

# **Global Capital Investment Plan**

## **Analytical Methodology Note**



**Scottish Government**  
Riaghaltas na h-Alba  
gov.scot

**Trade and Investment Analysis**  
**Business, Investment and Trade Economics**  
**Office of the Chief Economic Adviser**

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## 1. Introduction

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1. This note sets out the methodology underlying “Investing with Purpose: Scotland’s Global Capital Investment Plan”.
2. The analysis was led by the Office of the Chief Economic Adviser (OCEA) and carried out by an analytical working group drawn from OCEA, Scottish Enterprise and Scottish Development International.
3. The plan is evidence-led and is based on a detailed programme of analysis. This analysis draws on a number of data sets, including from Scottish Government statistics, the Office for National Statistics, Pitchbook, OECD, Ryden and Beauhurst, which were interrogated to:
  - build our understanding of the impacts of capital investment on the economy;
  - to identify our areas of current and future competitive and comparative advantage; and,
  - to understand the types of projects likely to deliver the widest range of benefits.
4. The plan also draws on the economic literature on capital investment, as well as previous analytical work undertaken for the Scottish Government Inward Investment Plan. The relevant literature is summarised in section 3 of this methodology note.
5. The objective of the analysis has been to comprehensively review Scotland’s approach to private capital investment and to consider how investment can best help realise the Scottish Government’s objectives for a resilient, inclusive economy. The plan aims to maximise the benefits of capital investment to Scotland’s economy, supporting the delivery of sustainable and inclusive growth.
6. The plan forms a key pillar in the evidence-led suite of policies and actions aimed at further strengthening and internationalising Scotland’s economy. The analysis underlying it has been developed to be complementary to the analysis in Scotland’s export plan [A Trading Nation](#), [Inward Investment Plan](#) and [Vision for Trade](#).
7. This technical note is split into 5 sections. This section, Section 1, introduces the note. Section 2 defines capital investment for the purposes of the plan and sets out the data used for the analysis. Section 3 explains the benefits of capital investment, and the market failures which the plan aims to address. Section 4 sets out an analysis of Scotland’s current capital investment performance and modelling of the impacts of increased investment.. Finally, Section 5 describes the analysis underlying the selection of the four priority areas.

## 2. Data and Definitions

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### 2.1 Defining capital investment

8. In the Global Capital Investment Plan, private capital investment is defined as investment, such as debt or equity finance, by private investors into a business, project or asset. This includes investment in business growth, infrastructure and real estate.
9. For the purposes of analysing capital investment, it is important to distinguish between the two definitions of investment – the financial and economic definition.
  - The economic definition focuses on investment in new long-term assets (such as new office buildings, wind farms or business machinery) which help produce more output in the future.
  - The financial definition centres around flows of funding into a business or project to help realise its goals (such as providing finance to an innovative business to help it grow).
10. While there is a large degree of overlap, there are important differences between these definitions. In particular, some investment under the financial definition may not necessarily yield wider economic value, but rather represent changing ownership of existing assets. The focus of the plan is private capital investment which drives increased economic activity, rather than driving financial transactions that don't generate wider economic value. In other words, it aims to support financial investment as a means to achieving wider economic impact and supporting recovery – bringing the financial definition to bear on the economic one.
11. For the purposes of this analysis we consider private capital investment as being distinct from inward or foreign direct investment. Inward investment involves a company or institution headquartered outside of Scotland establishing or expanding operations within Scotland. Private capital investment, by contrast, involves debt or equity financing in a business, project, or development.
12. Another key distinction to note is between private and public capital investment. The Global Capital Investment Plan is not a plan to lever private investment into core public services but rather to increase the flow of private capital into areas where it is already present, or where the Scottish Government's vision for infrastructure, as set out in Scotland's Infrastructure Investment Plan, has identified that private capital can support resilience and enable inclusive, and sustainable growth. Annex 1 sets out the areas of infrastructure considered in scope for the plan.

### 2.2 Data sources

13. The plan draws on a number of different data sources, however the primary data sources are the Scottish Government Quarterly National Accounts Scotland (QNAS) for the economic definition and Pitchbook for the financial definition. Pitchbook compiles detailed data on capital investment deals across the world. The data can be presented at company, deal or investor level and captures the amount invested, the source and destination geographies. The database contains historic data dating back to 2002 and is updated on an ongoing basis.
14. Other data sources used are referenced throughout this note.

