business services' (6.6% and 4.8%).

South Cambridgeshire corporate employment growth in 2022-23 was lower than in 2021-22, albeit still positive, in 'Other services' (3.2% and 6.9%, respectively) and 'Property and finance' (0.4% and 4.0%).

We now turn to look at the absolute change in employment rather than its percentage change.

Greater Cambridge

Figure 2.7 offers another comparison across sectors, this time looking at their employment change (rather than their employment growth) during 2021-22 (horizontal axis) and 2022-23 (vertical axis). Similar to Figures 2.4-2.6, this chart allows us to compare the performance of sectors over time. The position of the sector marker relative to the 45° line indicates whether employment change in the sector was higher or lower than last year. Sectors with a positive change in employment during 2022-23 are found above the horizontal axis and those with a positive change during 2021-22 appear to the right of the vertical axis.

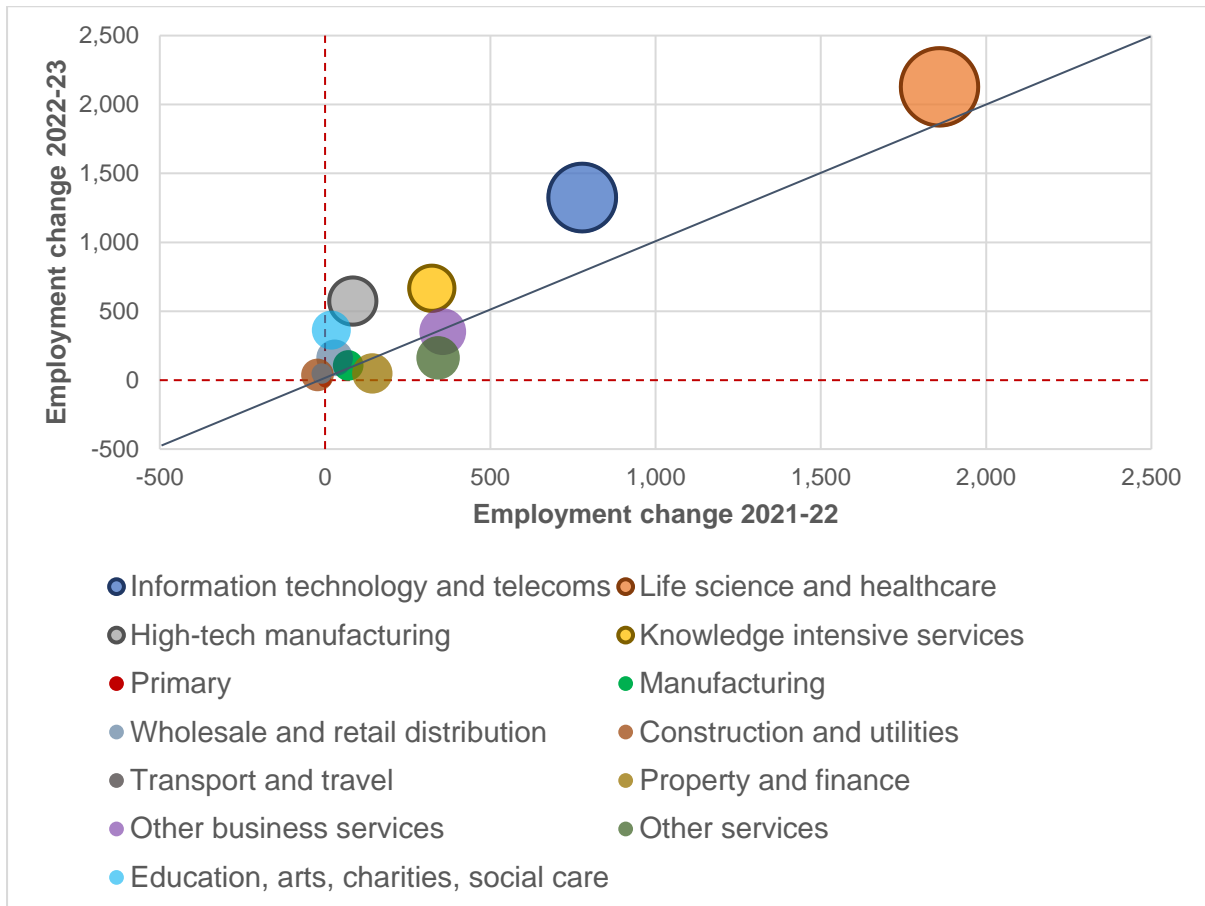
Since % changes can sometimes be misleading, Figure 2.7 examines changes in employment in terms of the number of people employed. In this case, the findings from Figure 2.7 largely confirm those from Figure 2.4.

The performance of the four KI sectors, particularly 'Life science and healthcare' and 'Information technology and telecoms', stands out when examined in terms of absolute employment changes.

'Life science and healthcare' had the largest employment change in 2022-23, adding 2,128 employees in the latest year compared with 1,859 one year earlier. PPD Global (330 employees), CMR Surgical (228 employees) and AstraZeneca (212 employees) contributed over a third of the employment change to 2023.

There was a change of 1,325 employees in 'Information technology and telecoms' in 2022-23 (778 in 2021-22). A significant share of the employment change to 2023 is associated with Bango (99 employees) and Speechmatics (60 employees).

Figure 2.7 Employment change by sector in the Greater Cambridge area – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale. Bubbles with an outline identify KI sectors.

Source: Cosh & Caselli, CBR.

Amongst non-KI sectors, employment change in 2022-23 was higher than employment change in 2021-22 in ‘Manufacturing’, ‘Wholesale and retail distribution’, ‘Construction and utilities’, ‘Transport and travel’ and ‘Education, arts, charities, social care’.

The largest employment change during the year to mid-February 2023 is observed for ‘Education, arts, charities, social care’ (363 employees compared with 19 employees in 2021-22). The Edmund Trust (28 employees), The Bell Foundation (27 employees) and Fauna & Flora International (26 employees) accounted for almost a fourth of the total employment change in the sector during 2022-23.

The ‘Other business services’ sector had the second-largest employment change in 2022-23, adding 352 employees. Last year’s change in the sector was very similar to the change one year earlier (356 employees).

