

Backing innovation-led businesses: the role of public investment



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Joint CEO foreword

A first for our organisations

For the first time, the British Business Bank and UK Research and Innovation – including Innovate UK – are sharing data and publishing this joint research report, which examines how the programmes we deliver to back innovation-led businesses work together to support their success.

In the same spirit of this collaborative report, we want this work to inform a better conversation amongst all relevant stakeholders about the way forward: answering some questions about how best public actors can work to support the UK innovation ecosystem and innovation-led businesses, while at the same time raising new ones. We'll be using the report's insights as we refine our delivery strategies.

Why this report, and why now?

With timely, flexible and relevant support and investment, new discoveries and ideas can ultimately flourish into initiatives and companies that will drive our country, and the wider world, forward. These might emerge from the UK's world-leading universities and research institutes, from businesses, or from other kinds of innovation partnerships.

This vision of the UK as a global science superpower, is a central ambition of the UK government. As the leaders of the major UK government-funded public bodies delivering across the research and development (R&D) ecosystem and the connected worlds of innovation support and finance for business, we fully support this goal.

We want to lead the way in turning this ambition into reality, building on the range of recent government commitments in this area. Public funding of R&D will have a significant uplift by 2024-25, and the British Business Bank has an increased volume of finance to deploy over the next three years.

We know that achieving this objective won't be straightforward. Growing the complex innovation ecosystem, and enabling innovation-led businesses to succeed, takes many ingredients, often working together in different, unique combinations.

Our organisations bring a diversity of perspectives and experience of supporting innovation in businesses. These range from enabling the translation of blue sky research,

skills and know-how in our universities and research centres, to supporting businesses by de-risking bold R&D projects, to helping ensure innovative businesses have access to the right kind of external finance to grow.

We are united in our commitment to taking an evidence-based approach, learning from both local and national evidence to inform our path and enabling us to direct public resources most effectively. We are also clear that increased collaboration in the innovation ecosystem is key to ensuring that we all pull in the same direction, aligning our investments and interventions to best effect. This report demonstrates these principles, and we look forward to continuing this work in collaboration with others across the innovation ecosystem.

“

New discoveries and ideas can – with timely and flexible support and investment – ultimately flourish into initiatives and companies that will drive our country, and the wider world, forward.

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Catherine Lewis La Torre,
CEO, British Business Bank



Professor Dame Ottoline Leyser DBE FRS,
CEO, UK Research and Innovation



Indro Mukerjee,
Chief Executive Officer at Innovate UK

Explainer

About this report's contributing organisations



UK Research and Innovation (UKRI)

UKRI is the UK's largest public funder of research and innovation. We invest more than £8 billion annually to advance our understanding of society and the world around us and deliver benefits for society, the economy and the environment.

Our organisation comprises nine councils. In summary, they are:

- Research England, which is responsible for supporting research and knowledge exchange at higher education institutions in England, working closely with the equivalent body in the devolved administrations
- seven disciplinary research councils, which fund specific disciplines in the research base, such as arts and humanities, or engineering and physical sciences
- the UK's innovation agency, Innovate UK, which drives productivity and economic growth by supporting businesses to develop and realise the potential of new ideas.

In this report you'll see mention of UKRI, referencing the whole organisation; research councils, referring to the collective support offered by them to researchers; and Innovate UK, in the context of its specific role supporting innovation in businesses.

As a UK-wide organisation we work across the four UK nations and with the devolved funding bodies and governments to understand and support different priorities that span research and innovation across the UK.

Through our Councils and the critical national capabilities provided by our centres, units and institutes, we deliver, support and champion the creativity and vibrancy of research and innovation in the UK, for the benefit of society, creating opportunities for all. UKRI is a non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS).

British Business Bank

The British Business Bank ('the Bank') is the UK's economic development bank, 100% owned by government but independently managed. Our mission is to drive sustainable growth and prosperity across the UK, and to enable the transition to a net zero economy, by supporting access to finance for smaller businesses.

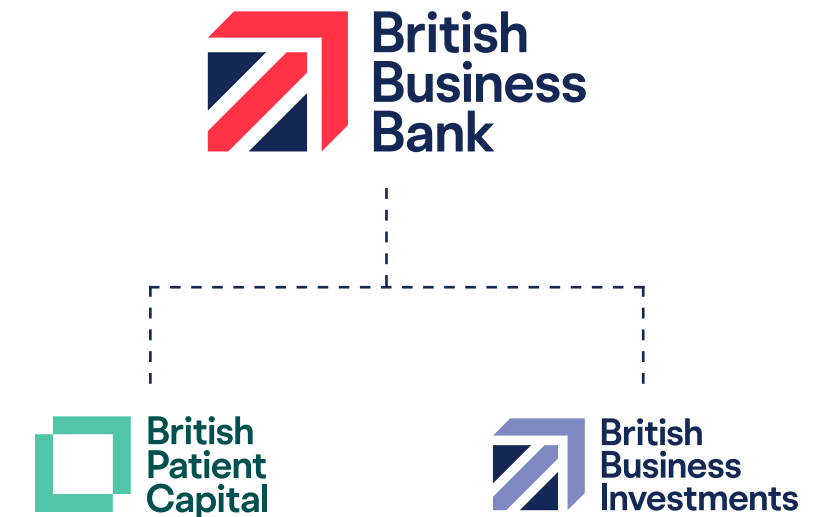
We're not a bank in a conventional sense. We don't take deposits, and generally don't finance businesses directly. Instead, we work with and through over 200 'delivery partners' in the finance markets – like venture capital funds, high street banks, non-bank lenders and business angels – providing funds and guarantees to enable our delivery partners to finance a greater number of smaller businesses, while also helping create a more diverse finance market, with greater choice of finance options and providers. Alongside, we work to improve smaller businesses' awareness of the finance options available to them.

We're also actively involved in key themes relevant to smaller businesses, such as climate change and the transition to Net Zero (where we've recently taken on a new strategic objective); regional imbalances in access to finance; diversity and inclusion; and backing innovation.

We're careful to use economic evidence to design targeted programmes, addressing market failures which affect smaller businesses throughout the economy, and in every region and nation across the UK. In examining how smaller business finance is doing, we share the expertise we've built up with government, working closely with them.

The Bank runs its programmes both directly and also through its two commercial subsidiaries, British Patient Capital (BPC) and British Business Investments (BBI). A key part of our model is leveraging in private sector sources of finance where appropriate, maximising the impact of the public money we invest.

At the end of March 2021, we supported finance worth £88.9bn to 1.77m businesses across the UK, following a significant scaling of government-backed support as a result of the COVID-19 pandemic.



Report background

This report considers the grant funding and investment overlaps between UKRI, including Innovate UK, and the Bank, with a focus on the journey of spinouts that have emerged from Higher Education Institutions (HEIs) as a result of research council grant funding ('research council spinouts'). A high-level summary of these overlaps is shown on the right.

As such, there are some important scope exclusions to note:

1. 'Research council spinouts' do not represent the full population of spinout companies emerging from UK HEIs - Some spinouts are not backed by UKRI research council grant funding. Spinout formation is also not the only route for the translation of research
2. Not all innovation-led business are spinouts, and will exist within the distinct portfolios of Innovate UK, the Bank, and indeed the business population more widely
3. The report does not consider the important role played by HEIs in enabling business formation and supporting access to the right kinds of funding to grow. In England, Research England (RE) supports HEIs to undertake this sort of activity through their Knowledge Exchange and Commercialisation funding streams. The Higher Education Funding Bodies in Scotland, Wales and Northern Ireland provide similar support to HEIs in their respective nations.

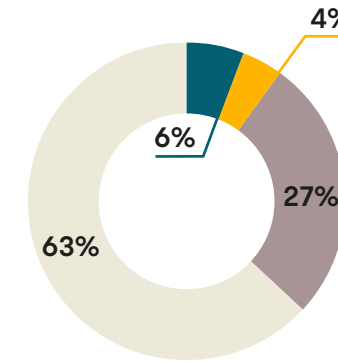
Figure 1.1A

Crossover between the British Business Bank, Innovate UK and 'research council spinouts'

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI 'research council spinout' company data

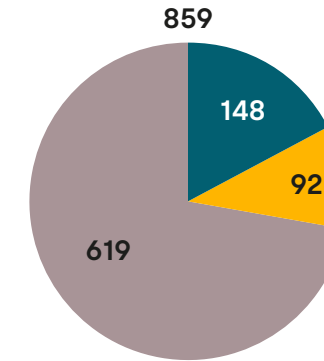
Proportion of 'research council spinouts', n=2,306

Of the 2,306 companies that have emerged from UK research institutions due to UKRI research grant funding ('research council spinouts'), 37% had either received investment from the Bank, funding for R&D project(s) from Innovate UK, or both



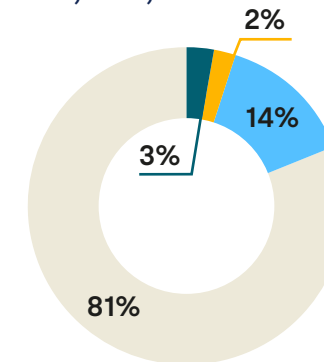
Number of 'research council spinouts'

In absolute terms, 859 had received investment from the Bank, funding for R&D project(s) from Innovate UK, or both



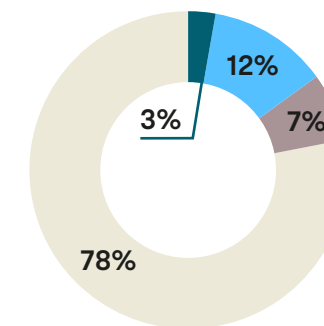
Proportion of Bank equity recipients, n=4,388

Overlap was also strong from the perspective of the Bank, with 19% of the Bank's equity portfolio were either 'research council spinouts' and/or supported by Innovate UK



Proportion of Innovate UK SME awards, n=23,725

Of all Innovate UK awards to SMEs, 22% went to businesses that were 'research council spinouts', Bank recipients, or both



- 'Research council spinout' companies with support from both the British Business Bank and Innovate UK
- 'Research council spinout' companies with investment from the Bank only
- 'Research council spinout' companies with R&D project funding from Innovate UK only
- Non-'research council spinout' companies with support from both the Bank and Innovate UK
- Non-crossover population

Executive summary



1

‘Research council spinouts’ with support from both Innovate UK and the Bank have almost double the survival rates and much stronger employment growth

‘Research council spinouts’, that have emerged from UKRI research grants, which also receive funding for innovation projects from Innovate UK and/or investment backed by the Bank show better business survival rates, and generated more jobs.

On business survival, for a sample cohort of ‘research council spinouts’ founded between 2010 and 2014, 97% that go on to receive support from both the Bank and Innovate UK are currently active as at 26/02/2022. Conversely, 49% of ‘research council spinouts’ that did not go on to receive such backing from either the Bank or Innovate UK are classified as ‘dissolved’ or dormant. This is a significant difference in business ‘dissolution’ rates – more than 17 times.¹

Large divergences can also be seen in terms of employment growth trajectories. The median ‘research council spinout’ with funding from both the Bank and Innovate UK had 18 employees, compared to 4 for ‘research council spinouts’ without support from either – a difference of more than four times. In fact, only 43% of ‘research council spinouts’ without funding from the Bank or Innovate UK report having any employees at all, compared to 91% for those with funding from both the Bank and Innovate UK.

17x

with support from both Innovate UK and the Bank, ‘research council spinouts’ are 17x less likely to have closed

2

‘Research council spinouts’ with support from both the Bank and Innovate UK were four times as likely to have raised external finance

‘Research council spinouts’ receiving support from Innovate UK and investments from the Bank also raised more external equity capital.² Specifically, 94% of those companies that have received support from both the Bank and Innovate UK raised at least one round of external equity capital, compared to 23% of ‘research council spinouts’ not in subsequent receipt of Bank investment or Innovate UK R&D support.

Moreover, 55% of ‘research council spinouts’ with funding from both the Bank and Innovate UK raised at least five equity financing rounds. This is a much higher level of follow-on funding than is seen in equity finance markets generally, where the data shows approximately 28% of companies who raise an initial funding round manage to raise at least five rounds of finance.³

Differences in financing outcomes persist. Those spinouts with support from both Innovate UK and the Bank raised 4.6 external equity rounds on average, compared to 2.9 rounds for those without investment from either organisation. The median value of equity investment raised by spinouts with funding from both the Bank and Innovate UK in the first eight years of being incorporated was £7.3m, compared to £1.6m for those without funding from either the Bank or Innovate UK.

3

Equity-backed spinouts are found across the UK but those in the Golden Triangle secured four times more investment

It is well understood that UK Venture Capital (VC) markets, are highly concentrated in London: for example, 46% of UK equity deals taking place between 2011 and 2021 went to London-based businesses, a much higher share than London's 21% of High Growth Businesses.

However, 'research council spinouts' appear more widely distributed across the UK, and are considerably less London-centric than VC markets, with only 17% of companies emerging from institutions in the capital. Emergence of spinout companies across the UK is closely aligned to the High Growth Business population. This has a natural impact on subsequent external equity financing geographic patterns into these firms, with both the number and value of 'research council spinout'-based deals being much less London-centric than typical VC markets.

However geographic challenges remain for innovation-intensive companies emerging from the UK research base. For a sample of 'research council spinouts', not limited to those linked to the Bank and/or Innovate UK, the data suggests that those emerging from research institutions outside of the established innovation finance ecosystems of the 'Golden Triangle' (Oxford, Cambridge, London) can find it more difficult to access equity than their 'Golden Triangle' peers.

53% of the 2010-14 'research council spinout' cohort located within the Golden Triangle received at least one round of external equity finance according to Beauhurst data, compared to 40% of those located across the rest of the UK. This discrepancy in the propensity for companies to attract equity finance not only persists but worsens through the next few rounds of follow-on equity finance.

£5.7m

raised by the median Golden Triangle 'research council spinout' versus £1.4m in the rest of the UK

The difference in value of capital raised is even more significant, with the median ‘research council spinout’ in the Golden Triangle having raised £5.7m by year eight, compared to £1.4m for the median spinout in the rest of the UK. Differences in the sectoral makeup of spinouts, the link with high-quality research, or the efficiencies of the technology transfer process in generating spinout companies from research does not appear to explain this discrepancy. As such, and as with equity finance more widely, private sector risk capital markets relating to spinouts emerging from the UK research base require continued attention to tackle regional disparities.

4

Supporting and financing innovation doesn’t follow a standard sequence: businesses need different and tailored types of support, in different combinations and at different times

Companies undertaking innovation intensive activities, whether they are earlier stage businesses that have emerged from the UK research base, or more established businesses looking to finance specific innovation projects, are highly diverse. Even within sector and age demographics, individual companies have bespoke support requirements, to enable innovation or R&D activity.

As a result, the idea that supporting and financing innovation within a business context is a fairly one-dimensional escalator where research is initially funded by grants to institutions, before graduating onto business grant funding and then eventually commercially-minded risk capital through equity investors, may be overly simplified.

Our analysis of the flow of support across UKRI (including Innovate UK) and the Bank confirms that the picture is much more complex in reality. For businesses that have received support from both the Bank and Innovate UK, there is no standard sequencing of events. Almost as many businesses received support from the Bank before securing any Innovate UK grant funding (46%) as they did afterwards (54%), across recipients of both the Bank’s debt and equity programmes.

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For businesses that have received funding from both the Bank and Innovate UK, there is no standard sequencing of receiving the finance

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The range of support types accessed by innovative firms supported by Innovate UK and the Bank as well as the timings are a testament to this, and show the distinct but important and complementary roles played by the Bank and Innovate UK. Companies require different types of support in different combinations, and at different times, in order to grow and/or undertake R&D activities.



Introduction

Report overview

Chapter 1: Crossover in support for innovation-led businesses

Examines the natural crossover of recipients of UKRI (including research councils and Innovate UK) and Bank-backed support, covering key aspects like finance type accessed, and sequence of support received.

Chapter 2: Outcomes for innovation-led businesses

Considers outcomes for innovation-led businesses in receipt of support from UKRI and the Bank (relative to those not in receipt), focusing on 'research council spinouts'. This includes the key outcome metrics of business survival, employment and access to equity capital.

Chapter 3: Innovation-led businesses, finance and place

Considers access to finance patterns for innovation-led businesses - again focusing on 'research council spinouts' - in a geographic context, with a particular emphasis on comparing the Golden Triangle (Oxford, Cambridge, London) with the rest of the UK.

Chapter 4: Looking forward

Gives details on how UKRI and the Bank are responding to the insights presented in this report, through a number of forward-looking initiatives.

Chapter 1

Crossover in support for innovation-led businesses



The potential social and economic prize presented by R&D undertaken by innovation-led businesses, especially those undertaking cutting edge research in frontier technologies to tackle global societal challenges, is significant.

However, enabling these companies to access the capital they require is challenging. Market failures limit the flow of private sector investment into these companies and technologies, necessitating government intervention throughout all stages of development, right back to funding for the research within institutions upon which these technologies are based.

Market analysis confirms this, showing that the largest gaps in the provision of equity finance – a key type of risk capital – are faced by companies in R&D-intensive industries.⁴ The British Business Bank and UKRI, including Innovate UK, were established with distinct missions and help solve specific challenges within the space.

Despite the distinct roles played by each organisation, there is clearly the potential for alignment in terms of the innovation support provided and facilitating access to capital. Research councils fund research within UK Higher Education institutions (HEI's) which can sometimes translate into the generation of spinout companies ('research council spinouts').

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Despite the distinct roles played by each organisation, there is clearly the potential for alignment in terms of the innovation support provided and facilitating access to capital

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These companies are likely to require funding to support R&D activities. Such support may be accessed through Innovate UK, to provide funding for specific R&D projects. This does not replace the need for the large amount of external capital required to power the growth of these companies. The Bank runs interventions in external finance markets, to provide investment to smaller businesses, which is often used for R&D purposes.⁵

Both the Bank and Innovate UK provide finance to innovative businesses, through different mechanisms and for different purposes, including university spinout and non-spinout -type companies (for example, an established company undertaking R&D projects). It is therefore likely that there is overlap in the beneficiaries of support between UKRI (including Innovate UK) and the Bank. For the first time, this research quantifies these theorised potential interactions and overlaps, and enables us to better understand how the underpinning capabilities and support activities of UKRI (including both research councils and Innovate UK) and the Bank complement each other.

Crossover between ‘research council spinouts’, companies receiving R&D project funding from Innovate UK and recipients of investment through a British Business Bank programme is strong

As shown in figures 1.1A and 1.1B, 148 ‘research council spinouts’ also received R&D project funding from Innovate UK and raised investment through one of the British Business Bank’s finance programmes. A further 619 ‘research council spinouts’ received R&D project funding from Innovate UK, without raising any investment from the Bank, and 92 received investment from a British Business Bank-backed programme without securing any R&D project funding from Innovate UK.

Substantial alignment in support also exists between the Bank and Innovate UK in companies that have not been identified as ‘research council spinouts’. 1,317 businesses received R&D project funding from Innovate UK and investment from the Bank, without being linked to research council funding to universities.⁶

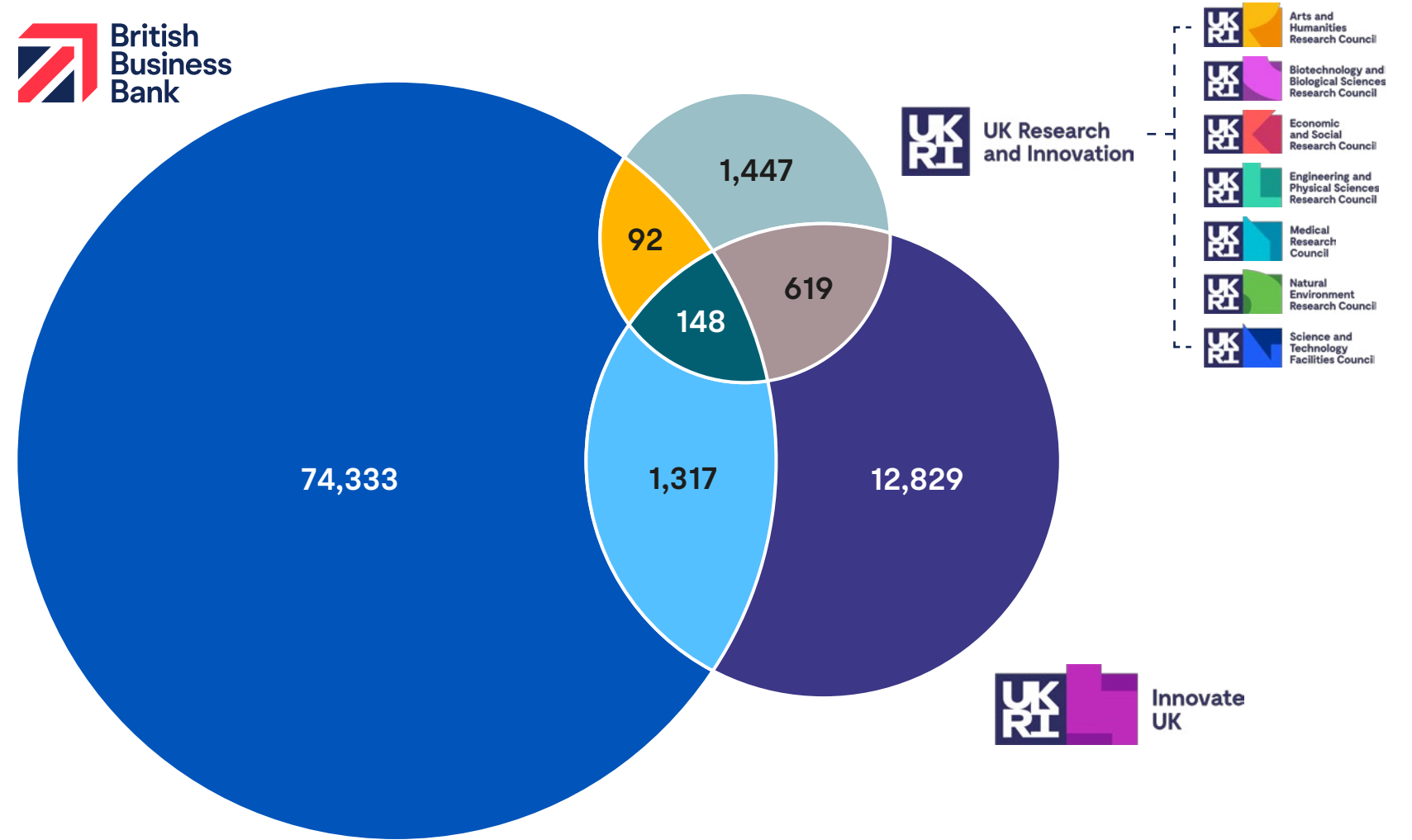
‘Research council spinouts’ are highly likely to go and secure funding for R&D projects from Innovate UK and/ or to receive investment through one of the Bank’s programmes. As highlighted in figure 1.2, 37% of ‘research council spinouts’ either received funding for R&D projects from Innovate UK (33%), investment through one of the Bank’s programmes (10%), or both (6%). 85% of those that received investment from the Bank were in the Bank’s equity portfolio.

