Scottish University Spin Outs

Reference: **JAN468731**
Report for Scottish Enterprise | August 2023

Direct enquiries regarding this report should be submitted to:

Brian McLaren
Managing Director EKOS
Email: brian.mclaren@ekos.co.uk

Jonathan Harris
Associate EKOS
Email: Jonathan@ycf.co.uk

EKOS Limited,
St. George's Studios,
93-97 St. George's Road,
Glasgow, G3 6JA
Reg 145099

www.ekos-consultants.co.uk

Contents

Executive Summary

Introduction

Spin out companies are formed to commercialise intellectual property (IP) created in universities and are generally held to offer significant potential for economic growth through their focus on innovative new technologies. However, it is often argued that while Scotland over performs in terms of university research activity and income, not enough of this research translates into commercial application. This review considers Scotland's performance in two main respects:

- **the creation of high growth spin outs from Scottish universities** - considering how research strengths feed into spin out creation, constraints at the pre-start up stage and the role and contribution of funding, advice and support.
- **Scottish spin outs raising equity investment** -looking at established spin outs, headquartered in Scotland, and their experience raising equity finance. Areas of focus include: equity stakes taken by Scottish universities; the role of non-dilutive grant funding and factors such as spin out age (based on incorporation date), when they raised their first external equity round, the amounts raised and the types of investors these companies are attracting.

For the purposes of this review, a spin out company is defined as meeting condition 1 and at least one of conditions 2-4 below[1]:

1. The company was set up to exploit IP developed by a recognised UK university;
2. The university owns IP that it has licensed to the company;
3. The university owns shares in the company; and
4. The University has the right to purchase shares in the company at a later date.

The review considered the exiting research literature and data on spin out creation and investment but draws its main findings from extensive consultation with over 90 universities, spin out companies, investors and stakeholders with an interest in this area.

Spin out creation

Scotland's performance in the creation of new spin out companies compares well to the rest of the UK but remains some way behind the Golden Triangle area (London, East and South East England). The wide consensus was that the success of the Golden Triangle is based on two factors – the quality of the science

[1] Source: Beauhurst

base (and the reputations of the leading institutions) and the weight of investment capital available. Scotland can compete on the first, but not on the second.

Scotland has sufficient research strength to generate viable high growth spin out companies particularly in life sciences, software and computing (including AI), engineering and advanced manufacturing, and cleantech. However:

- Scotland's performance on spin out creation is less strong than its share of research funding, suggesting issues somewhere between research and commercialisation;
- spin outs are highly concentrated in a small number of universities – notably Edinburgh, Strathclyde, Glasgow and Dundee and to a lesser extent Heriot Watt, Aberdeen and St Andrews; and
- Scotland may be spinning out fewer than 10 companies per annum (on average) suggesting considerable scope for improvement.

High quality research is a prerequisite, but the review identified a range of other factors that can inhibit or encourage spin out creation:

- academic motivation;
- translational funding;
- availability of high-quality commercial advice and expertise; and
- university support resources and approach.

Academic motivation is invariably the initial impetus for spin out creation. While academic reward systems and career pathways now place more value on commercial activity, there is still more to do to encourage and enable more academic researchers to pursue spin out and other commercial routes. There is a role here for training and support, but also flexibility in career progression.

The outputs of academic research are rarely in the form of investable assets, and this is where the role of **translational research funding** is critical in developing and testing technologies prior to commercialisation. However, the review heard clear feedback that more of this funding is needed in Scotland. The research suggests that while there are available sources of translational funding, these have been reducing, not least as a result of Brexit and pressure on public expenditure. They are highly competitive and cannot support the full range of viable prospects.

The research also found that the quality and extent of **commercial expertise** and advice available to spin outs in Scotland was often lacking. This is true both of the wider ecosystem supporting high growth companies in Scotland and of the universities themselves.

University **Technology Transfer Offices (TTOs)** will generally play leading role in supporting spin out companies, but the expertise within universities is highly variable, as are the resources available for

commercialisation. Funding structures tend to reinforce current arrangements and provide limited scope particularly for smaller universities to invest in their spin out and commercialisation support. Given the centrality of the universities in the spin out process, it is important to consider how this might be addressed.

There is evidence of good practice amongst Scottish universities regarding the creation and support for spin outs and the review has identified the characteristics of these processes. However, they are not universal and there is scope for improvement at institutional level and opportunity for **greater collaboration** particularly amongst the smaller universities.

Funders and investors both raised issues with the time it takes to spin out companies, and with the tendency of universities to over value their IP and often to seek terms on **equity shares** and **licensing** that serve their interests over those of the spin out company. The review found that these are not issues specific to Scotland but rather that they reflect institutional rather than geographic differences.

Raising equity investment

Investment into spin outs constitutes a significant proportion of Scotland's overall risk capital market, representing 25% of investment value and 14% of total deals in Scotland in 2022. Recent analysis also shows that investment into spin outs has been growing in recent years.

The UK market is dominated by the Golden Triangle area, and 90% of spin out investments over £10m went to firms in these areas. However, in terms of both the number and total value of deals over the last three years, investment into spin outs in Scotland exceeded all other areas of the UK apart from the Golden Triangle.

Looking at the mean size of deals spin outs in Scotland tend to secure lower value deals than those elsewhere although the variation is in most cases small. If using median measures rather than means, Scotland is comparable with London and better than all other regions except South East and East of England, and in some years the North West.

The implication here is that spin outs in Scotland do raise relatively lower amounts of investment, particularly when compared to companies in the Golden Triangle. However, when compared to other nations and regions of the UK, the differences are much smaller and vary year on year.

The issues affecting investment into spin outs are:

- the quality of the technology/ idea and its market potential (demonstrated through translation and non-dilutive grant funding support, such that it is sufficiently de-risked);
- commercially acceptable deal terms on equity (20% or less), licencing and assignation of IP (not setting royalties and assignation thresholds too high) and access to university resources – these

should be agreed such that the company's chances of future investment and growth are maximised; and

- the quality of the management team, including commercial as well as technical talent.

In each of these three broad areas, we found no evidence to suggest that Scotland is particularly disadvantaged relative to other regions with the exception of the third – commercial talent. However, university approaches to the deal terms remain inconsistent and there is scope here for further improvement and alignment.

It is in the attraction of larger investment deals that Scotland appears to do less well than its comparators, even if the differences are perhaps less marked than sometimes supposed (unless compared to the Golden Triangle).

This partly reflects the make up of the equity risk capital market in Scotland which is slanted towards angels and the early-stage market. Scotland has fewer VCs focussed on the Scottish market, and spin outs reported having to seek larger investment outwith Scotland.

Areas such as the Golden Triangle (and parts of the US like the Bay Area and Boston) are differentiated by the sheer **weight of investment capital** that is available. This enables more risk taking on the part of investors and can help catalyse the development of the wider ecosystems that support commercialisation.

A couple of the Scottish universities have their own funds to invest in spin outs, but these are relatively small and in investment terms may be considered sub-optimal. They are certainly useful and are well received by the wider investment community.

However, in order to develop a significant **investment fund for spin outs** in Scotland, possibly addressing the gap in the £2m-£5m range, this would need to operate across multiple (all) institutions. This may be a fruitful area of institutional collaboration, perhaps similar to the model developed in Ireland with the University Bridge Fund or in regions of England (e.g. Northern Gritstone or Midlands Mindforge).

Recommendations

The review makes a number of recommendations targeted both at increasing the number of spin outs created in Scotland, and the ability of those spin outs to raise investment capital. There is no single 'top-down' solution. Rather, action will be required on multiple fronts from a range of actors in the Scottish innovation system. Few, if any, of the recommendations are within the direct gift of any one organisation.

The recommendations address three broad areas:

- growing the pipeline of spin out (and commercialisation) opportunities;
- developing more investable assets and ideas; and

- improving access to investment capital.

Recommendation 1: institutions should support and encourage academic researchers to pursue commercialisation opportunities, including spin outs, taking account of the suggestions outlined above. The Scottish Government's Entrepreneurial Campus work provides a useful framework.

Recommendation 2: training in entrepreneurship should be extended to include post-docs and PhDs working in the research groups that are producing innovations with commercial potential.

Recommendation 3: programmes to raise awareness, inform, inspire and socialise the research community should include specific actions to encourage more female academics to participate and to increase the wider diversity of the spin out pool. It should be noted that there is already some activity in this area.

Recommendation 4: key research communities and groups with the potential to generate more commercial opportunities should consider establishing pipeline identification and management structures in partnership with their TTOs.

Recommendation 5: consideration should be given to how to incentivise more commercialisation and spin outs from smaller institutions which lack the resources to invest to the necessary level. This may have implications for how mechanisms such as the University Innovation Fund are used.

Recommendation 6: collaborative models from elsewhere suggest that universities working together can develop scale and share good practice in commercialisation and enterprise support. There is merit in exploring the potential for such collaborations in Scotland.

Recommendation 7: TTOs should dedicate resources to working with researchers to secure essential translational funding.

Recommendation 8: The Scottish Government and its agencies should give consideration to the Proof of Concept Fund proposal that has been developed within the University of Dundee.

Recommendation 9: There is a case to be made for increasing the resources available to the HGSP as a means of supporting commercialisation and early-stage spin out companies. Similar arguments could be made for SMART awards.

Recommendation 10: Commercial expertise should be input to the spin out at an early stage and certainly by Proof of Concept stage to ensure that the proposition develops in line with market demand and opportunity. Some universities are pursuing this but to what effect is unclear. Early engagement with investors can also help with this.

Recommendation 11: TTOs make use of the TENu USIT Guide to negotiating spin out deals as a means of enabling quicker agreements and adopting an impact first approach. This includes reasonable expectation regarding equity stakes, licencing arrangements and access to university resources.

Recommendation 12: Consider increasing the incentives to universities to invest in their TTOs and the processes supporting spin out creation.

Recommendation 13: Consideration should be given to the potential to establish a cross university fund drawing on the learning from examples such as the University Bridge Fund, Midlands Mindforge and Northern Gritstone.

Recommendation 14: The HESA review of the Higher Education Business and Community Interaction (HE-BCI) dataset must present solutions to improve the reliability of data on spin outs, and universities should align with the recommendations arising from that review. There is also a related need for better data to track the longer-term performance of spin outs and their impact on the Scottish economy.

1 Foreword

1.1 Introduction

The establishment of spin out companies is an important means for universities to commercialise research (alongside licensing and consultancy), and the companies created are considered to make a significant contribution to economic activity and growth.

However, it is often argued that while Scotland over performs in terms of research activity and income, not enough of this research translates into commercial application. The current study is focussed on reviewing Scotland's performance in two main respects:

- **the creation of high growth spin outs from Scottish Higher Education Institutions** - considering the recognised strengths of Scottish Universities feeding through into spin out creation, constraints at the pre-start up stage and the role and contribution of translational funding. The study will seek to identify issues and funding gaps that Scottish institutions and founders face when seeking to create a spin out company.
- **Scottish spin outs raising equity investment** - this part of the research will look at established spin outs, headquartered in Scotland, and their experience raising equity finance. It seeks to understand why Scottish spin outs raise relatively lower amounts when compared to the other areas of the UK (with a similar strong track record of creating and investing into spin outs). Areas of focus include: equity stakes taken by Scottish universities; the role of non-dilutive grant funding (such as SMART grant funding) and factors such as spin out age (based on incorporation date), when they raised their first external equity round, the amounts raised and the types of investors these companies are attracting.

For the purposes of this research, a spin out company is defined as a company that meets condition 1 and at least one of conditions 2-4 below[2]:

5. The company was set up to exploit IP developed by a recognised UK university;
6. The university owns IP that it has licensed to the company;
7. The university owns shares in the company; and
8. The University has the right to purchase shares in the company at a later date.

[2] Source: Beauhurst

This research will be used to inform recommendations as to how to improve the commercialisation of research from Scottish Universities, identifying barriers encountered by universities and founders when seeking to create new spin outs, and subsequently when seeking initial and follow on investment sufficient to realise their potential.

1.2 Objectives

A detailed background was set out in the ITQ and highlighted a range of specific questions that the research should address, as detailed below.

Part 1: Spin out Creation

- How are the recognised strengths of Scottish Universities feeding through into spinout creation? How does this compare to other regions of the UK?
- Mapping should be undertaken of how Scottish universities support the creation of spinouts, and how this is resourced, with a view to identifying good practice. Where appropriate, this should draw on experience from elsewhere in the UK;
- Establish if there any differences in the support available to Scottish based spin outs with respect to the support they receive from their host institution, and when compared to spin outs created elsewhere in the UK;
- Consideration should be given to the relative performance of Scottish universities with respect to the creation of spin outs. This should help to identify good practice, and if there are opportunities to improve performance, for example, as a result of increased collaboration between Scottish universities;
- Identification of constraints at the pre-start up stage should be considered in the context of identifying the emerging pipeline and what more could be done to increase opportunities at this stage. This should consider issues such as the importance of access to entrepreneurial and commercialisation talent; and
- The commission should consider the role and contribution of translational funding. This should explore how universities secure the funding required to advance intellectual property into investable assets that can attract significant seed and series A/B investment.

Part 2: Raising Equity Investment

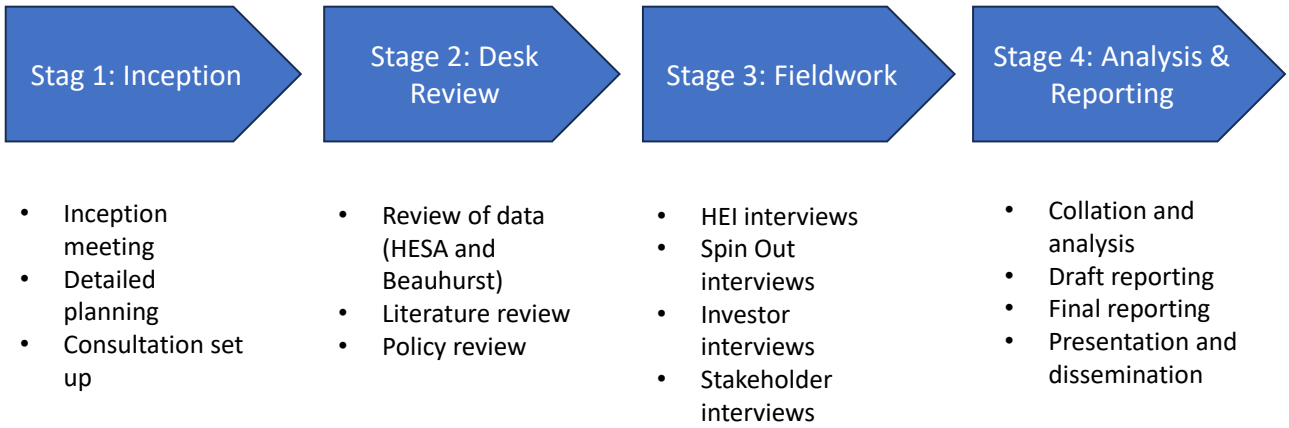
- This second part of the commission will seek to understand why Scottish spin outs raise relatively lower amounts when compared to the other areas of the UK (with a similar strong track record of creating and investing into spin outs), and seek to identify factors which might contribute to this;
- The role of non-dilutive grant funding (such as SMART grant funding) should be considered, with reference to whether availability of this funding (post incorporation) can support value creation and de-risking in advance of external investment being raised;

- The study should look at the equity stakes taken by Scottish universities and how these compare with other institutions elsewhere in the UK. Input from different investor types, who have a track record of investing into spin outs should be sought;
- The research should explore if there are any reasons why some Scottish spin outs raise less value per deal than those located in other high performing regions of the UK.
- The research should conclude with recommendations on:
    - How to improve the commercialisation of research coming out of Scottish Universities. This should include evidence of any barriers encountered by Universities and founders when seeking to create new spin outs
    - How to address any barriers experienced by Scottish based spin outs when seeking to secure adequate equity finance to meet their growth ambitions;
- The consultants are also required to consider how increased inclusion and diversity can be encouraged and supported in the marketplace, recognising the business benefits that come from having investors and companies drawn from under-represented groups and backgrounds.

1.3 Method

The study was conducted in four main stages, as outlined below.

Figure 1.1: Study Method



Stage 1: Inception

The purpose of the inception and set up stage is to ensure a strong understanding between the Client and the consultants as to the rationale for the study, the required outputs, to make any amendments to this proposal and provide a base for subsequent work.

It comprised an initial meeting with the Client to establish a shared understanding of the study requirements, and agree the more detailed approach, including access to data and contacts to be

provided by SE. In particular, SE provided contact information for the fieldwork along with data drawn from the Beauhurst database for high growth spin outs along with a range of other background reports.

The main points of agreement and relevant actions were subsequently detailed in an Inception Report along with an agreed work programme and project plan.

Stage 2: Desk Review

The desk review stage of the study focussed on the following tasks:

- review of the existing literature on the creation of spin outs from Scottish universities and Scottish headquartered spin outs raising equity investment, including Beauhurst publication *Spotlight on Spin Outs* and Scottish Enterprise's *Risk Capital Market Report* (2023)
- analysis of data collected by the Higher Education Statistics Agency (HESA) on universities' commercialisation activities, with a focus on spin out creation;
- analysis of the outputs of the Research Excellence Framework (REF) assessing research quality in UK universities[3]; and
- analysis of data from the Beauhurst database (provided by SE) tracking investment deals in spin outs in Scotland (and the UK).

The study team identified some definitional issues relating to some of these sources and these are discussed below.

During this stage, consultation materials were developed and agreed with SE prior to the start of the fieldwork process.

Stage 3: Fieldwork

The main focus of the research was a programme of 94 in depth, semi structured interviews with the following:

- 37 spin out companies from universities in Scotland;
- 21 investors, including Angel Groups, Venture Capitalists and sector specialist investors.;
- 16 higher education institutions (HEIs) in Scotland and the UK;
- 6 commercial champions or lead academics with prior involvement in spin outs;
- 10 stakeholders (including SE, Scottish Government and Scottish Funding Council); and
- 4 sector experts from universities and the commercial sector.

[3] Source: Scottish Funding Council

As noted above, the interview proformas were agreed with the SE client team in advance, and all contacts were provided to the study team by SE. Survey control rules were such that a number of well-known spin out companies (including some high profile successes) were excluded from the sample. It was also agreed that the Higher Education consultations should focus on those universities with more experience of spin out creation along with some UK contacts to provide wider perspectives. The consultation programme proceeded in four successive waves and all interviews were conducted during June and July 2023.

The appendix provides details of the organisations that took part in the research.

Stage 4: Analysis and Reporting

The final stage of the research focussed on the analysis of the evidence collected through the desk review and fieldwork stages, as follows:

- the desk review and data analysis provided context on the spin out landscape and trends in the creation of spin outs and in spin outs' performance in raising equity investment;
- the consultation outputs form the main evidence base and were analysed to provide a qualitative assessment of the issues affecting both the creation of spin outs from universities in Scotland and the ability of spin outs to raise sufficient levels of equity investment; and
- emerging findings and suggested recommendations were then tested with a series of sector experts (highlighted above).

The research outputs were then reported first in draft form and subsequently finalised following comment and input from SE.

1.4 Methodological Issues

1.4.1 Data and Definitions

There are two main sources of data relating to spin outs in the UK:

- data collected by HESA via the Higher Education Business and Community Interaction Survey; and
- data provide by Beauhurst, a commercial data provider that tracks high growth companies in the UK.

In relation to definitions, Beauhurst uses the same definition for a spin out as that stated above and is therefore consistent with the research scope.

The Higher Education Statistics Agency (HESA) reports data provided by universities on their commercialisation activities and defines a spin out company as follows (HESA uses the term spin off):

"Spin-offs are companies set-up to exploit IP that has originated from within the Higher Education Provider (HEP)."

It further differentiates two categories of spin off:

- **Spin-offs with some HEP ownership** are companies set-up to exploit IP that has originated from within the HE provider, where the HE provider continues to have some ownership.
- **Formal spin-offs, not HEP-owned** are companies set-up based on IP that has originated from within the HE provider but where the HE provider has released ownership (usually through the sale of shares and/or IP).

The first of these is consistent with the definition used in this research, while the second is not. As a result, unless otherwise stated, we have reported here only the data within the first category so as to remain consistent with the research definition. In particular, HESA data has been used to analyses the number of spin outs created by Scottish universities and the Beauhurst data has been used to examine equity investment into Scottish headquartered spin out companies.

Both HESA and Beauhurst data are also subject to some limitations. The data reported by HESA is self-reported by the universities and while HESA does provide definitions for all of the measures collected, accuracy and compliance may vary across the HE sector. Beauhurst data also draw on the HESA datasets, and so will be subject to similar issues.

Beauhurst data was provided to the study team by SE, with some minor gaps. Data for spin outs in 2020 and 2021 were provided for all of the UK and provided information on the company name, headquarter location, date of incorporation, university, value of investment secured, investors (where available) and sector. There were some missing fields, which in some cases were significant, and the sector data is less robust due to issues with classifying companies within a single sector area, which can be problematic. Further data for 2022 was supplied but contained a smaller number of categories - the company name, university, headquarters location, investment date and total investment value.

Inevitably, neither source is perfect but, they are the only available sources that can provide any kind of consistency. Where relevant we have highlighted specific issues in the analysis, but would note the following:

- there may be issues with the point in time at which a spin out is recorded, and this may vary across universities and across the different sources of data. This makes comparability between the HESA and Beauhurst data sometimes problematic; and

- there is a tendency to use mean values when analysing investment into spin out companies. As a measure of average values, the mean can be less useful where the dataset includes significant outliers, which is usually the case with investment values. Therefore, we have also used median values to present a more accurate picture.

1.4.2 Qualitative Data

While the quantitative data discussed above provides essential context, the primary focus of the research is on the qualitative data collected through the interview programme. Our approach to qualitative analysis is to review the data and identify common themes, and the questions were based around the research questions set in the ITQ. It is important to note that this does not require consensus on all issues across the consultees. Indeed, there were areas in which we found conflicting views, reflecting the degree of vested interest that different parties will have in relation to spin out creation and investment.

Where possible, we have tried to reflect both points of agreement and areas of divergence across the analysis and have sought to do so without prejudice. As such, the findings and the recommendations that they have informed, are as far as possible a true reflection of the views of the various expert parties that contributed to the research.

1.5 Format of Report

The report is structured as follows:

- **Chapter 2** describes the context for the study;
- **Chapter 3** reviews the available data on spin out creation in Scotland and the UK;
- **Chapter 4** considers the issues affecting spin out creation based on the input from the consultation programme;
- **Chapter 5** reviews the available data on investment into spin outs in Scotland and the UK over the last three years;
- **Chapter 6** discusses the issues affecting the ability of spin outs to raise investment, and draws again on the consultation inputs, in particular the feedback from investors;
- **Chapter 7** considers equality and diversity in spin out companies; and
- **Chapter 8** presents our conclusions and recommendations.

2 Context

2.1 University Spin Outs: Overview

In the 1960s, universities had limited links (from a commercial perspective) with industry although by the 1970's this began to increase until there are now over 1,000 spin outs in the UK each decade. This is supported by over 100 science parks at British universities, marking a rapid expansion since 1970, when the first one was set up at the University of Cambridge[4].