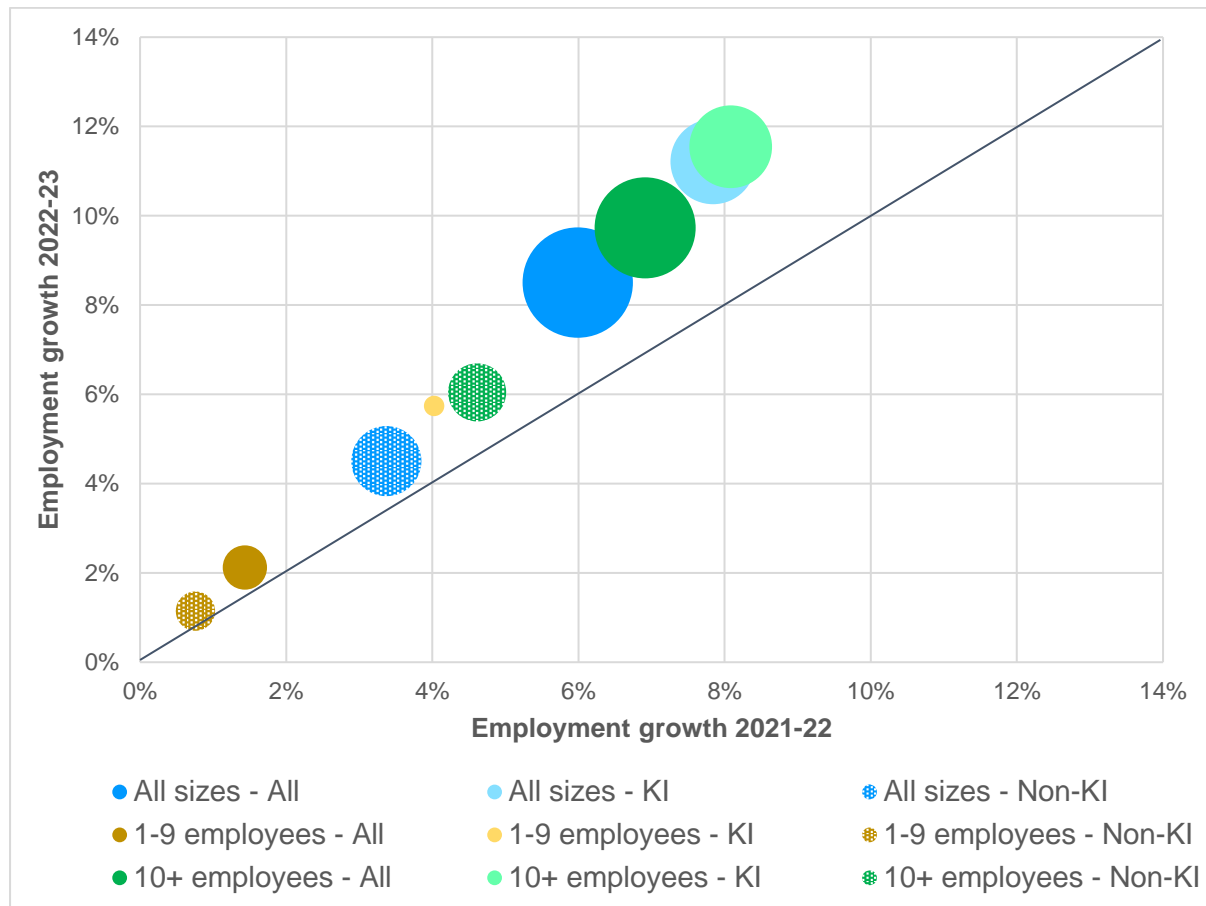
The ‘Property and finance’ and ‘Other services’ sectors also had a positive change in the latest year (49 and 162 employees, respectively), albeit lower than in the previous year (143 and 342 employees).

Collectively, KI sectors added 4,694 employees during 2022-23, whereas non-KI sectors contributed 1,278 employees.

2.3. Analysis by firm size

Figure 2.8 shows employment growth in KI and non-KI sectors during 2021-22 (horizontal axis) and 2022-23 (vertical axis) by firm size. This chart allows us to compare the performance of size classes over time. The position of the size marker relative to the 45° line indicates whether the size class grew more or less fast than last year. Size classes with positive growth in 2022-23 are found above the horizontal axis and those with positive growth in 2021-22 appear to the right of the vertical axis.

Figure 2.8 Employment growth by firm size in the Greater Cambridge area – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale.

Source: Cosh & Caselli, CBR.

Employment growth to 2023 was faster than employment growth to 2022 in both 1-9 employee and 10+ employee size classes.

Employment of 1-9 employee businesses increased by 2.1% in 2022-23 (1.4% in 2021-22). This growth was driven primarily by KI sectors, which saw employment grow by 5.7% in the latest year compared with 4.0% one year earlier. Non-KI sectors in this size class grew less fast than KI sectors, reaching 1.1% in 2022-23 (0.8% in 2021-22).

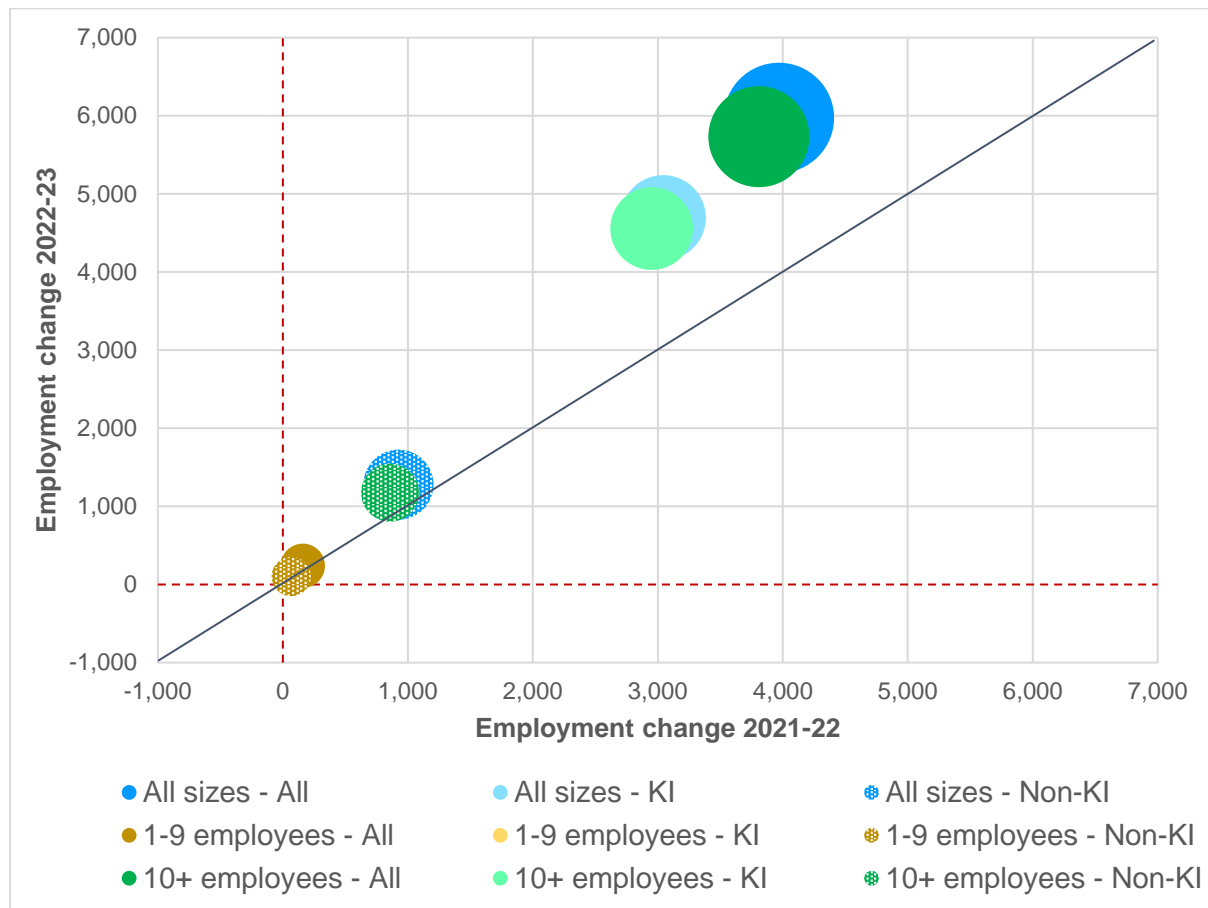
The picture looks broadly similar for 10+ employee businesses. Although both KI and non-KI employment increased much faster in this size class compared with 1-9 employee businesses, employment growth was substantially higher in KI sectors than it was in non-KI sectors (11.5%