This highlights that the capital intensity and risk profile of companies emerging from UK universities and other research institution is aligned to the Venture Capital (VC) finance model at the point of accessing capital from the Bank in most cases. Having not received support from either the Bank or Innovate UK does not necessarily mean that the business did not go on to raise external finance or find alternative means of enabling R&D projects to progress, such as through tax reliefs. As context, Bank-supported equity finance providers were involved in 14% of UK equity deals between 2019 and 2021.⁷

Figure 1.1B

Number of companies by organisation match type

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data



Case study

Paragraf

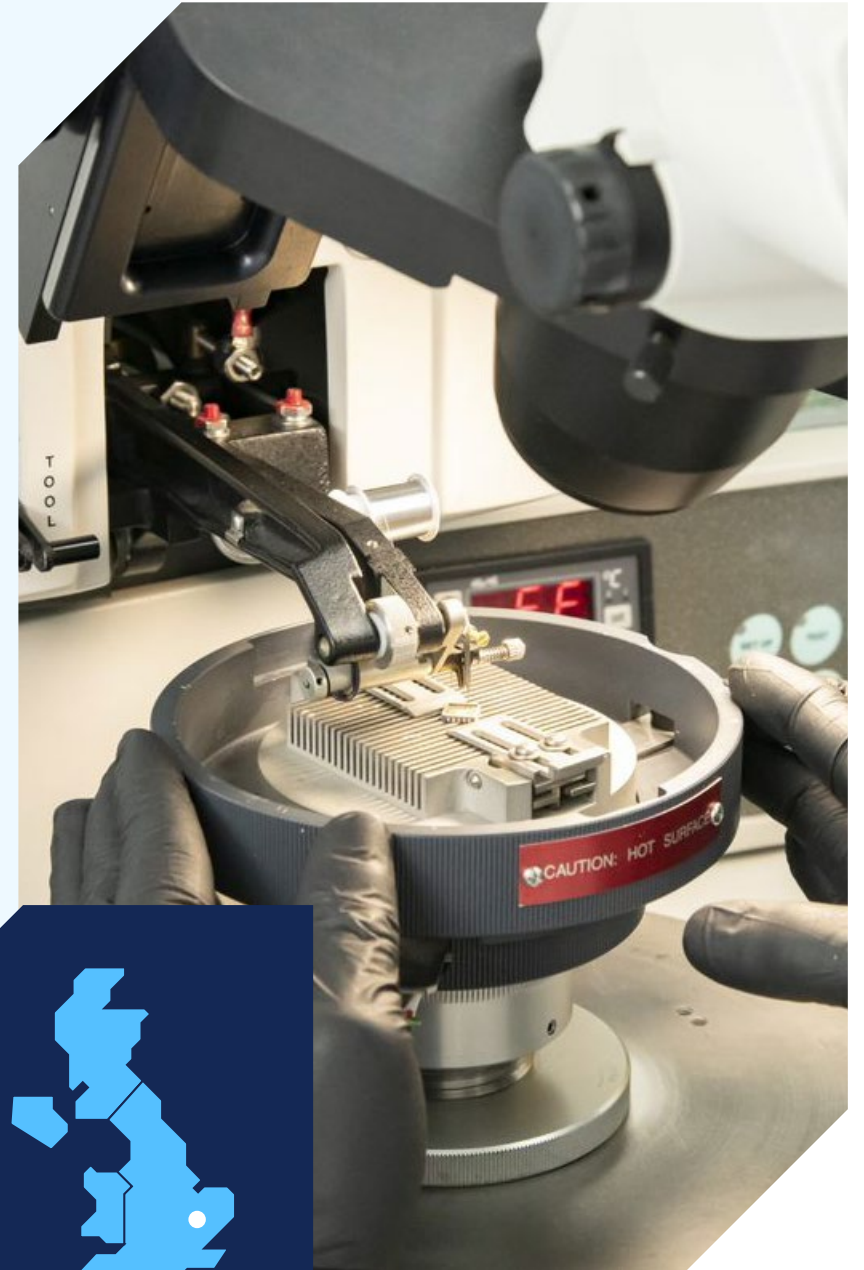
Location: Cambridge

Paragraf was initiated when a Professor Sir Colin Humphreys project at the University of Cambridge required the combination of gallium nitride (GaN) and graphene to create a novel electronic device structure, research that was supported by the Engineering and Physical Sciences Research Council (EPSRC). Dr Simon Thomas joined Professor Humphrey's group to investigate the possibility of combining semiconductors and graphene in a single process, resulting in the breakthrough development and invention that led to Paragraf. The company was created in 2015 as 2D Technologies and incorporated as Paragraf in 2018 when it spun out of the University, with Thomas as CEO, Dr Ivor Guiney Technical Director and Humphreys Chief Scientific Officer and Board Member. In September 2017, Paragraf raised its first commercial equity round of seed capital to support the development of its first major products. Two Enterprise Capital Fund (ECF) Programme funds, IQ Capital II and Amadeus IV ECF, contributed to the round.

Between 2018 and 2020 Paragraf secured six Innovate UK awards across multiple competitions, from feasibility studies through to collaborative R&D. Together, these R&D projects enabled Paragraf to explore product applications for its next generation graphene across different value chains from photonics, to electronic sensors and energy generation.

In 2019, Paragraf raised £16.2m of Series A funding, again involving existing ECF-backed investors but with British Patient Capital-backed Molten Ventures also contributing, further leveraging in private capital. This funding enabled Paragraf to significantly accelerate the delivery of its first graphene-based electronics products to market, and start generating revenue streams.

Most recently, in 2022, Paragraf raised a \$60m round of Series B funding, again including current ECF and BPC-backed investors, but with the addition of BPC directly through Future Fund: Breakthrough. The funding will help the company scale the business internationally by increasing its sales in the UK, US, EU and Asia, boosting its R&D capabilities to advance its technology and product development capacity, and expanding its manufacturing infrastructure.



Historic data on ‘research council spinouts’ covers a much longer time series than data on the activities of both the Bank and Innovate UK, even including legacy programmes. This difference in timescales across the three datasets is reflected in figure 1.3 which demonstrates that the mean average (median in bracket) age of ‘research council spinouts’ that have received support from both Innovate UK and the Bank is 12.5 years (11.0) compared to 14.7 years (14.5) for those without support from either. It is therefore likely that some of these ‘research council spinouts’ did not access any of Innovate UK or the Bank’s programmes as they pre-date both organisations and may have secured finance / support via other means.

Spinout companies generated from investments in research are very diverse. They operate across many sectors of the economy, use different business models and often have varied external finance needs. Some companies spinning out of universities are service based, for example consultancies, and may not be suitable for, nor require, equity finance. It is therefore important when considering this analysis, which covers spinout companies across this diverse spectrum, to acknowledge that raising equity finance is not necessarily the sole measure of success.

Figure 1.2

Proportion of ‘research council spinouts’ receiving funding from Innovate UK, the British Business Bank, or both

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data

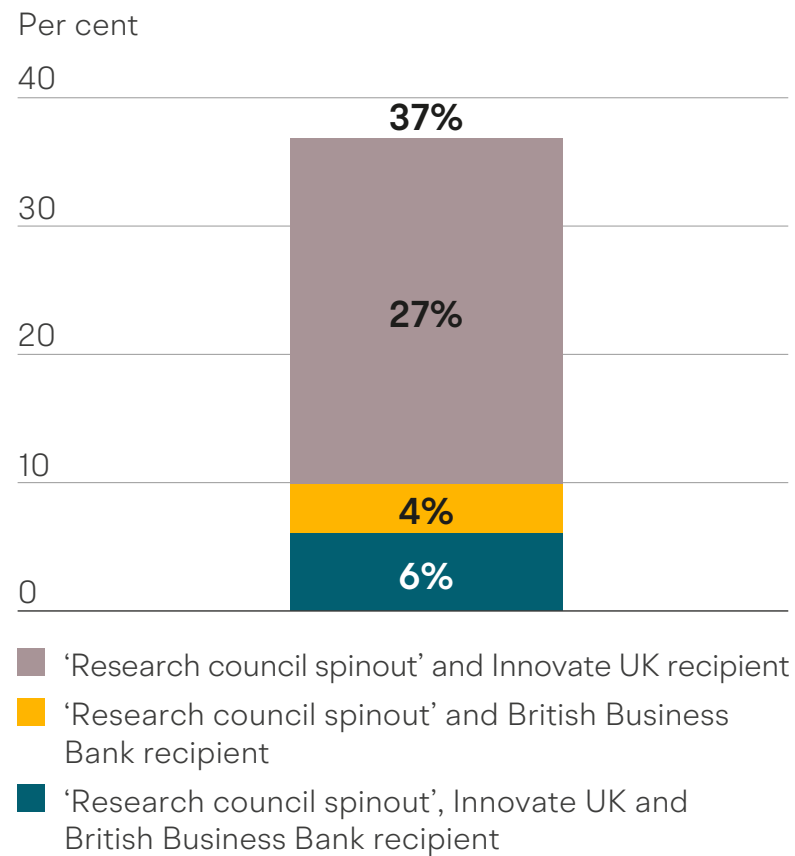
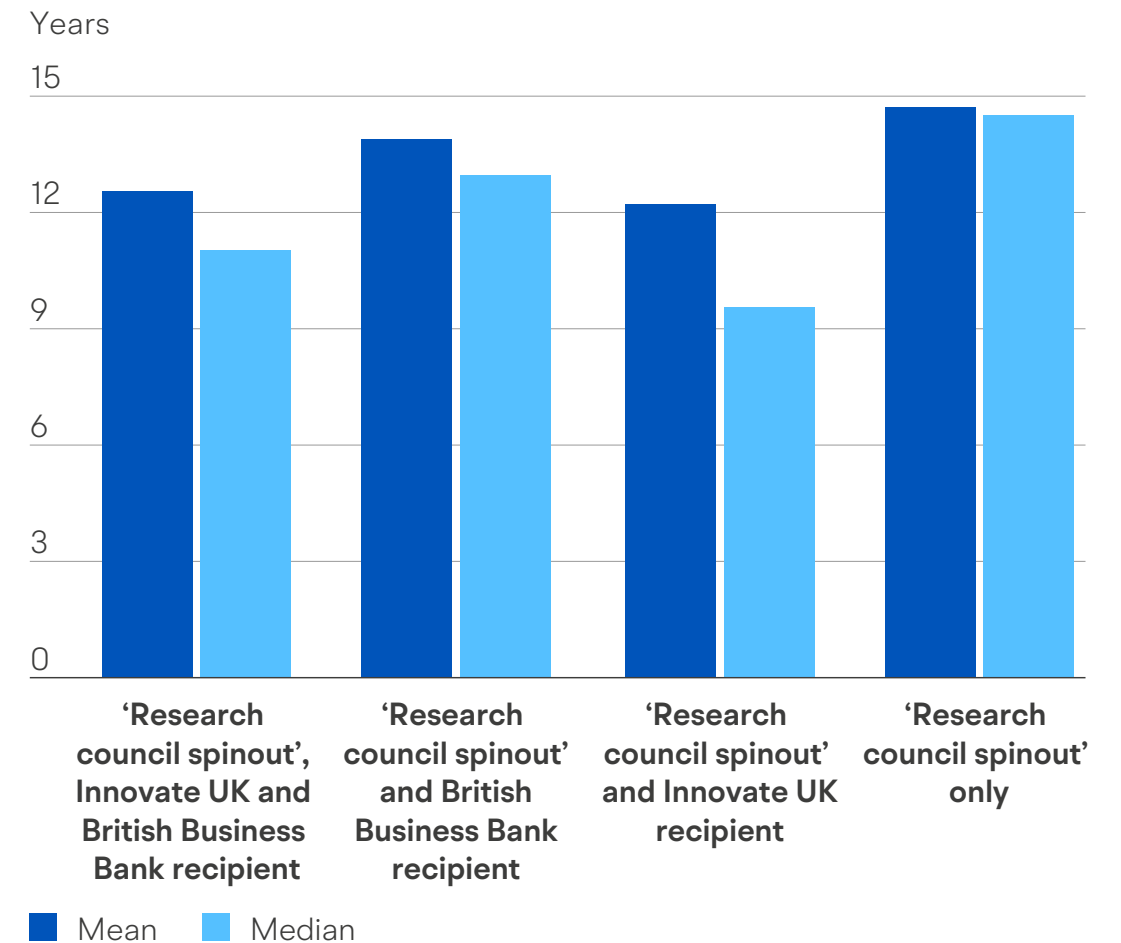


Figure 1.3

Average age of ‘research council spinouts’ by organisation match type

Source: Age as at 26/02/2022, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data



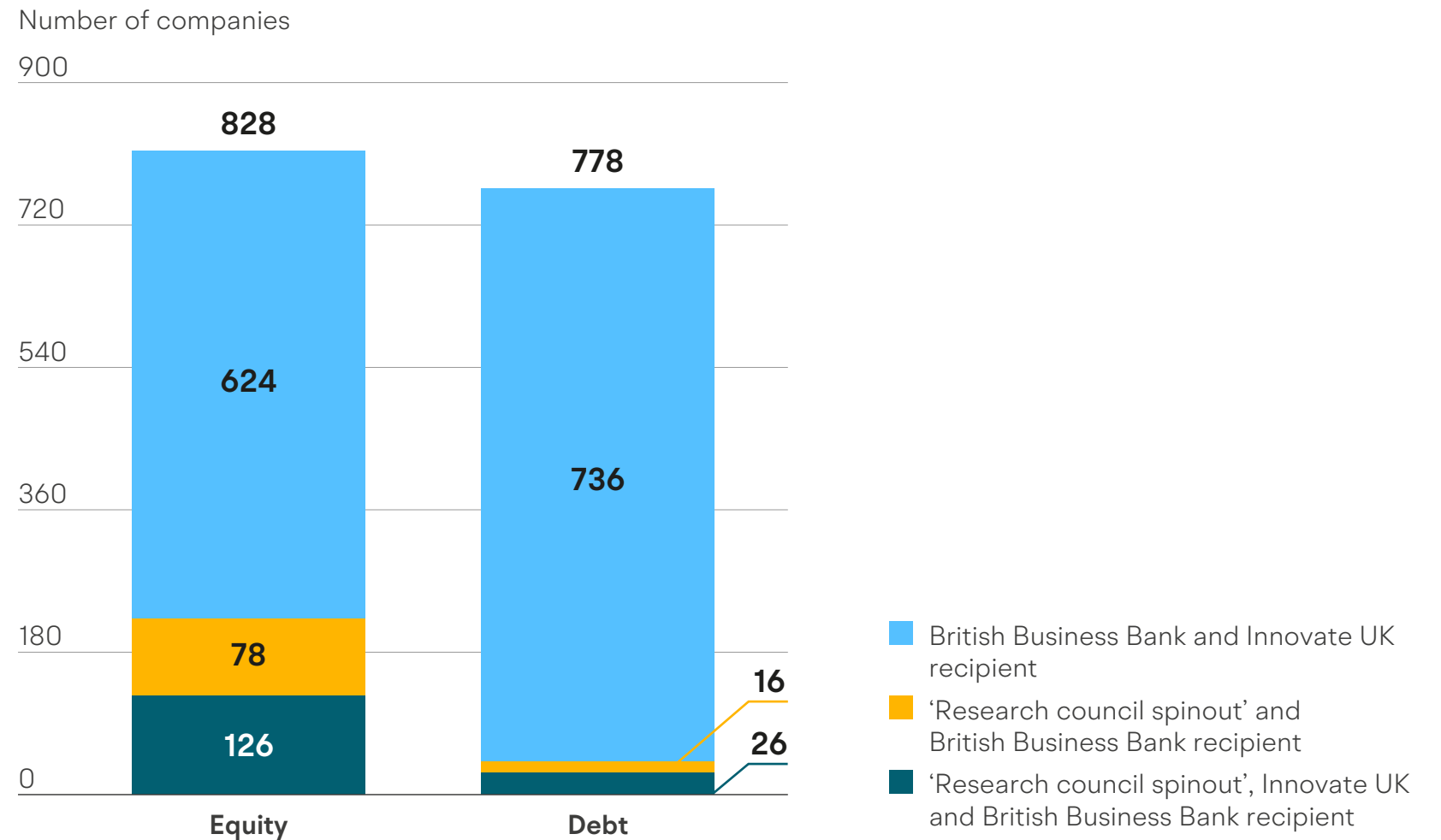
‘Research council spinouts’ and Innovate UK recipients appear within both the Bank’s equity and debt portfolios, and are most prevalent in the early stage equity-focused programmes

Figure 1.4 highlights the number of companies supported by one of the British Business Bank’s finance programmes that are ‘research council spinouts’ and/or have received funding for R&D projects from Innovate UK, split by finance type. 828 companies supported by the Bank’s equity programmes are either ‘research council spinouts’ (204), have received funding for R&D projects from Innovate UK (750) or both (126). 19% of all UK companies that have received investment through one of the Bank’s equity programmes fall into one of the above categories. Government support is therefore clearly important in the creation and development of highly R&D-intensive spinout companies, and the financing of R&D activity more broadly. Crossover between the Bank’s portfolio and UKRI, including Innovate UK, is currently largely organic, without formal catalysing structures in place for most programmes.

Figure 1.4

Number of British Business Bank-backed portfolio companies by organisation match type

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data



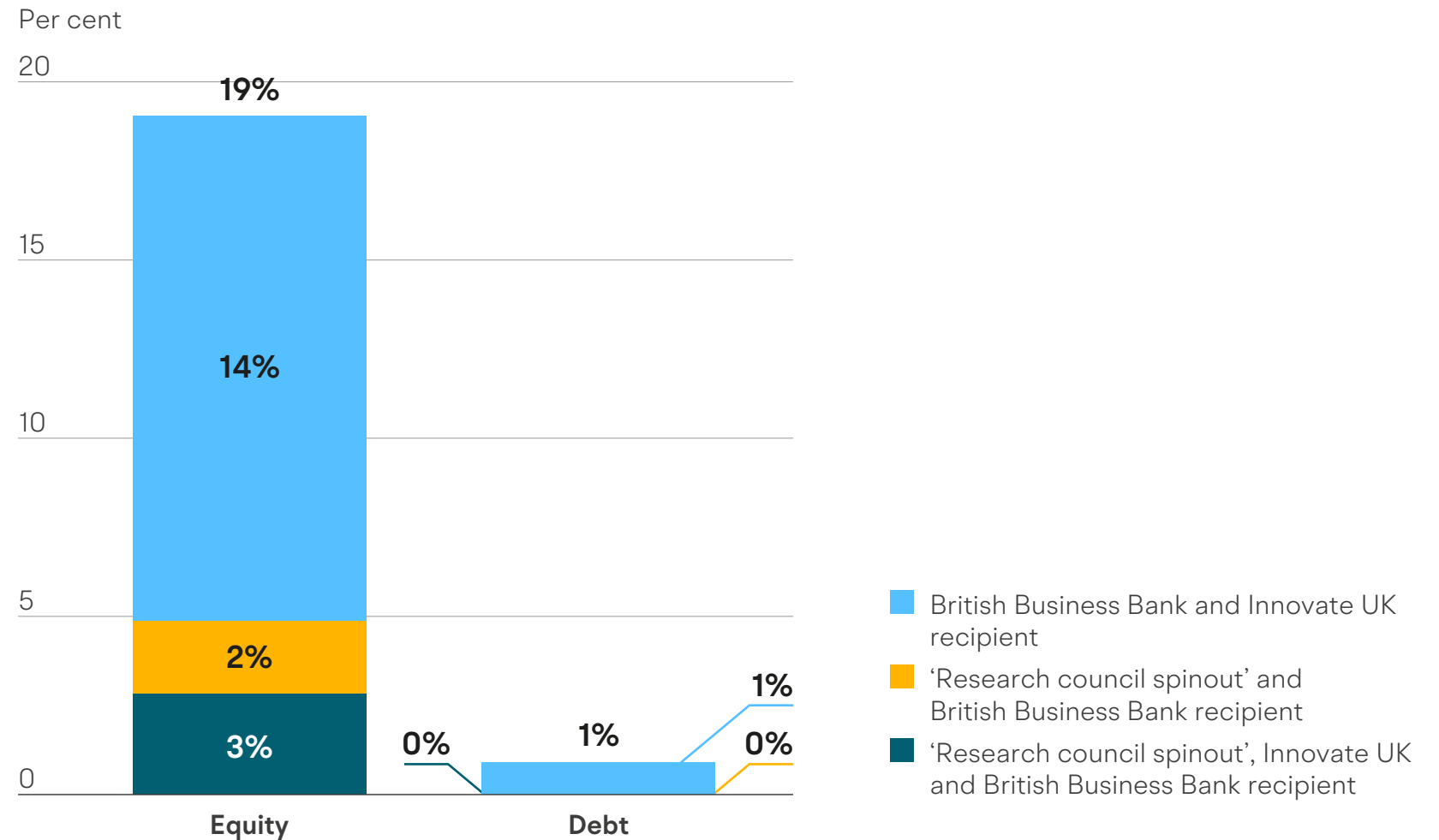
A similar number of companies that have received funding through the Bank’s debt programmes where 778 companies were either ‘research council spinouts’ (42), had received funding from Innovate UK (762) or both (26). However, proportionally, this is much lower than the equity side, at 1% of the Bank’s UK debt portfolio. This alignment of support, especially with Innovate UK, highlights an important point. The role of the Bank in supporting R&D activity is not solely providing risk capital to extremely high growth potential businesses, but also enabling R&D and wider commercial activity in more established companies through the provision of debt finance. This is confirmed by our interim evaluation of the Northern Powerhouse Investment Fund (NPIF) programme. As a result of NPIF funding, 68% of debt recipient respondents reported the introduction of more efficient processes, 65% introduced new products or services to market and 53% increased investment in R&D.⁸

Figure 1.6 provides a programme-level breakdown of the crossover between the Bank, Innovate UK and ‘research council spinouts’. This overlap is strongest within the Bank’s early-stage equity finance programmes. For the Bank’s regional funds, 36% and 31% of businesses in the NPIF and Midlands Engine Investment Fund (MEIF) equity portfolios respectively were either ‘research council spinouts’ or had received funding for R&D projects from Innovate UK. The MEIF equity portfolio had the strongest links with spinouts emerging from UK institutions, with 13% of the portfolio being ‘research council spinouts’.

Figure 1.5

Proportion of British Business Bank-backed portfolio companies by organisation match type

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data



From an access to finance point of view, the Next Generation of UK and Regional Funds supported by the British Business Bank have a strong platform to build on. The previous cohort of funds are clearly driving R&D and innovation in early-stage firms alongside other public sector actors such as UKRI. This is supported by evaluation evidence from the NPIF and MEIF programmes, which show a high proportion of businesses receiving both debt and equity finance are using it for innovation purposes. In particular, the NPIF evaluation found:

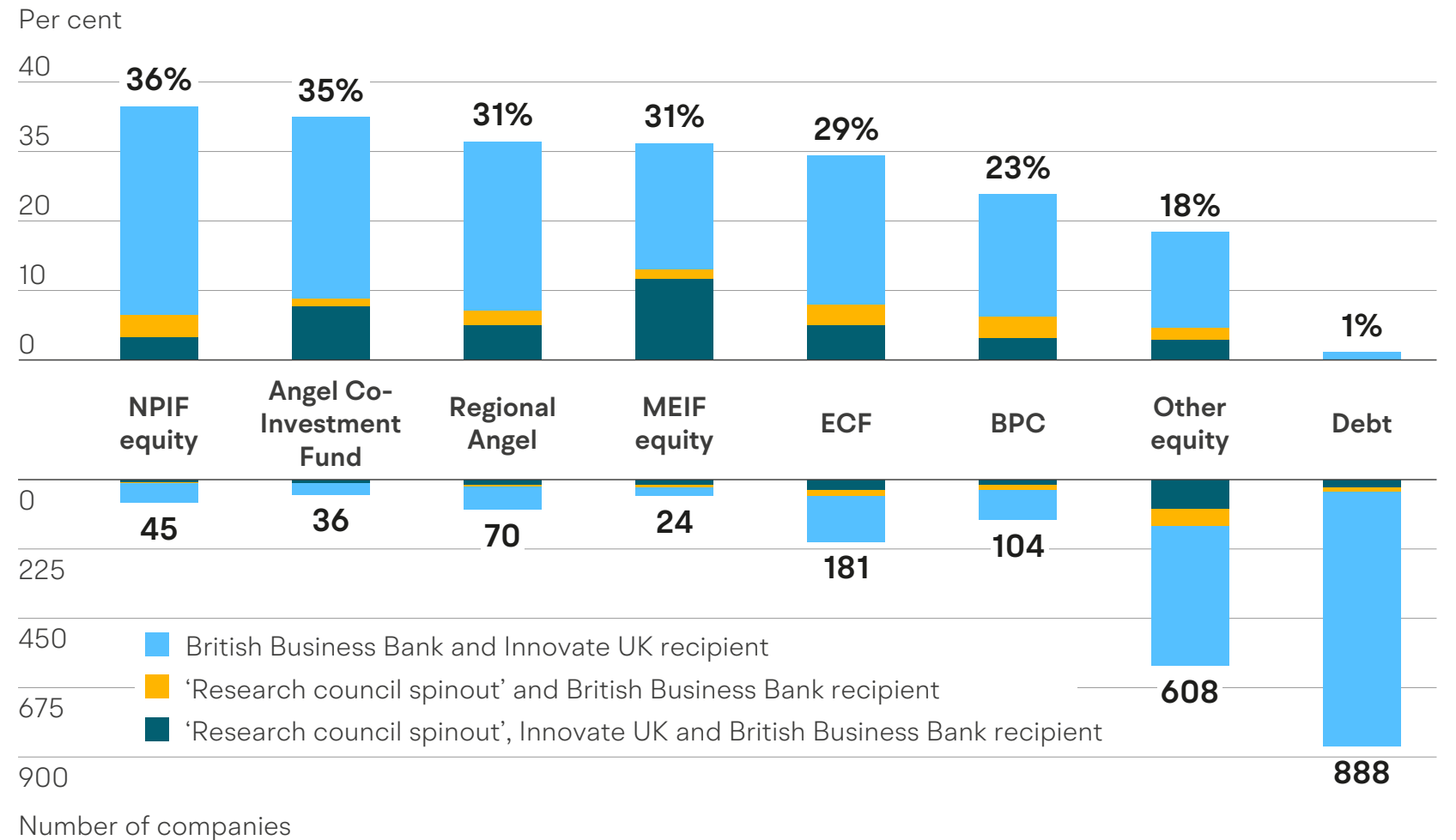
- A large aggregate uplift in R&D investment by recipient businesses with capital being invested to help commercialise new products and services
- 68% of surveyed recipients having introduced new products to market as a result of NPIF
- 93% of surveyed equity recipients and 53% of debt recipients reporting increased investment in R&D as a result of receiving NPIF finance.⁹

The links between the Bank’s Regional Angel programme (RAP) and UKRI, including Innovate UK, within the regions is also encouraging. The programme received an additional £150m at the 2021 Spending Review, which will enable the Bank to continue providing risk capital to innovation-led businesses across the UK through business angel syndicates.