Consequently, there has been growing interest in the economic contribution of universities, with various policy measures seeking to encourage and incentivise universities to increase their economic impact. In particular, the requirement for universities to evidence the impact of their research activities is an increasingly important feature of the Research Excellence Framework (REF), the primary means of assessing the quality of higher education research in the UK. This is a direct incentive for universities to commercialise their research outputs as the REF results then determine future funding allocations.

However, there are other reasons why universities might seek to create spin out companies, not least that they have the potential to generate a financial return for institutions. They can also confer prestige and help to promote a positive image to potential students and staff and to industry and government partners.

Similarly, there are benefits to academic researchers in being involved in commercialisation activity, and academic reward systems are (slowly) adapting to take account of this.

Potential advantages arising from spin outs both for the university and the researcher include those summarised below.

Table 2.1: Rationale for supporting spin outs

Advantages for university	Advantages for researcher
Image Ability to attract new research staff and students – Talent attraction Income Potential capital Promote the HEI as entrepreneurial Impact on REF	Add to CV Ability to attract assistants Demonstrate the practicality of research Income Potential capital Company start up

[4] *University spin-outs: where to find companies involved in cutting-edge science:* Money Week, Dr Mike Tubbs Published September 24, 2021

As of January 2023[5], Beauhurst estimates that there are 1,166 active spin outs from UK academic institutions, accounting for 2.5% of the nation's high-growth company ecosystem. The report states that these spin outs have demonstrated an impressive ability to raise investment, securing 9.1% of all equity finance raised by private UK companies in 2022.

Spin outs are concentrated in leading academic institutions and in some key sectors. For example, more than half of all UK spin outs originated from 10 academic institutions including the Universities of Cambridge and Oxford and Imperial College London along with the University of Manchester.[6] In Scotland this also includes the Universities of Edinburgh and Strathclyde. It is worth noting that those universities with the greatest numbers of spin out companies are also those which receive the most research income. In 2020/21, businesses spun out from the 24 Russell Group[7] universities alone created 33,000 jobs and brought in £4.9bn of investment to towns and cities across the country.

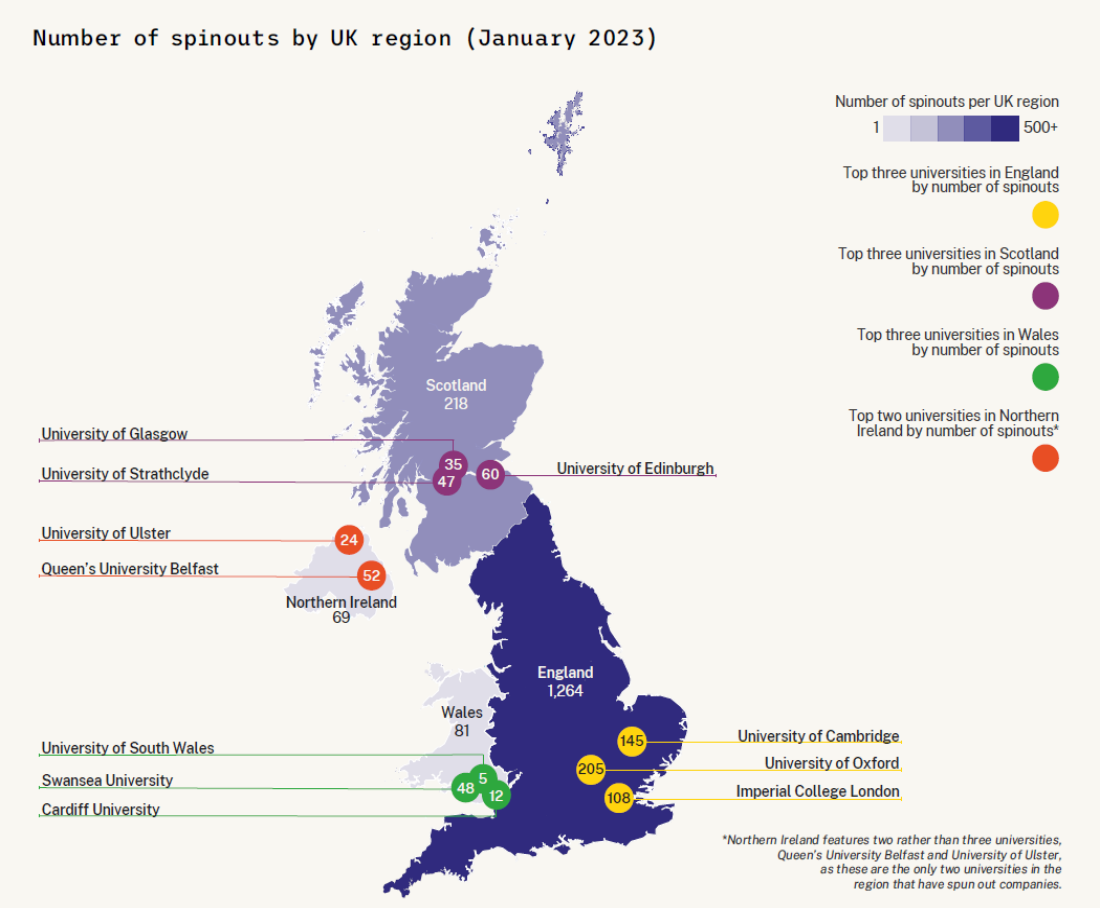
The life sciences sector continues to lead the way, with pharmaceuticals (309) and research tools/reagents (279) topping the sectoral ranking for spin outs. However, Artificial Intelligence (156) tops the emerging sector ranking for new technology across a range of sectors from drug discovery to agricultural forecasting.

The following chart shows the cumulative number of spinout companies currently trading, irrespective of year of formation.

[5] Spotlight on Spinouts, May 2023: Beauhurst and RSE

[6] Spotlight on Spinouts, May 2023: Beauhurst and RSE

[7] The Russell Group: University spinouts: a British success story https://russellgroup.ac.uk/policy/policy-documents/university-spinouts-a-british-success-story/



Source: Spotlight on Spinouts 2023: Beauhurst and RSE

2.2 Policy Focus

Innovation and enterprise are features of virtually all (international, national, regional and local) economic policy and have long been strong emphases in the UK and Scotland. Universities are considered a critical part of the innovation system and the last two decades have seen growing importance attached to the commercial application of university research.

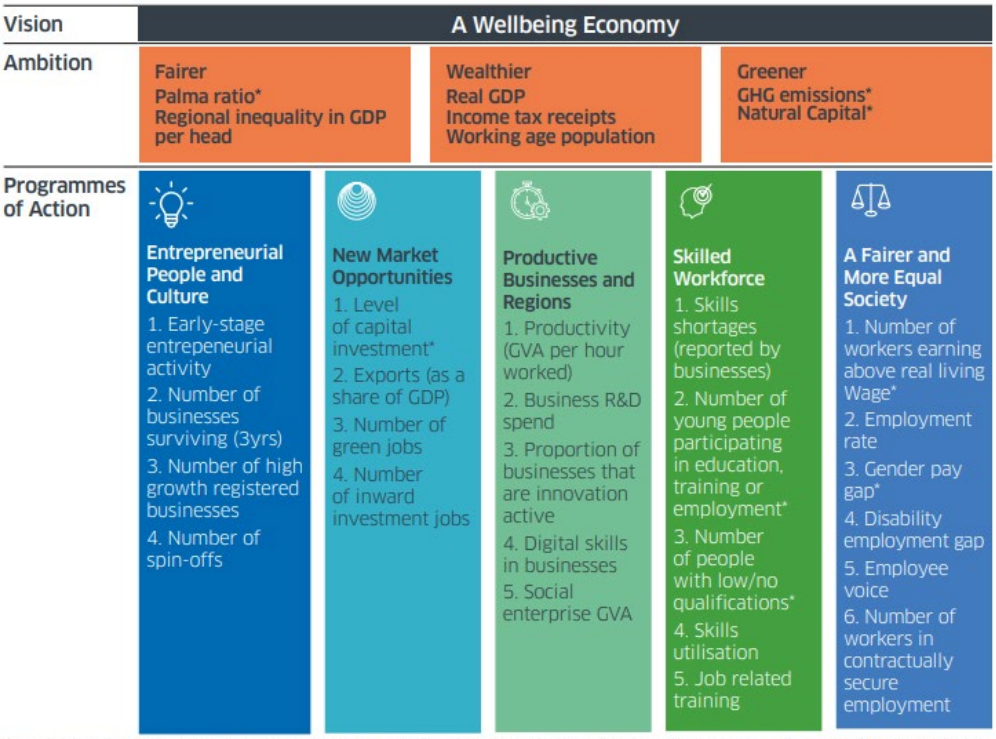
The role of universities in driving the inclusive growth agenda was given further impetus in late 2019, when Professor Sir Anton Muscatelli, Principal of the University of Glasgow, was asked by the Scottish Government to review industry engagement and the contribution to economic growth by Scotland's universities[8]. As the *Muscatelli Report* highlights, in 2017/18, there were 215 new spin outs and start-ups

[8] The Muscatelli Report: Driving Innovation in Scotland – A National Mission https://www.gla.ac.uk/media/Media_700300_smxx.pdf

generated by HEIs in Scotland (5% of the UK total), 1,154 active spin outs (7% of UK total), and the estimated turnover of active firms generated by HEIs was £613.7 million (19% of UK total)[9].

The report goes on to make a small number of headline recommendations for government, public agencies, universities and businesses to further enhance the contribution of Scottish universities to innovation and productivity. The creation of spin out companies is recognised as an important element of this. The report argues for greater flexibility in university policies to facilitate technology transfer and suggests opportunities for greater collaboration between HEIs – with smaller HEIs benefiting from larger HEI hubs, given the expertise of the latter in commercialisation. It also notes the under representation of women in commercialisation activities and recommends greater attention be paid to this area.

The *National Strategy for Economic Transformation* (NSET) continued this theme and stresses the importance of both entrepreneurship and innovation in driving the productivity and economic growth that will enable Scotland to thrive as a nation while addressing long standing challenges relating to poverty and inequality.



Source: NSET (2022)

[9] The spin out data used for the Muscatelli Report is drawn from the Higher Education Business and Community Interaction Survey compiled by HESA. This data source defines spin outs in a slightly different but similar way to the current research as discussed in **Section 1**.

Universities are acknowledged as having a central role to play in achieving the aims of NSET, in particular in relation to:

- Entrepreneurial People and Culture;
- Productive Business and Regions; and
- Skilled Workforce.

More recently, the Scottish Government published *Scotland's National Innovation Strategy*[10]. Based on a comprehensive review of the Scottish innovation system, the strategy identifies four programmes of action:

- Building successful innovation clusters;
- Innovation investment programme;
- Innovation-led entrepreneurship and commercialisation programme; and
- National productivity programme.

Higher education has a significant role to play in all four, but particularly in the third programme. Here the strategy points to Scotland's improving performance in university-led innovation and entrepreneurship, but notes that Scotland produces 50% fewer spin outs than the rest of the UK relative to the percentage of HEI research funding (a measure on which Scotland does particularly well, as considered below).

The strategy proposes a number or measures relevant to the current research, including:

- the development of a new framework for commercialising research;
- the Entrepreneurial Campus[11] – a mechanism for driving entrepreneurship at all levels across the university sector;
- establishment of a new £100m Scottish Innovation Fund, developed in partnership with universities and aimed at early-stage investment in start-up companies in deep science and deep tech; and
- review of the sufficiency of the investment in applied research, knowledge transfer and broader research projects aligned to the priorities identified in the strategy.

[10] https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2023/06/scotlands-national-innovation-strategy/documents/scotlands-national-innovation-strategy/scotlands-national-innovation-strategy/govscot%3Adocument/scotlands-national-innovation-strategy.pdf

[11] https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2023/06/entrepreneurial-campus-higher-education-sector-driving-force-entrepreneurial-ecosystem/documents/entrepreneurial-campus-2023-ross-tuffee-professor-joe-little-higher-education-sector-driving-force-entrepreneurial-ecosystem/entrepreneurial-campus-2023-ross-tuffee-professor-joe-little-higher-education-sector-driving-force-entrepreneurial-ecosystem/govscot%3Adocument/entrepreneurial-campus-2023-ross-tuffee-professor-joe-little-higher-education-sector-driving-force-entrepreneurial-ecosystem.pdf

The **Entrepreneurial Campus** framework builds on the Scottish Tech Ecosystem Review[12], NSET and the Muscatelli Report to set out the conditions and characteristics that will enable universities (and colleges) to maximise their impact on innovation and entrepreneurship in Scotland. Amongst these conditions is the need to develop support for academic staff spin outs, and the report makes a number of recommendations as follows:

- Design and implement a user centric technology transfer approach that meets the founders' expectations in terms of timelines to complete an investment;
- Reduce expectations of the level of equity to be retained by the institution;
- Where an institution requires involvement in the ongoing governance of a spin-out, ensure that the skill set, knowledge, and capability of the institution's representative on the spin-out's board is at the appropriate level;
- Set royalties at rates that ensure that revenues are being used for rapid growth rather than paying debt;
- Ensure that the level of support and engagement offered by an institution encourages future pay back and ongoing relationships between the university and founder; and
- Provide support and education for spin-out founders:
- improve their readiness to run a start-up
- Mentorship from experienced founders and investors
- Commercialisation best practice – Linking to recommendations in the Scottish National Innovation Strategy
- Link in with support offered by other Scottish Agencies – e.g. SE.

2.3 UK Spin Out Review

In March 2023 the (UK) Chancellor of the Exchequer and Secretary of State for Science, Innovation and Technology commissioned an independent review of UK universities' spin-out companies to ensure that the right incentives are in place for the UK to lead the world in turning university research into commercial success[13].The independent review considered the distribution of performance across universities to identify best practice in university spin outs.

The review identified the characteristics of a world class ecosystem for spin out creation, including:

[12] *Scottish Tech Ecosystem Review*, Mark Logan, 2020

[13]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1141484/rdi-landscape-review.pdf

- a diverse and experienced pool of academic founders, creating underpinning intellectual property (IP) and working closely with experienced start-up operators;
- anchor institutions, particularly universities, enabling researchers to generate world-leading IP in science and technology, nurturing technical talent, and connecting and convening stakeholders in the local ecosystem;
- a range of service providers, from accelerators to professional service firms, competing to offer business and entrepreneurship support to spin-out founders;
- accessible investment capital ranging from pre-incorporation translational funding to pre-seed/angel investment to other forms of capital including venture capital investment, particularly from investors experienced in building high-tech start-ups;
- a mix of large science and technology corporations providing spin outs with partnerships, access to global markets, and experienced technology leaders as co-founders or advisors;
- a supply of talented early employees to do the necessary work; and
- infrastructure (laboratory space, equipment, compute, housing, transportation) to support growing spin outs and their employees, ideally within proximity to their anchor institutions to enable porosity between all elements of the ecosystem.

It also concludes that the UK does not yet have all of these ingredients in place anywhere apart from perhaps the Golden Triangle although it is still developing compared to hot spots in the US (e.g. Boston, Bay Area, San Diego). Accordingly, it then proposed a series of recommendations aimed at developing such a world class spin out environment, including measures to:

- encourage universities to develop innovation-friendly policies;
- improve data on spin outs;
- using university innovation funding (HEIF in England and UIF in Scotland) to underwrite the costs of university infrastructure and resources for technology transfer;
- established shared resources for smaller universities to encourage and support commercialisation activities;
- strengthen the focus on commercialisation with the Research Excellence Framework (REF) assessment for universities;
- provide, support, training and information to academics (including PhD students) to encourage entrepreneurship;
- increase funding or proof of concept and translational research; and
- recognise the important role of university affiliated funds in helping spin-outs secure investment and continue to deliver reforms to enable scale up capital which can incentivise firms to stay in the UK.

3 Spin Out Creation

3.1 Introduction

This section addresses the first part of the study – spin out creation. It includes analysis of the available HESA data on the creation of spin outs from Scottish (and UK) universities as well as an account of the outputs from the consultation interviews with spin outs, universities and investors. As noted, all of the HESA data reported here are for spin outs with some HE ownership, thereby remaining consistent with the research definition (see **Chapter 1**).

3.2 Spin Out Creation: Overview

3.2.1 UK overview

Table 3.1 highlights the five-year performance in terms of spin out creation across the UK nations and English regions. The data from HESA show that the vast majority of spin outs are created in England (82%) with Northern Ireland performing similar to Wales, and Scotland accounting for around 10% of total UK spin outs over the five-year period from 2017/18 to 2021/22 (the latest year for which data is available).

As highlighted in *Scotland's National Innovation Strategy*, this is lower than Scottish universities' share of UK research income (closer to 20%).

Table 3.1: Number of in year newly registered spin out companies

	2017/18	2018/19	2019/20	2020/21	2021/22	Total	%
England	99	107	136	142	121	605	82%
East Midlands	0	7	1	9	4	21	3%
East of England	3	12	15	15	8	53	7%
London	29	24	29	34	31	147	20%
North East	5	12	8	4	12	41	6%
North West	5	7	14	18	19	63	9%
South East	23	21	19	23	15	101	14%
South West	11	11	27	18	14	81	11%
West Midlands	17	10	14	5	10	56	8%
Yorkshire	6	3	9	16	8	42	6%
Scotland	10	13	19	13	18	73	10%
Wales	10	1	2	5	7	25	3%
N Ireland	7	13	4	7	4	35	5%
Total	**126**	**134**	**161**	**167**	**150**	**738**	**100%**

Source: HESA / OC032 Chart 1

Taken together, the Golden Triangle area (London, South East England and East England) accounts for 41%. It should be noted here that the data for the South West includes a high return from Falmouth University which includes companies started through its Launchpad Programme. It is not clear that all of these would qualify as spin outs as defined for this research so this result should be treated with caution. This aside, Scotland's performance in spin out creation exceeds that of any of the English regions outside the Golden Triangle.

There is a strong correlation between the number of spin outs and a high level of research income. (**Table 3.2**). However, while both Edinburgh and Glasgow universities are in the top 10 in the UK in terms of research income, no Scottish HEIs are in the top 10 for spin out creation.

Table 3.2: Top 10 HEIs for Research Council Income and No of Spin Outs in 2021/22[14]

Top 10 HEIs in the UK for Research Council Income 2021/22	Top 10 HEIs in the UK for Spin Out Creation 2021/22
University College London	The University of Manchester
The University of Oxford	Imperial College
The University of Cambridge	The University of Oxford
London School of Hygiene and Tropical Medicine	Falmouth University[15]
Imperial College	University of Durham
The University of Edinburgh	University of Cambridge
King's College London	Royal College of Art
The University of Glasgow	University College London
The University of Birmingham	University of Wales Trinity Saint David
The University of Bristol	The University of Birmingham

Source HESA data/DT 031 Table 4e

Looking further back, according to Beauhurst, the top 20 universities for spin outs since 2011 (to 2022) are as shown in **Table 3.3**, below.

This is broadly consistent with the HESA data above insofar as the top performers are those in the Golden Triangle and the University of Manchester. In Scotland, Edinburgh comes out top, followed by Strathclyde and then Glasgow. Heriot Watt and Aberdeen universities are both just outside Beauhurst's top 20.

[14] The data here again included only spin outs consistent with the research definition (ie those within HESA's first category)

[15] The inclusion here of Falmouth University underlines the data issues referred to earlier. This appears in both the HESA and Beauhurst datasets and appears to be the result of the (arguably incorrect) way that Falmouth University interpreted the data request for spin outs.

Table 3.3: Top spin out universities since 2011to 2022

Top 10	No	10-20	No
University of Oxford	193	University of Warwick	45
University of Cambridge	137	University of Strathclyde	45
Imperial College	106	University of Southampton	41
University College London	88	University of Birmingham	39
University of Manchester	73	University of Sheffield	38
University of Bristol	66	University of Nottingham	36
University of Edinburgh	58	University of Glasgow	34
Royal College of Art	58	Newcastle University	34
Queens University Belfast	50	University of Leeds	26
Swansea University	48	University of Exeter	26

Source: Spotlight on Spinouts, May 2023, Beauhurst and RSE

Overall, the data here suggests that Scotland performs relatively well on spin out creation compared to the English regions, but is some way behind the Golden Triangle area, in particular institutions such as Oxford, Cambridge, Imperial College and University College London.

It is, however, also true to say that the number of companies presently being spun out of academic institutions in the UK is modest. According to the Beauhurst data provided by SE, over the past couple of years HEIs across the UK have created fewer than 100 spinout companies per year.

3.2.2 Scotland Overview

According to the HESA data, Scottish universities have created 73 spin outs over a five-year period. Looking in more detail, the Universities of Edinburgh and Glasgow report the greatest number of spin outs (**Table 3.4**, over) followed by Strathclyde and Dundee.

It is worth noting that seven universities reported no spin out activity over the period. However, Abertay University, for example, does not take ownership of IP which is likely why there is a zero return for that institution, highlighting again some of the definitional issues affecting the data.

Table 3.4: Newly registered spin out companies with some HE ownership

	2017/18	2018/19	2019/20	2020/21	2021/22	Total
The University of Edinburgh	3	4	3	3	4	17
The University of Glasgow	1	3	6	4	3	17
The University of Strathclyde	0	3	1	1	4	9
The University of Dundee	2	0	2	1	2	7
The University of St. Andrews	1	1	1	1	2	6
The University of Aberdeen	1	1	1	1	0	4
Heriot-Watt University	0	0	4	0	0	4
Edinburgh Napier University	0	0	0	2	1	3
Robert Gordon University	1	1	0	0	0	2
SRUC	0	0	1	0	1	2
The University of the West Scotland	1	0	0	0	1	2
Abertay University	0	0	0	0	0	0
Glasgow Caledonian University	0	0	0	0	0	0
Glasgow School of Art	0	0	0	0	0	0
Queen Margaret University	0	0	0	0	0	0
Royal Conservatoire of Scotland	0	0	0	0	0	0
The University of Stirling	0	0	0	0	0	0
University of the Highlands & Islands	0	0	0	0	0	0
Totals	**10**	**13**	**19**	**13**	**18**	**73**

Source HESA/ Number (of newly registered companies within the reporting period)/Table 4e

This pattern is also evident in the data on disclosures and patent registrations, with Edinburgh, Strathclyde and Glasgow again leading the field (**Table 3.5**). It is also worth noting that some universities appear to have large patent portfolios, raising the question of the extent to which this bank of intellectual property is being fully exploited.

Table 3.5: Disclosures and patents filed by or on behalf of the HE provider 2021/22

HE Provider	No of disclosures	No of new patent applications	No of patents granted in year	Total patent portfolio
Aberdeen	8	5	4	54
Abertay	0	0	0	0
Dundee	22	20	41	217
Edinburgh Napier	6	13	0	27
Edinburgh	75	161	94	453
Glasgow Caledonian	0	0	0	23
Glasgow School of Art	0	0	0	0
Glasgow	46	41	16	227
Heriot-Watt	5	22	0	367
Queen Margaret	0	0	0	0
Robert Gordon	5	0	0	2
Royal Conservatoire	0	0	0	0
St. Andrews	12	43	21	798
Stirling	0	0	0	0
Strathclyde	68	24	15	332
Highlands & Islands	0	0	0	0
West Scotland	6	4	2	9
TOTAL	**253**	**335**	**193**	**2,509**

Source: HESA – DT032 Table 4a

3.3 Research Strengths

One of the questions asked of the current research is to determine the extent to which research strengths in Scotland's universities correlate to spin out creation.