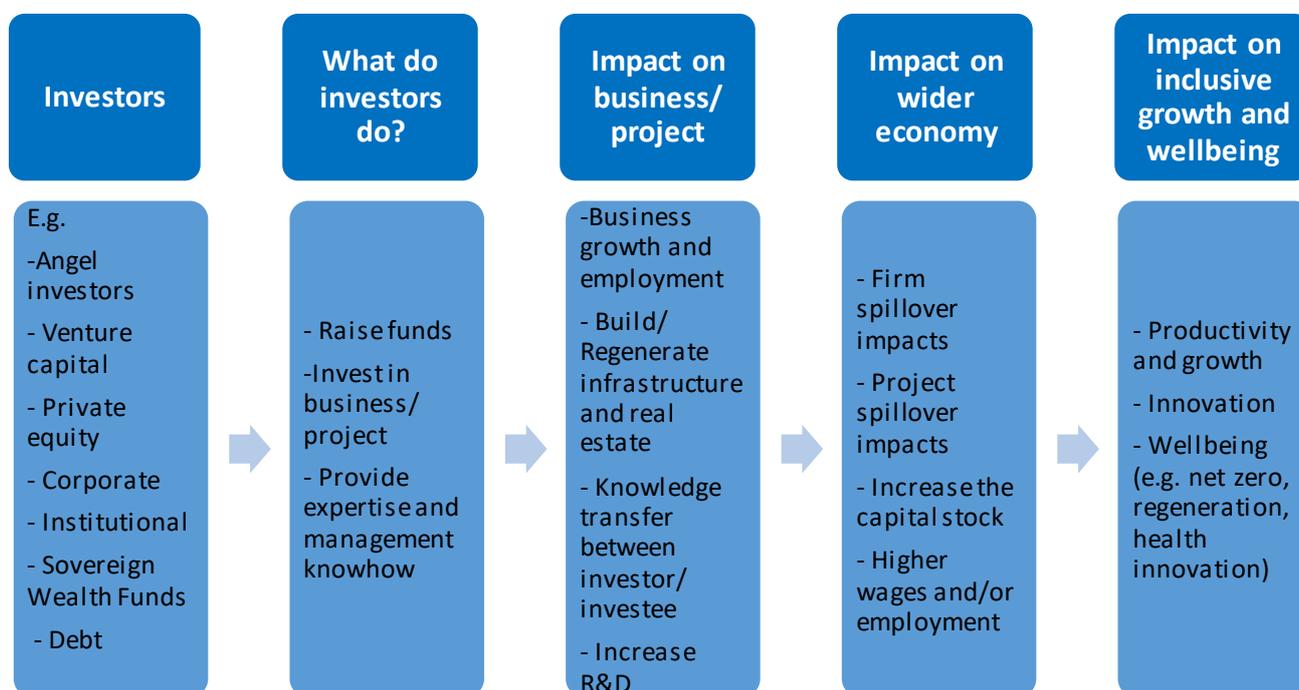
### 3. Economic Rationale for the Global Capital Investment Plan

15. As described above, the Scottish Government and agency partners have taken this opportunity to conduct an evidence-led review, starting from first principles, of Scotland's performance at attracting capital investment and realising wider economic benefits from that investment, in line with the values and priorities set out in the main document.
16. The starting point of this review is to consider the rationale for a capital investment plan. This section first sets out a framework which explains how investment impacts Scotland's economy, before outlining the rationale for government involvement in the capital investment market.

#### 3.1 A Framework for Understanding the Economic Impacts of Investment on the Scottish Economy

17. To understand the impact that private capital investment has on the economy, it is important to have a clear framework for outlining the different types of investors, what they do and what the impacts of their investment activity are – both directly and the wider spillover benefits to society and our environment (Figure 1).

Figure 1 – Framework for how capital investment impacts on the economy



#### Investors

18. Investors come in many different shapes and sizes from individual investors (e.g. angel investors) to groups of investors who pool together resources from a number of sources (e.g. angel syndicates, private equity, venture capital funds, institutional investors). Depending on the size, goals and strategy of the investor, they will target different types of assets or areas of the market. For instance, angel investors tend to invest in small, high potential start-up firms, while private equity firms tend

to invest in more mature businesses, and sovereign wealth funds in large infrastructure projects.