Figure 1.6

Number and proportion of British Business Bank portfolios that are 'research council spinouts', Innovate UK recipients, or both, by programme

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI 'research council spinout' company data



Case study

EarthSense

Location: Leicester

EarthSense is an air quality monitoring and modelling data firm that emerged from the University of Leicester in 2016. The University of Leicester has a strong heritage in Earth Observation Science, underpinned by long-term funding from the Natural Environment Research Council.

EarthSense uses data from ground sensors and satellites to produce unique, high resolution maps of air pollution from country-scale right down to street corners. The data is used by a range of clients including local authorities, health services, pharma businesses and government. It is helping local governments to address air pollution hotspots, has provided air quality information in hundreds of thousands of reports for property sales, and powers the BBC Pollution Postcode Checker which has received millions of hits.

EarthSense's Technical Director, Professor Roland Leigh, has spent more than 15 years at the University of Leicester developing new technologies for air quality monitoring and modelling and led a number of flagship technology demonstration projects in this field. EarthSense's Managing Director, Tom Hall, has 20 years' experience specialising in taking new technologies to market.

Between 2017 and 2019 EarthSense received three Innovate UK awards which enabled the company to further develop their product and explore various applications for the technology. In 2019 the Midlands Engine Investment Fund (MEIF), managed by Maven Capital Partners, provided EarthSense with a £200,000 of debt finance for growth. The funding enabled the business to invest further in research and development while also creating new jobs in the East Midlands.



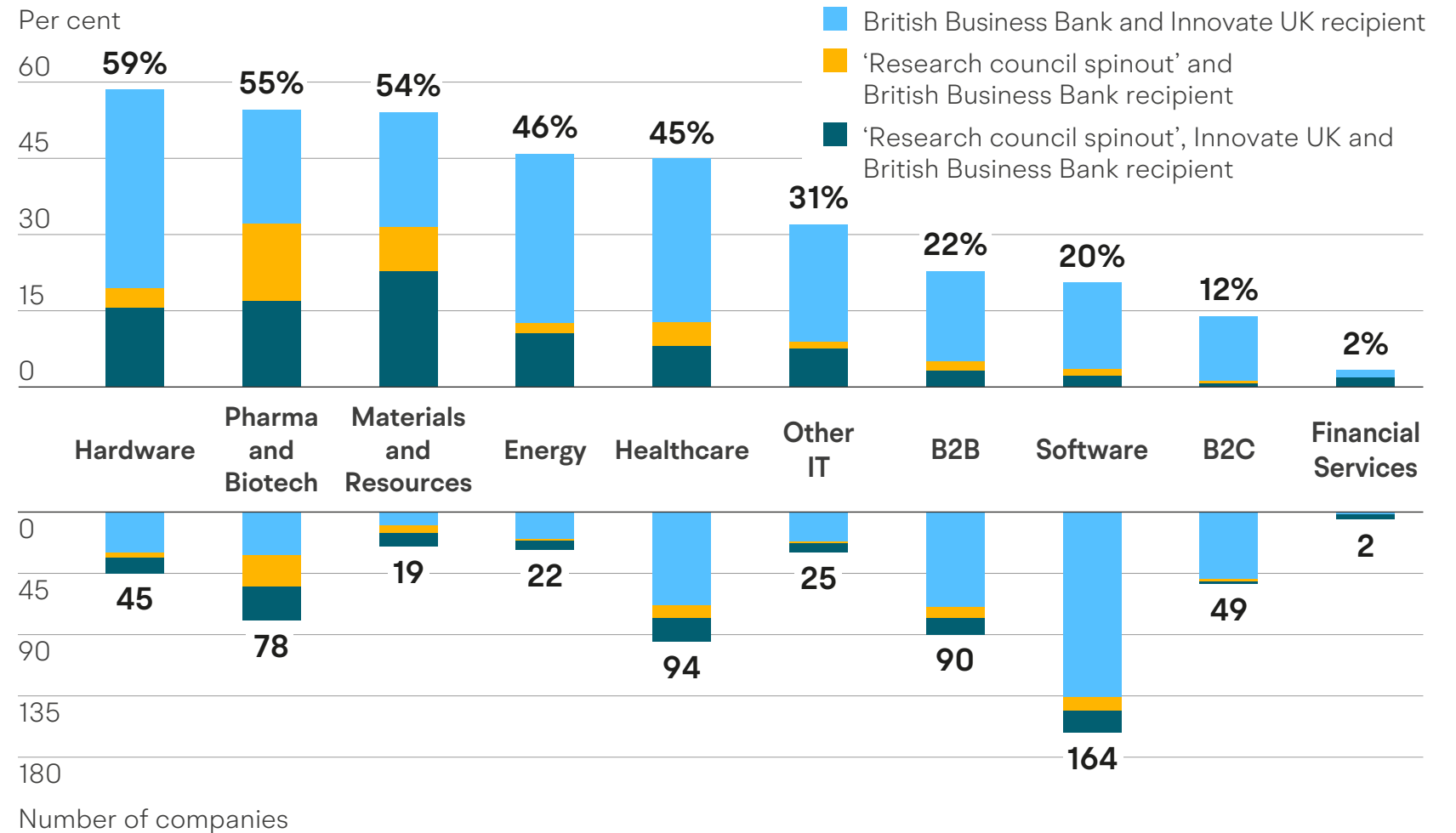
Figure 1.7 shows a sectoral breakdown of the overlap between the Bank’s equity portfolio, ‘research council spinouts’ and companies in receipt of funding for R&D projects from Innovate UK.¹⁰ In highly R&D-intensive sectors, such as Hardware, Pharmaceuticals and Biotech and Materials, companies supported by UKRI, including Innovate UK, have an extremely strong presence, representing more than 50% of the Bank’s equity investments in those sectors. This graph also shows that the spinout companies emerging from the UK research base are most commonly in sectors with long and costly technology development timeframes. These firms also commonly receive funding from Innovate UK to support their R&D activities.

The breadth of sectors supported by the British Business Bank’s finance programmes, even on the equity side, is broad. Companies range from consumer/ financial services to deep technologies and the Life Sciences. Some of these sectors are not the focus of UKRI activities, either through research grant funding provided by research councils or via Innovate UK business R&D/innovation support. The ‘criteria’ for support in UKRI is not based solely on market opportunity, but also the feasibility of the idea and the strength of the research. This difference in selection criteria between the Bank and UKRI is worth considering when comparing the portfolios.

Figure 1.7

Number and proportion of matched British Business Bank portfolio companies by organisation match type, PitchBook sector breakdown

Source: PitchBook Data, Inc, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data



22% of Innovate UK awards to SMEs went to companies with links to either the Bank or research councils

As figure 1.8 demonstrates, 18% of Innovate UK awards went to businesses¹¹ that were either a ‘research council spinout’, had received funding through one of the Bank’s programmes, or both. Given the range of businesses supported by Innovate UK spans both large and small companies, this crossover increases to 22% when only accounting for Innovate UK projects awarded to SMEs, as may be expected given the Bank’s mission to support smaller businesses.

Figure 1.9 breaks down the sample of Innovate UK award recipients that have also received investment through one of the Bank’s programmes by the type of finance the Bank facilitated. The number of matched businesses is split fairly evenly between the Bank’s debt and equity portfolios, with 745 equity recipients and 762 debt recipients having also received R&D project funding from Innovate UK. This demonstrates that the remit of both Innovate UK and the Bank goes beyond start-up propositions in the equity finance space and encompasses more mature companies looking to undertake R&D projects.

Figure 1.8

Proportion of Innovate UK awards to businesses that are either ‘research council spinouts’ and/or have received funding from the British Business Bank

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data

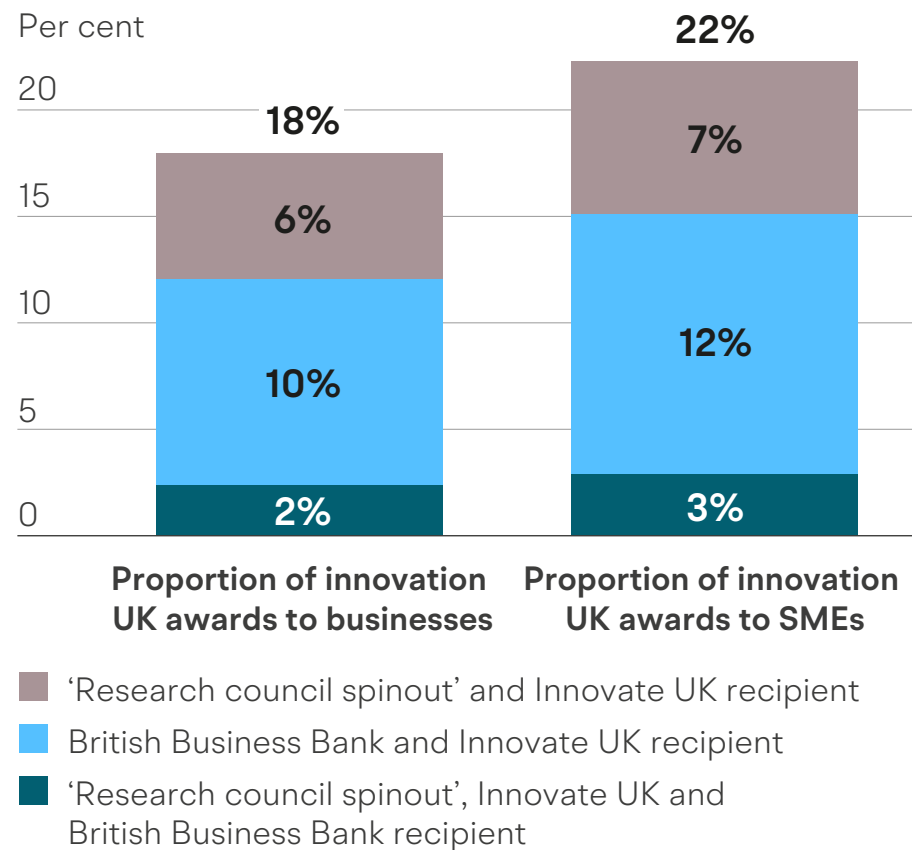
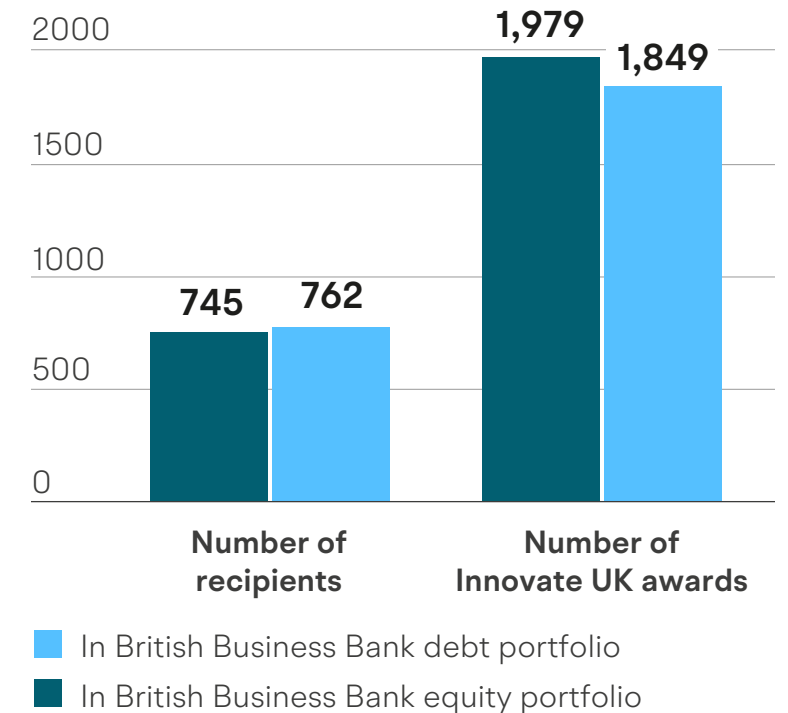


Figure 1.9

Number of Innovate UK recipients, and volume of Innovate UK awards, to businesses in the British Business Bank's portfolio, by asset class

Source: British Business Bank Management Information and Innovate UK awards database



To further understand the makeup of companies that received support from both the Bank and Innovate UK, figure 1.10 considers the average age of recipient businesses, depending on the type of finance facilitated by the Bank. The age of Innovate UK-matched companies within the Bank’s debt portfolio is approximately double that of those companies on the equity side. Debt finance recipients are generally more established, but still require support to finance R&D and innovation activities, which can often be provided by Innovate UK. On the equity side, despite being less mature, matched companies between the Bank and Innovate UK receive considerably larger funding awards from Innovate UK on average. This demonstrates the relative growth trajectory and R&D intensity of this cohort, as they are much more capital intensive.

Figure 1.10

Mean and median years since incorporation of Innovate UK recipients, by British Business Bank match category

Source: As at 26/02/2022, British Business Bank Management Information and Innovate UK awards database

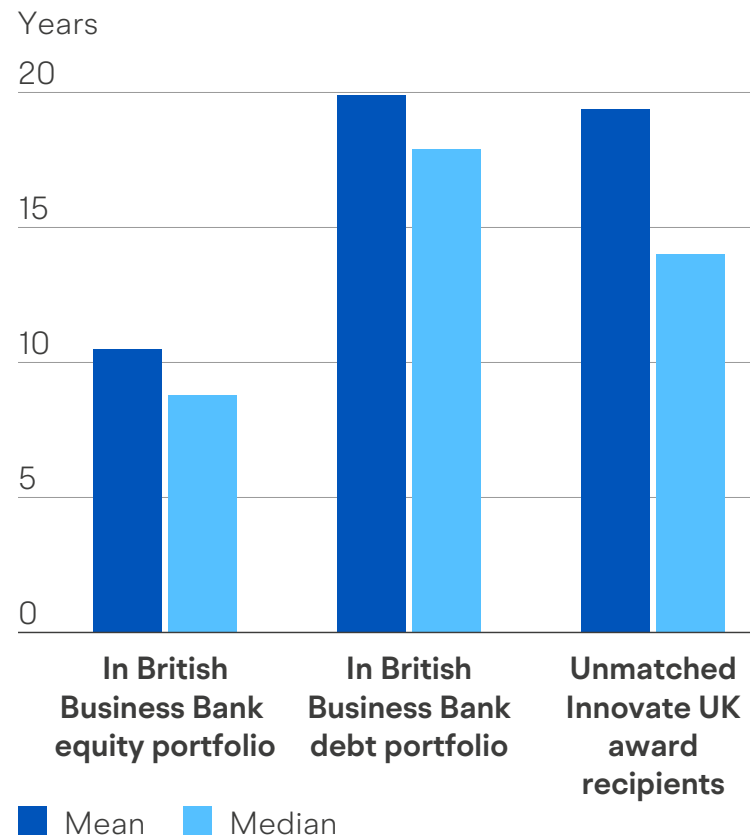
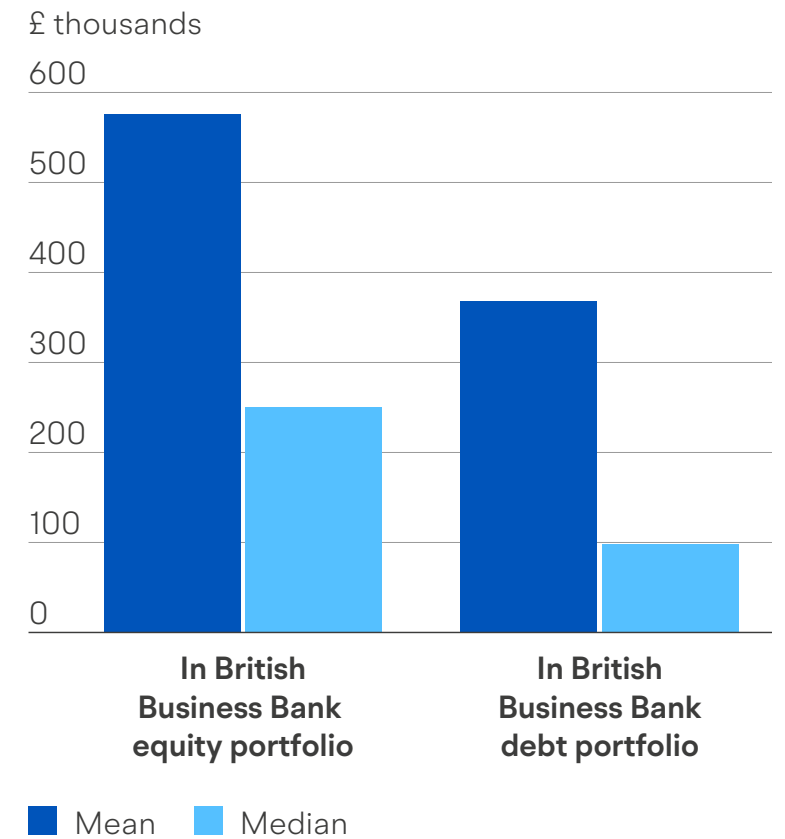


Figure 1.11

Mean and median value of Innovate UK awards raised by Innovate UK recipients, by British Business Bank match category

Source: British Business Bank Management Information and Innovate UK awards database



Event timing

Supporting and financing innovation doesn't follow a standard sequence: businesses need different and tailored types of support, in different combinations and at different times

Financing highly R&D-intensive companies emerging from research is often seen as a somewhat linear process. Initial research is seen as being funded through fully subsidised research grants before incorporated companies move onto Innovate UK grant funding which often requires some level of funding match. Companies are then seen to graduate onto equity finance markets which are largely driven by private sector players, some of whom are backed by government institutions such as the British Business Bank.

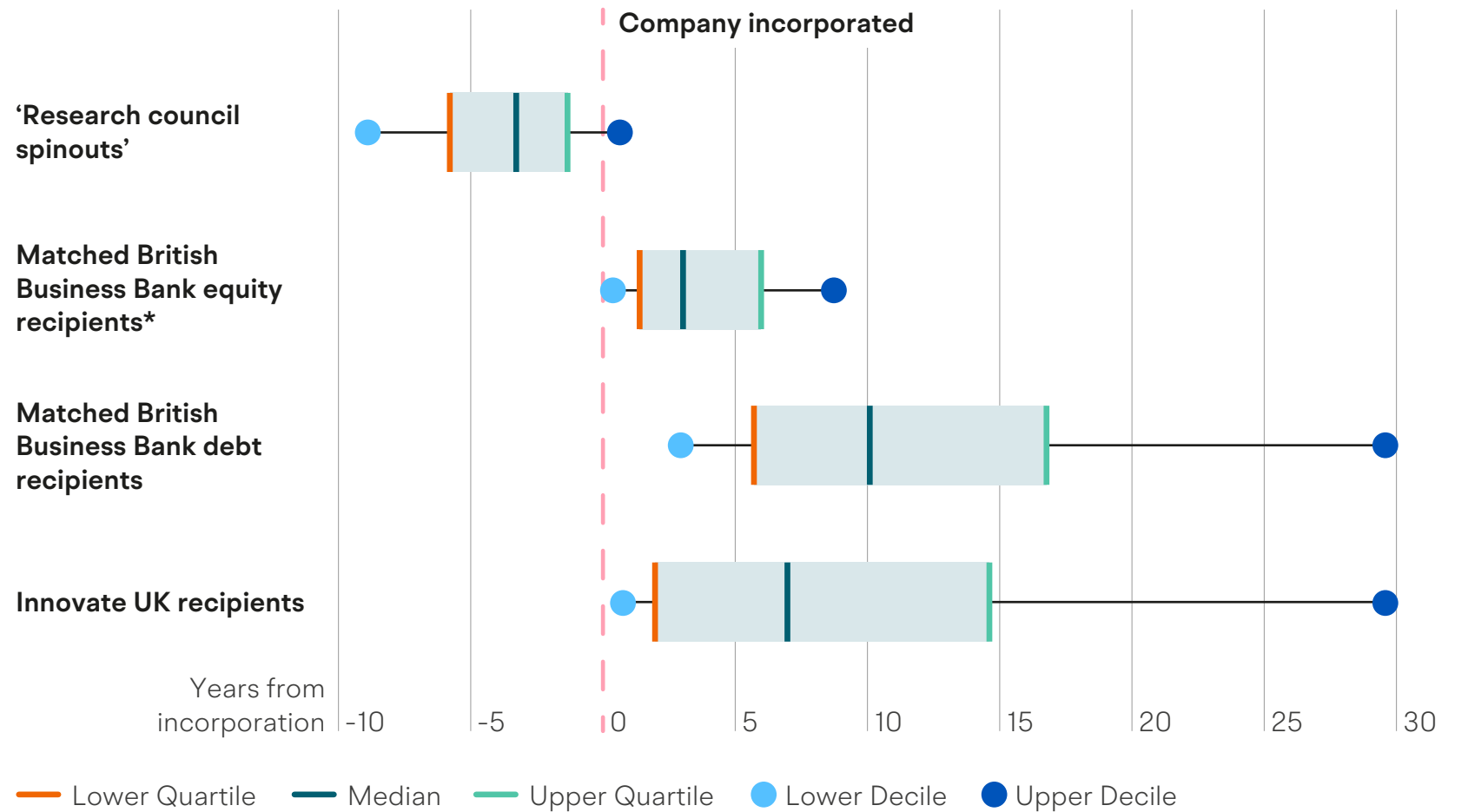
This perception is increasingly being challenged as an oversimplification and misrepresenting the different combinations of support accessed by these companies at different points of their growth journeys. To better inform future policymaking and programme design, especially in terms of identifying opportunities for operational join-up between the Bank and UKRI, we have undertaken analysis to test some of these assumptions.

Shown in figure 1.12 is a box plot chart highlighting the distribution of the years from incorporation to when the Bank and Innovate UK first provide support to businesses. It also shows the distribution of when

Figure 1.12

Distribution of initial investment timings by organisation

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information and UKRI 'research council spinout' data



* These investment timings relate to the cohort of British Business Bank recipient businesses that are 'research council spinouts' and/ or have received R&D project funding from Innovate UK.

the first research council grant relating to each ‘research council spinout’ occurred relative to the company’s incorporation.

As may be expected, given research councils mostly invest in research within UK HEIs rather than within businesses, the first research council grant pertaining to each ‘research council spinout’ occurred pre-incorporation in the overwhelming majority of cases. In 50% of cases, this first grant started between 1.3 years and 5.8 years before incorporation. There is a clear distinction in the timing of the Bank’s investments in ‘research council spinouts’/ Innovate UK recipients between the Bank’s equity and debt programmes. On the equity side, 75% of investments were made less than 6.0 years after company incorporation, and 50% less than 3.1 years. For beneficiaries of the Bank’s debt products, 75% received their first investment at least 5.6 years after incorporation, and 50% at least 10.1 years after incorporation.

Figure 1.12 is also helpful in framing how the Bank’s and Innovate UK’s programmes relate to each other in terms of the timing of support/investment. The timing of Innovate UK’s first award to businesses is the most varied of the four samples considered, with a lower decile of 0.6 years and an upper decile of 29.6 years post-incorporation. This again demonstrates the breadth of R&D activity and support funded by Innovate UK, from projects in high risk, early-stage companies on a rapid growth trajectory, to R&D projects in more established businesses.