The Research Excellence Framework (REF[16]) is the UK-wide system for assessing the quality of the research carried out in the UK's publicly-funded universities. The last REF assessment was completed in 2021, with the next one due in 2028.

The Scottish Funding Council (SFC)[17] uses results of the REF to:

- inform the selective allocation of research funding to HEIs;
- provide benchmarking information and establish the reputation of institutions in research; and

[16] The REF is undertaken by the four UK higher education funding bodies: Research England, the Scottish Funding Council (SFC), the Higher Education Funding Council for Wales (HEFCW), and the Department for the Economy, Northern Ireland (DfE).
[17] https://www.sfc.ac.uk/research/research-excellence/research-excellence.aspx

- provide accountability for public investment in research and demonstrate its benefits.

In completing the 2021 assessment, panels of experts made up of senior academics, international members, and research users in individual academic subject areas carried out the assessment under three broad headings.

- **Outputs:** an underpinning principle of the REF is that all forms of research output will be assessed on a fair and equal basis, from books and journal articles, to software, exhibitions and compositions.
- **Impact:** recognition is given where researchers build on excellent research to deliver demonstrable benefits to society, public policy, culture, quality of life and the economy.
- **Environment:** the REF takes account of the quality of the research environment in supporting a continuing flow of excellent research and its effective dissemination and application.

The three elements of the assessment were scored and combined to produce an overall quality profile for each submission. The REF is the biggest assessment of research excellence in the world, and it matters because it helps to decide how money from UK/devolved government budgets is distributed. The REF also boosts public recognition of the quality and relevance of HEI research which in turn can feed into several of the major league tables, which have the potential to have a significant effect on student and staff recruitment.

Table 3.13: REF 2021 Scotland 4* Ratings Top 10

Institution name	Unit of assessment	Profile	4*
University of Edinburgh	Computer Science and Informatics	Overall	76
University of St Andrews	Art and Design: History, Practice and Theory	Overall	72
University of Edinburgh	Psychology, Psychiatry and Neuroscience	Overall	71
University of Dundee	Biological Sciences	Overall	71
University of Edinburgh	English Language and Literature	Overall	69
University of Glasgow	Mathematical Sciences	Overall	66
University of Aberdeen	Theology and Religious Studies	Overall	64
University of Glasgow	Computer Science and Informatics	Overall	63
University of Strathclyde	Politics and International Studies	Overall	62
University of Edinburgh	Biological Sciences	Overall	61

Source: REF Results 2021

Biological Sciences and Computing are clear areas of research strength and are also areas that produce spin out companies. However, subjects such as Theology, English Literature and Politics and International Studies while they are highly rated in the REF are far less likely to contribute spin out companies.

It is also clear that the universities that produce the most spin outs are also those with the strongest research ratings and (as shown below) the largest Research Excellence Grants.

SFC uses the REF to inform the allocation of the **Research Excellence Grant** (REG) to Scottish universities. This grant has a dual purpose:

- to recognise and reward research excellence wherever it is found and in whatever discipline; and
- to uphold the principles of the dual support system, through making a contribution toward the full economic costs of research.

REG provides a long-term, stable source of funding which institutions can use flexibly to develop and support excellent research as best fits their individual circumstances, thereby supporting the diversity of the sector and their ability to respond to challenges.

In Academic Year 2023-24 SFC will provide £247 million through the REG as highlighted at **Table 3.6** below. As shown, the institutions that receive highest REG awards are also (in the main) those that create the most spin outs.

Table 3.6: Research Excellence Grants (£)

Institution	Research Excellence Grant for AY 2022-23	Research Excellence Grant for AY 2023-24	% Change
Edinburgh, University of	87,221,000	89,780,000	3%
Glasgow, University of	51,037,000	50,971,000	0%
Strathclyde, University of	19,593,000	19,998,000	2%
Dundee, University of	17,186,000	17,027,000	-1%
St Andrews, University of	16,580,000	16,622,000	0%
Aberdeen, University of	17,763,000	14,663,000	-17%
Heriot-Watt University	11,482,000	11,117,000	-3%
Stirling, University of	7,332,000	7,380,000	1%
Edinburgh Napier University	2,943,000	3,339,000	13%
Glasgow Caledonian University	3,149,000	3,253,000	3%
SRUC	3,253,000	3,205,000	-1%
Highlands and Islands, University	2,780,000	2,891,000	4%
West of Scotland, University of the	2,066,000	2,253,000	9%
Abertay University	1,101,000	1,270,000	15%
Glasgow School of Art	1,103,000	1,035,000	-6%
Queen Margaret University	816,000	870,000	7%
Robert Gordon University	1,124,000	846,000	-25%
Total	**246,827,000**	**246,829,000**	0%

Source SFC https://www.sfc.ac.uk/funding/university-funding/university-funding-research/university-research-funding.aspx

UK Comparison

Table 3.7 highlights the percentage of overall 4* ratings across the UK by region. Outwith London and Oxford/Cambridge, Scotland is higher ranked than other locations across the UK. This is again consistent with the notion of a relationship between research strength and spin out creation.

Table 3.7: REF % of 4* ratings by region

Region	%
East of England	49
London	47
South East of England	44
Scotland	41
North West of England	39
Yorkshire	38
West Midlands	38
Nother Eart of England	37
Wales	37
East Midlands	36

Source: REF 2021

3.4 Key Messages

The review of the available data on spin out creation suggests some overall messages:

- the Golden Triangle, in particular Oxford and Cambridge, dominate the number of spins outs created in the UK;
- the Scottish Universities which perform best in terms of spin out creation are Edinburgh, Glasgow, Strathclyde, and Dundee although it should be noted that overall numbers of spin outs from Scottish universities each year are relatively modest (c 10 - 20 per annum, depending on data source);
- Scotland's spin out performance is reasonable compared to other regions, with the exclusion of the Golden Triangle area, and at 10% of the UK total is greater that Scotland's population share. It is, however, lower than Scottish universities' share of research income (which is closer to 20%); and
- there is some correlation between research quality (as assessed by the REF), research income and commercialisation performance but this relationship is not always direct insofar as there are areas of research strength that do not translate into commercial activity.

4 Spin Out Creation: Issues

4.1 Introduction

This section considers the process of creating spin out companies and draws on the inputs provided by spin outs, investors and HEIs both to map out the process, and also to identify areas of good practice and any issues or challenges.

4.2 Pre-conditions

The consultation identified a number of pre-conditions for the creation of spin outs.

4.2.1 Research focus

Spin outs are based on knowledge created through university research, but that research must have demonstrable potential for commercial application for it to be suitable for spinning out. While most academic research does not meet this condition, and indeed is not intended to do so, almost all universities will have pockets of research, large or small, that are directly relevant to commercial markets. In particular, life sciences research in therapeutics and diagnostics often lends itself well to commercialisation via the spin out route, as do areas of computing, engineering and advanced manufacturing and energy where Intellectual Property (IP) is a key driver of competitive advantage.

As discussed earlier, there is some evidence of a correlation between areas of research excellence and spin out activity, but this is not always direct. For example, the Universities of Dundee and Edinburgh both have strong research in areas relating to Life Sciences and Edinburgh and Glasgow are strong in Computing and Informatics which are key areas for spin outs from these institutions. They are also widely acknowledged as such by investors. Strathclyde has lower overall REF scores but still creates spin outs across a range of disciplines, including advanced manufacturing. There are also areas of research excellence which do not translate to commercial activities such as Politics and International Relations at Strathclyde and English Literature at Edinburgh.

While we found calls from some investors and stakeholders for research funding to focus more on commercially applicable research, tis was challenged by the universities. It is important to remember both that the creation of commercial opportunities is not the sole or even the main purpose of academic research, and that high quality applied research is always based on a solid foundation of pure or blue skies research.

4.2.2 Academic motivation

Universities confirmed that the initial idea and motivation to create a spin out company most often comes from the academic researcher or research team. There are exceptions, but these are reported to be the minority and could be where specialist investors maintain relationships with key academics and effectively 'reach in' to university departments to seek out spin out opportunities. We heard that there are very few such investors in Scotland; this being more common in the Golden Triangle area of England. Rarer still is the university that proactively seeks out spin out opportunities as most do not have the resources, or in some cases the technological expertise, to be able to do so. Of course, when an academic presents with a possible commercialisation opportunity, they may at that point be advised on the most suitable route - a spin out, licence, industry collaboration or other, but the initial approach almost always comes from the academic.

It is for this reason that some universities have focussed on developing academic awareness of spin out opportunities and providing training in entrepreneurship as well as opportunities for secondments and sabbaticals. Others such as Strathclyde have focussed on academic incentives such as generous shares of royalty income from licences as a means of encouraging academics to consider the spin out route.

Academic career structures and reward systems remain strongly aligned with more traditional measures of academic performance such as research income, publications and so on. In recent years there have bene attempts to widen this out to include other activities, including spin out creation, but the universities reported that there is still more to do in this respect before more academics will consider the spin out route. We return to these issues later.

For now, the point is that the two essential prerequisite for spin out creation are research with commercial potential and academics willing to spin out a company.

4.3 University Spin Out Support Structures

All universities have some form of central function that provides support to the academic community in areas such as research funding, enterprise, career development and the commercialisation of research and intellectual property (IP). These vary considerably in terms of their scale, resources and focus, and may have different titles, including, for example, Research and Innovation Office, Research and Commercialisation Office, Research and Knowledge Exchange Services and so on. The terminology most often used on relation to spin out creation (and research commercialisation) is that of the Technology Transfer Office (TTO) and is the term that will be used here.

4.3.1 Institutional Commitment and Resources

Not all universities have a strong focus on spin out creation or on other forms of research commercialisation as this will depend on institutional focus. A summary of the support and resources available for spin out creation and commercialisation is provided in **Appendix A**, but some of the main messages are:

- all institutions have some kind of central support service, but for many this is more focussed on supporting academics to secure research funding, or on enterprise support for students (and sometimes graduates). That is not say that there will be no support for spin out companies, but this is likely to be a lower priority for the institution and resources will be limited;
- those with a stronger emphasis on commercialisation are also those that appear towards the upper end of the table for spin out creation and include the universities of Edinburgh, Glasgow, Strathclyde, Dundee, Aberdeen, St Andrews and Heriot Watt;
- within these, Edinburgh has the most resources and has established a separate company, Edinburgh Innovations, to support commercialisation activities. Edinburgh also has an investment fund (Old College Capital) which provides equity investment into early stage spin out companies;
- both Glasgow and Strathclyde have dedicated teams focussed on commercialisation and appear to have more resources than their counterparts in Dundee, St Andrews, Aberdeen and Heriot Watt, although all of these do have dedicated commercialisation teams. Strathclyde also has funding to support spin out creation (of which more later) and an investment fund (Strathclyde Inspire).

This summary was confirmed in our consultation with the universities. In particular, we found varying levels of institutional commitment to spin outs amongst Scotland's universities. In part this reflects research focus within individual institutions (where research strengths may not align to commercial opportunities) or overall levels of resource. In some cases, commercialisation of research via spin out companies is not a high priority for the institution.

Of the 12 universities that we consulted, seven reported a clear commitment to commercialisation generally, and spin outs in particular. The remaining five reported greater focus on working to develop research funding opportunities and on wider enterprise support activities such as student entrepreneurship.

Here it is also important to consider the incentives for HEIs to create spin outs and, thus, institutional motivations.

The REF has increasingly challenged universities to provide more detail on the impacts of their research beyond the institution and the academy. Given the importance of the REF to future research funding (via the Research Excellence Grant), there is clear value in institutions supporting the creation of spin out

companies as a means of demonstrating the impacts of their research activities. This in turn can lead to more funding.

Similarly, the University Innovation Fund (UIF) allocations are based on institutional performance on a number of knowledge transfer metrics, which include spin out creation, but also contract and collaborative research with external parties, licensing of IP and measures of external engagement and dissemination of research outwith academia. Again, there is a funding incentive for institutions to score well against these metrics, although we understand that these metrics are currently under review and may change in future. In Ireland, for example, there is a move away from reporting the number of spin outs towards reporting on the number of *investable* spin outs, emphasising quality rather than quantity.

Both sources of funding reward success, thereby reinforcing institutional commitment. Those institutions that perform less well on these measures and hence receive less funding may then be less motivated to invest time and resources into these kinds of activities preferring instead to prioritise, for example, research funding. It is also the case that with lower overall funding support, even those TTOs that are keen to do more on spin outs and commercialisation more generally, may continue to struggle. This may partly explain the wide variation in the resources available to TTOs.

4.3.2 Role of the TTOs

Before examining in more detail the issues around spin out creation, it is worth briefly discussing the role of the university TTOs in this process.

University TTOs[18] are at the heart of the spin out process, and the consultation elicited widely varying perceptions of Scottish TTOs from investors and spin outs alike, ranging from expert facilitators and champions to obstructive gatekeepers. Before turning to the stakeholders' views of the TTOs, it is worth briefly outlining some key elements of their role in the spin out process.

First of all the TTOs will have a close involvement in the decision to spin out in the first place. As noted, the initial impetus for a spin out normally comes from the academics, who would typically approach the TTO with their idea/ technology. At this point the TTO would review the idea/ technology, take an initial view on its commercial potential and advise on whether spinning out a company is the most appropriate route to take (or not).

The criteria applied to this decision are not always clear, but some consider licensing to be a simpler and quicker way of generating commercial income, albeit spin outs offer the potential for larger returns at a higher risk profile. We also heard (from TTOs) of instances in which the TTO disagreed with an

[18] These may also be called Research and Commercialisation Offices, Knowledge Transfer Offices or similar.

academic's wish to spin out but supported it anyway, and also of one case in which the TTO did not believe a spin out to be viable and gave away the IP. When the company subsequently went on to secure significant investment and start generating revenues, the TTO attempted to reverse its position.

Once the decision is made to spin out a company, the TTO may then be involved in the process in a number of ways:

- registering the intellectual property (IP) for example as a patent, on behalf of the university;
- providing the academic founder(s) with support to develop a business plan;
- helping to secure additional funding such as translational funding to develop the technology and test market potential;
- representing the university's position in the negotiation of terms for licensing the IP and equity stakes in the company;
- advising on and making introductions to private investors; and
- advising on management structures and teams and sourcing commercial expertise.

The extent to which the TTOs all deliver all of these functions varies according to their resources, expertise and operational priorities. All TTOs have to balance a range of responsibilities including supporting academics to secure research funding and managing entrepreneurship support alongside wider knowledge transfer and commercialisation duties (as discussed above).

Many of the universities now have defined and publicly available commercialisation or innovation policies which while different do tend to share some common positions. For example, the base assumption is that the institutions own the IP created through their research activities (although research funders may have a stake). IP created by postgraduate students is often owned by the researchers themselves or there may be a joint stake with the university. Undergraduate student IP is generally owned by the student.

On the issue of the equity share that universities typically seek in spin outs (discussed in more detail in **Section 4.4.3**) some policies are more explicit than others, and we found evidence of divergence from published positions and the eventual terms agreed.

A few of the TTOs (Edinburgh, Glasgow, Strathclyde and Dundee) follow a 'gated process' model for developing spin outs which has a defined set of stages that include due diligence, business planning, technology development, building the management team and investment readiness. At each gate in these processes, there is a decision to proceed (or not) depending on the outcomes of the preceding stage(s). This is generally considered by the universities and investors to be the most effective model for spin out creation.

Some TTOs also have modest amounts of funding that they can bring to support this process e.g. to hire consultancy support for business planning, but this is a minority. Most rely on external sources of funding such as SE's HGSP.

As noted, the TTOs did come in for some criticism from spin outs and investors.

The main criticisms from investors are:

- the TTO wishes to be the main point of contact for all communications about spin outs, but does not always have the capacity to do this;
- consequently some TTOs can be very slow at getting even straightforward tasks completed; and
- it is impossible for TTOs to have all the necessary skills (technical and commercial) in house, but they lack the resources to bring in much external professional support.

Many in the investment community did, however, report improvement over time with many universities striving to improve their support for spin outs – for example, one investor commented that "*there has been a step change in the quality of the panels brought together to vet prospects*".

Another criticism is conflict of interest. At the time of spin out, the founders are still university employees, but the TTO is representing the university's interests and there is a case for the founders to have more independent advice.

Spin out companies also reported a very mixed experience of the TTOs, and many described the process of spinning out as 'prolonged and difficult'. In large part this reflects university positions on equity share and licensing of IP (discussed below) which, while mainly resolved, still created delays. Some, however, felt that they received poor advice from TTOs which they attributed to a lack of commercial experience and knowledge.

One investor felt that instead of continually criticising TTOs, they should be incentivised to do better. They need more funding, and better people (or at least access to people whose knowledge and experience is wider than academia). It is not just knowledge, but the ability to recognise (or help create) a well thought-out Proof of Concept project. Instead of "throwing out stones" to see what is successful, universities could collaborate more to establish the most commercially attractive opportunities. The value of TTO performance should be measured over the longer term; they are often under pressure to meet targets such as the number of licences or spinouts created, rather than their quality or long-term outcomes.

4.4 Spin Out Creation

The consultation work identified a number of common themes regarding the process of spinning our new companies. These include:

- prospects and pipeline;
- translational funding;
- non-dilutive funding;

- negotiating terms;
- management structures and commercial expertise; and
- time.

4.4.1 Prospects and Pipeline

When researchers or inventors within universities make a discovery that has potential commercial value, they disclose their invention to the university's TTO. This disclosure then initiates the formal IP management process. The TTO will typically then evaluate the disclosed inventions to assess their market potential, patentability, and commercial viability. If an invention is deemed valuable, the university may decide to file for patents or other forms of protection to secure exclusive rights for a certain period. TTOs handle the legal, financial, and administrative aspects of IP management.

Generally speaking, most TTOs felt that they were not sufficiently well resourced to undertake much in the way of proactive prospecting for new opportunities. Some do have a pipeline of possible spin out opportunities, but these are not always actively managed and appear to be reactively developed (i.e. driven again by academic approach). Most do not have an active pipeline or at least are not able to quantify that. It is therefore difficult to be specific about how many or indeed what kind of future prospects there are within universities that could lead to high growth spin outs.

At the **University of Dundee**, there is a Translation and Commercialisation Group within the School of Life Sciences. This group was established both to provide support for (and encourage) academics with innovations that may have commercial potential, and to scan and scout for possible opportunities to feed into a commercialisation pipeline. What is instructive about this is that this group operates within the department rather than the TTO. It has both an explicit remit to identify and develop commercial opportunities and the scientific expertise to be able to assess them.

Most investors in spin outs (angel groups and VCs) also believe they have a responsibility to maintain communications channels with universities rather than expect entrepreneurs to come to them. They do this not only to find suitable investment opportunities, but also to make sure that their business experience, market knowledge, and investment criteria are communicated to researchers. This includes regular calls with university TTOs, some workshops, review of research projects before they become spin out candidates, and mentoring university companies. There is some frustration that TTOs seek to have all communications through themselves, when investors might like to speak to heads of department. The investor feedback would suggest that more direct contact between researchers and investors is rare, although Dundee Univrsity did report that the Translation and Commercialisation Group within the School of Life Sciences has regular interaction with investors.

It is essential to make it easier for founders to be able to get spin outs formed. Consultees felt that universities need to be much more transparent about the processes in place for a project to be assessed, IP created, and a company formed, and what a spinout agreement will look like.

Ideally universities should be able to articulate the reasons for their stance on equity stakes, licence and royalty terms, and the cost for use of resources such as the time of researchers working on the project, and facilities such as labs. Even better would be a statement about what they expect from the future of the venture, and why they are supporting it. Would-be founders should also be provided with as much information as possible from sources outside the university, about managing a business in general, and in the specific context of a spinout business. This could all best be seen as the university actively marketing the spinout route to its staff.

The work by TenU in publishing guides to the spinout process was generally agreed to be a good start[19], and the departmental example from Dundee is also instructive.

It is not surprising that investors are almost unanimous in regarding much university research as 'solutions in search of problems', as this reflects the spirit of blue-sky research which universities regard as a core function.

Finding those projects which could have general commercial potential (or could be directed towards a commercial application) requires extensive and knowledgeable filtering, which is part of the 'stage-gating' process used by some universities[20].

Some of the investors and stakeholders were in favour of encouraging universities (and translational funders) to produce more spinout companies by offering incentives 'for things we really need', one example being technology to help the transition from gas boilers to air heaters.

4.4.2 Translational Funding

Translational funding refers to grant funding provided by research councils, trusts and charities with the aim of developing technology further and de-risking propositions ahead of spinning out.

Most university research outputs, even those judged to have commercial potential, are at the lower end of the Technology Readiness Level (TRL)[21] scale, typically TRL 1 – 3. Private investors will not invest in

[19] TenU Ref…

[20] For example University of Edinburgh

[21] Technology Readiness Levels (TRLs) are a method for estimating the maturity of technologies during the development stages. TRLs enable consistent and uniform discussions of technical maturity across different types of technology. TRL is determined during a technology readiness assessment (TRA) that examines program concepts,

anything this early stage due to the high level of risk. The role then of translational funding is to enable the original IP to be developed into technology that is far closer to market application, moving to TRL 5-6.

Key sources of translational funding include follow on funding provided by the Research Councils for specific areas identified as research and innovation priorities. Similarly, trusts and foundations such as Cancer Research and the British Heart Foundation will also support translational projects in areas close to their own interests and priorities. The Medical Research Council has follow-on funding programmes, and the Biotechnology and Biological Sciences Research Council (BBSRC) sometimes does and sometimes does not have translational funding (there is now one programme currently open). Similarly, the Wellcome Trust also now offers no translational programmes and has not done so for the last two years. While these examples relate to life sciences, they are indicative of the growing scarcity of translational funding. Brexit (and hence loss of access to European funds) was mentioned by some of the universities as a contributing factor in this growing scarcity along with wider pressure on public funding.

These sources provide essential funding to bridge the gap between the knowledge created through university research and the development of investable assets. However, in order to secure funding of this kind, the underlying research must be high quality and the idea or technology must be demonstrably novel. These programmes are highly competitive and tend to be over subscribed.

Many of the spin outs that we consulted had benefitted from some form of translational funding, and noted the critical role that this plays in developing successful companies. This view was shared by the HIEs and, to a slightly lesser extent, investors and there was call for more in the way of translational funding to be made available if Scotland is to grow the number of successful spin outs. Investors and spin out companies were more likely to consider that translational funding is available if the idea is sufficiently compelling. All however tended to agree that Brexit had been damaging for research funding of this kind.

It also appears that what some of the spin outs referred to as translational funding might be more appropriately categorised as non-dilutive grant funding (i.e. post incorporation) and include sources such as SE HGSP, Innovate UK grants and SMART awards (discussed in more detail below). The point is that there is real value in (non-dilutive) funding that can help to de-risk the ideas and technologies from universities. This has obvious appeal to investors. Sources of translational funding such as those highlighted above are grants to the university rather than the company and as such have obvious appeal to universities.