and 6.0% in the latest year, respectively). As a result, employment growth in this size class was 9.7% in 2022-23 (against a figure of 6.9% in 2021-22).

Given the strong performance of both size classes in the most recent year, which captures the worsening of the UK’s cost of living crisis around October 2022, corporate employment in Greater Cambridge grew faster during 2022-23 (8.5%) compared with 2021-22 (6.0%).

Figure 2.9 compares size classes based on their employment change during 2021-22 (horizontal axis) and 2022-23 (vertical axis). Similar to Figure 2.8, this chart allows us to compare the performance of size classes over time. The position of the size marker relative to the 45° line indicates whether employment change in the size class was higher or lower than last year. Size classes with a positive change in employment during 2022-23 are found above the horizontal axis and those with a positive change during 2021-22 appear to the right of the vertical axis.

Figure 2.9 Employment change by firm size in the Greater Cambridge area – 2022-23 vs 2021-22



Note: The size of each bubble is proportionate to the number of employees in 2021-22 on a continuous scale.

Source: Cosh & Caselli, CBR.

The picture obtained from employment change data largely supports the conclusions drawn from employment growth data.

Employment change at 1-9 employee businesses was positive in 2022-23 and larger than in 2021-22 (240 and 160 employees, respectively). The employment change in the most recent

year originated primarily in KI sectors (138 employees compared with 102 employees for non-KI sectors).

Similarly, the employment change in 2022-23 (5,732 employees) was larger than the employment change in 2021-22 (3,809 employees) for businesses with 10+ employees. This increase is associated mainly with KI sectors, which saw an employment change of 4,556 in 2022-23 (2,951 in 2021-22). In turn, employment change in non-KI sectors was 1,176 in the latest year, up from 858 in the previous year.

Overall, these results confirm that it is the group of 10+ employee businesses operating in the KI sectors which have been driving growth in the Greater Cambridge area. Corporate employment change to 2023 across all size classes was 5,972 compared with 3,969 in the year to 2022.

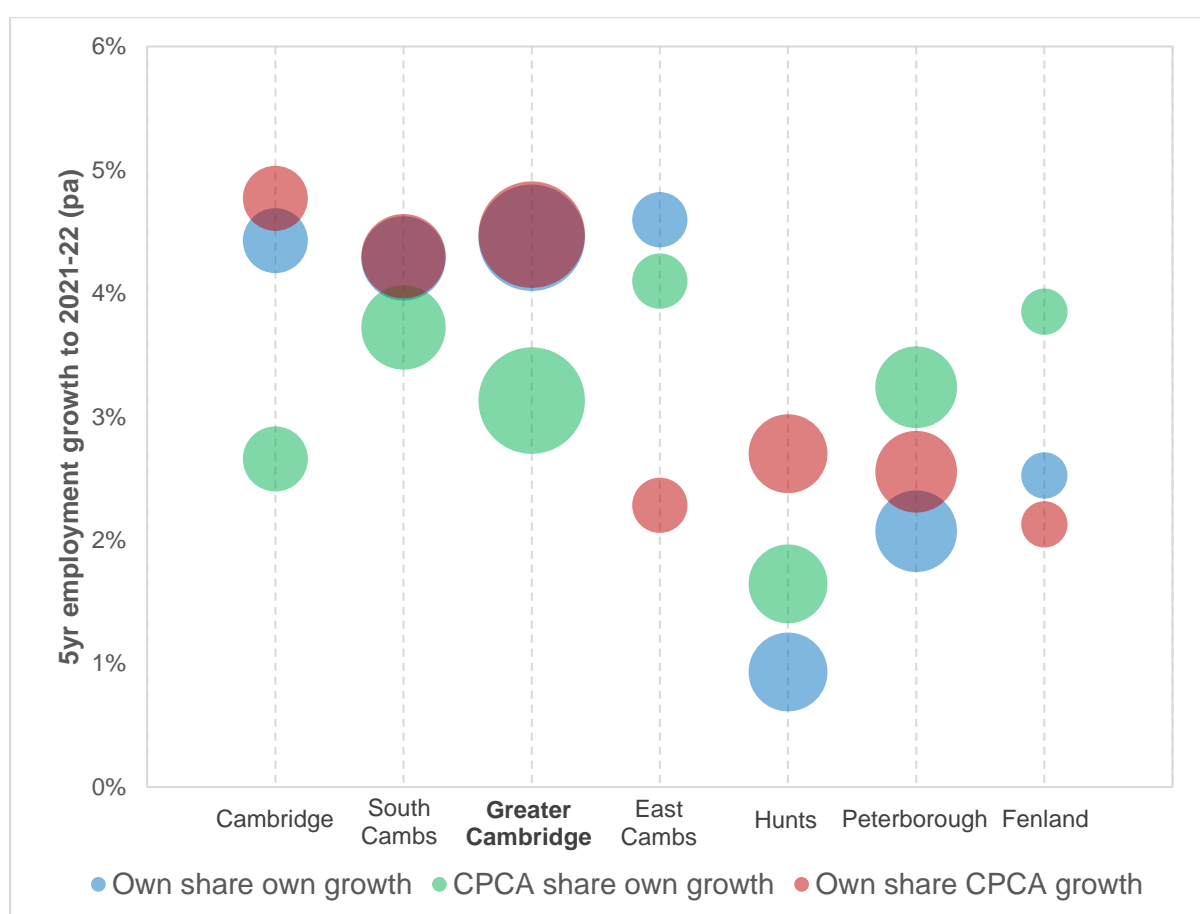
The next section further explores key sectoral strengths in the Greater Cambridge area through a shift-share analysis of corporate employment growth over the past five years.