Comparing the distribution of the age at which a company receives its first project from Innovate UK with that of the Bank’s debt and equity programmes further demonstrates this. 50% of Innovate UK award recipients received their first award within 5.7 years of incorporation, which is when the substantive majority (~75%) of the Bank’s initial equity investments in matched businesses were made. The other half of Innovate UK recipients received funding at least 5.7 years post-incorporation, where the substantial majority (~75%) of the Bank’s debt investments occurred.

Further analysis has been undertaken to specifically compare the relative timing of the research council grants relating to each ‘research council spinout’ and when the spinout first received investment through one of the Bank’s programmes.

50%

of Bank equity investments in businesses linked to Innovate UKRI and/ or research councils occurred within 3.1 years of company incorporation

For the majority of 'research council spinouts', it took 3-10 years for early investments in research to sufficiently mature for resultant companies to attract significant external investment

Figure 1.13 demonstrates that in almost all cases the Bank's earliest investment in a company was after the start of the earliest research council grant relating to that company. 66% occurred after the end of the last grant. Again, this is unsurprising given the role research councils play in supporting academic research in HEI's, which can lead to the creation of innovative spinout companies.¹²

66% of Bank investments in 'research council spinouts' occurred within ten years of the first research council grant relating to the company, and 55% between three and 10 years. This timeframe could be relevant in considering when to drive interactions and engagements between UKRI and providers of risk capital.

Both the Bank and Innovate UK provide funding to businesses as opposed to institutions, meaning there is more scope for case-by-case differences in relative timing. As figure 1.14 shows, for both companies in the Bank's equity and debt portfolios, there appears to be no typical sequencing of events when comparing the

earliest instance of receiving finance from the Bank and a company's first award from Innovate UK. Recipients of the Bank's equity and debt programmes are considered individually, to ensure the overall trend isn't driven by the Bank investing in earlier stage companies through its equity programmes, and then established companies through its debt programmes.

Overall, the Bank invested before the start of a company's earliest Innovate UK award in 44% of cases, during the award in 32% of cases and after their last award ended in 25% of cases. The most common value in both the equity and debt analysis was zero, i.e. the Bank and Innovate UK's first involvement with a business occurred within the same 12 month period.

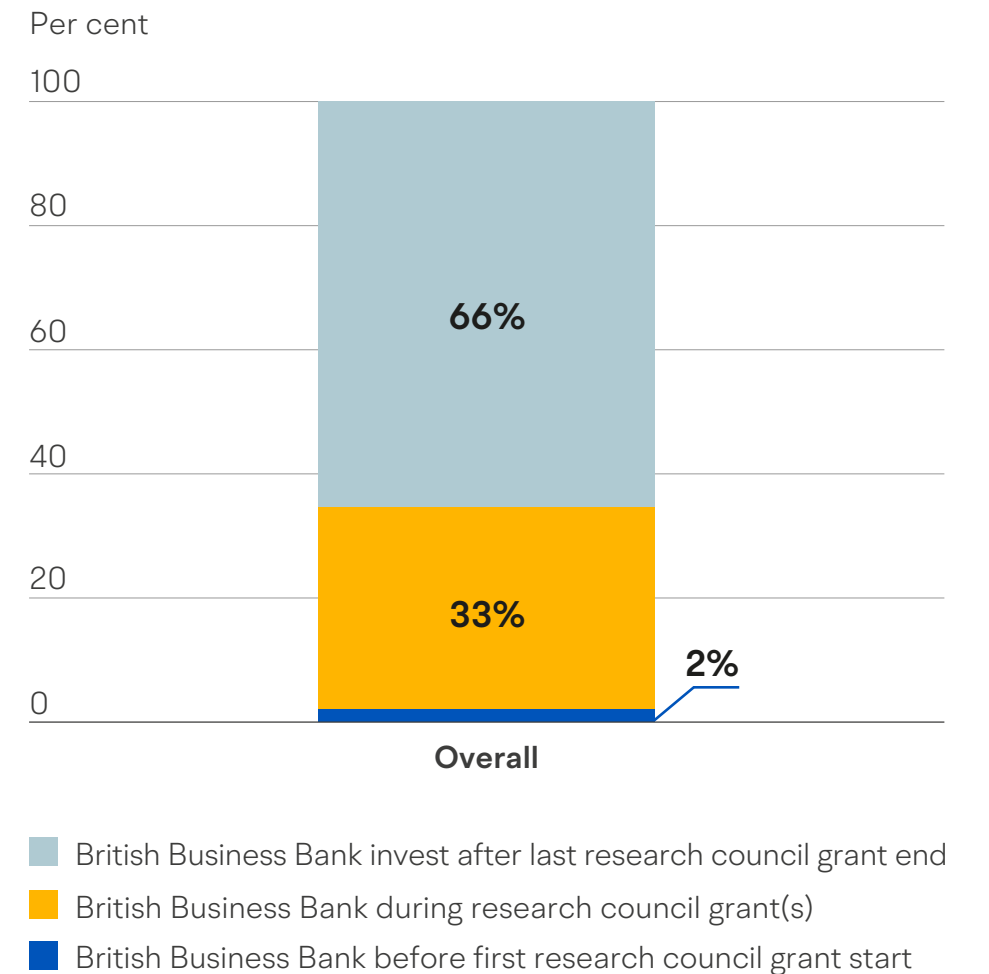
This challenges some commonly-held preconceptions that finance is a simple sequential escalator whereby companies graduate from pre-incorporation grant funding, through to Innovate UK grant funding, and then finally onto Venture Capital.

The reality is much more complex and differs on a case-by-case basis, with the different funding types complementing each other along a company's development and growth journey.

Figure 1.13

Timing analysis, British Business Bank investment vs research council grant provision

Source: British Business Bank Management Information, UKRI 'research council spinout' data



Overall, this first-of-its-kind analysis has given us some useful insights into how and when programmes within the Bank and UKRI, including Innovate UK, interact. Clearly, each organisation plays a critical and distinct role within the innovation ecosystem, and companies require different types of support in different combinations and at different times in order to grow. As may be expected, overlap is particularly strong within the Bank’s equity programmes, which enable the provision of risk capital to companies with high risk but high growth potential.

Looking forward, as the Bank expands and evolves its product offering, namely through the launch of the Next Generation of UK and Regional Funds, the Bank will want to build on the existing regional funds and help connect innovative businesses to the appropriate other forms of public support available. This includes that offered by UKRI and in particular Innovate UK. Shedding light on the complexity and non-linearity of the funding landscape for innovative businesses will also assist the Bank and UKRI in identifying potential opportunities to share insights and for better connecting support while assisting in the development of future policy.

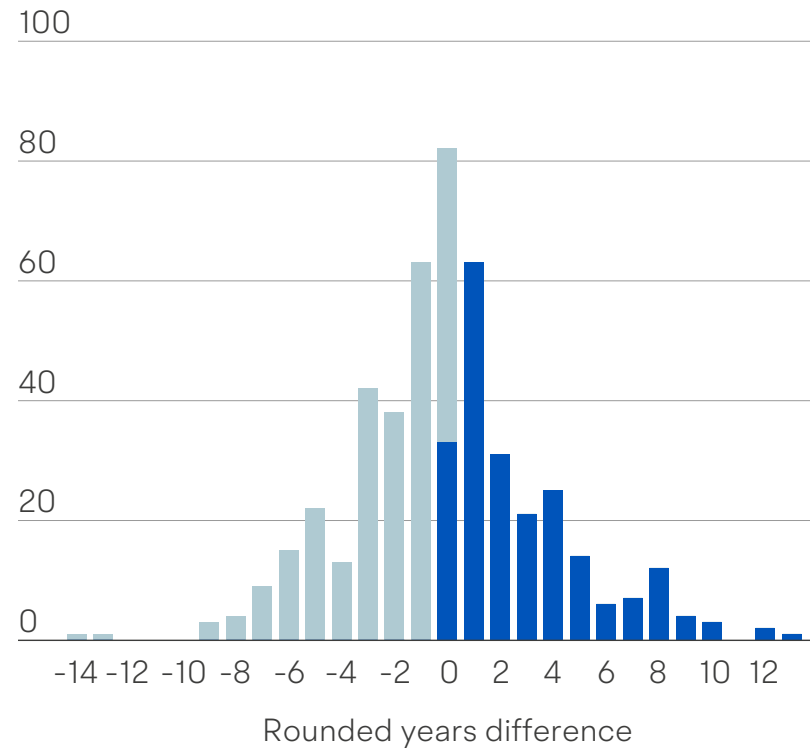
Figure 1.14

Timing analysis, British Business Bank investment vs Innovate UK award provision

Source: British Business Bank Management Information, Innovate UK awards data

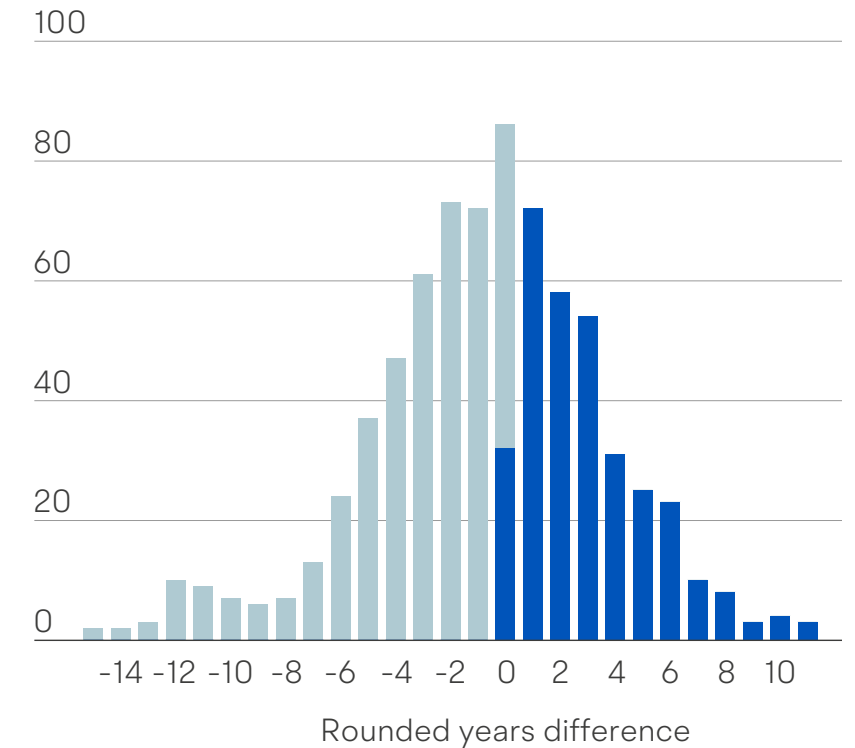
Matched Innovate UK / British Business Bank companies in the Bank’s **Equity** portfolio

Number of companies



Matched Innovate UK / British Business Bank companies in the Bank’s **Debt** portfolio

Number of companies



- Company received funding from the Bank after their Innovate UK award started
- Company received funding from the Bank before their Innovate UK award started

Chapter 2

Outcomes for innovation-led businesses



As outlined in chapter one of this report, external finance is often critical for high growth potential, innovative, R&D-intensive businesses emerging from research. This is due to the development of technology often being highly capital intensive with long lead-in times to market and the generation of significant revenue streams. Market failures exist throughout the development cycle of these companies, and the Bank and UKRI including Innovate UK, intervene at various stages to ensure these businesses can access the capital they require to grow and develop.

Although each organisation plays a distinct role, this analysis demonstrates there are strong alignments between us, with businesses often accessing multiple forms of support. Understanding the outcomes for businesses that navigate the complex fundraising environment and access support and capital through different agencies is an important policy consideration and one that could help guide how the organisations could/ should work together going forward.

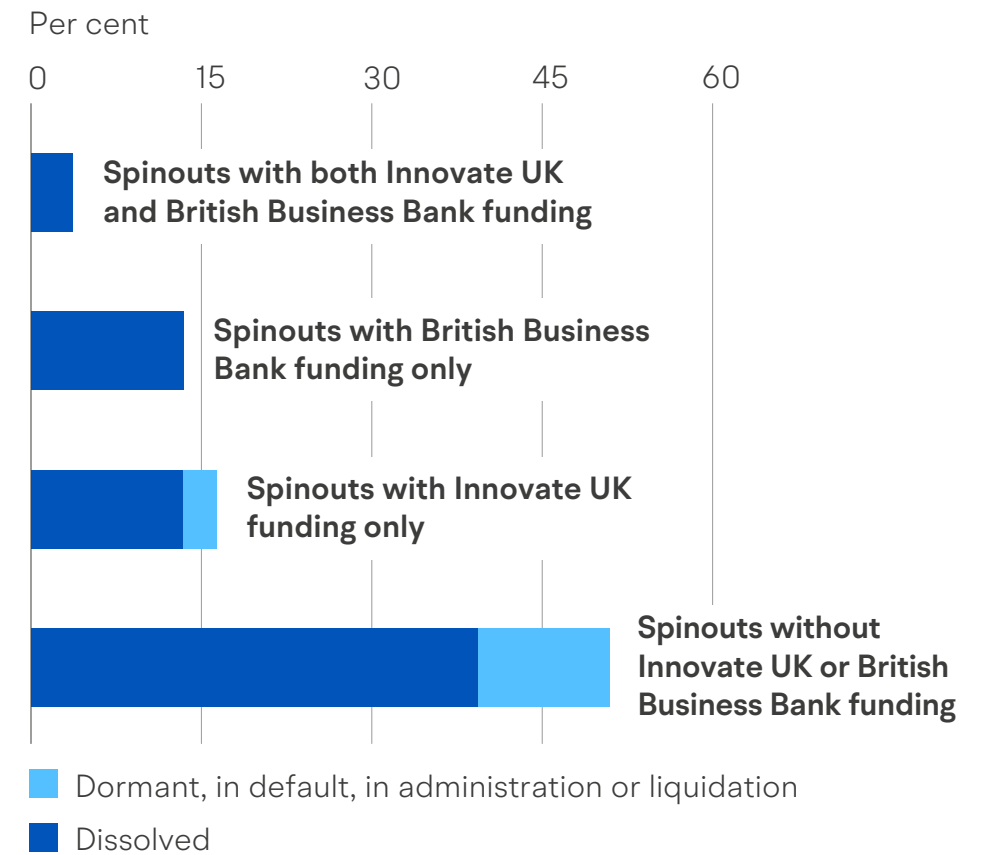
‘Research council spinouts’ with support from both the Bank and Innovate UK have almost double the survival rates of those without

The first set of outcome measures considered are various indicators attempting to assess business performance, in the first instance company status. Note that business performance indicators are as at 26/02/2022. For a sample of ‘research council spinouts’ founded between 2010 and 2014,¹³ 51% of those that do not go on to receive support from either the Bank or Innovate UK are currently dissolved or dormant.¹⁴ This is more than 17x the equivalent percentage for ‘research council spinouts’ that go on to receive support from both Innovate UK and the Bank, which is only 3%.

Figure 2.1

Proportion of ‘research council spinouts’ that are dissolved/dormant (‘research council spinouts’ founded 2010-2014)

Source: As at 26/02/2022 British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data, BvD Fame



Dissolution rates for spinouts receiving support from both the Bank and Innovate UK is also substantially lower than the proportions for just the Bank (13%) or just Innovate UK (16%).

Altogether, this signals how complementary financial support is to the growth and survival of the R&D-intensive businesses emerging from the UK’s research base, and those that fail to attract it are much less likely to succeed.¹⁵ It is worth noting that this finding may also reflect the fact that businesses will not attract funding from the Bank or Innovate UK if they are dissolved, so causation will likely go both ways. Similarly, better companies are more likely to receive investment from the finance providers the Bank supports.

‘Research council spinouts’ with support from both the Bank and Innovate UK also have a substantially larger employment base

To assess the impact of receiving financial support from the Bank and/ or Innovate UK on the growth outcomes of spinout companies, the total employment reported as at 26/02/2022 by a cohort of ‘research council spinouts’ founded between 2010 and 2014 was analysed. The results are outlined in figure 2.2. Analysis of financial metrics is difficult as companies are not

required to file full accounts until they reach a certain size, meaning current employment data is incomplete.¹⁶

Figure 2.2 considers the median current employment base of those companies reporting employment information to Fame. Medians are used to avoid being affected by outliers. The median ‘research council spinout’ with support from both the Bank and Innovate UK had 18 employees, compared to 4 for ‘research council spinouts’ without support from either- a difference of more than four times.

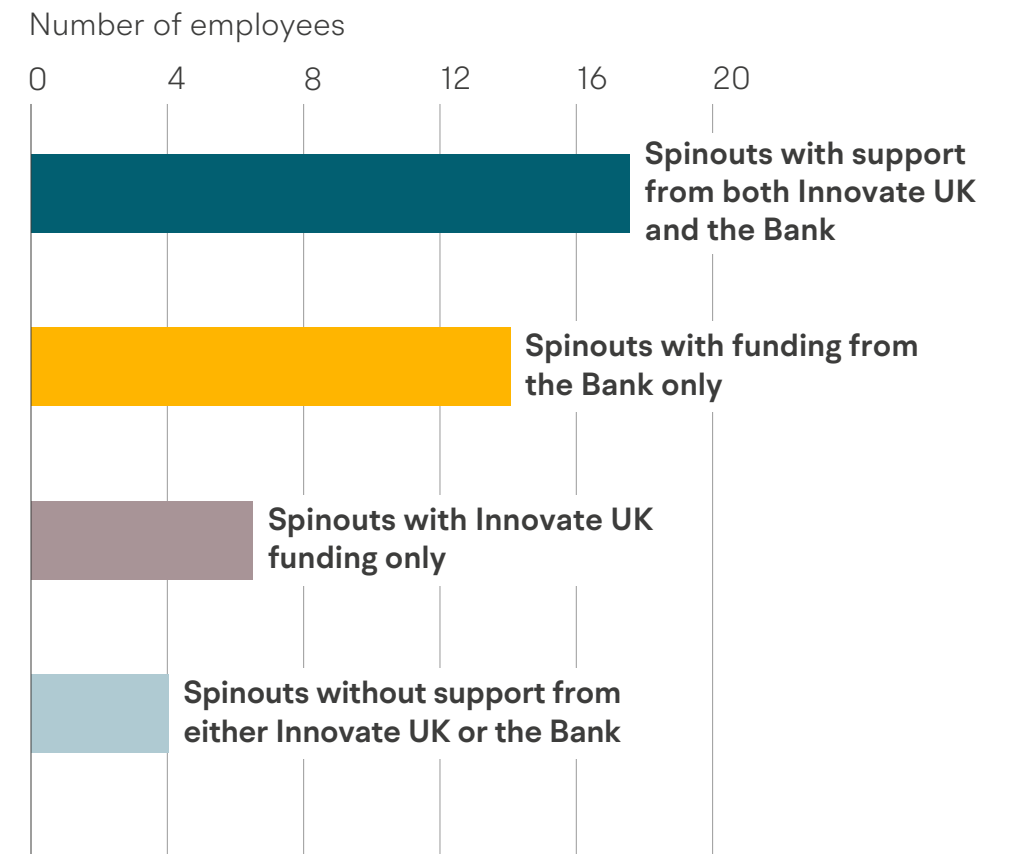
This is only part of the story, considering only those companies reporting employment information to Fame. As mentioned, this non-reporting sample is likely to be of smaller firms. 57% of ‘research council spinouts’ without support from the Bank or Innovate UK had not reported any employment information to Fame, compared to just 9% of those supported by both.

These differences demonstrate how important external capital is to the growth and survival of these companies, especially in the first few years whilst products are being developed and companies lack significant revenue streams.

Figure 2.2

Median number of employees (‘research council spinouts’ founded 2010-2014)

Source: As at 26/02/2022, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data, BvD Fame



Case study

Elasmogen

Location: Aberdeen

Elasmogen is an innovative and accelerating biotechnology company originating from the University of Aberdeen. Dr Caroline Barelle (CEO) and Professor Andrew Porter (CTO), whose initial research was supported by the Biotechnology and Biological Sciences Research Council (BBSRC), founded Elasmogen in 2016. Elasmogen aims to develop novel medicines - its soloMER technology is inspired by proteins found in sharks' immune systems that can get deeper inside solid cancer tumours because of their small, unique shape - to target autoimmune inflammatory diseases and cancer.

Elasmogen has continued to utilise UKRI funding and programmes, such as the BBSRC LINK Grant and iCASE

studentships. This has provided a solid platform for further successful collaborative funding from Innovate UK, with the company being awarded four Innovate UK grants to undertake R&D projects, including oncology and the treatment of ocular disease.

With a strong foundation of intellectual property and a healthy pipeline of new programmes, Elasmogen has progressed several innovative drugs to the late pre-clinical stage. Finance is vital at this early research and development stage.

Funding from British Business Investments' Regional Angels Programme delivery partner Deepbridge in 2020 added value to the company's platform, processes and products – and helped to retain its talented team. In May, Series A funding secured from the Business Growth Fund, Scottish National Investment Bank and Scottish Enterprise, means Elasmogen is now in a strong position to consider its next major milestone: entering clinical trials.



‘Research council spinouts’ with support from both the Bank and Innovate UK are more likely to raise external equity capital, and in larger quantities

For both Innovate UK and the Bank, leveraging private external finance into companies either alongside public money at the point of investment, or by providing a signal which helps companies go on to raise private external capital further down the line, is important. As a result, the next group of outcome indicators considered relate to the external equity capital raised by ‘research council spinout’ companies.

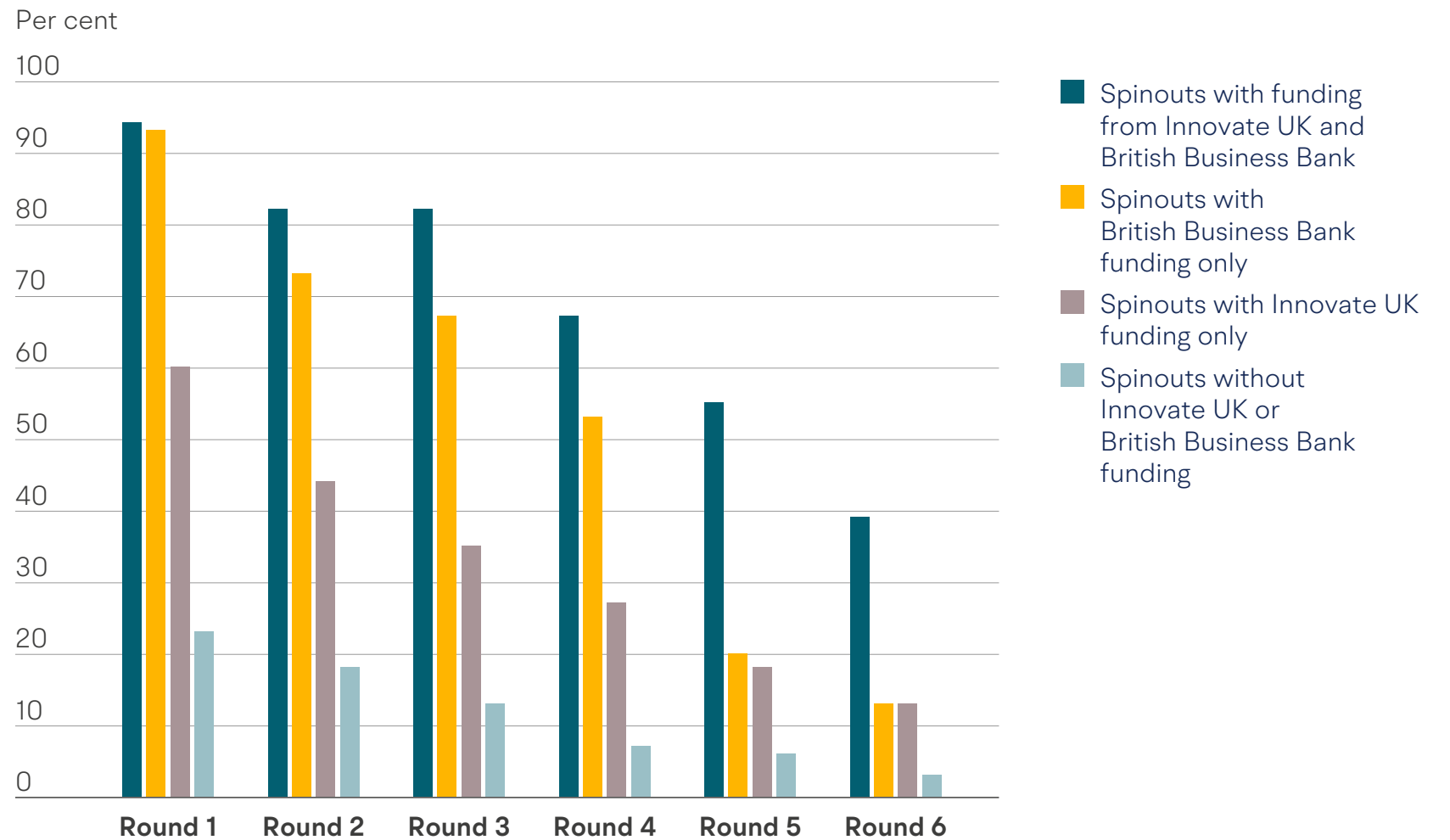
First, figure 2.3 compares the follow-on funding rates at each round for the same cohort of ‘research council spinouts’ founded between 2010 and 2014, depending on whether they had received support from the Bank and/or Innovate UK. 94% of those supported by both the Bank and Innovate UK raised at least one round of external equity capital, compared to 23% of those without support from either and 60% of those supported by Innovate UK but not the Bank.