Some of the investors also noted that some spin outs use translational funding to perpetuate research activity rather than move towards commercialisation and product development and called for funding to

---

technology requirements, and demonstrated technology capabilities. TRLs are based on a scale from 1 to 9 with 9 being the most mature technology.

be tied to agreed business development milestones. This is where HGSP and some of the Innovate UK programmes are focused, perhaps again underlining the blurred lines between translational research funding and non-dilutive funding.

4.4.3 Non-Dilutive Funding

Non-dilutive funding refers to funding that is provided to businesses, usually post-incorporation, that does not result in any dilution of shareholding. This is usually in the form of a grant or loan, and in the context of spin out companies, normally targeted at supporting early-stage technology and commercial development. It also includes programmes and competitions that provide funding alongside business development advice and training.

High Growth Spin-Out Programme

The majority of the consultees across all groups considered the widely used High Growth Spin Out Programme (HGSP) run by SE to be absolutely critical in supporting the development of more and better quality spin out companies in Scotland. The programme was universally praised by spin outs, universities and investors for filling a key gap in the process between the initial decision to spin out through incorporation to raising initial round 1 investment. It was praised not only for the funding that it allowed but also for the quality of the advice and non-financial support that the programme provides.

Indeed, the only criticism was that the HGSP does not have enough resources, in particular funding, and there was widespread support for its expansion. It was also noted that the limitations on SE's resources were such that supporting therapeutics or diagnostics spin outs was effectively now beyond the reach of the programme.

Innovate UK[22]

Innovate UK (now under the umbrella of UKRI) is also a key source of funding for UK-based businesses and contract research organisations and it runs regular funding competitions against themed areas of identified priority. Innovate UK's sectoral coverage is broad and there is evidence to suggest that spin outs that receive funding are more likely to find future success than those that do not[23].

It is also worth noting that from 2013-2022, Innovate UK grant funding for spin outs tripled from £31.9m to £94.6m, with the number of grants increasing from 208 to 274 during the same period[24].

[22] ICURe Programme
[23] Innovate UK
[24] *Spotlight on Spin Outs 2023*, Beauhurst, 2023

Funded by Innovate UK, **ICURe** is a pre-accelerator providing funding and training for researchers seeking to commercialise research ideas and IP. Through four programmes: Engage, Discover, Explore and Exploit, the Programme aims to guide researchers and research teams through the process of refining and validating the commercial potential of their research. Although ICURe is run on a regional basis, companies are free to join outside their own region if the content or timing suits them better.

ICURe is widely used and highly regarded both for the funding it provides but also the quality of its training. A number of the spin out companies that we consulted were fulsome in their praise for what they learned through the Programme and for the combination of finance and expertise that it offers.

According to Innovate UK, Scotland accounts for 7% of all ICURe cohorts (c.f. 8% of UK population), and 31% of these turn into spinouts which survive for three or more years, against a UK average of 20%.

Converge Challenge

Converge Challenge is a training programme and competition open to spin outs and start-ups from Scotland's universities. The programme includes four challenges – Converge, Net Zero, Create Change and Kick Start – each of which offer a packages of business training and advice and the opportunity to pitch a business idea to an expert panel at the end. The winner (and runner-up) receives an equity-free cash prize.

Again, this is a popular programme and some of the spin outs in our sample had been winners or runners-up and had found the process extremely valuable.

Other Support

Two other support programme were regularly mentioned through the consultation, in particular by spin outs:

- **Scottish EDGE** is an entrepreneurship support programme which spun out of Scottish Enterprise. It provides grants and loans to start-up businesses across Scotland but is not specifically targeted at university spin outs or start-ups. Nonetheless it has supported spin outs and remains an important part of the support landscape.
- **SMART: SCOTLAND** is also worth specific mention here as it was highly valued by consultees as a source of (non-dilutive) grant funding in the early stages of product development. The scheme requires match funding, and this can often be provided by early-stage investors while a company is still at the feasibility stage.

Investors did not comment on whether or not there is sufficient funding of this type, but generally welcomed it, and encouraged investee companies to apply for grants provided the effort required did not affect the company's focus or speed of development.

However, one university fund manager commented that there is a very real gap for funding at the earliest stage of a spin out's development. This investor is experimenting with small investments of £10k-£15k, in 30 companies so far. Eight of these have raised subsequent external investment. It is also piloting a similar scheme with £50k cheques; this is in particular helpful as the match funding for eg SMART awards. Both schemes help to build the spin out's track record to ease its discussions with other investors. However, these investment amounts need to be seen in the context of typical research grant funding of £1m.

Previous SE schemes such as the Proof of Concept programme (now effectively subsumed into HGSP) and the marketing grant (now withdrawn) were mentioned by some as helpful sources of early support.

4.4.4 Summary

These (and other) sources of funding and support are without doubt crucial in the spin out process. In almost all cases the research that emerges from university departments needs further development, testing and commercial validation before it can be considered commercially exploitable. Private investors will not support this process (at least not alone) and there is a clear case for intervention.

The bigger question is whether or not there is a need for more such finance, and we found responses on this question to be somewhat equivocal. HEI consultees generally reported a shortage of translational funding and a consequent need to invest in this area. Spin outs and investors on the other hand were more likely to consider there to be sufficient funding available so long as the business ideas and underlying research are strong enough. As noted, there was some evidence that some conflated translational funding with non-dilutive grant support. The implication here is that spin outs that do not succeed in raising sufficient translational (or non-dilutive) funding do not have a strong enough proposition.

What is clear is that it is not just funding that delivers value at this stage in the process. The business advice and training is crucial, particularly for founders.

4.4.5 Negotiating Terms

As noted, the TTOs will represent the institutions in the negotiation with founders (and often investors) on ownership of the spin out company and licence terms for the IP, and this was an area on which all parties held strong views.

Equity

The 37 spin outs that contributed all had different equity structures and initial university stakes ranged from 14% to 23%, with a very small number of outliers at each end. In broad terms the average starting position for the universities appears to be around 20% pre-investment, meaning that unless they continue

to invest their share will be diluted with each subsequent investment round. This could then result in a university owning a share or less than 10% at the point of exit. This compares with the evidence for the UK as a whole which found that university equity stakes in spin outs average around 17-18%.

Amongst the investors, the widely held view was that the universities over value their IP, particularly at an early stage. For some, this creates a barrier to investment both at the earlier stages but particularly at Series A or B where larger investments are sought. It does not mean that the deals do not get done, but rather that it is a prolonged and sometimes terse negotiation.

Academic founders and the management teams at spin outs tended to share this view, and some noted that the university's position on ownership had caused difficulties with some investors.

We heard from investors (and some spin outs) that this was not an issue specific to Scotland, but was reported to be common across the UK, even in the Golden Triangle area[25].

While this is clearly a cause of some frustration in the investment community, it is important to note that all parties recognised and supported the need for universities to have a stake – some 'skin in the game'. The issue is that the universities are perceived to be taking far less risk compared to the investors and there was widespread call for a more standard approach based on a lower starting position.

Licensing

The university position on equity is only one part of the overall set of terms to be agreed around a new spin out company. The other significant issue is that of the licensing of the IP to the new company.

Consultees again recognised that it was appropriate for a university to retain initial ownership of the IP such that should the spin out fail the institution can pursue commercialisation through a different route.

However, the issues for investors are first of all the terms of the licence and, critically, the terms under which ownership of the IP would subsequently be assigned to the company. The latter is typically tied to thresholds of sales and/ or investment. Investors reported that investors at Series A and B typically want the company to have full ownership over its IP.

There are also some sectoral issues at play here. In areas such as life sciences, in particular therapeutics and diagnostics, IP and its protection are critical as the IP could in theory be commercialised by another company. Thus investors are particularly concerned to ensure that the company in which they intend to invest has full ownership or at the very least an exclusive licence.

[25] It is worth noting that the Muscatelli Report stated in 2019 that some Scottish universities tended to seek a higher share of IP in spin outs than UK contemporaries. The feedback reported here suggests that this may have since shifted a little.

In software, however, IP can be less critical and the original IP with which a company spins out is then often developed further such that the company is essentially creating new IP. In parts of this sector, the value lies less in the IP itself and more in speed to market.

Again, investors and founders tend to believe that universities over value their IP in the licence negotiations, but for investors the bigger issue is assignation.

University Spin Out Investment Terms Guide (TenU)

TenU is an international collaboration, formed to capture effective practices in research commercialisation, and share these with governments and higher education communities. It is made up of the technology transfer offices of the University of Cambridge, Columbia University, University of Edinburgh, Imperial College London, KU Leuven, University of Manchester, MIT, University of Oxford, Stanford University, and UCL.

The six UK members of TenU came together with leading venture capitalists and legal advisers to develop and publish in 2023 the *University Spin out Investment Terms (USIT) Guide*. The Guide is intended to be used as a reference point for practitioners who will adapt to and recognise the specifics of each spin out deal. It is structured to create a 'landing zone' of terms, so that conversations can be guided rapidly to a place where agreement can be reached more quickly. The Guide makes recommendations based on the principle that universities should take an impact-first approach and strive to deliver technology benefit to society. Rather than seeking to maximise each deal, universities are advised to strive for optimal deals that represent good market value and can enable a greater entrepreneurship culture across the university.

Terms should be developed such that they help the spin out company to preserve early cashflow, spend investment on progressing the technology development and enable further investment to support longer term growth.

The Guide then goes on to make more specific recommendations in areas such as university equity stakes (between 10% and 25%), IP protection, licensing deals and royalties and management team structures.

Access to resources

The third area in which there can be some negotiation is on access to university resources for the spin out. This could include office space and access to laboratory facilities and equipment, or it might also include access to research staff. Here the feedback was mixed.

Some companies reported a very supportive relationship with the university and favourable terms on facilities, while others felt that they were being charged a lot for access to facilities, particularly labs. There was also some feedback that there is a shortage of lab space in Scotland, particularly wet lab space, and incubation space, and that this was a constraint on growth for life sciences spin outs and start-ups.

Summary

While much attention is focussed on the issues around university equity position, it is important to look at the whole package rather than isolating individual elements. That said, investors and spin outs alike felt that the TTOs tend to drive a hard bargain in these negotiations seeking to maximise the university's position on every aspect of the deal.

This was considered by some to be a backwards looking approach aimed at maximising the return on past investment rather than a more forward looking one that creates the best possible chance of success for the new company. As noted earlier, some of the early-stage investors also felt that they were taking more risk than the universities as a result of the deals that the TTOs sought.

This was the area in which the TTOs came in for greatest criticism, and many of the investors (and some spin outs) pointed to a lack of commercial experience generally and corporate finance expertise in particular within the TTOs. Again, this was not considered to be specific to Scotland and those that had worked with TTOs across the UK reported this to be a common issue.

Interestingly, two universities in Scotland (Strathclyde and Edinburgh) have their own investment funds for spin outs – Old College Capital in Edinburgh and Strathclyde Inspire Fund at Strathclyde. This was perceived by investors to be a real advantage both as a means of bringing capital to companies but also contributing corporate finance expertise to the TTOs (although the funds are separately managed). It is also worth noting that the universities of Edinburgh, Glasgow and Aberdeen are investors in an early stage life sciences fund manged by Epidarex (Exeed) which seeds early stage and highly innovative life sciences assets to create companies based on breakthrough science.

4.4.6 Management and Commercial Expertise

While academics are the initial driver of spin out formation, few, if any, of the consultees considered them the most appropriate people to lead the company post incorporation. Instead the widely accepted approach is to build a management team with commercial experience. In fact, often (but not always) the lead academic will take a part time advisory or non-executive role, preferring instead to retain their academic position. We also found many cases in which post-docs working on the original research did transfer into the spin out often as Chief Technology Officer or similar.

This is perhaps unsurprising. Mid to late career academics will have more investment in their academic career and may be less able or willing to take the risks of transferring into a new start company. Early career researchers on the other hand may be less committed to an academic career (or may find it difficult to secure a permanent position) and are therefore more able to take a risk in transferring.

Certainly it is rare to find a spin out managed by the lead academic. More often external commercial managers will have been brought in on the recommendation of the TTO or by investors. In fact, this

begins in the early stages of the development, before incorporation, when a 'commercial champion' is appointed to develop the business plan and work towards the initial rounds of investment.

Some TTOs maintain links with a pool of such expertise, and investors have their own networks. This is a key role, bringing commercial knowledge to the spin out process and supporting the development of a realistic business plan. In some cases, the commercial champion will join the management team of the company post-incorporation.

However, questions were consistently raised about the depth of this pool and the quality of the commercial expertise available to spin outs in Scotland. This is a scale issue and spin out hotspots like the Golden Triangle have both a larger pool of commercial managers and a far greater weight of investment capital (discussed in the following section).

Some of the spin outs that we consulted reported a negative experience with their first commercial champion, and others also reported receiving poor advice on specific issues such as regulation or investment. This was by no means universal, but nor was it rare, and there was general agreement across all of the consultees that Scotland needed more in the way of high-quality commercial expertise to support the spin out landscape.

Finally, it is also important to consider that different commercial experience may be required at different stages of growth and as such a management team may need to change over time (for example a strong financially focused team at key funding rounds while a strong market/sales team once the product or service is ready for market).

4.4.7 Time

One of the most consistent and significant issues raised by investors and spin outs was the time that it takes from initial approach to the TTO to incorporation. A typical timeframe would be between 12 and 24 months, with some taking even longer. To some extent this may reflect the work needed to prove the market potential of the IP, and in some cases was a result of the lead academic continuing to pursue research and technology development rather than commercialisation. Again, this was not felt to be an issue specific to Scotland.

However, in most cases, these long timescales are attributed to slow and inefficient processes within the university. This relates mainly to the TTO and in particular the often lengthy negotiations on terms (discussed above), but may also reflect communications issues between the TTO and research departments within the institution. TTO legal teams were identified as being particularly slow to respond.

Prolonged negotiations and a delayed start up process can be a significant problem for early-stage companies that are quickly burning cash. In rare cases it can also mean the difference between getting to market at the right time and missing the opportunity.

4.5 Key Messages

A number of key messages relating to the spin out environment emerge from the consultation work, as follows.

- Scotland has a fertile environment for the creation of spin out companies based on strong research in areas including life sciences, computing and AI, engineering and advanced manufacturing, and a number of institutions actively pursuing spin out opportunities. Institutional commitment, and the necessary research expertise, is concentrated in a small number of universities, as reflected in the data. This concentration is reinforced by funding allocations for research and innovation, which tend to reward success.
- while we found support for directing more research funding towards commercially relevant research, some caution is required here, and it is important to ensure that pure academic research continues to be of the highest quality. This is the foundation on which good commercial opportunities are based and is central to the reputation of higher education in Scotland.
- the primary constraints on spin outs at the pre start stage relate to:
    - academic motivation;
    - translational funding; and
    - availability of high-quality commercial expertise.

Thus, any attempt to increase the number of spin outs, or indeed to improve the quality of spin outs from Scottish universities, might look first at these three areas, all of which are also recognised in the Entrepreneurial Campus report[26]. Progress here would help to grow the pipeline of high potential spin out opportunities. This is developed in more detail in the final section.

The consultation findings also suggest significant variation in the quality and extent of institutional input to the spin out process, but not necessarily that Scotland has particular issues in this respect relative to elsewhere in the UK. Rather, issues such as inconsistent approaches, variable levels of commercial expertise, a tendency to over value IP and overly long time frames for the spin out process are generally held to be UK-wide issues, and variability reflects institutional rather than geographical differences.

Elements that could be considered good practice in institutional spin out support include:

- relevant commercial experience within the TTO;

[26] *The Entrepreneurial Campus | The Higher Education Sector as a driving force for the 61 Entrepreneurial Ecosystem*, Tuffee, R and Little J, 2023

- good understanding of institutional research strengths and of key technologies and their markets;
- clear and defined commercialisation policy;
- means of incentivising academic participation (financial and/ or contractual);
- sufficient resources within the TTO to support spin outs alongside the rest of the TTO's responsibilities (possibly a dedicated team);
- a gated process with clear stages and support at each stage;
- flexibility in negotiation particularly in relation to university equity shares in spin out companies;
- access to a strong network and range of commercial expertise and investors; and
- willingness to invest university funds into spin out companies (eg a specific investment fund or contribution to an externally manged fund).

The research suggests that some of these elements are in place in most institutions in Scotland with an interest in spin outs, but few could realistically claim strength in all. Those that were most frequently praised were Strathclyde and Edinburgh, both of which have dedicated resources and a clear, staged gate process for spin out creation. Both also have specific investment funds for spin outs.

While some variation in approach (and quality) is to be expected, there is some mileage in seeking to develop a more consistent approach across the sector as a means of reducing the time it takes to complete the spin out process, particularly in relation to negotiating the terms. This could include standardising key documents (albeit recognising that every case will be different) such that some time on legal negotiation may be reduced. This would certainly be welcomed by the investment community.

There may also be potential to consider more collaborative approaches and here we would highlight two examples from elsewhere in the UK.

SETSquared

SETSquared is a partnership and collaboration between six research-led UK universities - Bath, Bristol, Cardiff, Exeter, Southampton and Surrey. It is essentially a business support network that provides training for entrepreneurs, incubation for start-ups and accelerates the growth of scale-up businesses.

SETsquared focuses on nurturing innovative university-connected businesses with high-potential for growth, social and economic impact throughout their lifecycle. The Partnership has grown since it was established with set up funding from the Higher Education Innovation Fund (HEIF).

The Partnership operates the following programmes:

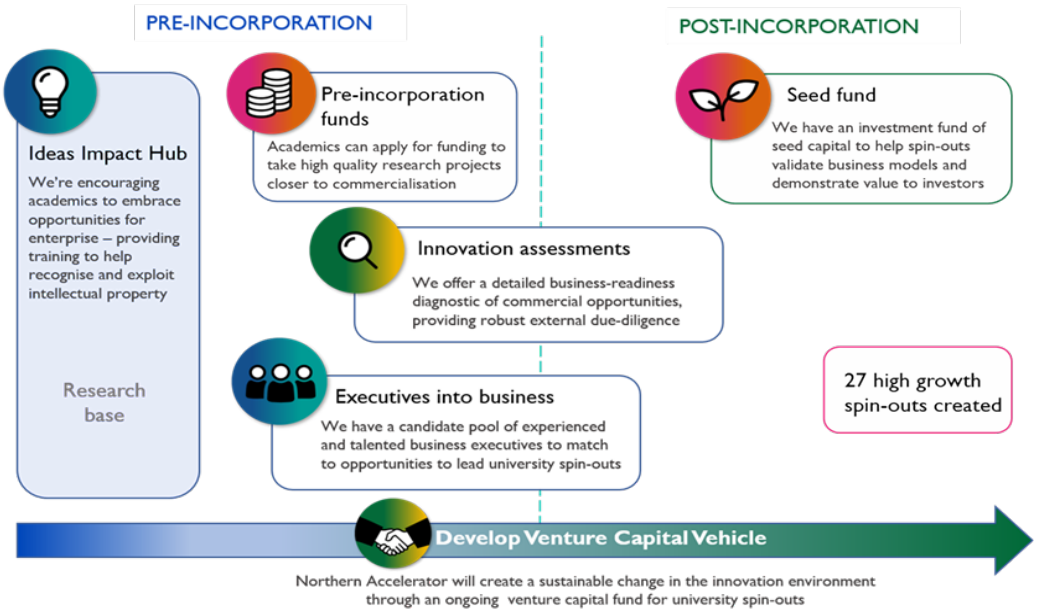
- Student Enterprise, including the Intrapreneurial Knowledge Exchange Enterprise Pathway (IKEEP) programme, helps campus-based potential aspiring entrepreneurs develop new business skills and ideas;

- Innovation to Commercialisation of University Research (ICURe) programme - the Innovate UK-funded national programme supporting academics to determine if there is market potential for their research and develop commercial skills;
- the Entrepreneurs Workout;
- six Business Acceleration Centres for start-ups to scale-ups;
- Scale-Up Programme for later-stage growth businesses, including the Innovation Workout; and
- an Investment Programme through which the SETsquared Partnership connects investors to investment opportunities across its ecosystem.

A recent Impact Report[27] found that since launching in 2002, the Partnership has supported over 5,000 entrepreneurs helping them raise £3.9bn investment, and the economic impact of SETsquared-supported companies was estimated to be £15.7bn, with the creation of 15,600 jobs.

Northern Accelerator

The Northern Accelerator is an innovative collaboration between Durham, Newcastle, Northumbria, and Sunderland Universities, designed to deliver a step-change in the exploitation and commercialisation of research activity and help address regional imbalances and strengthen the North East knowledge economy. It is particularly focussed on the creation of spin out companies and is designed to provide end-to-end support through the "commercialisation journey", from awareness raising and capacity building, through to seed investment funding. The main elements of the programme are outlined in the diagram below.



[27] *The economic and social impacts of the SETSquared Partnership*, Warwick Economics and Development, 2022

Source: Northern Accelerator

In the period between 2018/19 and 2020/21, the programme created 27 spin out companies and was found in an evaluation to have raised the profile of spin out creation amongst the academic communities. The same evaluation also found that while the universities of Durham and Newcastle had created the most spin outs, the other partners had benefitted from their engagement with these more developed TTOs and were showing signs of improved spin out performance.

What both of these examples demonstrate is the value of an integrated approach that provides advise and support to potential academic founders alongside business acceleration and connections to investment. They are both also examples of the power of collaboration amongst institutions. Beyond initiative such as the Research Pools (which have facilitated research collaboration) there appears to be no real equivalent in Scotland.

5 Raising Equity Investment

5.1 Introduction

The second part of the research is focussed on the ability of spin outs in Scotland to raise equity investment. As noted in the ITQ and referenced in the introduction, the research is intended to understand why Scottish spin outs raise relatively lower amounts when compared to the other areas of the UK (with a similar strong track record of creating and investing into spin outs) and seek to identify factors which might contribute to this.

Here again, we have combined desk review of existing research and investment data with the findings from the consultations with universities, investors, spin out companies and other stakeholders (see Method section at 1.4).

5.2 Investment into Spin Outs

According to SE's recent Risk Capital Market report[28], £235m was invested in Scottish spinouts in 2022, making it another record year for the amount invested in these companies. 15% of deals and 10% of investment into UK spinouts went to companies headquartered in Scotland.

The same report also noted that spin out deals represented 25% of investment value and 14% of total deals in Scotland in 2022, underlining the importance of spin outs to the wider equity risk capital market in Scotland. In addition, there has been an increase in the amount of funding sourced by university spin outs, and while the value raised by spin outs has increased between, their deal share has decreased, indicating that spin outs are sourcing, on average, larger amounts year on year.

In order to dig beneath these headlines a little, we have analysed the Beauhurst data provided by SE of all investments in spin out companies across the UK in the three years 2020-2022, to establish how Scotland as a region compares with other regions of the UK.

At times, the analysis here may differ from that presented in the Risk Capital Market Report as the following charts and tables are based on a database (Beauhurst) which is continually adjusted as new information comes to light. As a result, changes to details such as the date (year) of the investment can

[28] *Investing in Ambition: Scotland's Equity Risk Capital Market 2022*, Scottish Enterprise

result in figures different from those used in other reports. The overall comparisons and trends are however identifiable despite these differences.

The number of investment deals in each region by year is given in the **Table 5.1**, below. This is ordered by total number of deals for the three-year period and shows spin outs in Scotland securing more deals than any other region outside the Golden Triangle of East of England/London/South East.