### **What do investors do?**

19. Investors raise funds which they then invest into companies of different sizes and at different stages of their growth cycle, or into different development stages of projects such as infrastructure or real estate. Investors also often bring additional benefits of managerial expertise, market knowledge, specialised industry knowhow and networks to the companies they invest in. For example, they can improve the management information systems and enhance the corporate governance of investee companies and introduce performance-based incentives.<sup>1</sup>

### **The impact of capital investment on businesses and projects**

20. Private capital investment promotes the creation of new businesses and helps businesses to realise their growth ambitions by removing a key barrier to expansion. Investors who bring market experience or industry knowledge can have a positive impact on the operating performance of investee companies and projects in terms of profitability and growth. Investing in research and development for new products and processes boosts innovation, as does supporting start-ups and early stage companies. Investment in companies to implement restructuring measures can enhance their productivity and thus help them to survive.
21. Investment in projects, such as infrastructure and real estate, help businesses to operate more efficiently, increase productivity and attract talent. These projects also create economic activity through project construction and ongoing asset management. Investment may restore and regenerate unproductive assets, such as derelict buildings, for a new purpose, providing wider benefits to communities.

### **The impact of capital investment on the wider economy**

22. Capital investment can have spillover benefits on the wider economy, that are enjoyed by unrelated third parties to the investee business or project. For instance, a business growing, becoming more entrepreneurial or innovative has demonstration effects on other firms in the sector that can use the blueprint to improve their activities. There can be 'competition' effects where growth within a business leads to other businesses becoming more competitive and productive over time. Estimates by Oxford Economics in 2015 found that firms with angel and venture investment backing contributed around £30 billion to UK GDP, with around half accounted for by "indirect" channels such as supply chain impacts.<sup>2</sup> The Scottish Government's modelling for delivering the National Infrastructure Mission also reveals strong evidence of the link between infrastructure spending and improved economic growth.<sup>3</sup> An investment-led stimulus has both a short term

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<sup>1</sup> For further examples of different types of investor activities in private equity markets see Frontier Economics (2013). Exploring the impact of private equity on economic growth in Europe.

<sup>2</sup> Oxford Economics (2017) The Contribution to the UK Economy of Firms using Venture Capital and Business Angel Finance. April 2017 [PowerPoint Presentation \(bvca.co.uk\)](http://bvca.co.uk).

<sup>3</sup> Scottish Governemnt (2018). [Infrastructure investment: evidence summary - gov.scot \(www.gov.scot\)](http://www.gov.scot)

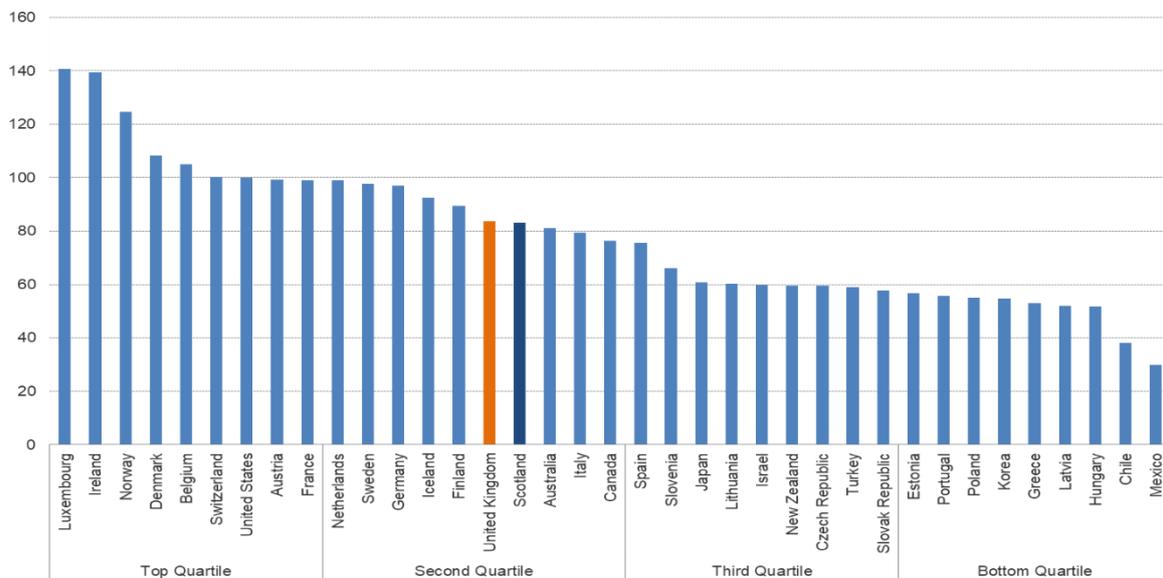
demand effect but also a longer term supply effect by increasing the long term productive capacity of the economy, enhancing productivity and wages and/or employment.