The figures relating to ‘research council spinouts’ within the Bank’s portfolio should be interpreted with some caution, given the equity finance provided by Bank-backed fund managers could be the round captured by this analysis. Comparing the dark green bar, ‘research council spinouts’ supported by both Innovate UK and the Bank with the dark yellow bar, those supported only by the Bank,

Figure 2.3

Proportion of companies successfully raising follow-on funding, by round (‘research council spinouts’ founded 2010-2014)

Source: Beauhurst, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data





provides an interesting insight as this consideration is relevant for both.

Although initially similar, the follow-on funding rates for 'research council spinouts' supported only by the Bank drops off more steeply than for those that also received Innovate UK R&D project funding. 55% of 'research council spinouts' with support from both the Bank and Innovate UK raised at least five funding rounds, compared to 20% of those funded by just the Bank. This is a much higher level of follow-on funding than is seen in equity finance markets generally, where the data shows approximately 28% of companies who raise an initial funding round manage to raise at least five rounds of external equity finance.¹⁷

The provision of Innovate UK funding for R&D projects includes independent assessment of the innovation potential and/or feasibility of the R&D project as well as the business opportunity during the assessment process. This competitive process, especially the independent assessment element, can provide a value signal to the market of the relative quality of the R&D project being undertaken, which may help crowd in further private sector capital. Private capital, including through the Bank's equity programmes, will also frequently be encouraged to invest as a result of the de-risking and non-dilutive funding in Innovate UK's awards.

55%

of 'research council spinouts' with support from both the Bank and Innovate UK raised at least five funding rounds, compared to 28% of companies across wider equity markets

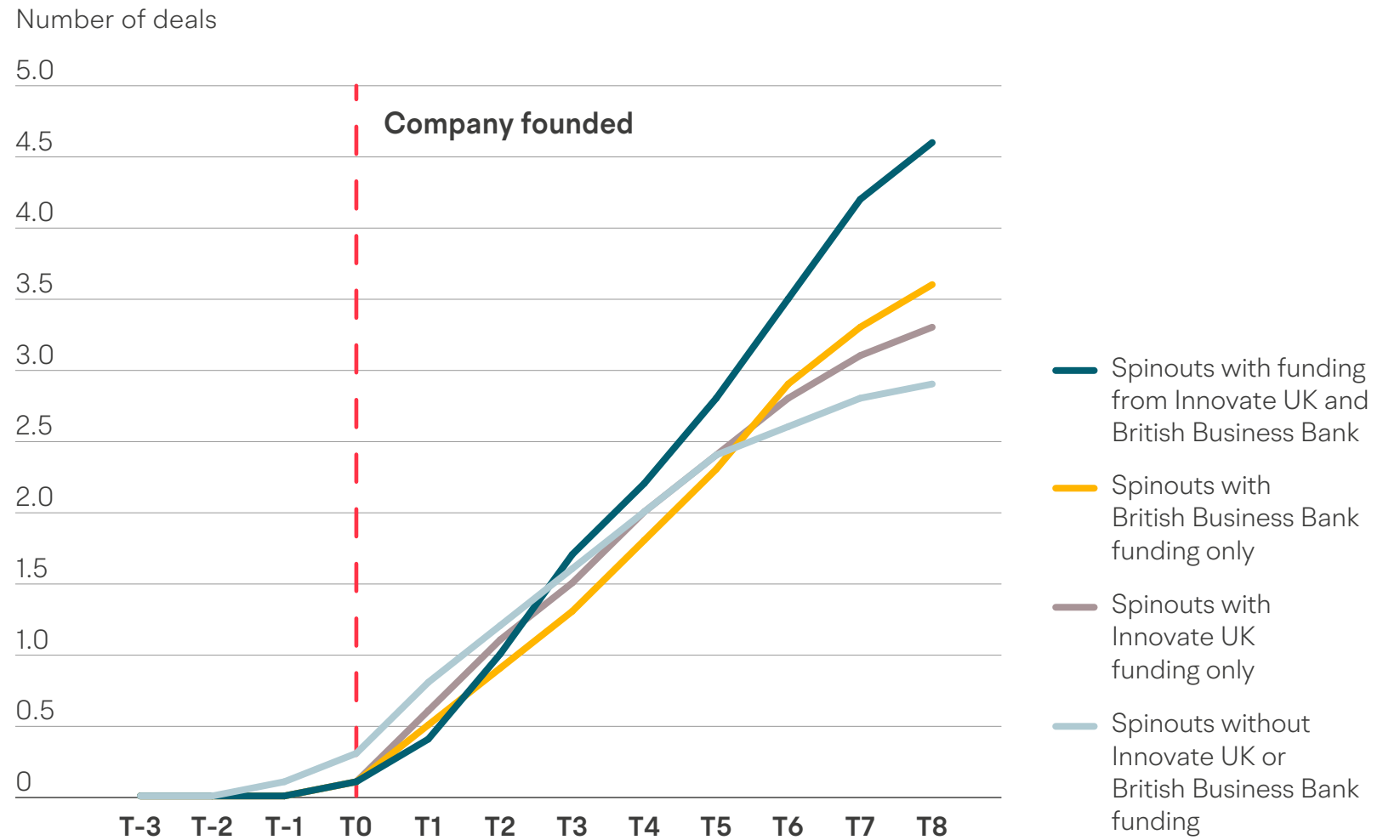
Similarly, the Bank undertakes extensive and market-leading due diligence on prospective fund managers to provide a quality signal to the market and help leverage private sector capital into selected funds. The rigour applied when assessing fund managers should also provide a signal to the market more widely that companies selected by these managers are high quality, which may have a further, less direct, leveraging effect.

Figures 2.4 and 2.5 look at these signalling effects by comparing the average number and value of external equity deals raised over time by ‘research council spinouts’ based on the combination of support accessed. Note that this analysis only compares those spinouts with at least one round of external equity finance. Eight years after incorporation, ‘research council spinouts’ with support from both Innovate UK and the Bank had raised 4.6 external equity rounds on average, compared to 2.9 rounds for those without funding from either. Discrepancies in the value of investment raised were much larger, where the median value of investment raised by ‘research council spinouts’ supported by both the Bank and Innovate UK in the first eight years of being incorporated was £7.3m, compared to £1.6m for those without support from either.

Figure 2.4

Average cumulative number of external equity rounds raised over time, by institution type (‘research council spinouts’ founded 2010-2014)

Source: Beauhurst, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, ‘research council spinout’ company data



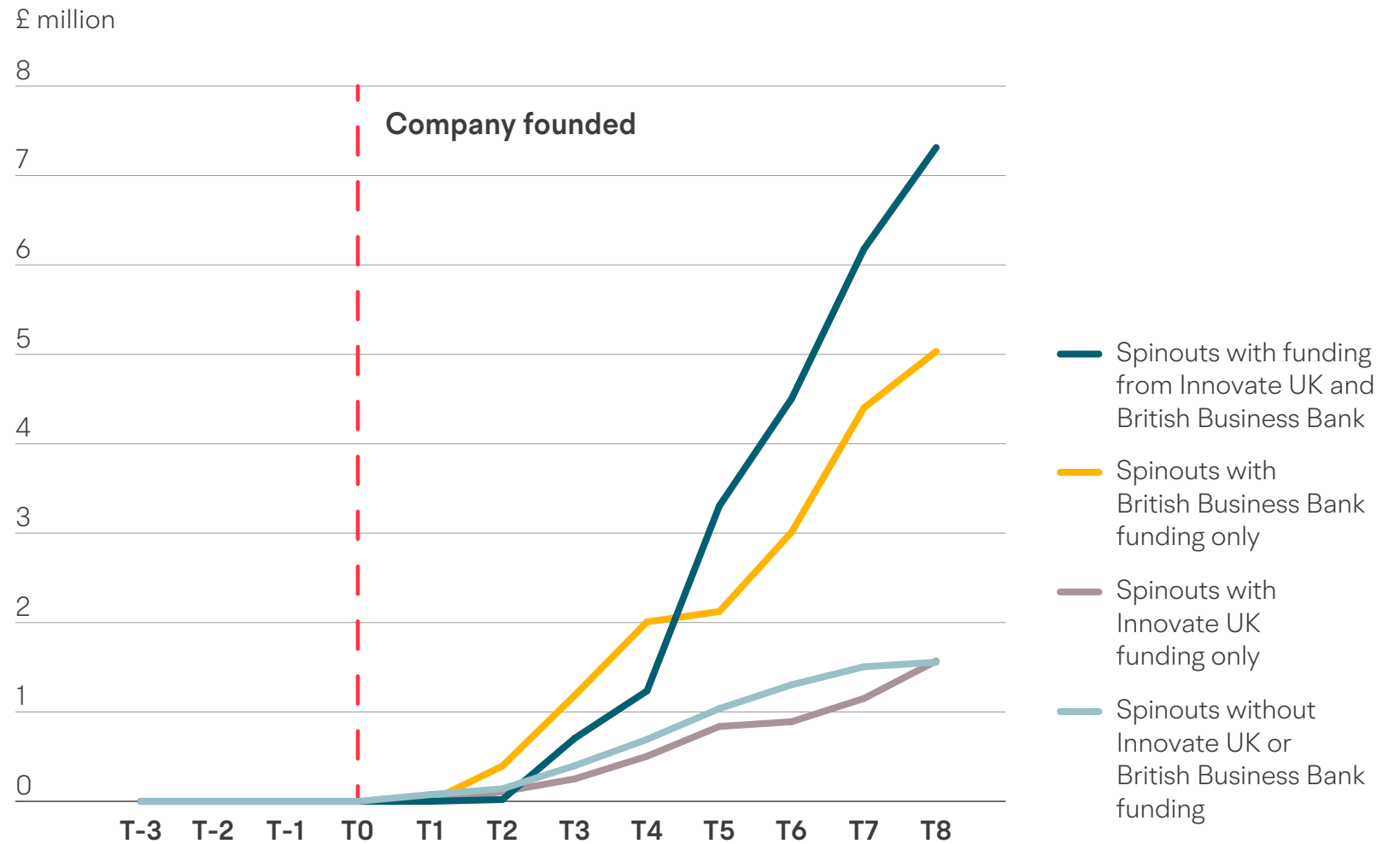
Overall, this analysis demonstrates the importance of equity finance and Innovate UK grant funding to R&D-intensive companies emerging from the UK research base. It also signals that there are benefits to spinout companies of receiving support from the Bank and Innovate UK, both in terms of accessing further finance and, more fundamentally, for their growth and survival. To increase visibility of Innovate UK’s offering to innovative firms, Innovate UK is developing an online Innovation Hub. This will sit alongside and complement the Bank’s finance hub and enable companies to better navigate across the offering of both organisations as well as the wider support on offer for innovation by other publicly backed institutions.

Innovate UK will also help connect smaller businesses they have supported with potential investors, including those backed by the Bank, by developing an online Portfolio Platform. These measures should hopefully increase the instances of innovative businesses tapping into the various types of support offered by the Bank, and Innovate UK, helping these businesses to grow, thrive, and bring new products and processes to market.

Figure 2.5

Median cumulative value of external equity rounds raised over time, by institution type ('research council spinouts' founded 2010-2014)

Source: Beauhurst, British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI 'research council spinout' company data



Chapter 3

Innovation-led businesses, finance and place



R&D and innovation is critical to the economic prosperity of local ecosystems, and the government supports regional innovation systems through its spending on public sector R&D. However, it is well documented that public sector R&D spending is imbalanced, with the Greater South East receiving substantially more funding than its share of the business population.¹⁸ Recognising the opportunity public investment in R&D provides as a tool to ‘level-up’, the government recently committed to increase public investment in R&D outside the Greater South East by 40% by 2030.¹⁹

Historically, private sector capital financing of R&D activity has also been concentrated in the Greater South East, especially forms of growth finance such as Venture Capital.²⁰ Recent analysis has linked this to equity investors’ preference for closer deals. Equity investors had an office within two hours of the recipient business in 80% of UK equity investment relationships between 2011 and 2020, and 61% within an hour.²¹ With risk capital investors heavily clustered around the finance and innovation ecosystems of the Golden Triangle (London, Oxford and Cambridge), innovative businesses emerging from the research base across the rest of the UK may be at a disadvantage, especially in their access to external capital.

UK private external equity markets are highly concentrated in London and the Greater South East, whilst ‘research council spinouts’ are spread more widely

This is reflected in figure 3.1 where 46% of UK equity deals taking place between 2011 and 2021 went to London-based businesses, and a further 17% to the South East and East of England. This is a much higher share than the area’s 45% of High Growth Businesses (as per the ONS data, businesses with annualised

growth greater than 20% over a three year period), with the biggest disparity being in London.

The geographic distribution of ‘research council spinouts’ at a region/nation level is reasonably similar to that of the wider UK High Growth Business population, although slightly higher in the South East and East of England. External equity deals in these spinouts are therefore more geographically diverse at a high level than wider UK equity markets.

46%

of equity deals between 2011 and 2021 went to London-based businesses, compared to the area's 21% of High Growth Businesses

Only 15% of external equity deals in ‘research council spinouts’ between 2011 and 2021 went to those based in London.

As may be expected given the strong research base in Oxford and Cambridge, a higher proportion of external equity deals in ‘research council spinouts’ went to those in the South East and East of England compared to the wider market.

Although ‘research council spinouts’ are less clustered in London and the South East/ East of England than UK private external equity markets at the region/nation level, they are more concentrated in specific clusters around key research institutions at a sub-regional level. Figure 3.2 compares the ITL3 (the UK successor to EU NUTS geographic classifications) distribution of the Bank’s debt and equity portfolios, with the distribution of companies that are Innovate UK recipients, and then ‘research council spinouts’.

Whilst the Bank has made equity investments in almost all local authority districts across the UK, investments in ‘research council spinouts’ are less widely distributed at a local authority level, given that research institutions are not present in every local authority.

Figure 3.1

Region/nation comparison of external equity deals, High Growth Businesses and ‘research council spinouts’

Source: Beauhurst, ONS Business Demography and UKRI ‘research council spinout’ data

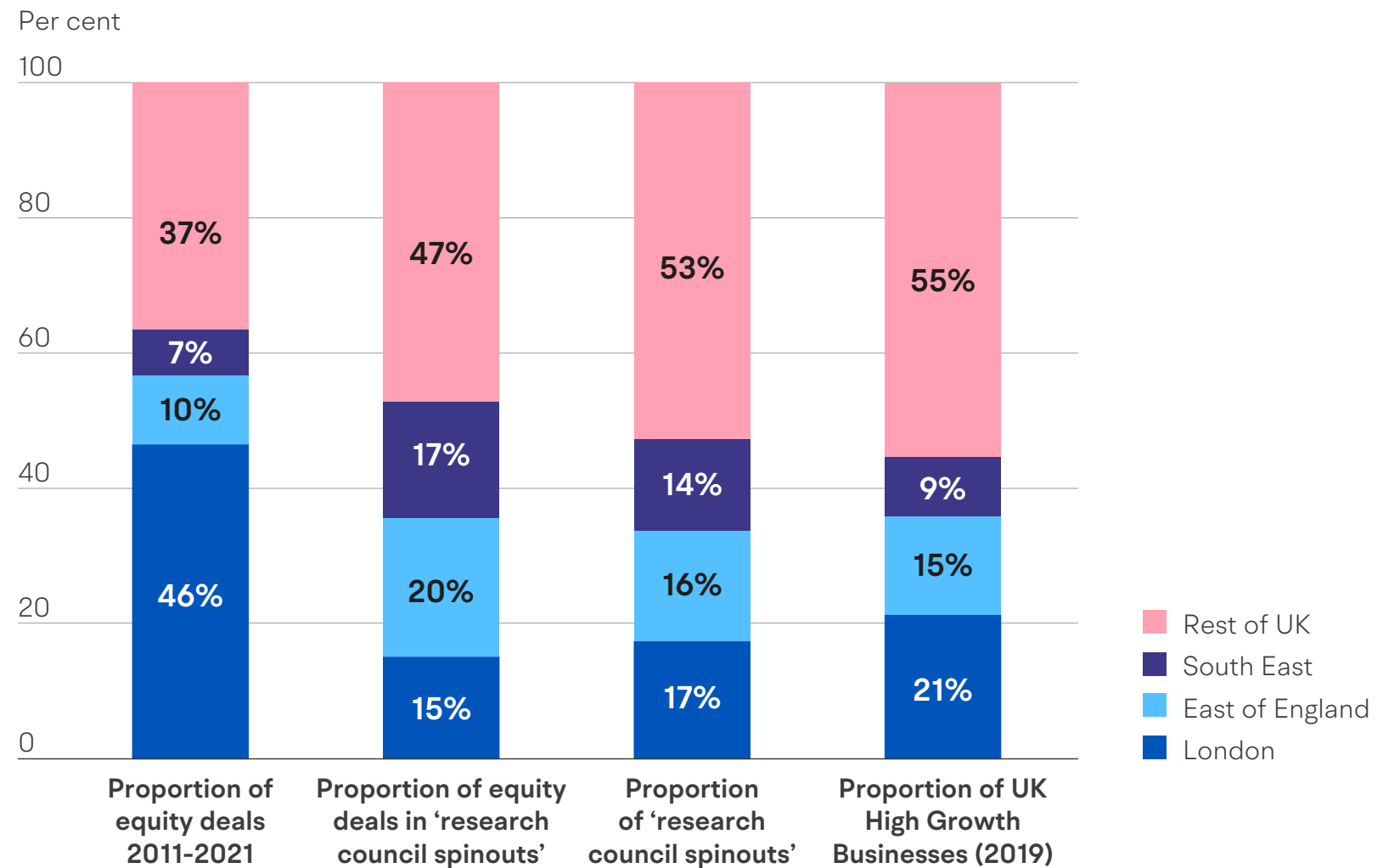
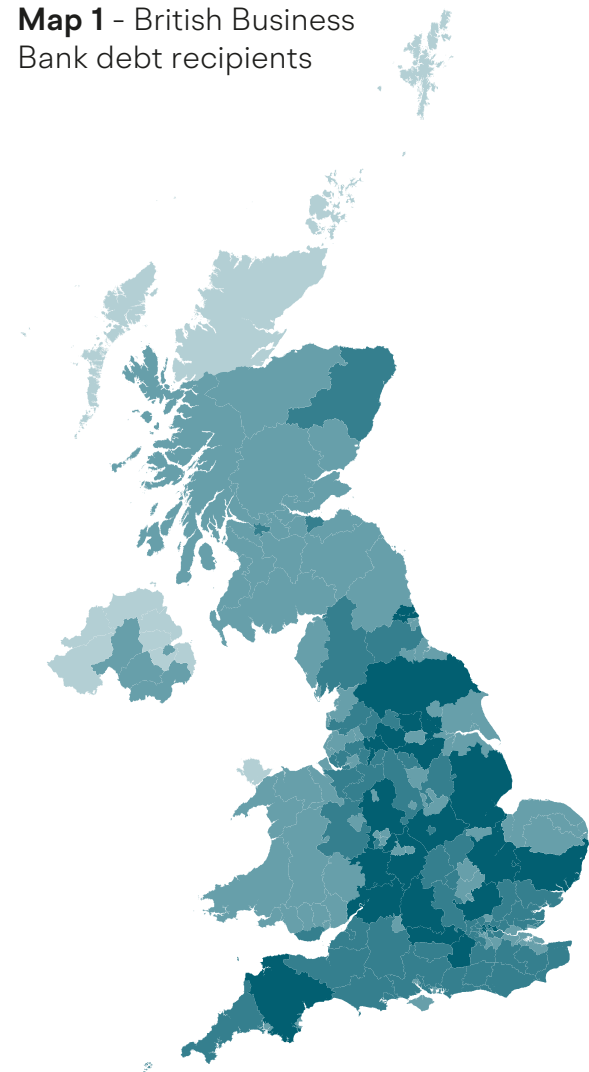


Figure 3.2

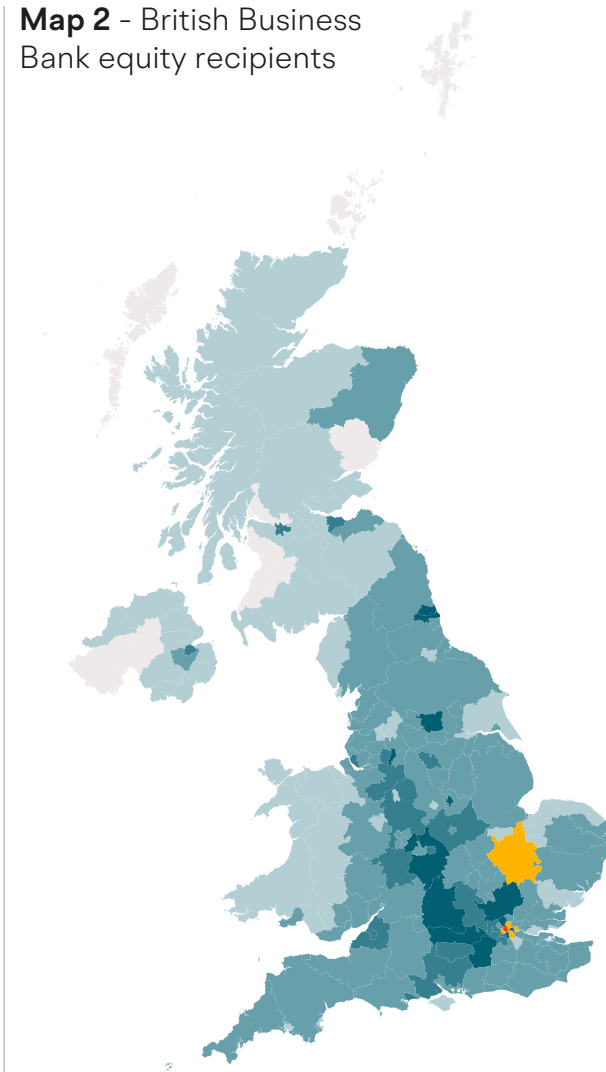
ITL3 distribution of the Bank’s debt and equity portfolios compared to Innovate UK and ‘research council spinout’ matched companies

Source: British Business Bank Management Information, Innovate UK awards database, Innovate UK Innovation Loans Management Information, UKRI ‘research council spinout’ company data