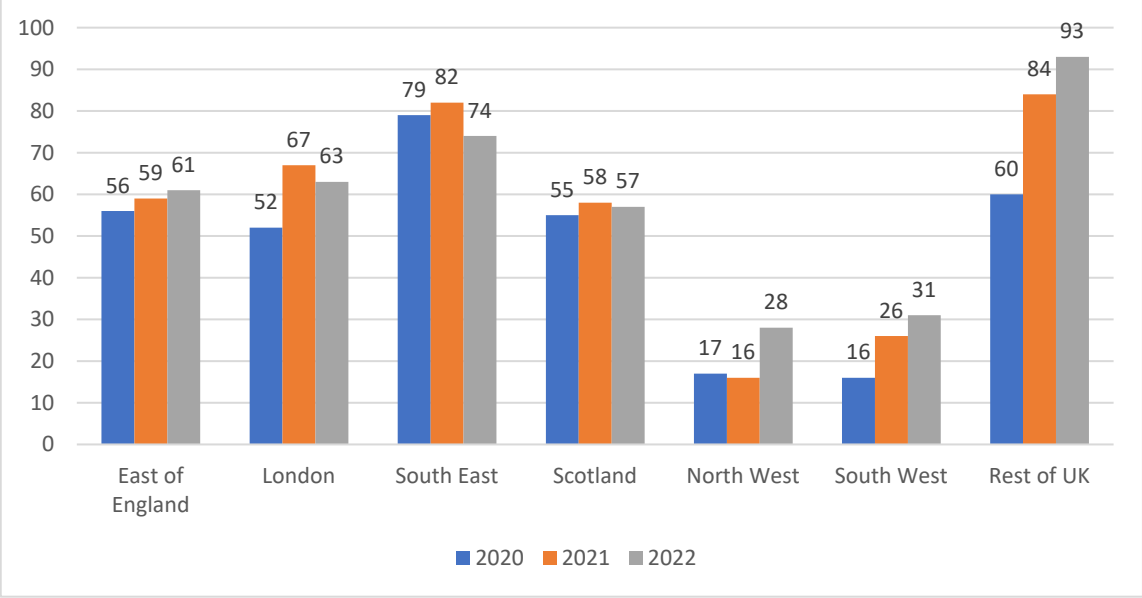
Table 5.1: Total Number of Spin Out Investment Deals 2020 - 2022

Region	2020	2021	2022	Total
South East	79	82	74	235
London	52	67	63	182
East of England	56	59	61	176
Scotland	55	58	57	170
South West	16	26	31	73
North West	17	16	28	61
Yorkshire and The Humber	13	19	18	50
West Midlands	12	19	18	49
East Midlands	10	14	18	42
North East	11	14	12	37
Northern Ireland	6	11	17	34
Wales	8	7	10	25

Source: Beauhurst database

To simplify the comparison, we have shown the same data in chart form for Scotland, the three Golden Triangle regions, the next two regions with the largest deal numbers (North West and South West), and the rest of the UK (**Figure 5.1**). This emphasises the fact that, purely in number of deals, spin outs in Scotland are not far behind two of the Golden Triangle regions, and well ahead of the two comparator regions.

Figure 5.1: Number of Investment Deals in Spin Outs



Source: Beauhurst database

The amounts invested in these deals vary widely, and **Table 5.2** below shows the annual totals by region. This again shows Scotland easily in fourth place after the Golden Triangle regions. Showing the same data in chart form emphasises how far the Golden Triangle regions are ahead of the rest.

Table 5.2: Value of Investments in Spin Outs (£m)

Region	2020	2021	2022	Total
South East	£584	£1,001	£1,167	£2,751
East of England	£290	£427	£510	£1,227
London	£211	£633	£294	£1,139
Scotland	£119	£154	£248	£521
South West	£11	£255	£34	£300
North West	£47	£47	£129	£223
North East	£5	£42	£42	£90
Yorkshire and The Humber	£6	£33	£40	£80
West Midlands	£13	£20	£20	£53
Northern Ireland	£5	£14	£33	£52
East Midlands	£4	£17	£28	£48
Wales	£4	£14	£17	£36

Source: Beauhurst database

Figure 5.2: Value of Investment Deals in Spin Outs (£m)

Source: Beauhurst database

As mentioned previously, while Scotland appears to perform well against UK peers with regard to the number of spin outs created, Scotland's average spin out investment deal size is the lowest when

compared with the other five top performing regions in the UK for attracting equity investment. A similar comment was made in respect of spin outs in SE's Risk Capital Market report for 2022[29]:

"As noted previously, Scotland was the best performing UK region for spin out investment after the Golden Triangle in 2022. However, at £4m, the average size of deals going into spin outs in Scotland was below the UK average of £6m."

For the three-year data set provided by SE, the figures for the period are shown in **Table 5.3**, below, ordered by the largest average (mean) including deals of all sizes. Scotland is in mid-table, placed 6th out of 12 regions. For deals under £10m, described in SE's Risk Capital Market reports as the 'underlying market', Scotland ranks 7th out of the 12 regions, lending some support to the observation that its spin outs secure lower value deals than those elsewhere; however, in this 'underlying market', the variation in average regional deal sizes from the UK total is in most cases small.

Table 5.3: Average (Mean) Investment Deal Size in Spin Outs (£m)

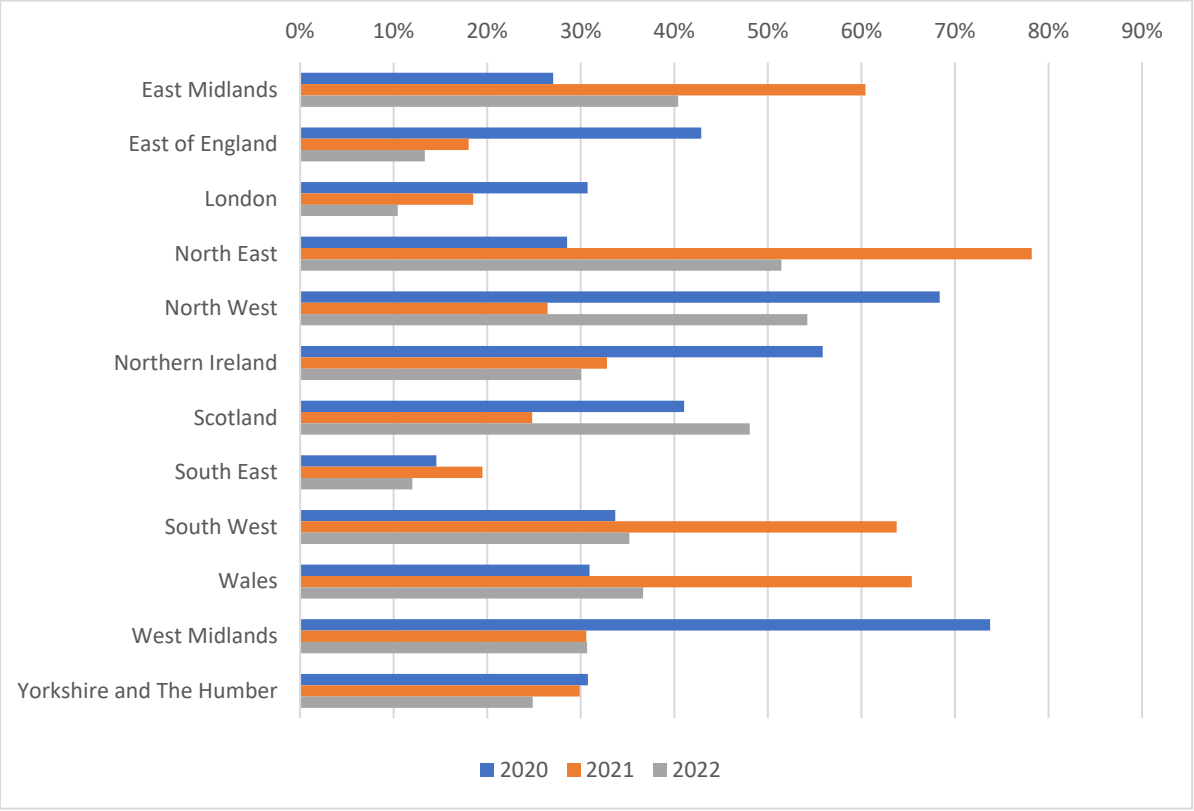
Region	All	£0-£9.99m	£10m and over
All UK	**£5.75**	**£1.52**	**£35.74**
South East	£11.71	£1.95	£42.89
East of England	£6.97	£1.82	£27.00
London	£6.26	£1.75	£34.55
South West	£4.11	£0.93	£78.12
North West	£3.65	£1.57	£26.95
Scotland	£3.06	£1.36	£33.46
North East	£2.42	£1.00	£27.34
Yorkshire and The Humber	£1.60	£1.25	£10.00
Northern Ireland	£1.52	£1.52	
Wales	£1.44	£1.44	
East Midlands	£1.15	£0.68	£10.71
West Midlands	£1.09	£1.09	

Source: Beauhurst database

There are some extremely large investments in spin out companies, well outside the normal range, and these affect the overall picture of the market. For example, these outlier deals often comprise a large percentage of the total investment in a region. The effect is greatest in regions with fewer spinout companies – as shown in the following chart. Outside the Golden Triangle the largest deal always accounts for at least 20% of the total. Even in the Golden Triangle, a single deal can sometimes account for a third of all investment in a year.

[29] *Investing in Ambition: Scotland's Equity Risk Capital Market 2022*, Scottish Enterprise

Figure 5.3: Largest Deal as % of Total Investment



Source: Beauhurst database

In light of the distorting effect of the large outlier deals on mean values, it can be useful also to consider medians to compare deal sizes. The median of a series is the value where there are equal numbers of records both above and below this value; although outlier deals are included in the formula, they are few in number but high in value, so have a lesser influence on the median than on a mean.

The larger the data set, the more representative the median value is, so the median values for the Golden Triangle, with large numbers of deals, offer a 'levelling out' for comparison.

Figure 5.4 shows that there is considerable variation from year to year, and that the South East and East of England regions do in general secure larger deals. Scotland is comparable to London on this measure, and well ahead of the South West, and of the North West in 2020, but lower in 2021 and 2022.

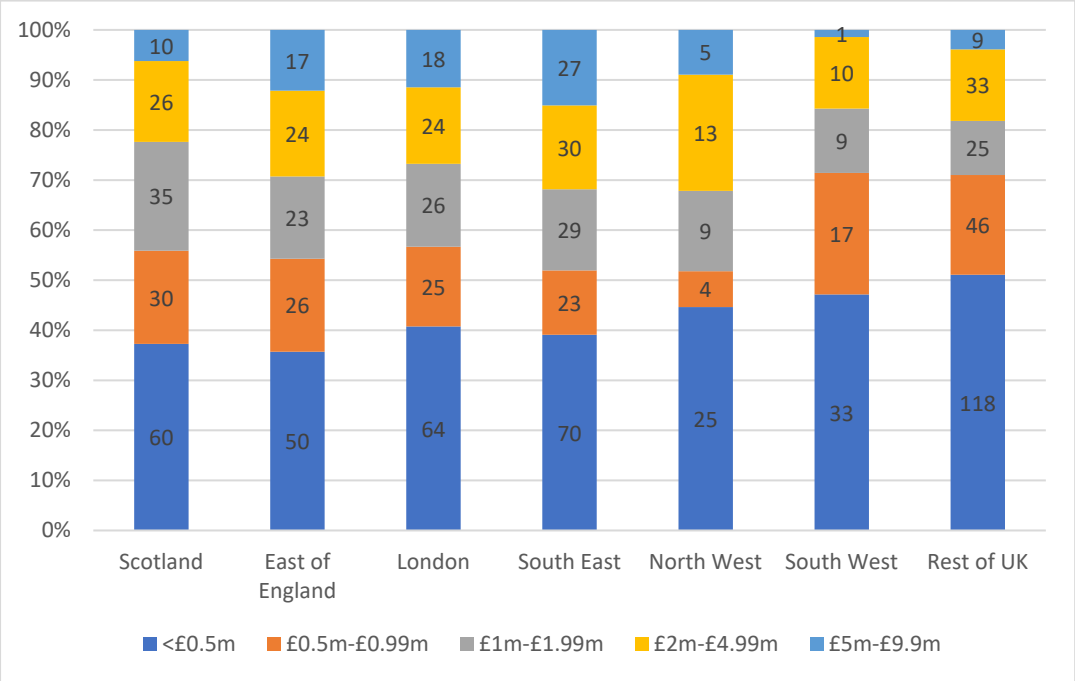
Figure 5.4: Median Deal Sizes (£000s)

Source: Beauhurst database

It is also possible to look at the breakdown of deals by size bands in the 'underlying market' (deals under £10m). Here it is helpful to look at the percentage that the numbers of deals and amount of investment comprise of the total in each size band.

In deal numbers, investments under £1m in Scotland's spin outs account for just over half the total 'underlying market', similar to most of the other regions in the chart, except for the South West and all other regions in the UK. Deals over £2m however account for just over 20% of the total in Scotland, but around 30% for the other regions, except again the South West and rest of the UK. Scotland has a greater proportion of deals in the £1m-£2m band than other regions.

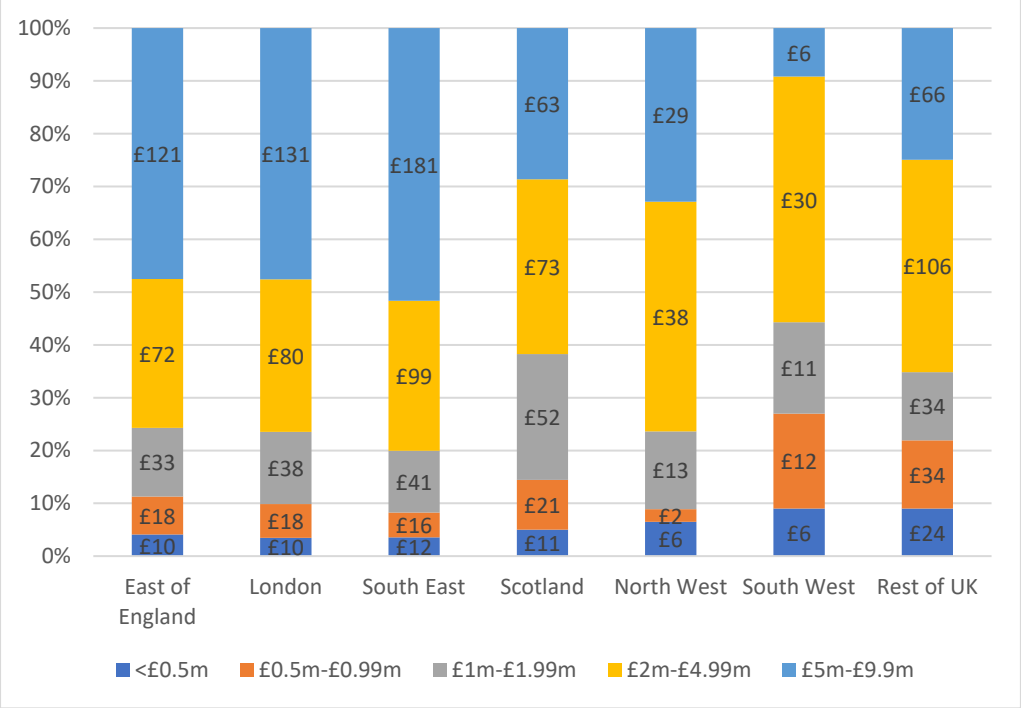
Figure 5.5: Number of deals by size band (under £10m) 2020-2022



Source: Beauhurst database

In terms of the investment raised in these deals, Scotland does not fare as well as the Golden Triangle regions or the North West in deals between £2m and £10m (the bands are not of equal sizes), and correspondingly has more investment in deals in the lower bands.

Figure 5.6: Investment by deal size (% of total investments) 2020-2022



Source: Beauhurst database

Taking these different analyses of the data together, it can be said that investment deals in Scotland's spin outs have a lower value than those in the Golden Triangle and the North West, but the effect is relatively small, and variable from year to year.

The top 20 deals in 2021 and 2022 in the UK except Scotland, and the top 5 in Scotland, are listed in the Appendix. There was a sizeable increase in the values of the top deals from 2021 to 2022, and the South East region (including Oxford) was a principal location for the mega-deals in 2022.

5.2.1 Investors

We have analysed 2022 figures for UK regions. The vast majority of investors (c70%) made a single investment in a university spin out in 2022. 96% made five or fewer investments. The 15 investors that made more than five investments are largely expected names: Scottish Enterprise (via the Scottish Venture Fund, Co-Investment Fund and other), three that are closely or exclusively linked to Oxford and Cambridge, and others (Parkwalk, IP Group) manage funds for specific universities.

Table 5.4: Main Investors in Spin Outs (all UK)

Over 5 investments (11 investors)	No of Deals (2022)
Scottish Venture Fund	19
Parkwalk Opportunities EIS Fund	17
Oxford Science Enterprises	16
IP Group	12
BGF Growth Capital	12
University of Cambridge Enterprise Fund	11
Scottish Co-Investment Fund	10
Foresight Williams Technology EIS Fund	8
IQ Capital Fund	7
Knowledge Intensive EIS Fund	7
Octopus Ventures	6
Oxford Technology	6
SFC Capital	6
Kelvin Capital	6
Scottish Enterprise	6

Source: EKOS analysis of Beauhurst data provided by SE

5.2.2 Sectors

Analysis of spin out investments by sector is impacted by Beauhurst's policy of assigning companies to more than one sector. Unfortunately, this includes a number of very generic categories – understandable if there is no other obvious category under which to place a company, but unhelpful when there are also assignments to other more specific categories.

The following table shows the total number of 'TRUE' values for the sectors with the largest counts in the 2022 data table. Remembering that many companies will feature in more than one category (and there is therefore double counting in the results), it is clear that pharmaceuticals/diagnostics companies dominate the number of spinouts securing equity, and in particular dominate those securing the largest investments. This correlates with the lists of top individual investments given in the Appendix.

Table 5.5: Main Investment Sectors (UK)

Sector	count	>£10m	<£1m
Other technology/IP-based businesses	62	12	23
Research tools/reagents	60	14	23
Pharmaceuticals	56	17	15
Analytics, insight, tools	48	7	24
Other software	40	7	18
Other manufacturing and engineering	35	6	13
Software-as-a-service (SaaS)	31	3	20
Medical devices	30	3	22
Clinical diagnostics	29	2	18
Other Cleantech	26	7	8
Nanotechnology	21	3	8
Materials technology	20	4	8
Medical instrumentation	15	1	8
Other hardware	15	4	4

Source: Spotlight of Spinouts, May 2023, Beauhurst and RSE

5.3 Key Messages

The analysis of the Beauhurst data on investment into spin out companies suggests some broad conclusions, as follows:

- investment into spin outs makes up an important part of Scotland's overall risk capital market, representing 25% of investment value and 14% of total deals in Scotland in 2022, and has been growing in recent years;

- the Golden Triangle area dominates the investment market, as it does spin out creation, and 90% of spin out investments over £10m went to firms in these areas suggesting a geographical disadvantage to raising ultra-large investments outside the south of England;
- in terms of both the number and total value of deals over the last three years, investment into spin outs in Scotland exceeded all other areas of the UK apart from the Golden Triangle;
- looking at the mean size of deals over the three-year period, Scotland ranks 6th out of 12 UK regions. For deals under £10m, Scotland ranks 7th out of the 12 regions, suggesting that its spin outs secure lower value deals than those elsewhere. It should be noted, however, that the variation in average regional deal sizes from the UK total is in most cases small;
- if using median measures rather than averages, Scotland is comparable with London and better than all other regions except South East and East of England, and in some years the North West. These figures change from year to year, but Scotland is in the upper end of the range;
- the largest investments are predominantly in pharmaceutical/therapeutics companies, which have a different business model from most others (i.e. their exit will almost certainly be to a global pharmaceutical corporate) and tend to be highly capital intensive; and
- the most prolific investors in spin outs in the UK are closely aligned to universities, particularly Oxford and Cambridge, or are involved in running university funds, suggesting a degree of specialism.

6 Raising Equity Investment: Issues

6.1 Introduction

This section discusses the issues that affect spin outs seeking to raise equity investment. As such it draws heavily on the input from the investors that were consulted, but also the HIEs and spin out companies, and in some places overlaps with the issues affecting spin out creation. Indeed, many of the factors that affect the ability of spin outs to raise investment relate to the ways in which the companies were first established.

6.2 Investment Sources

As demonstrated in SE's recent Equity Risk Capital Market report, Scotland's risk capital market has been growing in recent years, both in terms of the number and value of deals. While the UK market is substantially dominated by the Golden Triangle area, Scotland is now the next best performing area[30].

A useful overview of the market is provided in the evaluation report for the Scottish Co-Investment Fund and Scottish Venture Fund in 2022[31]. The report notes that Scotland's business angel market is particularly strong, but while there is a diverse mix of other investor types, including private equity and venture capital, Scotland faces similar challenges to other UK regions in terms of growing a pipeline of investor opportunities and attracting international investment. The public sector is also an important participant in the market through both SE and Scottish Government activities.

The Logan Report into the Scottish Technology Ecosystem[32] also reported that while angel investment is key to a well-balanced market, when this type of investment dominates, there is a 'relatively low upper limit on the capital that can locally be invested in a given business'. Angels generally struggle to invest beyond the early stages and while syndicates can do more there is still a cap on investment levels. The answer to this is Venture Capital (VC) but according to the Logan Report, Scotland has too few VCs, those that are here often focus on opportunities outwith Scotland and there are few out of territory VCs with a strong focus on Scotland. It was also argued that the cap tables (of investors and equity shares) can have

[30] *Investing in Ambition: Scotland's Equity Risk Capital Market 2022*, Scottish Enterprise
[31] *Evaluation of the Scottish Co-investment Fund (SCF) and Scottish Venture Fund (SVF) III and IV*, RSM Consulting for Scottish Enterprise, 2022
[32] Logan, M. (2020), *Scottish Technology Ecosystem Review An independent review* commissioned by the Scottish Government

a high proportion of passive investors (due to syndication) and public sector participation, which can be off putting to VCs.

It was reported to us that mainstream investors (VCs and institutional investors) are often averse to investing in university spin outs, mainly due to the perceived risk profile of early-stage propositions (although other issues are also relevant, as discussed below). As noted, Scotland has a well-developed and active angel investment sector. Many of the spin outs in our sample had received angel funding, and most of the angel groups that we consulted were active in spin out investment.

In broad terms, investors in spin outs tend to be specialists, focusing on early-stage companies usually with a sector or technology focus, or at least a focus on knowledge-based businesses. This includes business angel groups, used to investing at an early stage, as well as investors with a strong focus on company building. Examples include Parkwalk (spin out specialists), Oxford Science Enterprises (focussed on IP from Oxfords University) and Epidarex (life sciences specialists). Institutional investors such as Venture Capitalists (VCs) and Corporate VCs tend not to invest at the early stage but will come in once the company is established and shows potential for growth.