3. Employment growth shift-share analysis

In this section, we present the results of a shift-share analysis for Greater Cambridge and the other districts in the wider Cambridgeshire and Peterborough Combined Authority (CPCA) area. This analysis, which is based on our 2021-22 annual draw data, allows us to delve deeper into Greater Cambridge’s sectoral strengths by segmenting employment growth into impact of sectoral composition and impact of sector performance.²

Figure 3.1 presents the analysis for the five-year growth period up to and including 2021-22 (one-year growth to 2021-22 is analysed separately in Appendix A5). The chart compares realised employment growth rates (‘own share own growth’ blue bubbles) with hypothetical growth rates (i) had the sectoral share of employment in a given district been the same as the CPCA (‘CPCA share own growth’ green bubbles) and (ii) had employment increased in each sector by the same percentage as the CPCA (‘own share CPCA growth’ red bubbles).

Figure 3.1 Employment growth shift-share analysis by district – Five-year growth



Note: The size of each bubble is proportionate to the number of employees in 2016-17 on a continuous scale.

Source: Cosh & Caselli, CBR.

The chart shows some important differences between Greater Cambridge and the other four districts within the CPCA. The realised rates of employment growth (‘own share own growth’) in Cambridge and South Cambridgeshire have been broadly similar to the hypothetical rates had employment increased by the same percentage as the CPCA (‘own share CPCA growth’).

² The latest year covered by the annual draw, 2021-22, includes accounting years ending between 6th April 2021 and 5th April 2022 (the median year end is early December 2021).

The biggest differentiation is in the share of employment in fast-growing sectors (KI sectors). Employment growth in both districts would be lower had their sectoral composition been more similar to the CPCA (3.1% pa against realised employment growth of 4.5% pa).

The picture for the other four districts is more mixed. The effect associated with having a larger share of employment in fast-growing sectors tends to dominate, as can be seen for Peterborough and Fenland. However, there are some important exceptions.

In Huntingdonshire, employment growth would be particularly high had employment increased by the same percentage as the CPCA. In turn, realised employment growth in East Cambridgeshire is higher than hypothetical growth based on either the CPCA's sectoral composition or its growth rates.

Since the results for East Cambridgeshire appear somewhat puzzling at first, Table 3.1 qualifies the results presented in Figure 3.1 by comparing the sectoral employment growth rate and share in each district against the CPCA average. The table allows us to identify the sectors with the largest impact on overall employment growth in a given district and to separate the effect associated with sectoral employment growth rate from that associated with sectoral employment share. A sector with a high growth rate will have a material impact on overall employment growth in the district if its share of employment (provided inside square brackets in Table 3.1) is also high.

We can see that the largest impact for East Cambridgeshire is caused by the 'Education, arts, charities, social care' sector, where employment has grown by 13.6% pa and accounted for 12% of total corporate employment in the district (compared with 4.4% pa and 10% for the CPCA, respectively). If 'Education, arts, charities, social care' is excluded, non-KI employment growth in East Cambridgeshire over the five-year growth period would be 2.4% pa instead of 4.0% pa, while overall employment growth would be 3.0% pa instead of 4.6% pa. This result is driven by a considerable increase in the employment reported by some of the largest multi-academy trusts based locally, for example The Active Learning Trust, The Diocese of Ely Multi-Academy Trust and Anglian Learning (these three trusts alone have added over 2,000 employees combined since 2016-17).

Whilst 'Information technology and telecoms', 'Life science and healthcare' and 'Knowledge intensive services' have seen positive employment growth across all districts, 'High-tech manufacturing' has experienced a fall in employment in Greater Cambridge (where it represents 10% of total corporate employment) and Peterborough (where it has a 16% share). This fall has been caused by lower employee numbers at locally based high-tech manufacturers such as Xaar (Greater Cambridge) and Cummins Generator Technologies (Peterborough).

Employment in 'Transport and travel' has dropped by 14.6% pa in Peterborough, largely reflecting the collapse of Thomas Cook in September 2019. By contrast, districts such as East Cambridgeshire have exhibited strong growth in 'Transport and travel'. In the case of East Cambridgeshire, this strong growth (6.1% pa) is associated with a significant increase in employee numbers at leading haulage firm Turners of Soham.

We now turn to the results of the October 2023 turnover analysis.

Table 3.1 Sectoral employment growth (pa) and share (in brackets) by district – Five-year growth

2021-22 annual draw	Greater Cambridge	East Cambs	Hunts	Peterborough	Fenland	CPCA
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	8.6% [14%]	3.0% [3%]	2.3% [5%]	2.7% [3%]	8.0% [1%]	7.1% [8%]
Life science and healthcare	11.3% [14%]	0.9% [2%]	7.2% [0%]	6.9% [1%]	40.6% [0%]	10.7% [6%]
High-tech manufacturing	-0.6% [10%]	6.5% [7%]	0.6% [6%]	-0.8% [16%]	1.5% [3%]	0.1% [10%]
Knowledge intensive services	4.9% [7%]	2.8% [1%]	2.4% [2%]	0.9% [2%]	18.5% [1%]	4.4% [3%]
TOTAL KI SECTORS	7.2% [45%]	4.6% [13%]	1.8% [13%]	0.3% [22%]	6.0% [5%]	5.3% [27%]
OTHER SECTORS						
Primary	1.5% [1%]	3.2% [21%]	3.5% [1%]	6.6% [0%]	-3.4% [14%]	1.6% [4%]
Manufacturing	2.7% [4%]	0.2% [5%]	-0.6% [14%]	-0.3% [7%]	3.0% [16%]	0.8% [8%]
Wholesale and retail distribution	0.3% [6%]	1.5% [12%]	1.7% [12%]	1.4% [13%]	3.8% [14%]	1.5% [10%]
Construction and utilities	1.3% [5%]	3.6% [7%]	2.5% [19%]	4.5% [5%]	5.6% [10%]	2.9% [9%]
Transport and travel	1.8% [2%]	6.1% [15%]	7.6% [2%]	-14.6% [9%]	10.3% [6%]	0.0% [5%]
Property and finance	4.1% [6%]	5.1% [3%]	3.4% [4%]	6.1% [16%]	5.4% [3%]	5.1% [7%]
Other business services	2.5% [10%]	3.1% [5%]	0.2% [16%]	6.4% [12%]	-0.4% [19%]	2.5% [12%]
Other services	5.2% [8%]	0.3% [6%]	-1.0% [9%]	5.3% [7%]	6.0% [7%]	3.4% [8%]
Education, arts, charities, social care	1.8% [12%]	13.6% [12%]	-1.6% [10%]	9.8% [8%]	-0.1% [6%]	4.4% [10%]
TOTAL NON-KI SECTORS	2.6% [55%]	4.9% [87%]	0.9% [87%]	3.4% [78%]	2.6% [95%]	2.7% [73%]
TOTAL ALL SECTORS	4.7% [100%]	4.9% [100%]	1.0% [100%]	2.7% [100%]	2.8% [100%]	3.4% [100%]