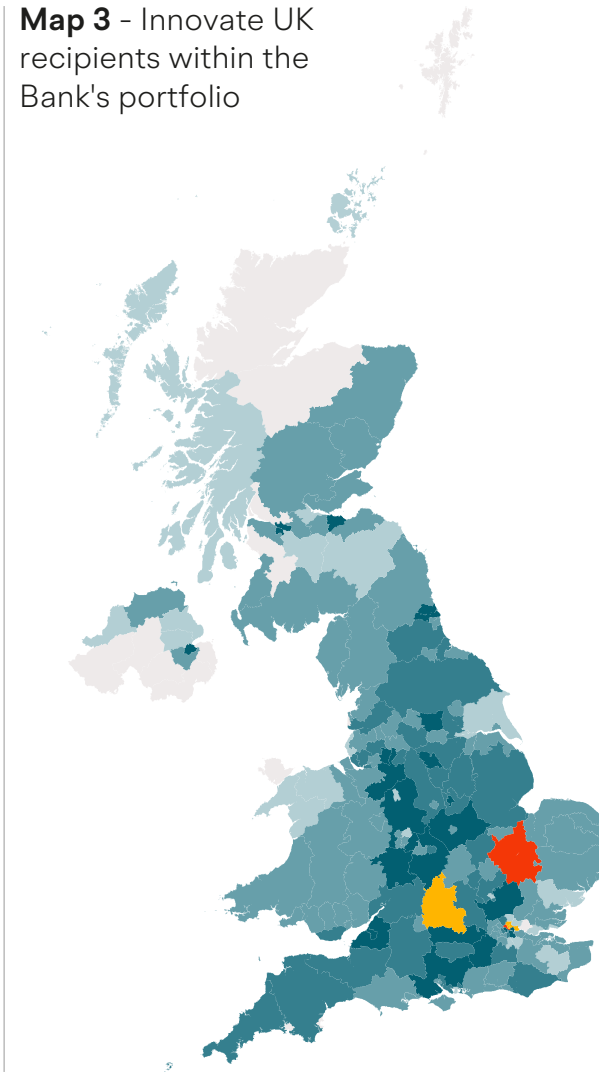
Map 1 - British Business Bank debt recipients



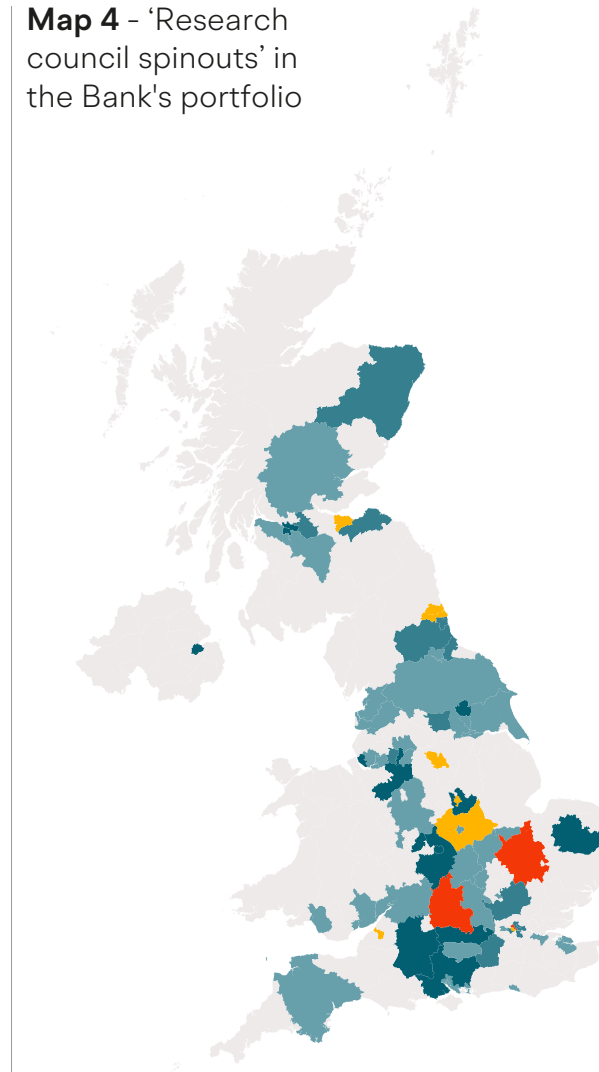
Map 2 - British Business Bank equity recipients



Map 3 - Innovate UK recipients within the Bank's portfolio



Map 4 - ‘Research council spinouts’ in the Bank's portfolio



- Zero recipients
- 0%-0.1% recipients
- 0.1%-0.5% recipients
- 0.5%-1% recipients
- 1%-2.5% recipients
- 2.5%-5% recipients
- 5%+ recipients

A higher proportion of ‘research council spinouts’ in the Golden Triangle raise equity finance

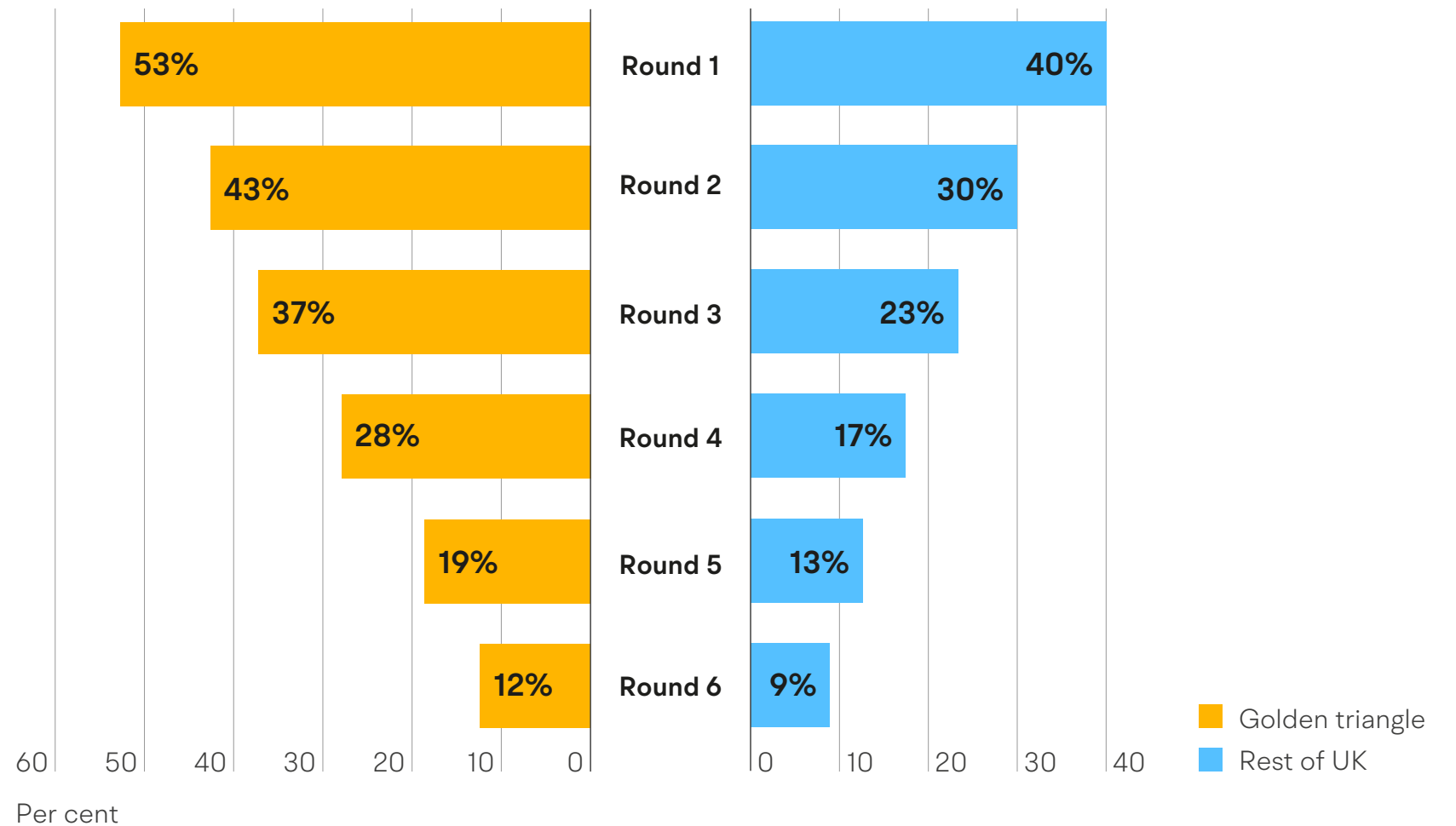
To assess the extent to which place affects company-level outcomes for innovation-led businesses emerging from the UK R&D base, analysis has been undertaken comparing ‘research council spinouts’ located in the Golden Triangle with those located in the rest of the UK across various metrics. The ‘Golden Triangle’ in this section refers to the London region plus Oxford, Cambridge, and their surrounding local authorities as opposed to the full South East and East regions.²² This aims to more directly capture the ecosystem benefits of being close to the core triangle of London-Oxford-Cambridge with anchored, internationally renowned universities, and more mature innovation ecosystems, accepting that the benefits may not be felt for firms across the entire South East and East regions. A cohort approach is taken, comparing ‘research council spinouts’ founded in specific time periods to account for timing effects.

Financial outcomes were considered first, with figure 3.3 comparing the follow-on funding rates for ‘research council spinouts’ in the Golden Triangle with those located in the rest of the UK. 53% of ‘research council spinouts’ located within the Golden Triangle received at least one round of external equity finance according to Beauhurst data, compared to just 40% of those located across the rest of the UK. This discrepancy in the propensity for companies

Figure 3.3

Proportion of ‘research council spinouts’ receiving follow-on funding by round, geographic comparison (‘research council spinouts’ founded between 2010 and 2014)

Source: Beauhurst, UKRI ‘research council spinout’ company data



to attract equity finance not only persists but worsens through the next few rounds of follow-on funding.

After one round of equity capital, Golden Triangle ‘research council spinouts’ continue to attract more finance

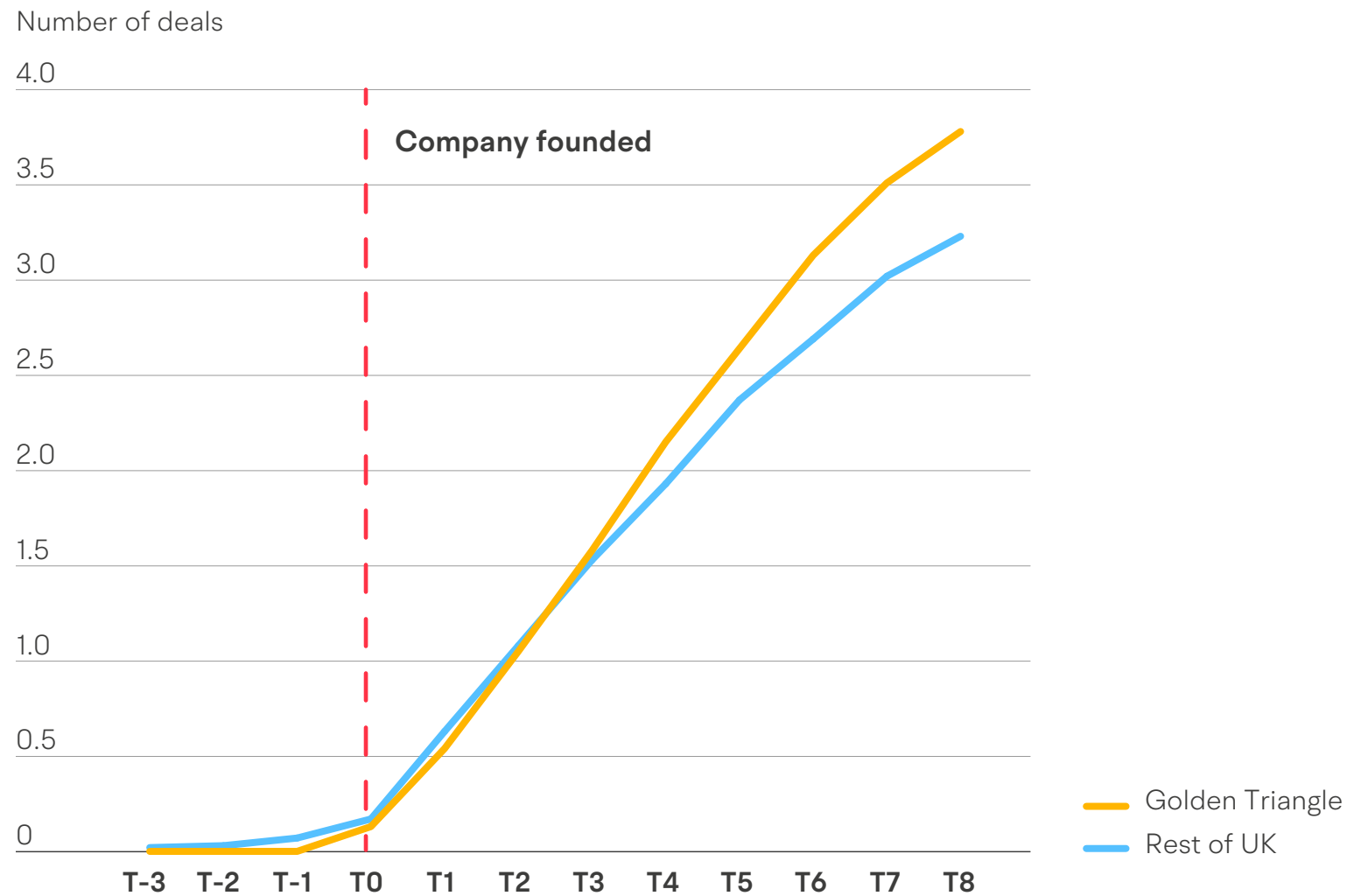
Figures 3.4 and 3.5 compare the fundraising activities of those ‘research council spinouts’ with at least one round of equity finance, to test whether the discrepancy in access to capital is limited to companies attaining capital at all, or if differences persist even for those who do successfully secure external equity capital. A differential in the average number of rounds raised emerges around three years into a company’s life, with ‘research council spinouts’ within the Golden Triangle who successfully raise equity raising 3.8 deals on average eight years after incorporation, compared to 3.2 for those located across the rest of the UK.

The differential in the value of capital raised, as shown by figure 3.5, is much larger. The median ‘research council spinout’ in the Golden Triangle sample had raised £5.7m by year eight, compared to £1.4m in the rest of the UK. The depth and range of R&D and innovation activities available to Golden Triangle businesses due to this extra capital is markedly different, even when factoring in the potential for higher costs. Medians have been used here to avoid the skewing effect that a single company raising huge amounts can have on the data and show that these differentials in terms of capital value are not outlier-driven, but exist across the board.

Figure 3.4

Average cumulative number of external equity deals, geographic comparison (‘research council spinouts’ founded between 2010 and 2014)

Source: Beauhurst, UKRI ‘research council spinout’ company data



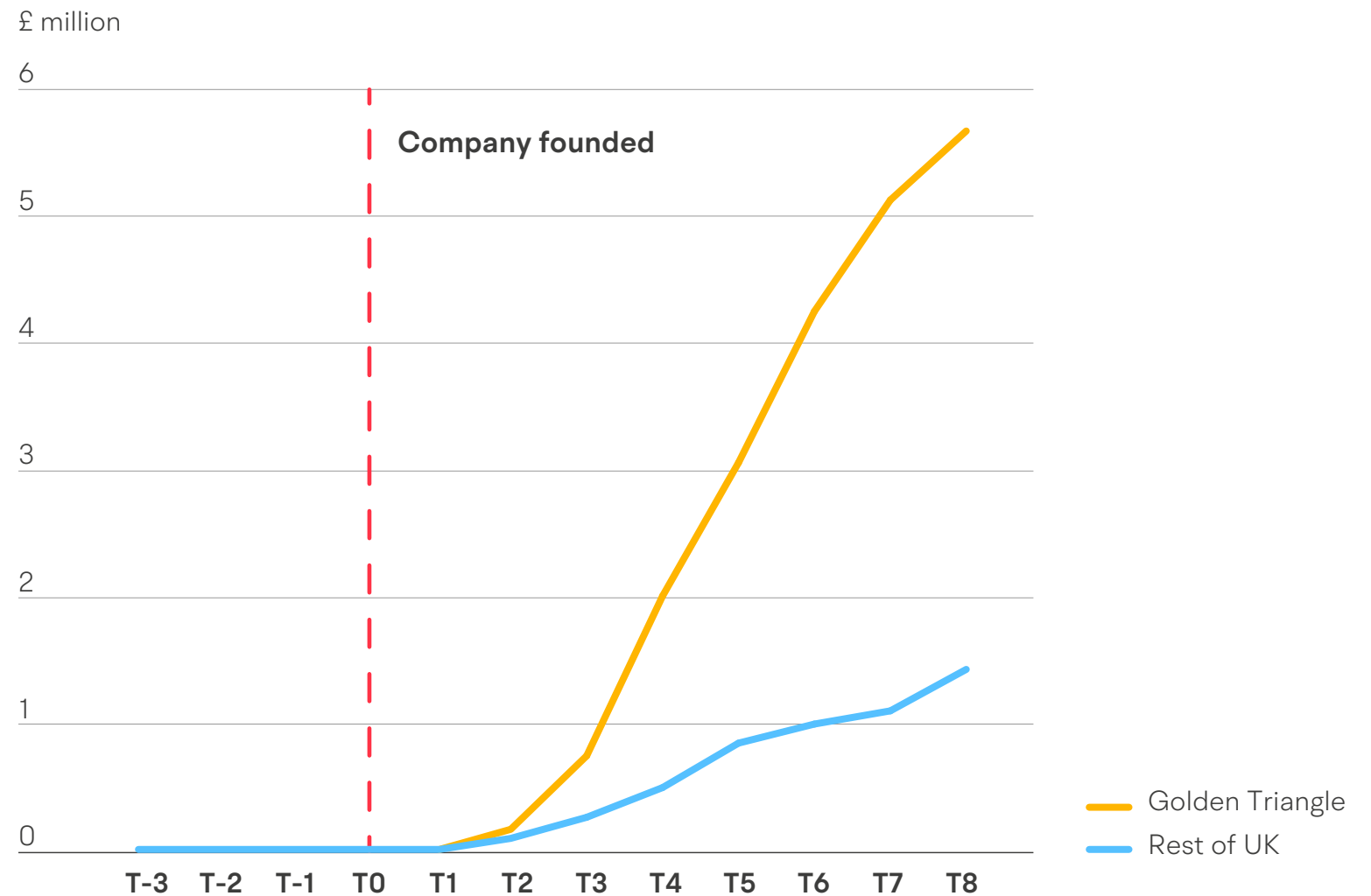
This geographic effect is seen in equity finance markets more widely, with analysis in the Bank’s Small Business Finance Markets 2022 report showing London-based businesses had raised double the amount of finance on average in the seven years following initial investment than an equivalent cohort of non-London businesses.²³ However, this report indicates the geographic disparity in finance availability faced by ‘research council spinouts’ may be even more severe, with the median Golden Triangle spinout having raised more than 4.6x as much capital at the same point in time.

4.6x
 as much capital raised by the median spinout in the Golden Triangle than the rest of the UK in the first seven years

Figure 3.5

Median cumulative value of external equity deals, geographic comparison ('research council spinouts' founded between 2010 and 2014)

Source: Beauhurst, UKRI 'research council spinout' company data



Universities outside the Golden Triangle are effective in generating spinout companies, but fewer receive external finance

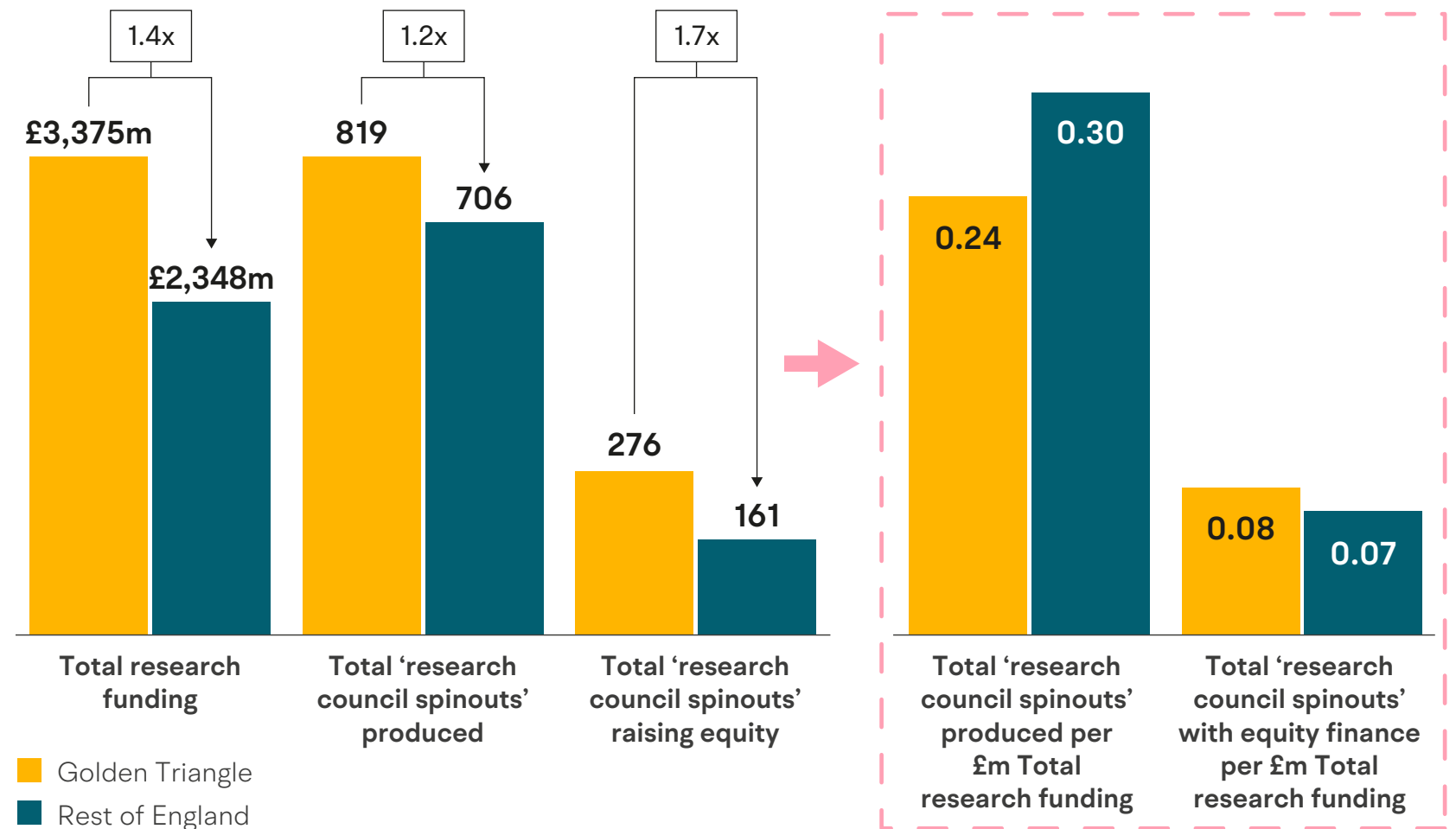
Two potential hypotheses for this discrepancy in the capital accessed by companies emerging from the R&D base outside of the Golden Triangle are a deficit of high-quality research, or institutions outside of the Golden Triangle lacking efficiency in generating spinout companies. To test this, further analysis was undertaken on a subset of ‘research council spinouts’ emerging from England’s 17 largest, most research-intensive, broad discipline universities as defined by being part of Cluster V of Research England’s Knowledge Exchange Framework (KEF). More detail on the methodology and a full list of included institutions can be found in the methodology annex. Of the 17 universities in KEF Cluster V, seven are located within the Golden Triangle, and ten are located across the rest of England (since KEF is only pertinent to English Higher Education Providers).

Figure 3.6 highlights that, in total, KEF Cluster V universities located within the Golden Triangle were allocated £3.4bn in ‘total research funding’²⁴ for the 2019/20 academic year compared to the £2.3bn received by Cluster V universities in the rest of England. Based on research within the Golden Triangle sample of universities, 819 spinouts were produced compared to 706 spinouts produced by the rest of England sample. Universities outside the Golden

Figure 3.6

Total research funding received, ‘research council spinouts’ produced, and those attracting equity by very large, highly research-intensive universities*

Source: UKRI ‘research council spinout’ company data, Research England Knowledge Exchange Framework, Research England High Education Business Community Interaction Survey and Higher Education Statistic Agency (HESA) and Beauhurst



Triangle were in fact more effective in translating research funding into spinout companies, producing 0.30 spinouts per £m of research funding received compared to 0.24 produced by universities within the Golden Triangle.