Early-stage investment in Scotland is the territory most often occupied by angel investors and groups. Some investors that we consulted specifically wish to be involved early in spin outs, even prior to incorporation (in an advisory capacity) and will invest pre-seed money. There are also a small number of specialist investors (usually with a specific sectoral focus such as life sciences) that take an active and hands on role in building companies. In addition to investment, they bring specialist market knowledge and technical expertise along with commercial experience and strong networks of commercial managers and advisors. Examples active in Scotland include Epidarex and Techstart.

It should be noted that SE is itself a major investor in spin outs through the Scottish Co-Investment Fund and Scottish Venture Fund. It is consistently identified as one of the most prolific investors in Beauhurst's updates and reports[33], at least in terms of number of deals. In relation to value of deals, SE is not typically within the top 20 investors in the UK, reflecting the earlier stage focus of SE's funds.

Those VCs which are active in investing in spin outs either have a very focused sector interest (especially in life sciences) or have a business model which involves managing university investment funds or otherwise working closely with universities. In both cases they aim to collaborate with universities to find the most promising research, in the belief that the transformative power of the technology will lead to high returns on investment.

[33] See, for example, *Spotlight on Spinouts, 2022 and 2023*, Beauhurst

We were told that there are relatively few of these investors in Scotland compared to hot spots in the UK (e.g. Golden Triangle), and that this is a reflection of the lower overall weight of capital in Scotland compared to elsewhere in the UK. This is explored in more detail below.

It is also important to note that two of Scotland's universities – Edinburgh and Strathclyde have their own investment funds for spin outs (Old College Capital and Strathclyde Inspire, respectively), As discussed below, this is positively viewed by the investment community.

6.3 Pre-Start and Pipeline

Pipeline and Early Engagement

Early-stage investors in spin outs, as noted above, tend to be angels/ angel groups or specialist company builders with a sectoral focus. The latter in particular often welcome early engagement (even pre-start) with potential spin outs and will provide advice. VCs and private equity prefer to invest later, and therefore may have less direct experience of the spin out pipeline or the pre-start stages.

The view from the investors that we consulted was generally that the pipeline of potential spin outs depends chiefly on the academics, and the feedback from the HEIs that TTOs rarely have sufficient resources (or knowledge) to prospect for opportunities was confirmed by investors' experiences. Some investors also noted that it was their experience that TTOs can be averse to others (eg investors) prospecting for opportunities themselves. Thus, the investment community does not always have good visibility of the spin out pipeline (nor indeed do many TTOs). Exceptions would be where TTOs keep in active contact with investors (a two-way street) or where mechanisms exist within key departments for maintaining such contact (such as the Dundee Life Sciences example highlighted in **Section 4.4.1**).

Investors also typically recognise that they have a responsibility to maintain active dialogue with the universities and many reported doing so, albeit with a small number of HEIs with the strongest track records in spin outs. Indeed, a few of the investors did note that it was difficult to maintain contact with all HEIs and that they focussed more on those that spun out more companies. Some reported that it was more difficult to work with institutions that only occasionally spin out companies as they tend to have less developed processes and more limited experience and expertise of spin out creation.

Technology Development and Translational Research

Even those investors prepared to support spin outs at an early stage told us that they require the technology in question to be de-risked through further development and testing. As discussed in **Section 4.4.2**, this is the focus of translational research funding, and some of the non-dilutive funding courses discussed in **Section 4.4.3**.

While HEIs tended to consider translational funding to be increasingly scarce, investors' views were more mixed. Certainly all recognised the important role of translational funding in de-risking technology propositions, but some were more concerned about availability than others. Those operating in life sciences, for example, were more likely to consider translational funding to be both critical and scarce compared to investors more focussed on tech companies. This may reflect the capital intensive nature of the technology development process in areas of life sciences. It may also reflect the feedback from some of the tech investors and spin outs that the original IP with which the company spun out was no longer the central focus of the business, and that new IP had since been developed (by the company).

Some investors also noted a tendency for (some) spin outs to use translational funding to support ongoing research activity rather than focus more on the commercial testing of the technology. This was generally attributed to the drive on the part of universities to secure more funding, highlighting again the complex issue of differing incentives and motivations affecting spin out creation.

However, despite these issues, Scotland appears to have a fairly benign environment for early stage investment driven both by the strong angel sector and a small number of specialists with a specific business model focused on early stage technology. This would align with the investment data reported earlier.

Although one angel group told us that there is little or no difference between investing in spin outs and other companies, in terms of the process of finding prospects, making investments, and helping them develop, institutional investors (those that will invest at this very early stage) tend to make this differentiation, by being more proactive in finding prospects and helping research teams to build the business before spin out (including negotiations with the university). They like to invest with a 'clean cap table', i.e. as the leader of the first investment in the business at the time of spinout. Most wish to have co-investors from the outset, and the presence of a university investment fund is regarded as very helpful. Few (angels or institutions) are likely to invest beyond a Series A round, so expect other investors to come in at a later stage. One life sciences investor we spoke to had calculated that together with three co-investors over several rounds they could fund the ~$60m needed for a biotech company to reach phase II clinical trials before acquisition by a corporate pharma which can afford to fund the later trials.

However, one of the specialist investors note that angel investors while a crucial part of the overall investment market, can accept high valuations at the early stages of technology/ company development, which can create issues further on when the company is seeking larger investment.

6.4 Issues Affecting Spin Out Investment

The review of the available data suggests that although investment into spin out companies has been growing in Scotland, spin outs here tend to raise, on average, lower amounts of funding than their counterparts in the Golden Triangle and in some of the UK regions (see **Section 5**) although this does

vary and differences can be small. It is worth highlighting some of the issues that affect the willingness of investors to provide growth finance for spin outs.

It is important to note that the sample of investors that were consulted are all involved with spin out companies, although not all have yet made investments into spin outs in Scotland. As such, the sample is, by and large, positively disposed towards spin out investment albeit with some caveats, as discussed below.

The three issues most frequently highlighted by investors are:

- the deal terms proposed by universities for spin out companies;
- the time it takes to complete deals and create spin outs; and
- the availability of high-quality commercial management talent.

Importantly these issues were felt to impact both on early stage and subsequent investment, as discussed below. It is also worth restating that the first two are not considered to be specific to Scotland and can be issues across the UK. The availability of commercial talent was felt to be a bigger issue in Scotland.

6.4.1 Deal Terms

The issues around deal terms are discussed in some detail in **Section 4.4.5**, but it is worth noting here that investors generally reported the terms expected by universities to be a disincentive – not just the equity stakes demanded, but also the licensing and royalty terms, and the assignment of staff and other resources such as lab facilities.

In respect of equity stakes, investors generally agreed both that universities should have a stake in the companies, and also that there has been growing flexibility in recent years. In **Section 4.4.5** we reported that university equity stakes were converging around 20% pre-investment, and this was confirmed by the investors. Some, however, did note that a few universities had at times sought higher equity shares and considered this to be unreasonable and off putting.

Investors operating outwith Scotland also reported that inflated equity expectations amongst universities was not an issue specific to Scotland but rather was evident across the UK.

Similarly, many investors also reported universities to be seeking to maximise their position on licensing and royalties, sometimes to the cost of the company's growth prospects – what one investor described as 'double or even triple dipping'. Assignation of IP was raised by a number of early stage investors as a particular issue, noting that VCs will expect investee companies to have full ownership of their IP. If the parent university has negotiated stretching terms for the assignation of the IP then it was reported that this can cause issues when seeking to raise larger investment from VCs. There is therefore a need for care in the set-up stages of a spin out to maximise its chances of future investment and growth. Some

investors felt that understanding of these issues was not always well developed within the universities and that more commercial expertise would help (discussed below).

Deal terms also often extend to access to university facilities and staff, and here we found a somewhat mixed picture. We heard from spin outs that reported good support from their university and favourable terms for accessing facilities, workspace and staff, and also from others whose experience was different. There was some feedback from a couple of life sciences investors that the wider infrastructure for supporting spin outs was also an issue with a particular shortage of lab space.

Many of the investors that we spoke to noted that while there was much attention on the issue of university equity stakes, it was more important to look at the deal terms as a whole, and to seek to structure deals at the early stage such that they maximise the company's chances of future success. This includes providing sufficient incentives to founders.

6.4.2 Time

The issue of the time that it takes to create new spin out companies was also discussed in **Section 4.4.7** but again bears further consideration here. Investors consistently reported that it takes too long to work through the deal terms with universities, and that sometimes this can make the difference between success and failure. The time delays are variously attributed to:

- universities seeking to negotiate terms considered unreasonable by investors (over valuing their IP);
- generally slow processes within the universities, particularly around legals; and
- lack of understanding within the universities about the commercial and financial implications of delays.

As noted previously, many investors felt that more standardisation of deal terms across the sector would help to reduce the time needed to agree suitable spin out deals.

6.4.3 Commercial Talent

We reported in **Section 4.4.6** that Scotland is felt to lack a sufficiently deep pool of commercial talent to support high growth spin outs. This was certainly the view of the investors that we consulted. Many investors noted that they invest in people as much as ideas and that this extends both to the technical expertise of the academic founder(s) and the commercial talent of the management team.

While investors are supportive of the commercial champion model, those that invest in spin outs will typically wish to be involved in the selection of an interim CEO and sometimes Chair for the company, and many considered the pool of available talent in Scotland to be of insufficiently high quality. Some of

the specialist investors have their own in-house talent teams to help companies source high quality commercial managers.

We also heard from a couple of VCs, only occasionally involved in spin outs, that these companies often have many advisers and mentors that have been incentivised early on with large equity stakes, but without the market or business expertise to justify them. This is considered off putting, again underlining the importance of setting up spin outs from the outset in ways that maximise the chances of future growth. This includes securing high quality commercial talent.

We also heard that some investors from outside Scotland have misgivings about investing in Scottish spin outs. Many of the consultees, for example, commented in the difficulty of getting out of territory investors to consider investments in Scotland when they have opportunities closer to home (e.g. Golden Triangle).

Another view compared Scotland with Ireland, which creates many more spinouts. The interviewees believe thanks to the dedicated funds attached to universities – discussed below.

6.5 University Funds

University funds are positively viewed by the investment community and do seem to help as part of the overall support environment for spin outs, as well as being a welcome source of co-investment. Investors also felt it important for universities to have an active stake in the success of the companies – something that they considered investment funds to encourage.

University investment funds are also considered important as a source of corporate finance advice and expertise within the universities - something that investors invariably considered to be lacking.

There was also some discussion of the potential to establish a fund with a number of universities as partners – perhaps designed along similar lines to the University Bridge Fund in Ireland. This may also be related to the reference in *Scotland's National Innovation Strategy* to a £100m Innovation Fund.

University Bridge Fund

The University Bridge Fund is 60m Euro Fund to invest in spin outs from universities in Ireland. The original impetus for the Fund came from University College Dublin (UCD), but early feasibility work soon made it clear that while UCD alone could support a Fund of around 15m Euro, the minimum viable fund size would be 30m Euro. This made collaboration essential so an approach to Trinity College Dublin led to both institutions investing 2.5m and then securing 15m from Enterprise Ireland so long as the partners raised a further 10m and extended the fund to all universities in Ireland. The fund was then completed with 30m Euro from the European Investment Bank and fund management was contracted out to Atlantic Bridge. The Fund is now ranked in the Top 5 Funds of its kind in the world.

At present, only two of the universities in Scotland – Edinburgh and Strathclyde - have their own investment funds and regularly provide early-stage investment to spin outs. In addition, Glasgow, Edinburgh and Aberdeen universities are investors in the Epidarex Exeed Fund for life sciences.

Here it is worth considering experience from elsewhere in the UK.

Within the Golden Triangle, Oxford and Cambridge both have investment funds to support spin outs (see box below for more detail on Oxford) and Parkwalk manages investment funds for a number of universities including Oxford and Cambridge along with Imperial College and Bristol.

There are also examples of collaborative ventures between universities, including Midlands Mindforge, and Northern Gritstone.

Midlands Mindforge

Midlands Mindforge is a patient capital investment company, co-founded by eight research-intensive universities in the Midlands – Aston, Birmingham, Cranfield, Keele, Leicester, Loughborough, Nottingham and Warwick. The company seeks to accelerate and enhance the commercialisation of science and technology innovations from the eight partner universities and the Midlands region.

It provides capital and company-building skills to university spin outs and early-stage IP rich businesses in the Midlands and is aiming to raise up to £250m from strategic corporate partners, institutional investors and qualifying individuals.

Northern Gritstone

Northern Gritstone was established with the assistance of the Universities of Manchester, Leeds and Sheffield with the dual purpose of supporting the commercialisation of science and IP-rich businesses originating from these institutions alongside funding the development of similar businesses based across the North of England. The company has since raised over £300m from a range of investors including local authority pension funds, high net worth individuals, institutional investors and real estate investors active in the tech and science ecosystem of the region. The founding universities each retain a small shareholding in the company.

The company began deploying capital immediately after the initial close in May 2022 and subsequently has made nine new investments in the period, three of which were to new spin outs and two were subsequent funding rounds for existing spin outs.

Compared to these funds (and those at Oxford and Cambridge) both Old College Capital and Strathclyde Inspire are considerably smaller. A more collaborative approach might offer the scope to develop a larger investment fund for spin outs and related innovation companies.

Oxford Science Enterprise

Oxford Science Enterprise (OSE) was founded in 2015 with the ambition to bring Oxford University's best ideas to the world. It invests in companies that are part of the Oxford cluster (including the science parks and Saïd Business School), with a special focus on the University's science departments. OSE raised an initial £600m and invests in spin outs at pre-seed and seed stage. It also provides follow-on financing all the way to exit.

The University has a 5% stake in the firm, for which it provides OSE an early opportunity to see all potential spin out projects under a confidentiality agreement, and 50% of the University's shareholding in each new spin out. OSE subsequently went on to raise a further £250m and is "the largest uni-affiliated investment company in the world". OSE focuses solely on company creation (not licensing).

The Oxford University TTO (Oxford University Innovation) is also different in a number of ways:

- it is piloting a 'take-it-or-leave-it' equity stake of 20% to the University (OU + OSE), and 80% to the founder group; in strictly limited circumstances this can be a 10:90 split. This reportedly helps to reduce negotiation time;
- academics wishing to start a spin out company are not expected to leave their research role in the University, but to find a partner which can take on the commercialisation of the IP; by default this is Oxford Science Enterprises (OSE); and
- the University expects to hold on to the IP, which is licensed to the spinout rather than transferred at any stage.

The combination here of a clear and transparent approach by the TTO and the commercial expertise and weight of capital provided by OSE has been a game-changer for Oxford's record in spinning out companies.

6.6 Weight of Capital

A number of investors and advisers noted that the key difference in performance between Scotland and the Golden Triangle areas is a function of the weight of capital available for investment into spin out companies. OSE alone has raised over £850m and both of the regional examples more than £250m, all targeting spin outs and 'university adjacent' and IP-rich businesses. Scotland does not have anything of equivalent scale, even to the smaller University Bridge Fund in Ireland.

This was considered important for a number of reasons:

- more available investment capital encourages more flexible approaches to risk;
- a large volume, of capital attracts commercial talent;

- larger investments enable spin outs to grow and scale more quickly, creating market advantage; and
- large volumes of capital encourage the development of the wider ecosystem to support innovation and company growth, including facilities, accelerators and networks.

This last point is consistent with the findings of the recent review of the UK Spin Out market[34] which identifies successful spin out ecosystems in Boston, San Diego and the Bay Area in the US and developing in the Golden Triangle in the UK. It notes that new spin-out ecosystems are developing, supported and driven by partnerships between universities and investors including Northern Gritstone, Midlands Mindforge and SETsquared.

Greater weight of investment capital might also encourage more value to remain in Scotland. Many of the spin out companies that we consulted have completed multiple funding rounds and some have progressed through Series A and B. Their experience, which was largely confirmed by the investors, is that smaller investment capital (up to £2m) is readily available in Scotland. Companies seeking investment of up to £5m reported finding fewer options in Scotland and tended to look to London, or elsewhere, and for larger still investments were looking globally (typically the US or Europe).

While a Scotland based company securing significant investment on the international market should (rightly) be considered a benefit to the Scottish economy – an inward investment – two issues do arise. First, we heard of some companies that having secured investment from overseas investors were then under pressure to relocate closer to that investor. This can sometimes, but not always, be an issue at exit where this is via trade sale and the acquiring company insists on a relocation. Indeed, this was the expectation of some life sciences companies that we consulted – a trade sale to global pharma that would likely result in relocation of the company.

There is no easy solution to this issue, and we were informed by some of the consultees, including investors themselves, that attempts to attract investors to locate in Scotland have met with mixed success. However, if greater weight of capital is a driver of spin out success, as is reportedly the case in the Golden Triangle, then the development of a larger scale investment fund targeting spin outs (and related high tech and high growth companies) could be considered. This is an approach which seems to have been taken elsewhere (the UK funds highlighted above provide some useful examples) but as yet dedicated funds in Scotland (such as Old College Capital and Strathclyde Inspire) remain comparatively small. We return to this issue in the final section.

[34] *Independent Review of University Spin-Out Companies,* Octopus Ventures for UK Government,2023

6.7 Key Messages

From our interviews with investors, we were able to make a number of observations.

Universities and investors have different perspectives on the success of spin out companies, and different incentives. From the investor's point of view, the company needs to become sufficiently profitable to generate a return on investment, a purely commercial point of view; universities have much more mixed motivations, as described previously.

Investors therefore are likely to focus on the market readiness of a spin out's products or services rather than the original technology. Furthermore, many investors stress that they invest in people (the commercial experience as well as technical expertise of the founders and team) rather than ideas. To ensure that the projects to be taken forward have a 'touch of reality', they welcome the involvement of commercial champions or other experienced business people, provided they have genuine and extensive experience of the spin out's target market.

Universities are more likely to focus on the IP itself, and how it reflects on the status of the institution, as well as how it might attract more research funding if the spinout is a commercial success.

For this reason, most investors in spin out companies are to a greater or lesser extent specialists, either business angels who see their best investment opportunities at an earlier stage of development than most institutional investors, or sector specialists, especially in life sciences. Later stage investors tend to choose sectors such as software (SaaS, AI, cyber, etc) where companies can reach market more quickly and cheaply than is the case for sectors such as hardware and life sciences where extensive testing, trials, or prototyping is required.

To maximise the chance of finding the right ventures and making sure they start off in the right direction, investors in spin outs are keen not only to develop good relationships with universities (not expecting founders to come to them), but also to help in the stages of spinning out. This often includes advising the company at the spin out stage, so that reasonable terms are secured, in respect of licensing and royalties (where uncommercial terms can have a lasting effect) as much as in the negotiation on equity stakes.

To make this process more efficient, all investors in spin out companies would like to see better information and training available to academics who might consider spinning out a company, and more transparency from universities on their processes and expectations. 'A change of mindset is needed, so that all parties are concentrated on the success of the spin out business.'

Many investors in spin outs (and other deep-tech ventures) do not expect to continue investing beyond a Series A round, mainly because they lack the scale of capital or because their model is specifically targeted at early-stage investment. This means that they need to either bring in larger co-investors at this point or develop the company towards a trade sale (the obvious business model for pharmaceutical spin

outs). Scotland has more angel syndicates than other parts of the UK, and while this has been a strength in helping spin outs get started, it also has limitations in terms of the amount they can invest in a company as it begins to scale up; however, more recently several of the syndicates have shown a willingness and capability to bring in later stage investors with deeper pockets.

University funds are highly valued but there are only two in Scotland, and none based on collaboration between universities. This contrasts with examples elsewhere in the UK. This may present an opportunity to increase the volume of investment capital for spin outs in Scotland while also fostering useful collaboration across the universities to build scale.

7 Equality and Diversity

This section considers the issues of equality and diversity in spin outs. It does not consider type or sector of spin out but instead the personal characteristics of those involved. The data is limited and is not collected, monitored or reported at a national level by any single organisation, although Beauhurst does have some information relating to gender. Interestingly none of the interviews were able to highlight any research data around gender or equality issues.

7.1 Data

In addition to Beauhurst, the main source of research[35] into gender is the Gender and University Spinouts in the UK: Geography Governance and Growth Report (2019). It states that:

"Scotland and Northern Ireland had the highest number of spinouts per institution but only 12% of those spinouts had one or more woman founders. Universities Scotland are actively encouraging innovation and commercialisation of research through their Five Point Plan for Innovation but the Statement of shared principles for Spin-Out Company formation, signed by all Scottish institutions, makes no reference to issues of diversity and inclusion or widening participation as part of spinout creation and governance. Although the climate in Scottish institutions may be more conducive to commercialising research, the current framework does little to acknowledge or address the underrepresentation of women in spinouts and academic entrepreneurship more widely."

Their research showed that only 13 per cent of UK university spinouts were being founded by women. They looked at the 789 spinouts identified as active from the Beauhurst database (January 2019), which showed that across the UK, only 13 per cent of university spinout companies had at least one woman founder. The research recommends that the overall HE ecosystem needs to improve, to establish equal opportunity for women no matter where they are in the country, or which institution is funding their research. They believe that developing a more diverse spinout ecosystem, with equal opportunity and a clear system of support and resources for all researchers – regardless of their HE or background – will not only create greater opportunities for individuals, but help to drive innovation within the UK.

[35]https://www.researchgate.net/publication/337764529_Gender_and_university_spinouts_in_the_UK_Geography_Governance_and_Growth?enrichId=rgreq-f4b86e28f53d51ed95ce5b4cbfa44b8a-XXX&enrichSource=Y292ZXJQYWdlOzMzNzc2NDUyOTtBUzo4MzI3MzA2ODIwOTc2NzZAMTU3NTU0OTg3NDYwNA%3D%3D&el=1_x_3&_esc=publicationCoverPdf

Other key points include:

- The University Alliance's Research and Innovation Network, has recently been discussing what more can be done to promote greater diversity and representation across the academic pipeline;
- A 2022 Royal Academy of Engineering report Spotlight on Spin outs highlights lack of diversity in spinout leadership;
- Of the 1,629 spinouts tracked by Beauhurst, 86.4% had all male founders contributing to the commercialisation of university research. In contrast, only 2.39% of spin outs had an all-female founding team, and 11.2% of companies had at least one female founder;
- The Energy and Physical Sciences Research Council (EPSRC) found in 2021 that too few women researchers are leading spin out companies and that there has not been enough attention focused on the progression of women researchers at all career stages on the entrepreneurial pathway from research to spin out leadership[36].
- Directorship teams made up of all female directors have increased from 0% for companies incorporated in 2016 to 10.6% for those incorporated in 2021[37].
- in terms of gender equality progress, the results (published in November 2019) show a significant gender gap across the UK, with only 13% of spin out companies founded by women or have a mixed gender founding teams.[38]

Interestingly, the Independent Review of University Spin Outs: Terms of Reference does not have a gender question or issue to be addressed. In terms of diversity or ethnicity there is even less data reported. Beauhurst data[39] show that 25% of directors of UK spinouts have foreign nationality.

We could not however, find any data relating to socioeconomic disadvantage or those from disadvantaged locations.

7.2 Consultation Evidence

Throughout the consultation we found little in the way of positive comment on equality and diversity in the spin out landscape. While most consultees recognised, for example, the under representation of women as spin out founders as a missed opportunity, few were aware of initiatives designed to improve matters. Fewer still had much to offer on wider equalities issues.