Note: Five-year employment growth rates are given in the first row, while sectoral shares of employment in the district are included inside square brackets. The 'Life science and healthcare' and 'Knowledge intensive services' sectors in Fenland had low employment and extreme % growth. For these two sectors, CPCA growth was used in the 'CPCA share own growth' calculations.

Source: Cosh & Caselli, CBR.

4. October 2023 employment and turnover update results

The analyses presented so far have examined only changes in employment, 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 three years of actual turnover and employment data; and with accounting year ends between December 2022 and April 2023. This gives us a sample of 165 companies (representing employment of about 20,000 and turnover of about £6.4bn). Table 4.1 provides a comparison of employment and turnover growth rates over the past two years for this group of companies.

Table 4.1 Comparison of employment and turnover growth rates over the past two years in the Greater Cambridge area (October 2023 Update)

Greater Cambridge area Sample of companies with both employment and turnover for the last three years	Turnover growth %pa		Employment growth %pa	
	2021-22	2022-23	2021-22	2022-23
KI COMPANIES				
Number of companies	92	92	92	92
Totals in 2022 and 2023	£4,112m	£5,010m	14,227	16,095
Median growth	10.2%	17.3%	4.6%	6.8%
Weighted average growth	13.0%	21.8%	7.6%	13.1%
NON-KI COMPANIES				
Number of companies	73	73	73	73
Totals in 2022 and 2023	£1,208m	£1,407m	3,475	3,703
Median growth	7.6%	11.1%	0.0%	0.0%
Weighted average growth	8.8%	16.5%	0.0%	6.6%

Source: Cosh & Caselli, CBR.

In recent updates we have found that the pandemic affected turnover more strongly than employment due to the operation of the furlough scheme. The table above shows that with the recovery from the pandemic normal service has been resumed and turnover growth exceeds employment growth as it does usually. The findings are dependent on the sample selection and are provided to enable a comparison between employment and turnover growth and between the latest year and one year earlier.

Employment growth for these companies providing both employment and turnover data was notably stronger among the KI companies, which saw employment increasing by over 10% in 2022-23 (up from 7.6% in 2021-22). Non-KI companies achieved positive but lower growth in each year. Both groups showed a marked increase in growth rates in the latest year. These findings are in broad agreement with those found for the full sample (see Appendix A1) and are exceptional by comparison with the performance of the national economy shown in Figure 1.1.

The next section discusses the results of the October 2023 snapshot.

5. October 2023 snapshot results

This section summarises the results of the October 2023 snapshot. Having seen in Section 4 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 in either May or June 2023. Only turnover data is available and together they represent a combined current annual turnover of about £413m and have over 3,700 employees.

The gain from focusing on interim results for six-month periods is that most of the activity reported in the accounts took place in 2023. For each company we look at turnover growth in the same six-month period in 2021 and 2022.

5.1. Turnover growth

Total turnover for this group of companies grew by 7% in the first six months of 2023 compared with the same period last year. Whilst positive, this is slower than the 25% growth achieved in the previous year. The median growth in the first half of the year for these companies was 10% compared with 24% in the previous year. This suggests that conditions became more challenging in the first half of 2023, but positive growth was still achieved by these successful KI companies. The consequences of the onset of recession in 2023 has been felt even by these successful Greater Cambridge businesses.

5.2. Companies' comments on coping with the recession

We report below some comments from the companies' latest reports. They offer some further insights into the impact of the recession on their business. These reports, published in recent months, appear to show that business conditions have been challenging in the first half of 2023.

In summary, the first half of 2023 has continued the Group's track record of resilient performance, delivering record results in line with the Board's expectations. However the Board does not underestimate the potential impact of the prolonged uncertainty in the current economic environment, both UK and international, and is maintaining its conservative attitude to risk, governance and financial discipline. At the same time, economic downturns may present further acquisition and/or investment opportunities for Science Group. With a very strong balance sheet, including significant cash resources and undrawn debt facilities, Science Group is well placed to explore any such opportunities.

Science Group PLC: Science and technology consultants

The Group has delivered a solid first half performance with increased revenues across our strategic sectors together with materially improved profitability. Alongside this, we have seen evidence of our strategy to diversify across our customers, product offerings and markets paying off, with the first deliveries of our turnkey gaming cabinet solution during the period and a strengthening of our presence in the Broadcast market. Through close cooperation and planning with our customers, we have helped them navigate through the supply chain challenges, cementing our position as a trusted technology outsource partner. Our value proposition continues to grow in reputation across our target verticals and we see a healthy pipeline of opportunities ahead. Reflecting our ambitions to expand our solutions across new technology markets, we have completed our repositioning under the Nexteq brand during the

period. Looking ahead, whilst we are cognisant of shortterm market conditions, the strength of our customer relationships, healthy pipeline and product roadmap leaves us well placed to grow over the medium term in both new and existing markets.

Nexteq (Quixant) PLC: Products for the global gaming and broadcast industries

In the first half of 2023, we remained focused on supporting our global customers and meeting our business and corporate objectives. Our strategy has transformed Abcam to become a scale innovator and important catalyst in the global life science community. The proposed acquisition by Danaher demonstrates external validation of our brand, business model, product quality, and market platform, while providing certain and significant value for our shareholders. Danaher's operating company model allows us to continue to pursue our strategy, while harnessing the power of the Danaher Business System to ensure we remain the partner of choice for our customers.