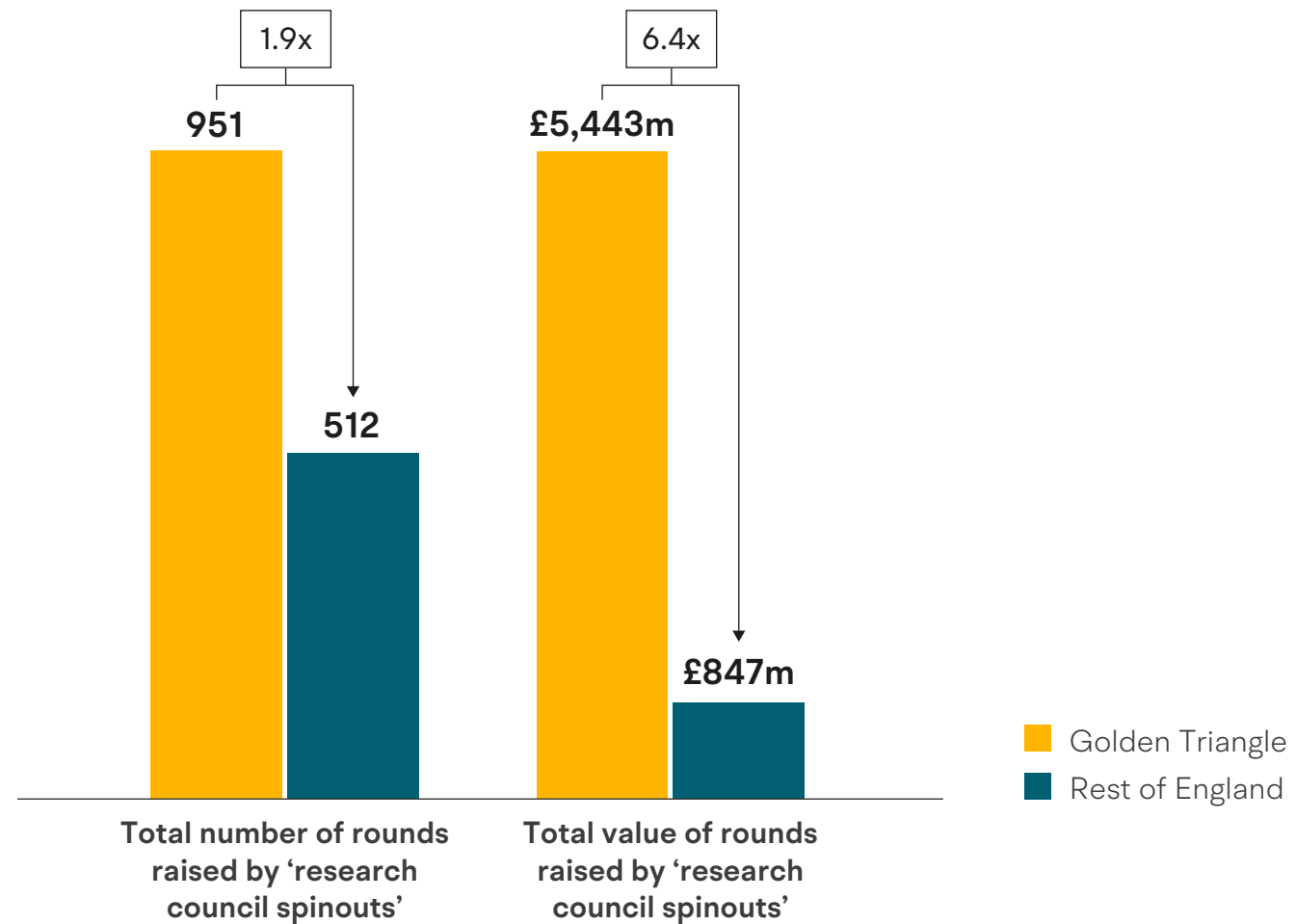
However, 276 ‘research council spinouts’ from Golden Triangle universities managed to raise at least one round of external equity finance, compared to 161 from universities in the rest of England. This means that, despite producing more spinouts per £ of total research funding, non-Golden Triangle institutions produce fewer spinouts per £ of total research funding that manage to raise external equity (0.07 compared to 0.08). A much higher proportion of spinouts from universities outside the Golden Triangle never managed to raise external equity finance.

Figure 3.7 takes this a step further and looks at the quantities of external equity raised, both in terms of the number and value of deals. Although there were only 1.2x as many ‘research council spinouts’ produced by institutions within the Golden Triangle compared to the rest of England, these spinouts raised 1.9x as many rounds of external equity finance and 6.4x the amount of funding. This huge differential in overall value of capital raised is not simply driven by one or two companies. Nine of the top ten, and 18 of the top 20, ‘research council spinouts’ from KEF Cluster V universities in terms of total capital raised are based in the Golden Triangle.

Figure 3.7

Total number and value of rounds raised by ‘research council spinouts’ emerging from KEF Cluster V institutions

Source: UKRI ‘research council spinout’ company data, Research England Knowledge Exchange Framework, Research England High Education Business Community Interaction Survey and Higher Education Statistic Agency (HESA) and Beauhurst



Differences in sectoral makeup do not appear to explain the discrepancy in accessing finance

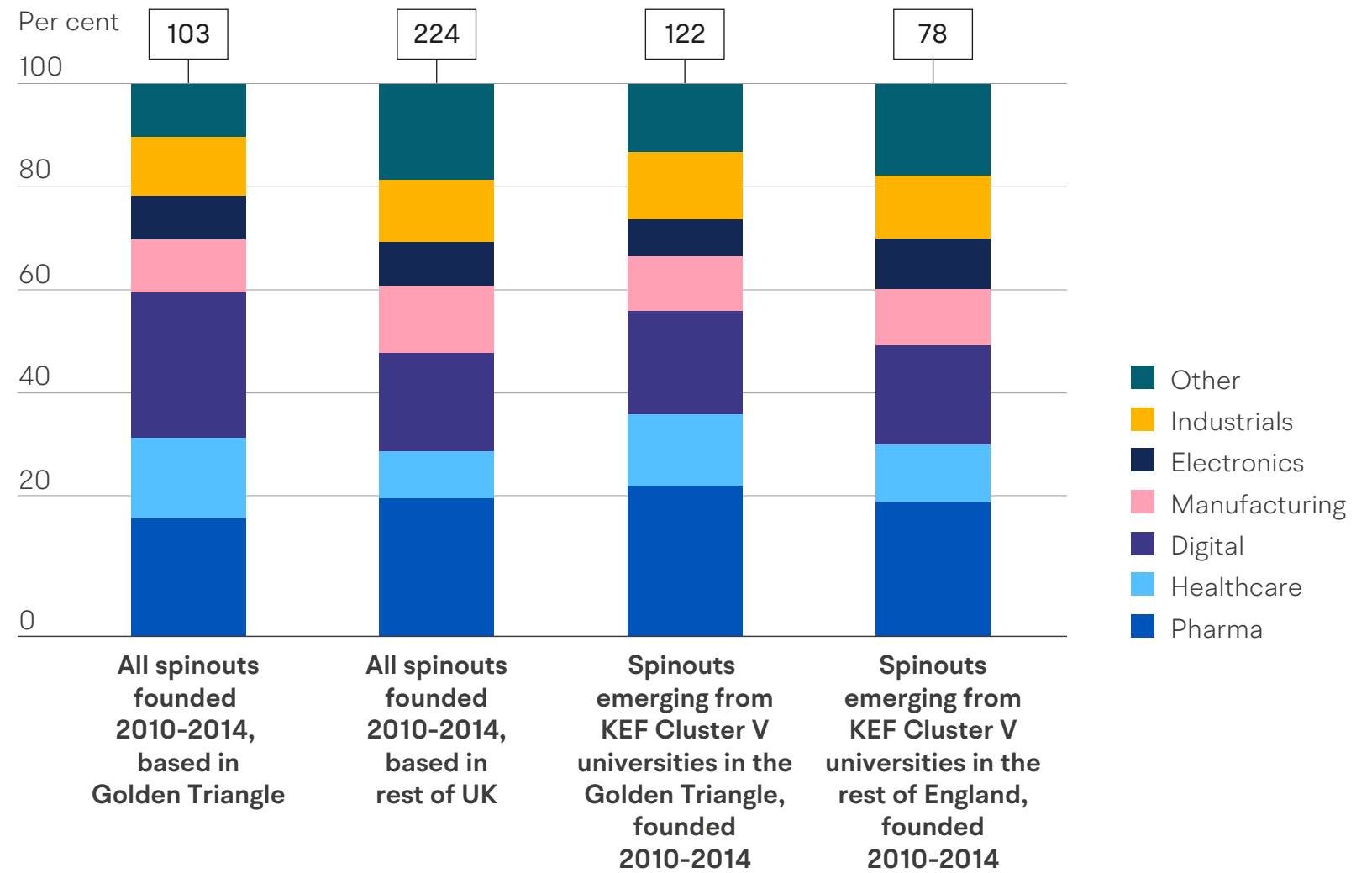
Differences in the sectoral makeup of the two samples could explain this disparity if ‘research council spinouts’ in the Golden Triangle are more likely to be in well capitalised, more capital-intensive sectors such as Life Sciences and Healthcare. Spinouts in these sectors receive more investment on average and have higher follow-on funding rates. However, as figure 3.8 shows, sectoral makeup of the Golden Triangle and rest of UK samples, both for the general ‘research council spinouts’ cohort used and limited to those emerging from KEF Cluster V universities, is relatively similar. There are insufficient differences in the representation of highly capitalised industries such as Life Sciences and Healthcare to fully explain the geographic discrepancies in funding outcomes seen.

Analysis in this section dismisses the hypotheses that a lack of funded high-quality research capability or inefficient spinout generation could explain the discrepancy in funding outcomes seen between ‘research council spinouts’ emerging from Golden Triangle institutions and those emerging from institutions across the rest of the UK (based on English evidence as presented). Moreover, given the sectoral distribution of spinouts is also similar, this factor alone cannot explain the differences seen. Instead, we hypothesise that the lack of access to established finance ecosystems may be hindering the ability of companies emerging from institutions outside the Golden Triangle to access capital in sufficient quantities.

Figure 3.8

Sector comparison of ‘research council spinouts’ based on geographic grouping

Source: UKRI ‘research council spinout’ company data, Research England Knowledge Exchange Framework, Research England High Education Business Community Interaction Survey, ResearchFish, and HESA Finance



Case study

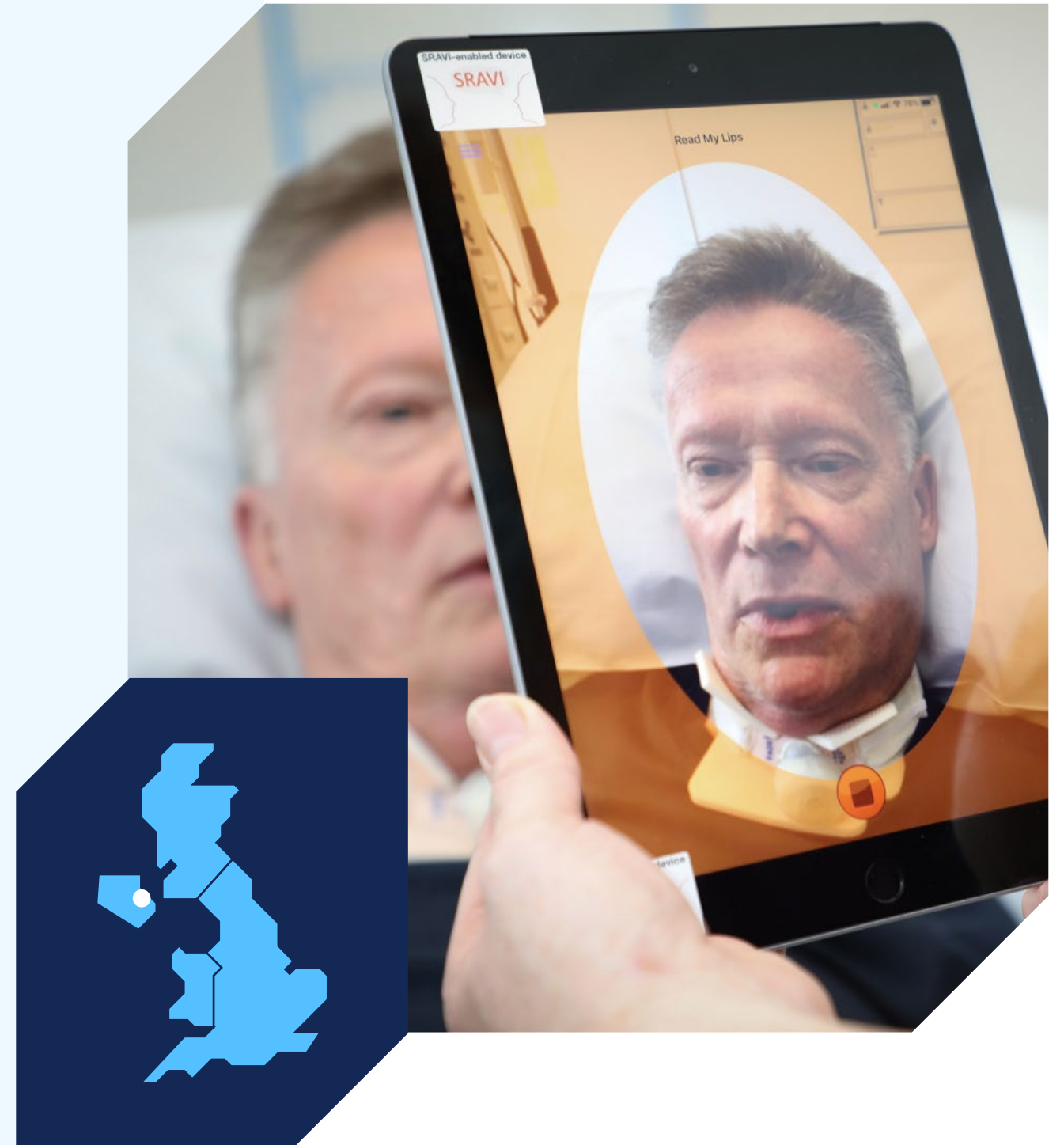
Liopa

Location: Belfast

Liopa is a spinout from the Centre for Secure Information Technologies at Queen's University Belfast. Initially developed by two Engineering and Physical Science Research Council-funded (EPSRC) PhD students, Liopa's core product, known as LipRead, is an accurate and easy-to-use visual speech recognition platform focused on the speech recognition market.

Between 2019 and 2021, Liopa received two Innovate UK grants to help develop a lip-reading aid to help enable communication with tracheostomised patients, especially important during the Covid-19 pandemic where a large number of ventilated patients required a tracheostomy.

In 2020 Liopa was in the process of raising finance to release products to the digital healthcare and media transcription markets when the pandemic broke out. At that time, the amount of available venture capital investment fell drastically, which threatened to severely hamper go-to-market plans. Struggling to raise funding, it secured investment from the Future Fund, which allowed the company to maintain its business plan. In 2021, Liopa secured its first commercial contract with a UK-based hospital.



Initial Public Offerings (IPOs) are much less common for 'research council spinouts' outside of the Golden Triangle

Given the demonstrable differences in accessing external equity finance between 'research council spinouts' emerging from Golden Triangle institutions compared to those coming out of institutions in the rest of the UK, the next step is to assess whether this has led to clear differences in performance across other, business-level, outcome indicators.

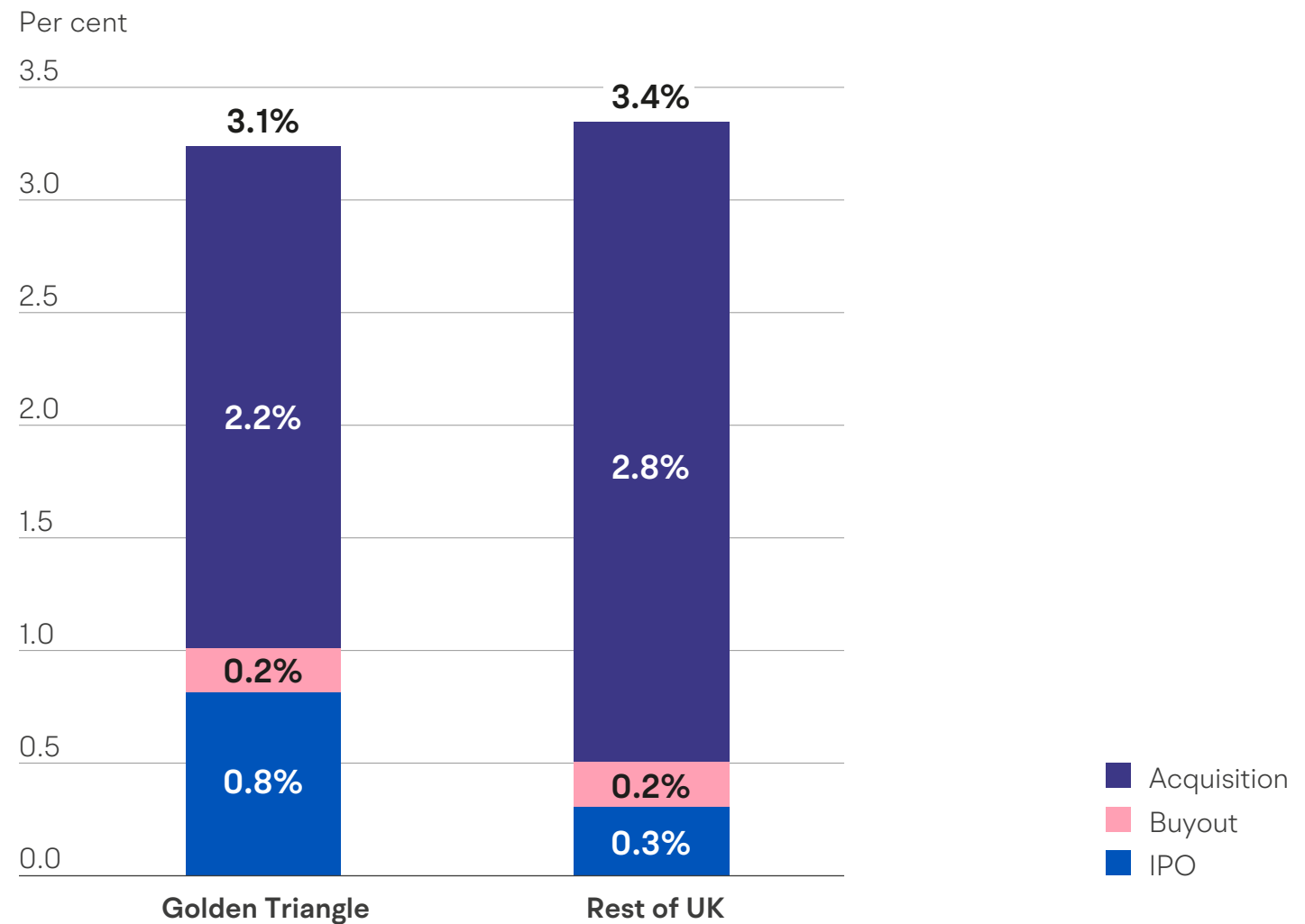
Exits were the first indicator analysed, with the cohort widened to all 'research council spinouts' founded between 2004 and 2020 to provide a sufficiently large sample given the rarity of exit events. As shown by figure 3.9 a relatively similar proportion of 'research council spinouts' in the Golden Triangle and rest of the UK had exited, with the proportion actually slightly lower in the Golden Triangle at 3.1% compared to 3.4%.

25%
of Golden Triangle 'research council spinout' exits were IPOs, compared to 10% for the rest of the UK

Figure 3.9

Proportion of 'research council spinouts' that have exited, by exit type ('research council spinouts' founded between 2004 and 2020)

Source: Beauhurst, UKRI 'research council spinout' company data



However, Initial Public Offerings (IPOs) were much more prevalent in the Golden Triangle, representing 25.0% of exits by companies in the sample compared to just 9.6% of exits by those in the rest of the UK. Exit sizes reflect this, as shown by figure 3.10, where the average size of exits by ‘research council spinouts’ in the Golden Triangle was £116m compared to £46m for those in the rest of the UK. This isn’t purely driven by a handful of outliers, as there is also a large differential in the median exit size which was £24m for Golden Triangle spinouts but only £13m for those founded in the rest of the UK.

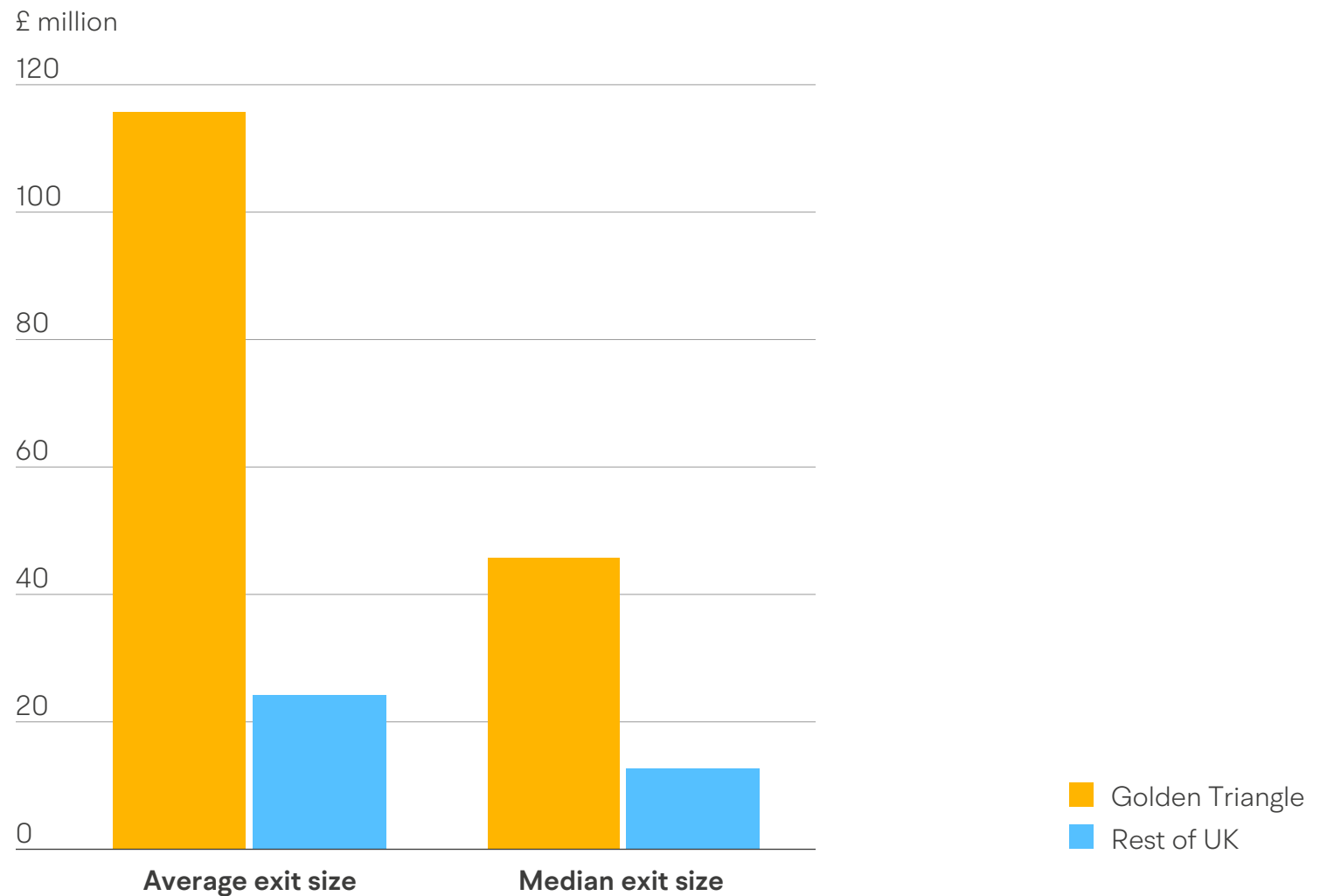
The data also indicates that ‘research council spinouts’ based outside the Golden Triangle exit earlier, with an average (median) age at exit of 6.8 (7.2) compared to 6.3 (5.4) for those companies based in the rest of the UK. A lack of capital availability may therefore be driving companies outside of the Golden Triangle to exit earlier, for example through trade sales rather than IPOs, at smaller sizes.

The link between a lack of sufficient patient capital provision and the sub-optimal exit timing of UK companies relative to their US peers, was made as early as the 2017 Patient Capital Review.²⁵ This evidence indicates that this is not only a feature of UK innovation finance markets nationally, but companies in geographies with thinner equity finance markets are even more affected.