### The impact of capital investment on productivity

23. Productivity performance is the most important determinant over time of growth in living standards. As Paul Krugman set out in his famous quote, “Productivity isn’t everything, but in the long run it is almost everything. A country’s ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker”.<sup>4</sup> Analysis of productivity drivers show that while Scotland performs well in relative terms with respect to inputs such as skills, there is a case to be made that lower levels of capital investment – in businesses and infrastructure - is one of the reasons why Scotland, and the UK, lag behind other economies in terms of productivity growth.

24. Scotland currently ranks in the 2nd quartile of OECD nations for GDP per hour worked, a key indicator of productivity (Figure 2). Scotland’s productivity growth, while higher than that of the UK in recent years, lags behind international competitors. In nearly every OECD country where productivity is above the Scottish level, annual average wages are also higher. On average for every 1% increase in productivity, annual wages increase by around 0.8% across OECD countries. If Scotland’s productivity matched that of the OECD top quartile, annual wages could be almost £3,850 or 10% higher.<sup>5</sup>

Figure 2 – OECD productivity quartiles, GDP per hour worked (USA = 100), 2018



Source: Scottish Government

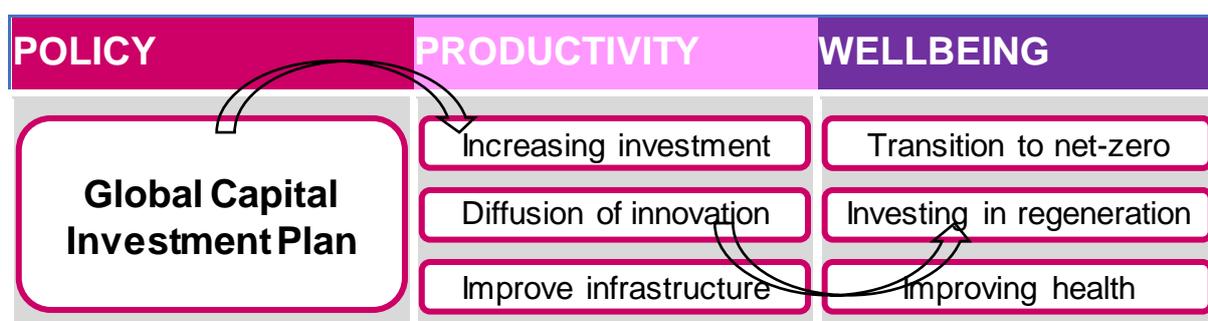
### The impact of capital investment on wellbeing

<sup>4</sup> Krugman, P. *The Age of Diminished Expectations*. 1990.

<sup>5</sup> Richmond, K and Turnbull, J. *Scotland’s Productivity Performance: latest data and insights*. Fraser of Allander Economic Commentary Vol. 39, No. 2, 11.2015, p. 77-90

25. Investment can create high quality jobs, which supports our inclusive growth ambitions and improves wellbeing (Figure 3). Private investment in innovative businesses and infrastructure can have an impact on wider social goals by, for example, improving digital connectivity and supporting health innovation. Increasing, directing and sustaining investment in the low carbon economy now will accelerate the transition to Net Zero. Not only will this reduce the impacts of climate change, it will also serve to create new industries, and improve air quality and health outcomes. The spillover impacts may deliver greater wellbeing or community impact.

Figure 3 – Global Capital Investment Plan wider impacts



### 3.2 Market failures in the market for capital investment

26. This section outlines why Government has a role in the capital investment market, helping connect the supply and demand of capital and helping stimulate investments that have wider social impacts. In other words, there are “market failures” that exist and the government can potentially improve outcomes through some form of intervention in the market.

27. Here, the term market failure is used to describe a circumstance in which there are potential economic benefits that the private sector would not realise in the absence of government intervention.