Abcam PLC: Provides biological and tools for drug discovery

Over the last six months the business has stayed focused on our core telecommunications and utility markets and our team has delivered very strong growth across all key financial metrics. We continue to see high levels of investment in fibre broadband rollout and utility grid modernisation, as well as growth in the adoption of our network management software. These positive trends give us confidence in our targets for the second half of the year and moving forward into 2024. Given the technical burden demanded by managing multiple software vendors, customers are responding well to our strategy of developing a single fibre network and electric grid management platform that supports their entire operational lifecycle. Our lifecycle solutions are the foundation for our 'land & expand' sales approach as customers add new workflow software to support other areas of their business. The IQGeo revenue stream comprises a healthy mix of new deals with large and small companies, and expansion projects with existing customers. This model has also allowed us to further establish our global footprint as we've announced major contract wins in North America, Europe, and Asia.

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

While remaining vigilant to broader macroeconomic conditions, the Board remains confident of delivering full year results in line with its expectations. Despite the lifting of COVID related restrictions in China, sales volumes in the Printhead business continue to be affected, but we expect market conditions in the sectors in which we operate to improve during H2 2023 and this, coupled with increased customer product launches, will drive higher demand for Xaar printheads. We have maintained our policy of increased investment in inventory during 2022 and 2023 to ensure the Group is well placed to capitalise on our targeted opportunities and satisfy customer demand. There is positive momentum in the business with strong customer interest and customer engagement. Our strategy to diversify across a range of market sectors means further customer product launches are expected in 2024 providing confidence in delivering our medium-term growth plans.

Xaar PLC: Digital inkjet printing technology

Group revenue grew by 10% during the first half of 2023. This growth was achieved despite adverse economic headwinds impacting the confidence, and additional fleet investment of

existing customers, with rolling UK van registrations at the beginning of 2023 matching record lows seen during the COVID-19 pandemic. In addition, attrition has been higher at 13.5% (2022: 11.6%), primarily due to an increase in business closures and customers downsizing their fleet sizes. Price erosion on a constant currency basis continued to improve and was 4.6% (2022: 4.8%).

Quartix Technologies PLC: Vehicle GPS tracking

Sales of streaming devices were significantly lower than the prior period at \$9.4m, representing a decrease of 71% year-on-year. Whilst the video streaming device market continues to grow, the number of devices shipped in the period was impacted by customers de-stocking in response to reduced lead-times after building up stocks to weather post-COVID supply chain challenges. This downturn in Amino revenues has had a significant impact on Group results for the period. Consequently, Group revenue in the period was \$23.3m, a decrease of 48% versus the prior year. As a result, we took proactive steps to reduce the Group's cost base in both 24i and Amino in February 2023 and, post period end in June 2023, we took further action to reduce costs in the Amino business. Together these actions have generated c\$8m of annualised cost savings for the Group. We have also identified additional savings in 24i through a targeted cost-reduction programme which is due to complete in early September 2023.

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

Bango has developed unique purchase behavior technology that enables millions more users to buy the products and services they want, using innovative methods of payment including carrier billing, digital wallets and subscription bundling. Bango harnesses this purchase activity into valuable marketing segments, called Bango Audiences. Merchants use these audiences to target their marketing at paying customers based on their purchase behavior. Better targeting increases spend through the Bango payments business, in turn generating more data insights, creating a powerful virtuous circle that drives continuous growth. Everyone connected to the Bango Platform thrives as the virtuous circle grows. Revenue increased to \$20.3M (1H22: \$10.8M). Growth driven by payment & subscription volumes, new DVM contracts and a contribution from the acquisition of DDL.

Bango PLC: Technology and services helping global businesses to grow

Trading conditions continued to be difficult in the first half of 2023, with some drug development companies cutting costs and others delaying clinical trials. Some companies providing solutions and services for clinical trials have reported declining performance in the period. While we increased the value of contracted orders from half-to-half, we did see some delays to contract awards that we anticipate will close in the second half of 2023 or in 2024.

Cambridge Cognition Hldgs PLC: Digital solutions to assess brain health

6. Concluding remarks

The October 2023 Update is the ninth 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 5,673 companies with accounting year ends between December 2022 and April 2023. This sample, which covers about two-thirds of corporate employment in the area, has a modal year end of mid-February 2023. Therefore, it captures the impact of the worsening UK's cost of living crisis on the recovery from Covid. We compare this period with the previous year, which covers the recovery from the effects of the pandemic and the impact of the early days of the ongoing conflict in Ukraine.

The picture that emerges is one of continued and faster employment growth in Greater Cambridge in the year to mid-February 2023. This faster employment growth was driven by a buoyant KI economy, which continued to expand at fast rates despite the supply chain disruptions and inflationary pressures following the onset of the conflict in Ukraine and unfolding cost of living crisis. Life Sciences and ICT, the two largest KI clusters in the area, added over 3,400 employees (out of a total change of 5,972 employees). The resilience of the Greater Cambridge corporate economy also benefited from a robust performance of non-KI sectors. Sectors such as 'Wholesale and retail distribution', low- and med-low-tech 'Manufacturing', 'Transport and travel' and 'Construction and utilities', some of which were severely hit by Covid lockdowns, achieved higher employment growth last year than they did one year earlier. These results point to continued recovery from the effects of the pandemic into the Autumn of 2022, when the cost of living crisis became more severe as inflation peaked at 11.1% (a 41-year high).

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 three years. We have found in recent updates that Covid affected turnover more strongly than employment due to the operation of the furlough scheme. Our October 2023 analysis shows that, with the recovery from the pandemic, normal service has been resumed and turnover growth exceeds employment growth as it does usually. Both KI and non-KI companies included in this sample reported a marked increase in growth rates in the latest year. Employment growth was notably stronger among the KI companies, which grew their employment by over 10% in 2022-23 (up from 7.6% in 2021-22). Non-KI companies achieved positive yet lower growth in each year.

Finally, we augment the results for turnover by providing a snapshot for companies with interim accounts ending in either May or June 2023. Total turnover for this group of companies (all knowledge intensive) increased by 7% in their latest six months compared with a growth of 25% in the same period last year. These findings reinforce those from the employment update sample, while suggesting that conditions became more challenging in the first half of 2023. The perusal of their interim reports also offers some further insights into the impact of the recession on their business.

Overall, the results of our October 2023 Update reveal that, although some businesses were adversely impacted by the challenging macroeconomic environment, the recovery of the Greater Cambridge corporate economy from the effects of the pandemic continued into 2022-23. Our next update, which will cover the year to mid-October 2023, will shed further light on the impact of the cost of living crisis on Greater Cambridge businesses.