Figure 3.10

**Mean and median exit size, by geographic group
(‘research council spinouts’ founded between 2004 and 2020)**

Source: Beauhurst, UKRI ‘research council spinout’ company data



Employment and survival outcomes for ‘research council spinouts’ outside the Golden Triangle were also worse

Fewer ‘research council spinouts’ based outside the Golden Triangle accessing external capital, and raising smaller amounts of funding when they do, is expected to affect the growth trajectory and survival prospects of these firms. Finance is critical to the growth and survival of spinouts due to their capital intensity and the long lead-in times before they can bring products to market and begin to generate sufficient revenue streams to offset their costs. The final indicators analysed as part of this section utilised Companies House data to assess some of the outcomes in this space.

First, figure 3.11 compares the dissolution rates for ‘research council spinouts’ founded between 2010 and 2014 in the Golden Triangle with the rest of the UK. Overall, 29% of spinouts within the Golden Triangle cohort are currently either dissolved or dormant compared to 36% of the rest of the UK. Figure 3.12 compares the current employment base of the same cohort, for those companies reporting employment information to Companies House. There is a substantial difference in the current average number of people employed by ‘research council spinouts’ in the Golden Triangle and those in the rest of the UK. Those in the Golden Triangle have an average of 35 employees, compared to 12 in the rest of the UK. Although this appears to be partly outlier-driven, there is still a material difference in the median employment base.

Figure 3.11

Proportion of ‘research council spinouts’ that are dissolved, dormant, in default, or liquidation, by geographic group (‘research council spinouts’ founded 2010-2014)

Source: UKRI ‘research council spinout’ company data, BvD Fame

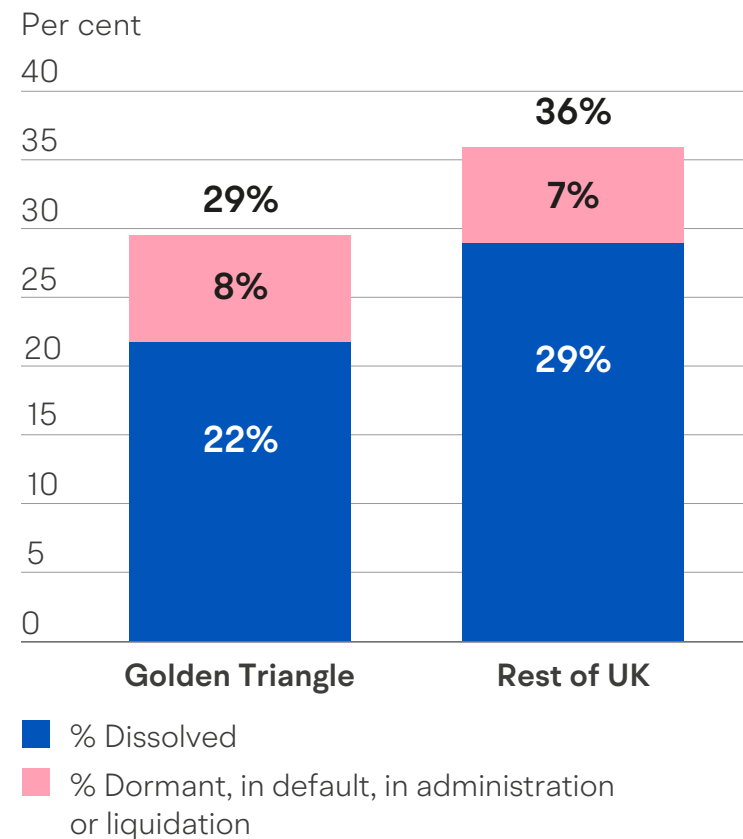
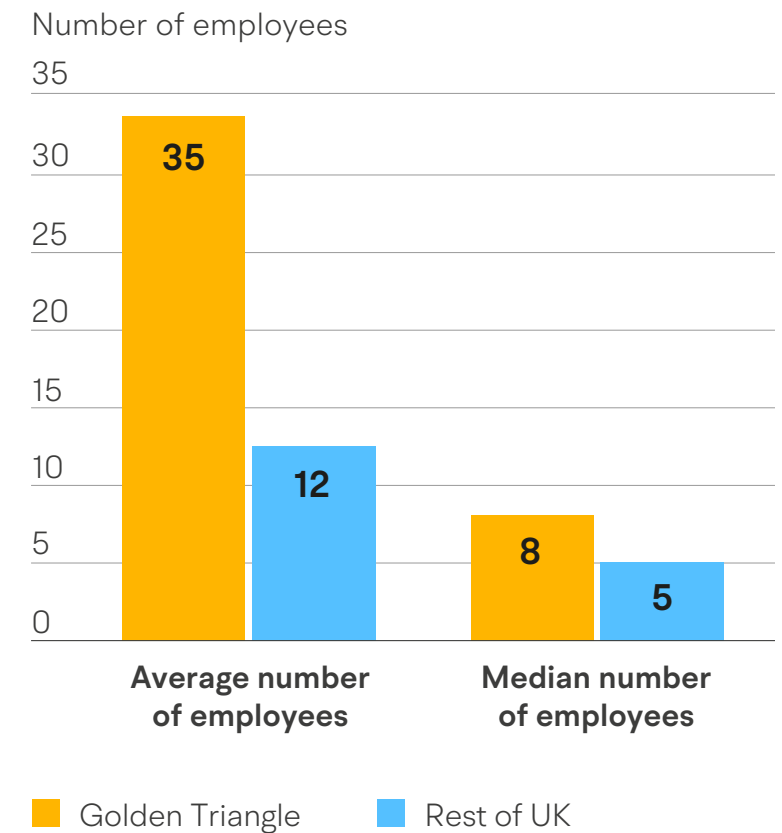


Figure 3.12

Mean and median current number of employees (‘research council spinouts’ founded 2010-2014)

Source: UKRI ‘research council spinout’ company data, BvD Fame





It is clear that companies emanating from the research base outside of the Golden Triangle exhibit worse outcomes in terms of survival and growth and are able to access significantly less capital than their Golden Triangle peers. A lack of funded high-quality research capability, inefficient spinout generation, or fundamental differences in the sectoral makeup of spinout companies cannot explain these disparities.

Instead, it is likely that the lack of access to established finance ecosystems may be hindering the growth trajectories of companies emerging from research institutions outside the Golden Triangle. The launch of the £1.6bn 'Next Generation of UK and Regional Funds', and a further £150m for the Bank's Regional Angels Programme over the next three years will help improve access to capital for innovative businesses across the nations and regions of the UK.

Complementing the Bank's initiatives, UKRI and cross-government partners will develop the UK Science and Innovation Seed Fund (UKI2S) to create new opportunities throughout the UK for early stage, innovative businesses

emerging from science base. The UKI2S provides the patient, long-term committed capital and strategic advice these companies need to flourish. Over the past decade and more, the fund has built a substantial track record with recipient companies having gone on to attract over £650m of later stage investment.

Innovate UK's Regional Angel Investment Accelerator, part of its investor partnerships programme, has also been used to encourage the development of angel networks and investment alongside grants in areas outside the 'Golden Triangle'. This programme will be combined with other Innovate UK place-based interventions over the coming three years.

Other relevant initiatives are those supporting the development of skills in academia to enable greater understanding of commercialisation of research, such as Innovate UK's Innovation to Commercialisation of University Research (ICURe). This helps prepare people, and their idea, for the reality of the commercial world.

Chapter 4

Looking forward



Implications for future work

This report represents the first jointly authored research project between the Bank and UKRI (including Innovate UK). It provides a helpful baseline of our current activities, showing where support for innovation-led businesses is aligned, the impact of this support at a business level as well as a regional analysis of supported firms.

Taken together, these findings offer practical examples of our organisations working to help deliver the government’s vision of the UK as a science superpower, namely an innovation-led, high skills and knowledge-based economy, incorporating high quality jobs and operating with higher productivity, and with such jobs and firms being found and supported across the UK.

However, as well as baselining current activities, this report also provides a clear evidence base on which to build insight and action through further collaboration. To that end, the Bank and UKRI have identified areas where we believe greater co-ordination between our organisations could lead to even better outcomes for R&D-led, innovative firms. We are taking active steps to deliver this, in line with government’s wider Innovation Strategy, UKRI’s five-year ‘transforming tomorrow together’ strategy and the Innovate UK Plan for Action. These actions are as follows:

- 1. Innovate UK Innovation Hub signposting to the innovation ecosystem.** Innovate UK is developing and will shortly launch an online Innovation Hub to sit alongside and complement the Bank's existing Finance Hub, with clear links between the two to provide innovators with a complete view of government-backed funding options. This will make it easier for businesses to navigate the funding offer across both institutions, helping ensure that wherever businesses arrive first, they will end up at the right destination for them. Innovate UK and the Bank will introduce improvements swiftly, with the launch of the Innovation Hub planned for summer 2022, by consulting with users and stakeholders to develop and implement an improved digital solution.
- 2. Innovate UK Portfolio Platform.** Innovate UK is developing a Portfolio Platform that will help to connect Innovate UK-supported SMEs with potential investors, including the Bank-supported network of investors and other financial intermediaries. This will help to better align the innovation funding ecosystem allowing potential investors to see companies who have already been supported by Innovate UK programmes.

3. Better connectivity in the Bank's next generation

of UK and regional funds. The British Business Bank aims to make finance markets work better for smaller businesses across the UK, in line with the Government's aim of boosting long-term growth in the regions and nations and levelling-up the whole of the UK. At the Spending Review 2021, the government announced a £1.6bn commitment to a next generation of UK and regional funds, to be delivered by the Bank:

- £660m for the Northern Powerhouse Investment Fund, including an expansion into the North East of England
- £400m for the Midlands Engine Investment Fund
- £200m to provide a new fund for businesses in the South West of England, building on the Cornwall and Isles of Scilly Investment Fund.
- £150m to provide a new fund for Scottish businesses
- £130m to provide a new fund for Welsh businesses
- £70m to expand provision for businesses in Northern Ireland

“

Together with UKRI, Innovate UK will work closely with the Bank in the development of the new UK and regional funds, exploring how these new funds and UKRI and Innovate UK programmes can better connect innovative small businesses across the UK to the appropriate financial support.

”

4. Further appropriate data sharing and closer working relationships between UKRI (including Innovate UK) and the Bank.

At the national and organisational level, this will help inform strategic direction and areas for future collaboration for the respective organisations, as well as facilitating better and more informed policymaking centrally. Operationally, this will enable more effective join up in programme delivery. Examples include closer collaboration between the Bank and Innovate UK through programmes like Innovate UK's Investor Partnerships, which is designed to accelerate investment into highly innovative SMEs by offering grant funding support for R&D projects, aligned with external equity investment.

5. Collaboration to increase awareness of finance options for spinout companies.

Working collaboratively with Innovate UK and UKRI and local universities to identify mechanisms to help spinout businesses to better understand their finance options, including supporting local connections between university spinouts and investors keen to support these businesses.



6. Drive collaboration amongst other relevant innovation-supporting, publicly-backed agencies. Using the insights gained from this report and the joint working to date by the Bank and UKRI (including Innovate UK), we will convene strategic discussions with relevant government-backed actors, including UK Export Finance and the UK Infrastructure Bank. These discussions will aim to drive a more cohesive and efficient approach to public support for innovation and innovation-led companies.

In addition to these actions on further collaboration, this report and its relatively narrow scope of focus also raises further and more wide-ranging questions about the nature of the innovation finance ecosystem in the UK. Such questions include access to equity for ‘research council spinouts’ outside of London and the South East, other company types (beyond spinouts) and how they are supported and the nature, propriety and degree of co-ordination between publicly-backed innovation ecosystem actors.

Over the coming months, the Bank along with UKRI and Innovate UK will continue to build our evidence base and gather further insights to broaden our understanding of these topics, to help support future policy making and potential further collaboration across publicly backed actors.

To achieve this in the first instance the Bank working with UKRI and Innovate UK, as well as industry bodies and important intermediaries, will host a series of focused round-table discussions bringing together universities, investors and businesses themselves, to identify what currently works well and also to better establish the barriers holding innovative firms back from securing further investment.

Methodology annex



1. Data sources:

This report combines three main data sources, from UKRI (including Innovate UK) and the British Business Bank:

1.1. British Business Bank portfolio data

Management Information (MI) data on the UK businesses that have received funding through the Bank's debt and equity finance programmes. This includes 75,680 businesses in total, 4,388 of which received funding through one of the Bank's equity programmes. The remaining 71,766 businesses have only received funding through one of the Bank's debt interventions, either through a loan guarantee or delivery partner that has received funding from the Bank. The Covid-19 loan guarantee schemes and Start Up Loans were excluded from the scope of this analysis.

1.2. UKRI datasets:

1.2.1. Research Councils data

UKRI uses an online reporting system (Researchfish²⁶) to identify and record outputs and outcomes from its investments in research.²⁷ These records, submitted by researchers themselves, were used to identify those spinout companies that have emerged from research councils' grant funding. The spinout companies identified via Researchfish are also accessible via the online portal Gateway to Research.²⁸

The dataset of spinout companies identified via Researchfish was supplemented by legacy data from BBSRC, EPSRC and MRC. Legacy data via previously reported outcomes systems were also used. In the case of legacy data, not all spinout companies can be associated with a specific research award.

Curation of the data submitted to Researchfish was further enhanced by ensuring that company names matched to their Company House Registration number via the commercially available database, Fame.

The resulting dataset identifies all available data on spinout companies that have emerged from UK research institutions as a direct result of UKRI research council grant funding to that institution. This dataset identified 2,306 unique spinout companies registered between 1963 to March 2021 that have emerged from research organisations linked to specific research grant funding by the research councils. These spinout companies were linked to 4,896 instances of funding by research councils, 3,956 being identified via research grants reference numbers.

To simplify our nomenclature, the spinout companies that have arisen from research councils investments in research are referred to as ‘research council spinouts’ within this report, although UKRI does not own any shares in these companies (in most cases, with the exception of UKRI-owned research institutes where UKRI might be a shareholder in some of the spinout companies created).

UKRI also contributes to UK Innovation and Science Seed Fund (UKI2S), a privately managed investment fund who invest in early-stage companies emerging from some Public Sector Research Establishments (PSREs)

and UKRI campuses. UKI2S was not the focus of this work and its investments have not been considered in this analysis.

1.2.2. Innovate UK data:

Innovate UK publishes a publicly available dataset which outlines all Innovate UK grant awards to UK companies to support R&D activities. It includes data about collaborative research and development, feasibility, smart and innovation voucher grants, and Knowledge Transfer Partnerships from 2004 until 2021. The Innovate UK dataset includes all project proposals that have succeeded in the assessment stage of different competitions for funding subject to grant offer and conditions being met.

This dataset is available from <https://www.ukri.org/publications/innovate-uk-funded-projects-since-2004/>

The Innovate UK grant dataset was supplemented with the Innovate UK loan data not currently available publicly.

Exchange of data from UKRI to the British Business Bank was the subject of a one-way data sharing agreement when pertinent to data not yet available in the public domain.

This core dataset was supplemented with data from two market data sources:

1. Bureau Van Dijk Fame – The Fame database from BvD covers private company information for the UK and Ireland is now available through the Fame database. Covering 11 million companies it provides detailed or summary financials for both active and inactive companies reaching up to 20 years history per company. Content includes company news, industry research, credit scores, strength indicators, corporate CCJs, directors and shareholders and detailed corporate structure. It is searchable with hundreds of criteria to build bespoke reports, analyse companies and create peer analysis. Content can be extracted for further analysis and presentation with Excel and Powerpoint add-ins and alert settings are available to ensure currency.
2. Beauhurst – Beauhurst is a searchable database of the UK's high-growth companies, and tracks investment into some of the UK's most ambitious businesses. Beauhurst identifies and records equity deals made by the full range of equity investors from large multi-million growth deals in established businesses by

private equity funds, to smaller deals in early stage companies by angel investors and equity crowdfunding platforms. In this report ‘equity investment’ includes any form of external equity finance, excluding transactions on public equity markets and buyouts.

Beauhurst coverage of deals is split into two broad buckets. First, those deals which are announced via government regulatory organisations, confirmed with the investee or investor or via a press release or news source. Second, Beauhurst also identifies unannounced deals using share allotment filings. When a company allocates its shares, an SH01 form is submitted to Companies House, but details of who the new shareholders are not included in the SH01 form. All references made in this report to the number and value of equity deals refer to both announced and unannounced deals.

2. Timing of data collection:

It is important to consider the timeframe of the main three data sources used in the report when considering and discussing the results. Research councils have been collecting data on outputs and outcomes from investments in research, including the creation of companies, for many years with some data going back as early as the 1960s. Since the emergence and use of online reporting tools by research councils the quality and strength of the association between research investments and outputs has increased notably since 2010.

Innovate UK was created as an executive agency to support business innovation in 2007. Its dataset on business-led innovation support is available online²⁹ but also includes legacy government funded R&D projects dating back to 2004.

The British Business Bank dataset has legacy programme investment activity going back as far as 2003, with the Bank officially created in 2014.

The UKRI datasets, including Innovate UK awards and loans, is as at September 2021, and the British Business Bank portfolio data is as at June 2021.

3. Analysis

Links between the three datasets were identified by matching the companies’ unique Company House ID. Companies without Companies House IDs, or with invalid Companies House IDs, were excluded from this analysis.

The location of research organisations where spinout companies have emerged from or where the initial research took place were identified using the UK postcode of the institutions as recorded by UKRI Research Grant system.

The geographic location of spinout companies was identified as per the public records of their registered offices in Company House as of September 2021. This may vary from the ‘operational site’ for later stage companies (which might operate from multiple sites) or for companies that might relocate for business purposes. In all cases, geographic locations were defined as per Office for National Statistic ITL regions.

There can be a significant time lags and time differences between research grants awarded by UKRI research councils, the incorporation of a spinout company and the raising of equity (or debt) finance by the company

itself. Given this, and the time period available for some of the market data sources used, a cohort approach was taken to understanding timing of events as part of various pieces of analysis in this report.

Since various factors can affect spinout company outcomes (namely the ‘volume’ and quality of the research undertaken in the given geographic area) it is important to ‘normalise’ the data by type of research organisations. To achieve this, we only considered a subset of universities with similar characteristics as identified in the Knowledge Exchange Framework (KEF).³⁰ To this effect, we use ‘Cluster V’ of the largest, broad discipline, most research-intensive Higher Education Providers (HEPs) in England as defined by KEF to ascertain the effectiveness of translating research income into spinout companies that attract further investments. Included universities are as follows: University of Bristol, University of Cambridge, Imperial College London, King’s College London, University of Oxford, Queen Mary University of London, University of Southampton, University College London, University of Warwick, London Business School, University of Birmingham, University of Leeds, University of Liverpool, University of Manchester, University of Newcastle, University of Nottingham, University of Sheffield.

4. Data Quality Assurance

Data from UKRI and the British Business Bank were quality assured following Microsoft PowerBI initial analysis. UKRI spinout company data was imported by the UKRI data warehouse following curation by research councils. Publicly available Innovate UK data was used and only those projects supporting UK companies with a valid Companies House registration number considered.

The data analysis itself was quality assured using British Business Bank standards and processes.

5. Sample sizes

The sample sizes used within the cohort analysis in this report are as follows:

1 - ‘Research council spinouts’ with support from both Innovate UK and the Bank:

- a) 2010-2014 overall cohort - 33
- b) 2010-2014 with equity - 31
- c) 2010-2021 overall cohort - 78

2 - ‘Research council spinouts’ with support from the Bank only:

- a) 2010-2014 overall cohort - 15
- b) 2010-2014 with equity - 14
- c) 2010-2021 overall cohort - 52

3 - ‘Research council spinouts’ with support from Innovate UK only:

- a) 2010-2014 overall cohort - 135
- b) 2010-2014 with equity - 81
- c) 2010-2021 overall cohort - 299

4 - ‘Research council spinouts’ without support from either Innovate UK or the Bank:

- a) 2010-2014 overall cohort - 219
- b) 2010-2014 with equity - 51
- c) 2010-2021 overall cohort - 616



Endnotes

1. Dissolved companies are those listed as: Dissolved, dormant, in administration or in liquidation on Fame. Note that not all 'dissolutions' necessarily indicate 'failure', early acquisitions could be reflected in this, which some spinouts set up to quickly generate and then sell Intellectual Property (IP).
2. By external equity capital, we mean equity investment which requires the involvement of investors outside of the company, who undertake due diligence and subsequently invest. This is distinct from 'internal investment', in which (for example) investment comes from company proceeds, or Company Directors investing in their own company's shares.
3. British Business Bank analysis of Beauhurst
4. British Business Bank: Small Business Equity Tracker 2022 - <https://www.british-business-bank.co.uk/wp-content/uploads/2021/06/Equity-Tracker-2021-Final-report-1.pdf>
5. See British Business Bank interim evaluation of the Northern Powerhouse Investment Programme.
6. It should be noted that some of these businesses could still have engaged with the research base.
7. British Business Bank: Small Business Equity Tracker 2022 - <https://www.british-business-bank.co.uk/wp-content/uploads/2022/06/small-business-equity-tracker-2022.pdf>
8. Northern Powerhouse Investment Fund Interim Evaluation Report: British Business Bank - <https://www.british-business-bank.co.uk/wp-content/uploads/2022/04/NPIF-Interim-Evaluation-report-FINAL.pdf>
9. Northern Powerhouse Investment Fund Interim Evaluation Report: British Business Bank - <https://www.british-business-bank.co.uk/wp-content/uploads/2022/04/NPIF-Interim-Evaluation-report-FINAL.pdf>
10. Note that PitchBook sectors have been used as the basis of this analysis, however a grouping methodology has been used to group similar sectors to give a more succinct overview. As PitchBook is an equity finance data platform primarily, only the Bank's equity portfolio has been matched and therefore has this sectoral information. Proportions relate to the proportion of British Business Bank equity recipients within each sector that are 'research council spinouts' and/ or have received funding from Innovate UK.
11. Note that all Innovate UK awards are business-led, however they can be in collaboration with other institutions such as universities, research organisations, public sector organisations, and so on. These proportions relate purely to awards to recipients classified as: micro, micro/small, small, medium (SMEs) or large (all businesses) in the 'enterprise size column'.
12. In a few cases, the spinout companies might have already been created and attracting investments from the Bank while the research was further developed in the academic setting. In those specific cases and according to the reporting guidance to research councils, academic research might disclose when their research contributed to the establishment or the further development of an early-stage spinout company.
13. To account for the disparity in timing of the different datasets used, a cohort analysis approach is taken considering spinouts founded in a shortened set of years. This is an attempt to mitigate some of the timing effects caused by the three datasets covering widely different time periods.
14. 'Dormant' companies are those currently classified by Fame® as: dormant, in administration or in liquidation.
15. Note that 'dissolution' does not always indicate that a company has failed, it may reflect the original company being acquired leading to the dissolution of the legal entity. This is a valid commercialisation route for many 'research council spinouts' operating in complex value chains with a long lead time to market.
16. To qualify for small company accounts you must meet two of the three following conditions: turnover must be not more than £10.2m, balance sheet total must not be more than £5.1m, average number of employees must not be more than 50.
17. British Business Bank analysis of Beauhurst
18. Nesta- The Missing £4 Billion: Making R&D work for the whole UK https://media.nesta.org.uk/documents/The_Missing_4_Billion_Making_RD_work_for_the_whole_UK_v4.pdf

19. Levelling the United Kingdom White Paper - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052046/Executive_Summary.pdf
20. British Business Bank: Regions and Nations Tracker: Small Business Finance Markets 2021 - https://www.british-business-bank.co.uk/wp-content/uploads/2021/10/J0018_Regional_Tracker_Report_AW.pdf
21. British Business Bank: Regions and Nations Tracker: Small Business Finance Markets 2021 - https://www.british-business-bank.co.uk/wp-content/uploads/2021/10/J0018_Regional_Tracker_Report_AW.pdf
22. Local Authority Districts included- South East: Cherwell, Oxford, South Oxfordshire, Vale of the White Horse and West Oxfordshire. East: Cambridge, East Cambridgeshire, South Cambridgeshire and Huntingdonshire.
23. British Business Bank – Small Business Finance Markets 2022 - <https://www.british-business-bank.co.uk/wp-content/uploads/2022/02/Small-Business-Finance-Markets-Report-2022-FINAL.pdf>
24. This is defined as the amount of money an institution received from funding body grants as well as research grants/ contracts (HESA Finance).
25. Patient Capital Review - 2017
26. <https://researchfish.com/>
27. <https://www.ukri.org/manage-your-award/reporting-your-projects-outcomes/#contents-list>
28. <https://gtr.ukri.org>
29. <https://www.ukri.org/publications/innovate-uk-funded-projects-since-2004/>
30. <https://kef.ac.uk/about>

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