[36] https://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/S010734/1
[37] https://www.beauhurst.com/wp-content/uploads/2023/05/Beauhurst-Spotlight-on-Spinouts-2023.pdf
[38] https://www.ukri.org/blog/the-spinout-journey-from-a-gender-perspective/
[39] Spotlight on Spinouts: UK academic spinout trends: April 2022

One consultee (a university) did suggest that they felt it might be more difficult for female founders to raise investment, but also that there was no supporting evidence to confirm or deny this assertion.

The universities were, however, in favour of action to promote greater diversity and were also aware that this has been an issue too within the academic community, not least in STEM subjects. A couple did note that they were aware of specific programmes targeting women within wider enterprise support programmes whether targeted at academics or more often students.

However, the overall impression is that diversity is generally a lower priority issue in the context of spin out creation.

7.3 Solutions

While, the issue is now better understood, there is much less is known about the solutions. As the Oxford report states:

"*Universities Scotland are actively encouraging innovation and commercialisation of research through their Five Point Plan for Innovation but the Statement of shared principles for Spin-Out Company formation, signed by all Scottish institutions, makes no reference to issues of diversity and inclusion or widening participation as part of spinout creation and governance.*

Although the climate in Scottish institutions may be more conducive to commercialising research, the current framework does little to acknowledge or address the underrepresentation of women in spinouts and academic entrepreneurship more widely".

See also https://www.universities-scotland.ac.uk/campaigns/five-point-plan-for-innovation/

7.4 Key Messages

It is clear that gender does play a role in terms of spin outs and that women are currently under-represented with just over 10% in a spin-out leadership role .

According to UNESCO[40] around 30% of researchers in universities in Europe are women and given that the number of HE academic staff is 25,000 in Scotland this implies a "potential" target market of 7,500 who may have potential to spin out their research[41].

[40] https://uis.unesco.org/sites/default/files/documents/fs55-women-in-science-2019-en.pdf
[41] Source HESA

8 Conclusions and Recommendations

8.1 Introduction

This Chapter sets out our overall conclusions based on the evidence base. It addresses the specific questions raised in the ITQ and presents some suggested areas for future development.

8.2 Part 1: Spin Out Creation

8.2.1 Scotland's Performance on Spin Out Creation

Conclusions here address two of the research objectives identified in the ITQ:

- How are the recognised strengths of Scottish Universities feeding through into spinout creation? How does this compare to other regions of the UK?
- Consideration should be given to the relative performance of Scottish universities with respect to the creation of spin outs. This should help to identify good practice, and if there are opportunities to improve performance, for example, as a result of increased collaboration between Scottish universities.

Scotland's performance in the creation of new spin out companies could be characterised as good but could do better. Looking across the UK, the Golden Triangle area is far out ahead, and the University of Manchester drives strong performance in North West England. However, Scotland is broadly competing in terms of the number of spin outs with other regions outwith the Golden Triangle.

Most of the issues identified in this research are not specific to Scotland and are in fact evident across the UK. Differences tend to be institutional rather than geographic. The wide consensus was that the success of the Golden Triangle is based on two essential factors – the quality of the science base (and the reputations of the leading institutions) and the weight of capital available.

Scotland can compete on the first, but not on the second.

However, three further points should be made here:

- Scotland's performance on spin out creation is less strong than its share of research funding, suggesting issues somewhere between research and commercialisation;
- spin outs are highly concentrated in a small number of universities – notably Edinburgh, Strathclyde, Glasgow and Dundee and to a lesser extent Heriot Watt, Aberdeen and St Andrews; and

- reasonable comparative performance tells only part of the story. Scotland may be spinning out fewer than 10 companies per annum (on average) suggesting considerable scope for improvement.

Clearly Scotland has sufficient research strength to generate viable high growth spin out companies particularly in areas relating to life sciences, software and computing (including AI), engineering and advanced manufacturing, and cleantech.

The findings suggest that there is a correlation between research strength and spin out performance, although this link is not always direct. Most university research will never be suitable for commercial exploitation, and research strengths do not always map neatly onto spin out sectors. However, there can be no doubt that high quality research is an essential pre-requisite for high quality spin out companies.

This is particularly the case for life sciences in which IP is often critical. Other sectors such as software may be less IP based and even when companies spin out with university owned IP they often move beyond this such that the original IP is no longer the source of value in the business. Some of these may in fact be more suited to a 'walk out' model than a spin out.

8.2.2 Pre-Start Constraints and Issues

Our conclusions here address a further two research objectives:

- identification of constraints at the pre-start up stage should be considered in the context of identifying the emerging pipeline and what more could be done to increase opportunities at this stage. This should consider issues such as the importance of access to entrepreneurial and commercialisation talent; and
- the commission should consider the role and contribution of translational funding. This should explore how universities secure the funding required to advance intellectual property into investable assets that can attract significant seed and series A/B investment.

The primary constraints on spin outs at the pre-start stage relate to:

- academic motivation;
- translational funding; and
- availability of high-quality commercial advice and expertise.

Academic motivation

The initial push for a spin out company almost always comes from an academic. This raises two issues. First, it tends to result in a model based on technology push rather than market pull. In other words, an idea or technology is developed in the lab and is then pushed out into the commercial marketplace – what one investor described as 'solutions looking for a problem'. A market pull model would start with

the identification of gaps and opportunities within the commercial marketplace and then seek out the technologies to address these. Some private investors with deep academic connections will operate more in this way, but we found little evidence of this in Scotland. In part this reflects the smaller investment community here but may also be a function of the tendency of TTOs to act as gatekeepers with investors.

This is also related to the issue of the pipeline. While some TTOs reported a pipeline of future spin out opportunities it is not clear that these are proactively developed or managed by the TTOs (or anyone else). One exception, as noted earlier, is the University of Dundee where the School of Life Sciences takes an active role in developing and managing a commercialisation pipeline. The TTOs continue to have a central role but should be enablers rather than gatekeepers.

The second issue is that academics are not (or are at least rarely) entrepreneurs. Many universities have been actively promoting entrepreneurship both within the student base but also to academic staff. This is to be welcomed. However, there is more to do in incentivising academic staff to consider the spin out route to commercialising their research. Here the lead academics may not be the primary target as they rarely leave academia to work in spin outs. Instead, post-docs more often transfer from university to companies and may therefore be a more useful focus for entrepreneurship development and training.

Oxford University now makes it clear that academics are not expected to leave their academic positions but should instead hand the innovation to a commercial team for exploitation. This is similar to the model adopted at MIT, widely regarded as the gold standard, and provides academics with the comfort that a spin out route does not mean the end of the academic career that they have spent much of their working lives developing.

Translational funding

Translational funding is clearly crucial in helping to de-risk new ideas from a technological and commercial perspective. This is essential if private investment is to come on board, and there was clear feedback that more of this funding is needed in Scotland. The research suggests that while there are available sources of translational funding, these have been reducing, not least as a result of Brexit and pressure on public expenditure. They are highly competitive and cannot support the full range of viable prospects. Demand is outstripping supply and certainly Scottish universities (and some investors) identified a need for more in this area. It is instructive that a number of universities down south, including Bristol, Cambridge and University College London now have dedicated teams helping academics to secure translational funding.

However, we also heard from investors that too often translational funding is used to further research objectives rather than commercial development with the result that the technical and commercial risks of projects remain too high for private investment.

Non-dilutive grant funding (discussed below) is also important in helping to de-risk projects for investors and again resources are both limited and in high demand.

Indeed, there is a reported gap between translational funding and private sector investment for Proof of Concept funding to take the outputs of translational work into an investable asset. We are aware of a proposal by the University of Dundee to develop a fund of £5m to target this gap. This proposed fund is specifically targeted at enabling projects to develop innovations into investable assets ready for seed investment. It is based on a working assumption of providing 20 projects with an average of £250K each of non-dilutive grant funding.

Commercial expertise

The research also found that the quality and extent of commercial expertise and advice available to spin outs in Scotland was often lacking. The expertise within university TTOs is highly variable, as are the resources available for commercialisation. Given the centrality of the TTOs in the spin out process, it is important to consider how this might be addressed.

At present, most TTOs are essentially a cost to universities. While commercialisation activities offer the potential for income creation this can be long term, thus requiring institutions effectively to underwrite the costs until such time as income is generated. Current funding allocations – in particular the University Innovation Fund – are based on past performance against a set of defined metrics (including spin outs) and reward past success. Thus, in order to achieve the performance that would return significant levels of funding, the universities must first invest at risk. It is also the case that smaller institutions may struggle to make this investment without more funding support, and the system as currently designed is somewhat stacked against them in this respect. Indeed, the University of the West of Scotland has very limited resources but has supported two spin outs and is keen to do more. Similarly, SRUC has also spun out one company and is ambitious to do more.

Beyond the TTOs, there is also a lack of commercial expertise in the wider marketplace. It is widely acknowledged that academics are rarely best placed to lead spin out companies (although some might argue otherwise) and the placing of a commercial champion or interim CEO in a new company is now common practice. However, Scotland does not have sufficient depth of commercial talent. Similarly, there is a shortage of high-quality commercial advisors.

8.2.3 Support for Spin Out Creation

Our conclusions regarding the support available for spin out creation addresses the final two research objectives relating to spin out creation:

- Mapping should be undertaken of how Scottish universities support the creation of spinouts, and how this is resourced, with a view to identifying good practice. Where appropriate, this should draw on experience from elsewhere in the UK; and
- Establish if there any differences in the support available to Scottish based spin outs with respect to the support they receive from their host institution, and when compared to spin outs created elsewhere in the UK.

The stages of a spin out company through pre-start, spinning out and subsequent growth are not always clearly delineated and can overlap. Similarly the support required may overlap, as will the issues and barriers affecting success at these different stages.

TTO Resources and Processes

The research found wide variability in the robustness of TTO spin out processes and the resources attached to them, but also that these issues are not specific to Scotland but are in fact evident across the UK. Many of the investors that we spoke to reported that commercial expertise is limited in most TTOs across the UK. At UK level we identified good practice in Oxford Science Enterprise and in university collaborations aimed at promoting commercialisation and spin outs such as SETSquared and Northern Accelerator.

In Scotland, both Edinburgh and Strathclyde universities received regular praise from investors and (most) spin out companies with which they had engaged, but there was evidence of good practice and strong commitment in other institutions including Aberdeen, Dundee, Glasgow, Heriot Watt and St Andrews, even if some of these had more limited resources available to support spin out creation.

The more successful TTOs operate a staged gate process with formalised protocols to manage spin out creation which, together with money to invest, seems to be helpful. Elements that could be considered good practice in institutional spin out support include:

- relevant commercial experience within the TTO;
- good understanding of institutional research strengths and of key technologies and their markets;
- clear and defined commercialisation policy;
- means of incentivising academic participation (financial and/ or contractual);
- sufficient resources within the TTO to support spin outs alongside the rest of the TTO's responsibilities (possibly a dedicated team);
- a gated process with clear stages and support at each stage;
- flexibility in negotiation particularly in relation to university equity shares in spin out companies and around licensing and access to university resources;
- access to a strong network and range of commercial expertise and investors; and
- willingness to invest university funds into spin out companies (eg a specific investment fund or contribution to an externally manged fund).

Here we would also note the scope for more in the way of collaboration across the university sector. While there is certainly evidence of research collaboration, commercialisation and enterprise support tend to be institutionally based. The examples highlighted in the report of SETSquared and the Northen Accelerator demonstrate the benefits of a more collaborative model in helping to build scale, share good practice and build a deeper support ecosystem.

Time and Deal Terms

While many felt that the spin out process itself took far too long, this may seem at odds with the contention that prospects are not sufficiently de-risked. In fact it is not, as much of the de-risking should take place before the spin out process, and before the IP is registered by the university as this is effectively the start of a clock ticking where speed is of the essence.

Many of the reported delays relate to the perceived slow pace of the universities generally, communications issues within institutions and in particular to the time-consuming nature of negotiations over deal terms.

The last of these is a familiar bone of contention, with universities generally perceived to be seeking too high an equity share in the new companies as well as sometimes onerous licensing conditions. In fact, we found that the universities are largely converging on an average equity position of c.20% pre-investment (hence dilutable) which is broadly in line with the wider UK. Certainly, there has been some progress in this respect in recent years, but the lack of a clear and transparent initial position has often led to protracted negotiations. It is also worth noting that spin outs in which IP plays a less central role (e.g. in some areas of software and tech) there is a case for the university to take a smaller equity position.

This comes back again to incentives and to attitude to risk. TTOs are in the business of generating returns to the university, whether direct (return on investment) or indirect (via funding allocations). The former is arguably best served by an approach that gives the new spin out the best possible chance of success, which requires greater flexibility in areas such as equity and licensing. Returns, however, are, longer term and this may be part of the challenge.

Similarly, most TTOs appear to be quite risk averse, seeking to mitigate risk by maximising the university's position in deals. A more flexible approach to risk would provide spin outs with a better chance of securing further investment and maintain growth, leading ultimately to better returns to the institutions.

8.3 Part 2: Raising Investment

The second part of the research sought to understand why Scottish spin outs raise relatively lower amounts when compared to the other areas of the UK (with a similar strong track record of creating and investing into spin outs) and seek to identify factors which might contribute to this.

8.3.1 Investment into Spin Outs in Scotland

Investment into spin outs constitutes a significant proportion of Scotland's overall risk capital market, representing 25% of investment value and 14% of total deals in Scotland in 2022. Recent analysis also shows that investment into spin outs has been growing in recent years. The market is dominated by the Golden Triangle area, and 90% of spin out investments over £10m went to firms in these areas suggesting a geographical disadvantage to raising ultra-large investments outside the south of England.

However, in terms of both the number and total value of deals over the last three years, investment into spin outs in Scotland exceeded all other areas of the UK apart from the Golden Triangle.

Looking at the mean size of deals over the three-year period, Scotland ranks 6th out of 12 UK regions. For deals under £10m, Scotland ranks 7th out of the 12 regions, suggesting that its spin outs secure lower value deals than those elsewhere. It should be noted, however, that the variation in average regional deal sizes from the UK total is in most cases small. In addition, if using median measures rather than means, Scotland is comparable with London and better than all other regions except South East and East of England, and in some years the North West. These figures change from year to year, but Scotland is in the upper end of the range.

The implication here is that spin outs in Scotland do raise relatively lower amounts of investment, particularly when compared to companies in the Golden Triangle. However, when compared to other nations and regions of the UK, the differences are much smaller and vary year on year. Thus, while average deal size may indicate an issue, the data suggest that this may be less marked than often supposed.

8.3.2 Issues Affecting Investment into Spin Outs

Here we summarise the issues affecting investment into spin outs, including consideration of two of the ITQ objectives:

- The role of non-dilutive grant funding (such as SMART grant funding) should be considered, with reference to whether availability of this funding (post incorporation) can support value creation and de-risking in advance of external investment being raised;

- The study should look at the equity stakes taken by Scottish universities and how these compare with other institutions elsewhere in the UK. Input from different investor types, who have a track record of investing into spin outs should be sought.

Most investors in spin outs in Scotland are angel groups used to investing an early stage or specialists with a strong sectoral focus, particularly life sciences and maybe deep tech, or with an early stage, company building business model. Few, if any, expect to invest beyond Series A and so expect other investors to come in at a later stage.

Those VCs which are active in investing in spin outs either have a very focused sector interest (especially in life sciences) or have a business model which involves managing university investment funds or otherwise working closely with universities.

Pre-start and Pipeline

Few investors have good visibility of the pipeline of possible spin out opportunities and some note that closer relationships with research departments as well as TTOs would be advantageous in this respect. Investors have much to offer even at the pre-start stage and can provide valuable advice on market potential, and on how best to structure spin outs to maximise their chances of future success. Indeed, many of the issues that affect the willingness of investors to invest in spin outs relate to decisions made in the early stages. Mechanisms to engage investors at the early stages are therefore worth consideration.

Non-Dilutive Funding

While early stage investors such as angels and the specialists are willing to take greater risks, they will not invest in pure research. Instead they require some de-risking of new technologies. This requires translational and non-dilutive funding.

Non-dilutive funding (i.e. grants provided to incorporated businesses) is widely recognised as crucial to the success of spin outs. This would include, for example, funding like HGSP, SMART or the Innovate UK Funds (including ICURe) and there is some crossover with translational funding (for example, SMART awards for feasibility can be made on the condition that a company is formed).

However, non-dilutive funding is generally more clearly focussed on (and used for) commercialisation while translational funding as reported as sometimes used to continue research. Both have a critical role to play, but non-dilutive funding is essential for market and commercial de-risking, and investors consistently identified this as important for creating investable assets and manging future risk.

Like translational funding, non-dilutive funding is available, but is similarly competitive. Some sources such as SE's grant funding are under pressure and budgets are not keeping pace with demand.

Many of the interviewees felt that there is a case to be made here for more funding, but also that this should recognise the different needs of different companies – in particular the capital-intensive needs of life sciences.

Deal Terms

As noted above, the research suggests that universities in Scotland tend towards an average equity position of 20% pre investment and indeed we found examples where the stake was lower. This is broadly consistent with the rest of the UK.

However, investors consistently reported that universities tend to over value their IP, and that it is important to consider not just the equity stake, but the whole package, including licencing and access to university resources. Universities are often perceived to be seeking to maximise their position in every part of the deal sometimes at the expense of the company's future prospects. In particular, investors noted the need, in addition to a reasonable approach to equity, to have commercially appealing terms for licencing and the assignation of IP to the company. The right deal at the outset can certainly make a difference later on when the company is seeking Series A/ B investment.

There was support for the development of a set of standard terms and agreements that could help reduce the time it takes to negotiate early stage deals. This does not mean standardising all deals – each case will be different – but rather it is intended to provide a 'landing zone' to speed negotiation and the USIT Guide produced by TENU was considered a good starting point.

Commercial Expertise

The availability of high quality commercial management talent for spin outs was also an issue for investors. As noted, investors typically stress the importance of the management team in making a company investable. There is a clear need to expand the pool of high quality managers for spin outs in Scotland and this is again an area in which investors can help. Similarly, some of the investors also noted that spin outs can have various advisers attached, often with equity shares which they felt outweighed their utility. This was considered off putting and again underlines the importance of getting the initial set up right.

Summary

The issues affecting investment into spin outs are:

- the quality of the technology/ idea and its market potential (demonstrated through translation and non-dilutive funding support, such that it is sufficiently de-risked);
- commercially acceptable deal terms on equity (20% or less), licencing and assignation of IP (not setting royalties and assignation thresholds too high) and access to university resources – these should be agreed such that the company's chances of future investment and growth are maximised; and

- the quality of the management team, including commercial as well as technical talent.

In each of these three broad areas, we found no evidence to suggest that Scotland is particularly disadvantaged relative to other regions with the exception of the third – commercial talent. However, university approaches to the deal terms remain inconsistent and there is scope here for further improvement and alignment.

8.3.3 Larger Capital

As shown, it is in the attraction of larger investment deals that Scotland appears to do less well than its comparators, even if the differences are perhaps less marked than sometimes supposed (unless compared to the Golden Triangle).

This partly reflects the make up of the equity risk capital market in Scotland which is slanted towards angels and the early stage market. Scotland has fewer VCs focussed on the Scottish market, and spin outs reported having to seek larger investment outwith Scotland. This is a more systemic issue which may not be related solely to the spin out market.

Nonetheless, a consistent finding was that areas such as the Golden Triangle (and parts of the US like the Bay Area and Boston) are differentiated by the sheer weight of investment capital that is available. This enables more risk taking on the part of investors and can help catalyse the development of the wider ecosystems that support commercialisation.

8.3.4 University Funds

A couple of the Scottish universities have their own funds to invest in spin outs, but these are relatively small and in investment terms may be considered sub-optimal. They are certainly useful and are well received by the wider investment community.

However, in order to develop a significant investment fund for spin outs in Scotland, possibly addressing the gap in the £2m-£5m range, this would need to operate across multiple (all) institutions. This may be a fruitful area of institutional collaboration, perhaps similar to the model developed in Ireland with the University Bridge Fund or in regions of England (e.g. Northern Gritstone or Midlands Mindforge).

8.4 Strategic Considerations

In addition to the review findings above, we would also raise three issues of a more strategic nature.

The first relates to the economic development benefits of investing in spin outs. As shown, life sciences continue to dominate the spin out landscape, which is unsurprising given both the research strengths in

Scottish universities and the strong alignment of life sciences business models with the spin out route. However, many of these companies, particularly in therapeutics and diagnostics, are capital intensive yet create only a modest number of (albeit high value) jobs. Indeed, outsourcing is widespread in the sector, and some may be closer to virtual companies. Then, at the point of exit the companies may seek a trade sale to global pharma resulting in both the IP and the jobs relocating outwith Scotland.

Of course, this will not be the case with every spin out in the sector, and there are other good reasons to support these companies. Indeed this example is not intended to suggest that these companies should not be supported, but rather to illustrate that these are not the only opportunities. If the goal is economic benefit in the form of employment creation, then some of the smaller universities may have much to offer by creating spin outs that are more regionally based with different investment needs and business models. They may not create the big investment returns (or headlines) of life sciences, but they may create more in the way of regional employment.

The issue here is that the current system is not always aligned to these goals, particularly mechanisms such as the allocation of commercialisation funding and support to institutions. There is also a lack of reliable information to track the performance and impact of these companies on the Scottish economy.

The second issue that we would raise is that spin outs cover a broad range of sectors from life sciences to tech and engineering to renewables. These each have different business models and different investment requirements, which need further consideration when looking at recommendations. For example, as discussed, areas of life sciences clearly lend themselves well to a spin out model, while some areas of software may be better suited to start-up or 'walk out' models in which universities have less of a formal stake. Both are of value but require different approaches.

Similarly the quantum of finance required for some areas of life sciences is far greater than in other sectors, hence investment needs will be very different. What works for one sector may not be needed in another.

The final issue we would also raise is that of equality and diversity. The evidence here is clear that both women and minorities are significantly under-represented in spin outs. This is clearly an issue of equity, but also one of missed opportunity. It should be a strategic priority to address this imbalance and ensure that the full range of entrepreneurial research talent feels that a spin out route is open to them.

8.5 Recommendations

Based on the research findings we have identified a number of areas for further consideration. We recognise that many require investment at a time of great pressure on university and public finances. That is unavoidable and while the current research does not allow for detailed assessment of costs and

benefits, we believe that targeted investment into the development of high growth spin outs (and start-ups) will deliver meaningful economic development returns.

It is also worth noting that there is no single 'top-down' solution that will result in Scotland producing more spin outs and more high-quality spinouts. Rather, action will be required on multiple fronts from a range of actors in the Scottish innovation system. Few, if any, of the recommendations are within the direct gift of any one organisation.

Our recommendations address three broad areas:

- growing the pipeline of spin out (and commercialisation) opportunities;
- developing more investable assets and ideas; and
- improving access to investment capital.

The recommendations are targeted both at increasing the number of spin outs created in Scotland, and the ability of those spin outs to raise investment capital. If implemented, they should result in an increase the number of spin outs from Scottish universities, and in the number of high quality, investable spin outs and an increase in the scale of the funding and investment capital available to those spin outs.