Andy Cosh & Giorgio Caselli

Centre for Business Research, University of Cambridge
October 2023

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

October 2023 Update	Number of companies	Total empl 2022-23	Total empl 2021-22	% of GC total 2021-22	Empl growth 2022-23	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	769	14,156	12,831	69.6%	10.3%	6.5%
Life science and healthcare	243	18,691	16,563	83.9%	12.8%	12.6%
High-tech manufacturing	164	7,054	6,480	79.3%	8.9%	1.3%
Knowledge intensive services	233	6,656	5,989	84.4%	11.1%	5.7%
TOTAL KI SECTORS	1,409	46,557	41,863	78.3%	11.2%	7.8%
OTHER SECTORS						
Primary	110	461	464	37.8%	-0.6%	-0.2%
Manufacturing	233	2,484	2,377	59.7%	4.5%	3.0%
Wholesale and retail distribution	445	3,569	3,407	64.6%	4.8%	0.9%
Construction and utilities	553	2,739	2,701	57.6%	1.4%	-0.8%
Transport and travel	94	1,109	1,061	65.0%	4.5%	-0.9%
Property and finance	827	4,187	4,138	70.8%	1.2%	3.6%
Other business services	1,041	5,909	5,557	56.1%	6.3%	6.8%
Other services	651	4,963	4,801	54.0%	3.4%	7.7%
Education, arts, charities, social care	310	4,225	3,862	34.0%	9.4%	0.5%
TOTAL NON-KI SECTORS	4,264	29,646	28,368	53.7%	4.5%	3.4%
TOTAL ALL SECTORS	5,673	76,203	70,231	66.1%	8.5%	6.0%

Source: Cosh & Caselli, CBR.

Appendix A2. Employment growth by sector in Cambridge

October 2023 Update	Number of companies	Total empl 2022-23	Total empl 2021-22	% of Camb total 2021-22	Empl growth 2022-23	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	302	8,665	7,870	85.2%	10.1%	6.9%
Life science and healthcare	96	7,740	7,179	98.4%	7.8%	18.7%
High-tech manufacturing	37	502	469	36.7%	7.0%	0.6%
Knowledge intensive services	91	1,853	1,657	75.9%	11.8%	14.8%
TOTAL KI SECTORS	526	18,760	17,175	85.9%	9.2%	12.1%
OTHER SECTORS						
Primary	24	147	146	77.7%	0.7%	-2.7%
Manufacturing	63	370	345	50.3%	7.2%	-0.3%
Wholesale and retail distribution	148	835	813	54.1%	2.7%	-1.2%
Construction and utilities	125	482	476	55.7%	1.3%	1.5%
Transport and travel	27	243	225	55.3%	8.0%	26.4%
Property and finance	377	2,166	2,125	68.8%	1.9%	3.2%
Other business services	403	2,227	2,103	47.1%	5.9%	10.4%
Other services	271	1,935	1,867	52.0%	3.6%	8.9%
Education, arts, charities, social care	143	2,627	2,414	42.4%	8.8%	1.3%
TOTAL NON-KI SECTORS	1,581	11,032	10,514	51.4%	4.9%	4.8%
TOTAL ALL SECTORS	2,107	29,792	27,689	68.4%	7.6%	9.2%

Source: Cosh & Caselli, CBR.

Appendix A3. Employment growth by sector in South Cambridgeshire

October 2023 Update	Number of companies	Total empl 2022-23	Total empl 2021-22	% of S Cambs total 2021-22	Empl growth 2022-23	Empl growth 2021-22
KNOWLEDGE INTENSIVE SECTORS						
Information technology and telecoms	467	5,491	4,961	53.9%	10.7%	5.8%
Life science and healthcare	147	10,951	9,384	75.3%	16.7%	8.4%
High-tech manufacturing	127	6,552	6,011	87.2%	9.0%	1.4%
Knowledge intensive services	142	4,803	4,332	88.2%	10.9%	2.6%
TOTAL KI SECTORS	883	27,797	24,688	73.8%	12.6%	5.1%
OTHER SECTORS						
Primary	86	314	318	30.6%	-1.3%	1.0%
Manufacturing	170	2,114	2,032	61.7%	4.0%	3.6%
Wholesale and retail distribution	297	2,734	2,594	68.8%	5.4%	1.5%
Construction and utilities	428	2,257	2,225	58.0%	1.4%	-1.3%
Transport and travel	67	866	836	68.2%	3.6%	-6.4%
Property and finance	450	2,021	2,013	73.1%	0.4%	4.0%
Other business services	638	3,682	3,454	63.5%	6.6%	4.8%
Other services	380	3,028	2,934	55.3%	3.2%	6.9%
Education, arts, charities, social care	167	1,598	1,448	25.6%	10.4%	-0.9%
TOTAL NON-KI SECTORS	2,683	18,614	17,854	55.2%	4.3%	2.5%
TOTAL ALL SECTORS	3,566	46,411	42,542	64.7%	9.1%	4.0%

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 twelve years. The current database goes from 2010-11 to 2021-22 audited company data and covers the accounting periods of companies ending in the 2021-22 financial year. The results of the 2022-23 annual draw will be made available in February 2024. 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.jbs.cam.ac.uk/wp-content/uploads/2023/04/cbr-10-cbr-database-methodology.pdf>

Various analyses can be found at:

<https://www.jbs.cam.ac.uk/centres/business-research-cbr/research/research-projects/project-the-cambridge-corporate-database-regional-growth/>

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 two updates each year and this can be seen in Table A1. If we look at 2023, we have conducted April and October updates which yield estimates of growth for the years to mid-October 2022 and mid-February 2023. These periods capture: the impact of the ongoing conflict in Ukraine on the recovery from Covid (April update); and the effects of the unfolding cost of living crisis (October update). 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>Annual draw 2021-22*</i>	All companies	6 th April 2021 to 5 th April 2022	Year to early December 2021	April 2023	Recovery from worst impacts of Covid
<i>Update April 2023**</i>	Sample	May 2022 to December 2022	Year to mid-October 2022	May 2023	Impact of the ongoing conflict in Ukraine on recovery from Covid
<i>Update October 2023**</i>	Sample	December 2022 to April 2023	Year to mid-February 2023	November 2023	Impact of unfolding cost of living crisis
<i>Annual draw 2022-23*</i>	All companies	6 th April 2022 to 5 th April 2023	Year to early December 2022	February 2024	Impact of unfolding cost of living crisis
<i>Update April 2024**</i>	Sample	May 2023 to December 2023	Year to mid-October 2023	May 2024	Early recovery from cost of living crisis
<i>Update October 2024**</i>	Sample	December 2023 to April 2024	Year to mid-February 2024	November 2024	Assessment of robustness of Greater Cambridge economy

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

Update Sample (using October 2023 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 2022 and April 2023. We then check 2021-22 and 2022-23 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 (**3,686** companies this time representing total employment of **60,424**):

- Company name
- Company registration number
- LA District
- Sector
- KI or non-KI
- Size class in 2021-22 – 1 = 1 employee, 2 = 2-9 employees, 3 = 10 or more employees
- Latest employment 2022-23 (on average mid-February 2023)
- Employment 2021-22 (on average mid-February 2022)
- % change in employment over last year (i.e. on average to mid-February 2023)

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 2022 and April 2023 (whether, or not, they have yet reported). For companies that were included in the update sample we enter their employment data for the last three years. For the remaining companies that have not yet reported in 2022-23 we next download the latest FAME data and check employment data for the last three years against the existing figures on the database. Following this, we create a file with all the companies based in the Greater Cambridge area (**5,673** companies representing total employment of **76,203**) with the following information:

- Company name
- Company registration number
- Local Authority District
- Sector
- KI or non-KI
- Size class in 2021-22 (as above)

- Employment 2020-21
- Employment 2021-22
- Employment 2022-23
- % change in employment between 2021-22 and 2022-23

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 2022-23. This allows us to examine the most recent growth of each sector and size class over the most recent year 2022-23 in comparison with the year 2021-22 for this sample of companies. The year 2022-23 covers the intensification of the UK's cost of living crisis during the second half of 2022, whereas the year 2021-22 captures the recovery from the effects of Covid and the impact of the early days of the ongoing conflict in Ukraine.

The resulting sample is shown in Appendices A1-A3 and these tables highlight how significant these companies are, representing about 66% of corporate employment in Greater Cambridge. The sample has a high coverage of total employment in this update because many large businesses have a March or December year end and so are captured in this update.

Analyses

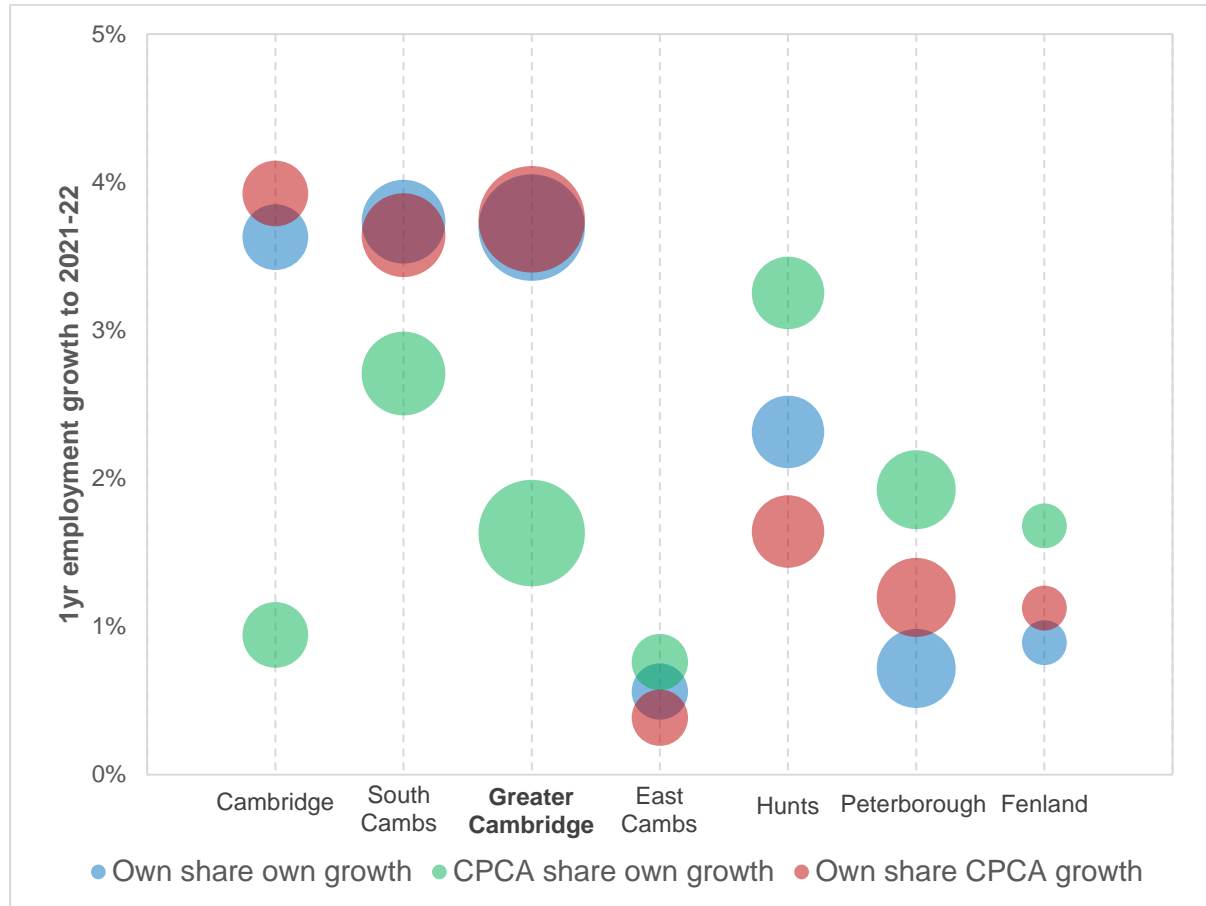
Using the methodology described above we can compare the performance of our sectors over time and identify those sectors with the strongest post-Covid performance. A powerful tool for doing this is one that has as the horizontal axis the sector's employment growth rate in the year 2021-22 and as the vertical axis the annual growth shown in the update sample for 2022-23 – see Figure 2.4 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 2022-23 are found above the horizontal axis and those with positive growth in 2021-22 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.

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 shift-share analysis by district – One-year growth

Figure A1 presents the results of our shift-share analysis focusing on employment growth in the last year.

Figure A1 Employment growth shift-share analysis by district – One-year growth



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

Source: Cosh & Caselli, CBR.

Figure A1 reinforces the findings from Figure 3.1, albeit with some important differences. Whilst the findings for Greater Cambridge (as well as Cambridge and South Cambridgeshire separately) and Peterborough remain qualitatively unaffected, the picture for the other three districts changes somewhat if one looks at one-year rather than five-year growth.

The performance of East Cambridgeshire and particularly Huntingdonshire is pulled down by their share of employment in fast-growing sectors – employment growth would be higher had their share been more similar to the CPCA. Conversely, their performance would be lower had employment increased by the same rates as the CPCA, suggesting that their sectoral growth rates are stronger than the CPCA average.

We still find that employment growth in Fenland is the highest when growth is calculated using the CPCA’s sectoral composition. The results for one-year growth show that even sector growth rate differentials have an impact – employment growth in Fenland would be higher had employment increased by the same percentage as the CPCA.