8.5.1 Growing the Pipeline

We have not focussed here on measures to support university research activity save to note the fundamental importance of maintaining Scotland's high quality science base. Feeding the commercialisation pipeline is only one reason for doing so.

Academic Community

Spin outs start with the academics. Growing the pipeline must therefore begin with creating an environment in which researchers are encouraged and supported to pursue commercialisation. While academic career pathways do increasingly recognise and encourage commercialisation, there is more to be done, and institutions should consider how they can do this within the academic career structures and reward systems that exist.

At an institutional level, socialising academic research communities is key, providing information and reassurances that spinning out a company need not (and should not) mean an end to academic careers. Indeed, academics should be encouraged to return to research post spin out and mechanisms such as secondments and sabbaticals can help.

There should be greater awareness of the spin out process and what it entails along with clear direction that support with the business aspects will be provided by the TTO and commercial management team rather than the academic founders.

There has been growing interest in the use of Entrepreneurs in Residence, and there is a Royal Society scheme which aims to increase the knowledge and awareness in UK universities of cutting-edge industrial science, research and innovation. This is also an approach worth considering.

Recommendation 1: institutions should support and encourage academic researchers to pursue commercialisation opportunities, including spin outs, taking account of the suggestions outlined above. The Scottish Government's Entrepreneurial Campus work provides a useful framework.

Lead academics rarely transfer completely into spin out companies. However, there may be a need for some entrepreneurship support also for post-docs and PhDs, who are more likely to transfer into the new company.

Recommendation 2: training in entrepreneurship should be extended to include post-docs and PhDs working in the research groups that are producing innovations with commercial potential.

Diversity

Both of these areas should also consider how to increase diversity within the spin out community. In particular, addressing the gender imbalance should be a priority and institutions should consider how best to encourage more female researchers into commercialisation. Gender specific programmes of awareness raising and training, networks for female academic entrepreneurs and case study examples are all mechanisms to consider.

Recommendation 3: programmes to raise awareness, inform, inspire and socialise the research community should include specific actions to encourage more female academics to participate and to increase the wider diversity of the spin out pool. It should be noted that there is already some activity in this area.

Pipeline Management

TTOs do not generally have the resources or expertise to be able to scan for and identify potential commercial opportunities to feed into a pipeline. This is more effectively done at the level of research groups, departments, schools or possibly faculties where the scientific expertise resides. Establishing structures for doing this within key research communities also has the benefit of raising the profile of commercialisation and supporting the socialisation work mentioned above.

These structures should also have a direct line of communication with the investment community, as this can help bring market knowledge to the identification and assessment of very early-stage opportunities. The TTOs would of course retain an advisory and support role in relation to commercial and business aspects.

Recommendation 4: key research communities and groups with the potential to generate more commercial opportunities should consider establishing pipeline identification and management structures in partnership with their TTOs.

Expanding the commercialisation pool

Commercialisation is highly concentrated in a small number of institutions, and this is reinforced by funding allocations which reward past performance rather than incentivise future ambitions. While the largest gains will continue to come from the leading institutions (and there is no argument to reduce their funding) support for smaller universities to develop more commercialisation is lacking. As discussed, this risks missing opportunities to spin out companies that while unlikely to be the unicorns that may emerge from the research intensives, could nonetheless be important in terms of regional economic development and employment.

Recommendation 5: consideration should be given to how to incentivise more commercialisation and spin outs from smaller institutions which lack the resources to invest to the necessary level. This may have implications for how mechanisms such as the University Innovation Fund are used.

Recommendation 6: collaborative models from elsewhere suggest that universities working together can develop scale and share good practice in commercialisation and enterprise support. There is merit in exploring the potential for such collaborations in Scotland.

This point is also consistent with the recommendation of the Muscatelli Report which states:

"Universities should encourage greater collaboration (and where appropriate specialisation) between their knowledge exchange and innovation activities. This may involve regional hub-and-spoke models, which would involve the larger HEIs with greater capacity to engage and co-ordinate innovation activities taking the lead."[42]

8.5.2 Developing more investable assets and ideas

The fundamental issue is that Scotland is failing to convert enough of its high-quality research output into investable commercial propositions. This is not unique to Scotland (the English regions and Wales are similar), but it represents untapped potential. Recommendations here impact both of the creation of more spin outs but also on the ability of spin outs in Scotland to raise investment.

[42] *The Muscatelli Report: Driving Innovation in Scotland – a National Mission*, Muscatelli, A. 2019, p20.

Funding

Bridging the gap between academic research and investable propositions and assets needs funding. This is territory of translational research funding and proof of concept support, and both are in increasingly short supply.

We have also noted that a number of universities in England now have dedicated teams working with researchers to secure translational funding and this is a model that could be replicated more widely in Scotland.

Recommendation 7: TTOs should dedicate resources to working with researchers to secure essential translational funding.

Beyond working to secure a greater share of a diminishing pot, there may also be an opportunity to develop a relatively modest Proof of Concept Fund. This could be structured such that it can support opportunities in any university in Scotland but should not be managed within any one institution. Indeed, decision making should certainly make use of commercial expertise from industry and the investment community. A proposal for such a fund targeting life sciences opportunities already exists (proposed by the University of Dundee) and we believe that it has merit not least as a relatively modest investment of c. £5m could unlock very significant levels of private sector investment into spin out companies.

Recommendation 8: The Scottish Government and its agencies should give consideration to the Proof of Concept Fund proposal that has been developed within the University of Dundee.

The other area in which there is a reported need for more resource is in non-dilutive funding. Again, Scotland could establish mechanisms to help secure a greater share of available UK resources such as Innovate UK grants. In Scotland the High Growth Spin Out Programme at SE was highly praised but universally considered to be under resourced.

Recommendation 9: There is a case to be made for increasing the resources available to the HGSP as a means of supporting commercialisation and early-stage spin out companies. Similar arguments could be made for SMART awards.

Commercial Input

Commercial expertise is essential to the success of spin outs and should be introduced at an early stage. Commercial input can help clarify market focus and customer needs, develop robust business plans and engage investors and there is no doubt that such expertise is in short supply in Scotland. Some of the TTOs have active networks as do investors and these should be used to harness the pool of commercial talent to support spin outs.

It is also important that spin outs assemble the right management team with commercial and entrepreneurial experience working alongside the technical knowledge.

Recommendation 10: Commercial expertise should be input to the spin out at an early stage and certainly by Proof of Concept stage to ensure that the proposition develops in line with market demand and opportunity. Some universities are pursuing this but to what effect is unclear. Early engagement with investors can also help with this.

Role of the TTOs

Gated processes are increasingly the preferred model in TTOs actively pursuing commercialisation opportunities, and these have the advantage of raising the quality bar on spin outs. The result, hopefully, is that the companies that do spin out, having met the defined criteria at each stage in the process, have a better chance of raising investment and achieving growth. This is critical, as growing the pipeline is only of strategic value if it is a pipeline of high quality, investable prospects.

There is also merit in seeking to develop a more standardised set of agreements and processes to reduce the negotiation time on spin out deals. This does not mean constraining TTOs to a narrow set of parameters but is more akin to the approach set out in the TenU USIT Guide which proposes an impact first principle and a 'landing zone' set of terms to facilitate quicker agreement.

This also includes a realistic approach to equity stakes and licensing terms such that the company is given the best chance of securing investment and sustaining growth.

It is clear that many of the TTOs are under resourced and under pressure to deliver often short-term results. This is detrimental to an effective approach to spin out creation as the returns are inevitably longer term. Instead, TTOs should be incentivised to create long term value by supporting the creation of successful scalable companies rather than delivering short term outcomes.

Recommendation 11: TTOs make use of the USIT Guide to negotiating spin out deals as a means of enabling quicker agreements and adopting an impact first approach. This includes reasonable expectation regarding equity stakes, licencing arrangements and access to university resources.

This also raises the issues of the resources available to TTOs. Adopting the good practice elements identified above would likely stretch considerably the resources of many if not most TTOs, and the Scottish Funding Council may wish to consider expanding the University Innovation Fund to incentivise universities in this respect.

Recommendation 12: Consider increasing the incentives to universities to invest in their TTOs and the processes supporting spin out creation.

8.5.3 Improving access to investment capital

The findings suggest that one of the major constraints in the Scottish ecosystem is that it lacks sufficient weight of capital. The game changing effect of Oxford Science Enterprise's (OSE) £600m investment fund

is an example of this, but so is the University Bridge Fund (UBF) in Ireland, which is on a smaller scale (60m Euro), and Northern Gritstone in the North of England or Midlands Mindforge in the Midlands.

Two possible avenues to increasing the volume of investment capital could be:

- seek to establish a fund for investment in spin outs (and start-ups) from Scottish universities along similar lines to the University Bridge Fund; and
- work to attract existing investors to set up offices in Scotland with a focus on those that will participate in the larger deals for which most spin outs currently have to look elsewhere.

The first approach may offer a quicker impact. For example, the University Bridge Fund took around two years to establish including raising the funds. This would require collaboration between the leading HEIs, and a willingness on their part to invest themselves into the Fund. It should be a venture building fund, willing to play an active role in building genuinely scalable businesses and would require deep commercial expertise. The impact of such a Fund could be significant and would also be a visible signal of intent and confidence in the Scottish spin out market. This in turn could help attract commercial talent and investors.

The reference in *Scotland's National Innovation Strategy* to a £100m Fund to be developed with the universities may offer a genuine opportunity to take forward this idea.

The second approach is a longer-term strategy requiring sustained effort over, say, a ten-year period. Investors are notoriously reluctant to invest time to travel to Scotland when they can find good prospects closer to home in the Golden Triangle (or in the US) so a strategy to encourage them to invest into a new fund or even set up offices here would require careful thought and design. Again, however the impact would be very significant indeed if this brought sufficient weight of capital to Scotland to start to develop some critical mass.

Recommendation 13: Consideration should be given to the potential to establish a cross university fund drawing on the learning from examples such as the University Bridge Fund, Midlands Mindforge and Northern Gritstone.

8.5.4 Data

On a final note, we would concur with the recommendation of the UK Spin Out Review that there is a need for greater transparency and consistency in the reporting of spin outs and that the HESA review of the Higher Education Business and Community Interaction Survey provides an opportunity to address this.

Recommendation 14: The HESA review of the Higher Education Business and Community Interaction (HE-BCI) dataset must present solutions to improve the reliability of data on spin outs, and universities

should align with the recommendations arising from that review. There is also a related need for better data to track the longer-term performance of spin outs and their impact on the Scottish economy.

8.6 Final Comments

The recommendations above are intended to provide a broad framework and we are aware that many will require further development and appraisal.

Some may fall at this hurdle and others may change focus and direction. Some areas may require, or at least benefit from, policy support while others will be more within the direct gift of universities or other actors in the Scottish innovation ecosystem. They have all emerged from an objective interpretation of the views of a substantial cross section of those involved in the spin out landscape in Scotland.

Scotland's National Innovation Strategy proposes the development of a new research commercialisation framework. We hope that the findings and recommendations of this research are a useful input to that process.

Appendix 1: Stakeholders

Spin Outs
Albasense
Bellrock Technology Limited
BioCaptiva
Calcivis Limited
Carbogenics Ltd
Celtic Renewables Limited
Clyde Biosciences Limited
Cyacomb Ltd (Formerly Cyan Forensics Ltd)
Fitabeo Therapeutics Limited
Fixed Phage Limited
Green Bioactives Ltd
Insignia Technologies
Kenoteq
Lupovis
Lustre Skin Ltd (formerly Ambicare Health Limited formerly Lumicure)
Net AI Tech
Mironid Limited
Wobble Genomics
Ocutec Limited
PlanSea Solutions Limited
Pneumagen (Holdings)
PowerPhotonic Limited
Reactec Limited
Roslin Technologies Limited
Sofant Technologies Ltd
Tay Therapeutics Ltd (formerly In4Derm Ltd)
uFraction8 Limited
Wellfish Diagnostics Limited
Caldan Therapeutics Ltd
Dimensional Imaging Limited
Nitech Solutions Limited
Vector Photonics Limited
Bennu.ai
Synaptec Ltd
Chromacity Limited
Pure LiFi Ltd (Formerly PureVLC Ltd)
Caldan Therapeutics

Investors
Archangels
EOS
Equity Gap
Epidarex
Gabriel
Deepbridge
Shakleton
Old College Capital
Atlantic Bridge
Start Codon
SIS Ventures
Techstart Ventures
Mercia Fund Management
Strathclyde Entrepreneurs Fund
Green Angel Syndicate
Investing Women
LSIP
Frontier IP
Boehringer-Ingelheim Venture Fund
We are Pioneer Group
Octopus

Organisation
Scottish Funding Council
Scottish Government
Innovate UK
British Business Bank
KKI Associates
Scottish Enterprise

HEIs
Edinburgh
Napier
Heriot Watt
Abertay
Dundee
Glasgow
St Andrews
West Scotland
Strathclyde
Stirling

Appendix 2: HEI Funds and Support

University	Internal Fund	Other support	Total Spin Outs[43]	Innovation Grant[44] (£m'000s
Abertay University	No VC	Abertay University does not normally take a stake in Spin-Out companies and is not normally involved in any decision to create a company. But they do provide proof of concept funding for small-scale research and knowledge exchange projects, and work with Bell Street Ventures to translate research into startups and spinouts; provide opportunities for entrepreneurship and corporate co-location to facilitate collaborations between staff, students and companies See Research and Knowledge Exchange Strategy 2020-25[45]	5	0.37
Edinburgh Napier	No fund but offer support to research staff to access However, the NHS Assure Research Fund is managed by Napier.	The team helps with: • Assessments of inventions and due diligence • Obtaining appropriate IP protection • Developing the most appropriate commercialisation strategy • Supporting the formation if spinouts • Marketing and promoting licencing opportunities • Networking and making connections with investors and funders • Negotiating Licensing deals with companies See Innovation Hub[46]	14	0.60
Glasgow Caledonian	No fund but offer support to research staff to access	The Research Innovation Office (RIO) supports the University's research and innovation environment through five support units: • Helping to embed a research culture within the University and overseeing the University's REF Submission. • Supporting Social Innovation through Knowledge Exchange. • Driving innovation through KTPS and Innovation Vouchers.	4	0-.45

[43] Source Beauhurst since 2000 https://www.spinoutsuk.co.uk/listings/university-listings/

[44] SFC

[45] Abertay RKE Strategy 2020-25

[46] Innovation Hub (napier.ac.uk)

		• Specialising in International Collaboration Projects. • Finding solutions for Business in our Consultancy and Contract Research https://www.gcu.ac.uk/research/researchstrategy		
Glasgow School of Art	None	See https://www.gsainnovationschool.co.uk/	0	0.37
Heriot Watt	Heriot-Watt University have forged a £12 million partnership to encourage academic spin-off companies..	See https://www.hw.ac.uk/uk/research/our-resources.htm# Support through Edinburgh Business School https://www.hw.ac.uk/ebs/ Heriot-Watt's enterprise team offer advice for start-ups and University spin-outs across a range of business-related activities including funding options, intellectual property, finance, sales and marketing support.	34	0.73
Queen Margaret Edinburgh	None	QMU actively encourage staff, students and alumni to develop entrepreneurial skills. They believe that promoting a culture of innovation and entrepreneurialism will help build an economy for the 21st Century that benefits all. It is how we can support Scotland's ambition to become a world-class entrepreneurial and innovative nation. They foster innovation and enterprise by offering a range of activities and opportunities delivered through a Business Innovation Zone (the BIZ), a service delivered in partnership with Business Gateway.	1	0.43
Robert Gordon University	More than 180 entrepreneurial teams sought access to 2020 Startup Accelerator, and its prized programme of mentorship, development and £10,000 seed funding.	https://www.rgu.ac.uk/business-innovation/innovation-rgu/supporting-startups To grow the quality and impact of globally recognised, innovative and interdisciplinary research, we will: • Develop a strong research culture that encourages inclusivity, • collegiality and career development • Build critical mass around a focused set of interdisciplinary • thematic areas, addressing global sustainability challenges • Collaborate with public, private and third sector • organisations through knowledge exchange to • develop partnerships that create societal benefit • Grow research and knowledge exchange income • to sustain research of public value	13	0.54

Royal Conservatoire	None The Royal Conservatoire of Scotland has today launched a £10,000 fund to help kickstart new creative companies and collaborations. https://www.rcs.ac.uk/wp-content/uploads/2022/03/Innovation-Studio_Business-Ideas-Fund-Guidelines_Green-Recovery-Copy.pdf	Research at the Conservatoire is about inspiring innovative research There are two main strands of activity: • Artistic Research (Practice Research or Research in-and-through the arts) • the Performing Arts in Society https://www.rcs.ac.uk/research/welcome-to-research-and-ke-at-rcs/	0	0.32
UHI	None direct but offer support to access	UHI R&E Ltd was established by the University as a trading vehicle for the purposes of progressing commercial spin off developments, contract research, consultancy and other professional services https://www.uhi.ac.uk/en/t4-media/one-web/university/research/health/Institute-Research-Strategy.pdf	1	0.76
SRUC	None	Support for innovation in SMEs https://www.sruc.ac.uk/research/challenge-centres/	0	1.3
University of Aberdeen	The University of Aberdeen under the Aberdeen Grants Academy manages several internal funding opportunities to pump-prime research and knowledge exchange activities. https://www.abdn.ac.uk/staffnet/research/internal-funding-10569.php No dedicated internal fund but connections externally https://www.abdn.ac.uk/staffnet/research/external-funding-10568.php Spin outs policy https://www.abdn.ac.uk/staffnet/research/impact-knowledge/spinouts-ip-policy-10630.php#panel10633	Research and Innovation (R&I) provides specialist advice dedicated to maximising the University's research income, identifying intellectual property opportunities and successfully exploiting innovative ideas. The R&I team are the first point of contact for business and facilitate access to the University's expertise for Consultancy and Continuing Professional Development. R&I works closely with colleagues in the University's Schools and has detailed knowledge of their research interests and expertise. Dedicated business development resource is provided to each of the Schools. https://www.abdn.ac.uk/2040/ We aim to provide a research environment that is enabling and supportive, and that allows our researchers to achieve their full potential. This includes the protection of the physical and mental wellbeing of all our members of staff. Research and Innovation (R&I) is the main hub for supporting research activities, with the Grants Academy delivering a structured framework that provides supportive intervention throughout the research life cycle, from idea generation and grant proposal stage, to delivery of outcomes and follow on funding and impact support.	35	1.5
University of Dundee	Whatever your aims, we have a wide network of	Research & Innovation Services. Spin-outs | University of Dundee	30	0.96

	funding bodies and organisations including: • Innovate UK • Funding bodies and Research Councils • Bridging organisations • Defence organisations • World and European initiatives	https://www.dundee.ac.uk/industry/spin-outs#:~:text=We%20take%20commercially,enhancing%20intellectual%20property. • Partnerships • Innovate • Consultancy • Facilities • Licensing • Spin-outs		
University of Edinburgh	Old College Capital is the venture investment arm of the University of Edinburgh providing growth and development finance into early and mid stage spin-out and start-up companies as part of syndicated venture capital rounds. • Committed funds under management: £14m • £50m+ of partner co-investment • Average first investment £150,000 • 26 companies in portfolio	Edinburgh Innovations is the University of Edinburgh's commercialisation service. https://www.ed.ac.uk/about/strategy-2030 See also spin out support guide https://www.ed.ac.uk/files/atoms/files/eri_spin-out_support_guide.pdf	82	1.7
University of Glasgow	No internal venture fund but support to direct/ signpost through Research & Innovation Services (R&I) which is part of University Services and comprises two Directorates: Research Services and Innovation, Engagement & Economic Development. The Glasgow City-Region Innovation Accelerator - unlocking access to a share of £100 million of new funding.	The University actively supports researchers and academic staff in the creation of new ventures to bring new ideas and breakthrough innovations to market. This support ranges from licensing IP, connecting with investors and partners and facilitating the creation of spinout companies. https://www.gla.ac.uk/connect/businessandinnovation/ The University of Glasgow offers a wide range of high technology services, supported by the University's base for innovative research and knowledge. These services are available to industry at commercially competitive rates, enabling companies to address and solve key technical challenges, increase product performance, and improve business operations. https://www.gla.ac.uk/research/strategy/ourstrategy/	41	1.8

University of St Andrews	Research and Innovation Services operate a series of internal funding schemes: • St Andrews Interdisciplinary Research Support (STAIRS) • STAIRS Funded Projects 2021 (PDF) • St Andrews Leadership Initiative for Tailored Support (LIFTS) • St Andrews Innovation Fellowship Impact funding Impact and innovation funding managed by Research and Innovation Services • UKRI Harmonised Impact Acceleration Accounts • University of St Andrews Impact & Innovation Fund 2022-23 • NERC Cross-disciplinary research for Discovery Science 2022-2023 • BBSRC Flexible Talent Mobility Account 4 (FTMA) 2022-2023 The Finance Department offers a support service to academics in all aspects of research awards and contracts from pre-application (idea, finding funding and costing stage) to award (contract negotiation, project account setup, invoicing and financial reporting).	We will encourage a culture of innovation and create an inclusive entrepreneurial ecosystem to enhance our impact on society and diversify and grow our research funding streams. This ecosystem will be created through the interactions of students and staff, through enterprise and entrepreneurial education, and through strong engagement with business, government, the third sector, and other funders. The University of St Andrews is a research-intensive university. Research and Innovation Services (RIS) supports research, innovation and impact activities	29	0.76

University of Stirling	No dedicated fund he University of Stirling offers a range of grants and funding to help you grow your business.	Research, Innovation and Business Engagement. https://www.stir.ac.uk/research/ The Hive is the University's student and graduate business incubator, supporting the creation of innovative and viable start-ups. Based at the University of Stirling Innovation Park. The Enterprise Programme provides opportunities and support for emerging founders to develop their ideas and create commercially viable business models. Programme is open to eligible students, staff, and alumni.	2	0.52
University of Strathclyde	https://www.strath.ac.uk/whystrathclyde/universitygovernance/committees/universitycourt/enterpriseinvestmentcommittee/ Strathclyde Inspire has a £7.5M investment fund for investment in companies created by Strathclyde students, staff, alumni, and strategic partners. Investment is also available from the Entrepreneurs Fund, The University has announced that a further £7.5M has been allocated for such investments for the period from 2020-2024. Investments are typically between £100,000-£400,000 as part of funding rounds led by established 3rd party lead investors. Investment decisions are made by the University's Enterprise and Investment Committee which is a committee of the University Court.	The Innovation and Industry Engagement Directorate is at the centre of Strathclyde's strategic commitment to delivering global economic and societal impact. Working with entrepreneurs, academics and external business partners, our aim is to support the formation and growth of commercial opportunities and to facilitate new partnerships between these communities. Four dedicated research centres https://www.strath.ac.uk/research/ https://www.strath.ac.uk/workwithus/innovationentrepreneurship/ https://www.strath.ac.uk/media/1newwebsite/strathclydeinspire/Entrepreneurship_Strategy_2020-2025.pdf	61	1.4
University of the West of Scotland	None but signposted to other internal and external sources	The UWS academic portal features the research and enterprise activities within the University of the West of Scotland and highlights the particular teaching interests and skills of our academics and postgraduate research students. https://research-portal.uws.ac.uk/	0	0.49