28. A number of different market failures exist in the capital investment market that justify government intervention. Indeed, the Scottish Government and supporting agencies already have many policy responses that aim to correct for market failures. Most of the market failures are relevant to a particular area of the investment market, whether that be business finance, infrastructure or real estate. These include:

- **Information failures:** When, during a transaction, one party has better information than the other, or information is costly, this can make judging the risk and return of investments difficult. This is called “information asymmetry”. For the lender (the supplier of finance), this makes it difficult to distinguish between high and low risk firms/investments without incurring significant costs in due diligence procedures. For the borrower (the demander of finance), this makes it difficult to find information on sources of funding available. Evidence suggests that information failures can lead to gaps in business investment for certain types of businesses, such as small businesses, start-ups, innovative and high growth firms. Government can overcome this market failure through

producing market information, providing consultancy for businesses, or through de-risking the investment process for investors (to overcome a lack of information).

- Externalities: an externality is a cost or benefit that is imposed on a third party who did not agree to incur that cost or benefit. Externalities mean that the social costs and benefits of capital investment (e.g. supply chain or social impacts) may not be fully realised by the investor, and so will not be priced in to an investment decision. For example, a business producing renewable energy technologies may contribute towards reducing carbon emissions, or investment in digital infrastructure may create new technologies that help improve broadband access for local businesses and residents. One estimate puts the total social benefit of meeting Net Zero by 2050 at around £80 billion for the UK (through improved air quality, flood prevention and better health).<sup>6</sup>
- Coordination failures: Capital investment in certain industries can falter due to “coordination failures”. A coordination failure occurs where the consumption or production of one good requires the consumption or production of another. Hence, if one of these related goods is missing, investment may not be viable. An example of this is the relationship between the roll out of electric vehicle charging infrastructure, renewable energy and electric vehicles. Coordination failure is also apparent in for example the combination of energy production, hydrogen and heating infrastructure.

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<sup>6</sup> Vivid Economics (2020) Keeping us competitive: An investment strategy for Net Zero, February 2020, Vivid Economics Report prepared for WWF UK [Keepingus\\_competitive.pdf \(wwf.org.uk\)](https://www.wwf.org.uk/keeping-us-competitive).

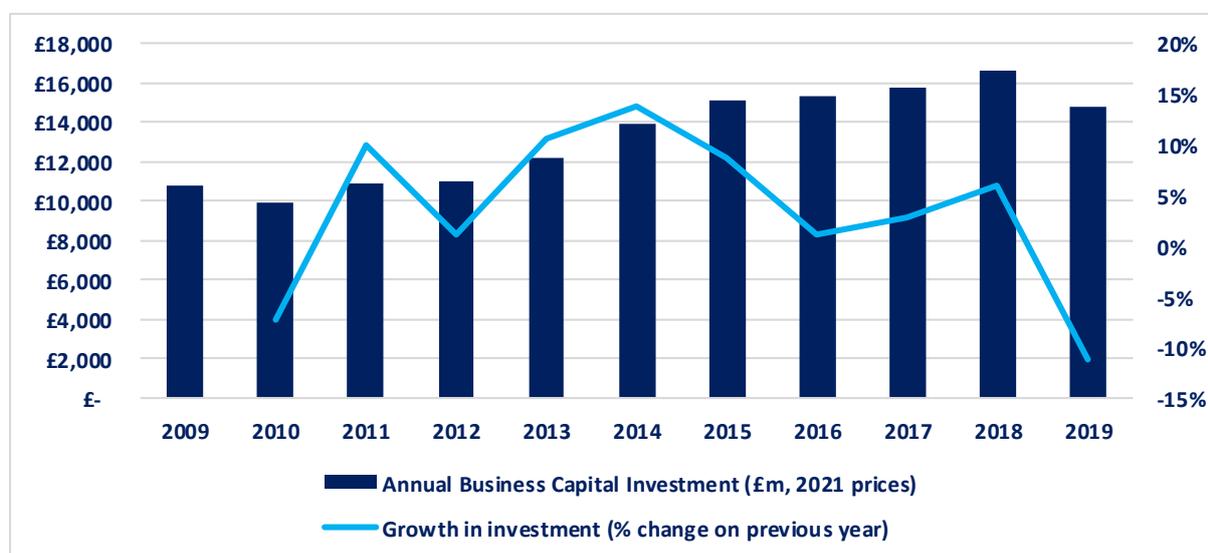
## 4. Understanding Scotland's Performance

29. Having established the economic benefits of capital investment and the market failures that justify government intervention we now turn to understanding Scotland's performance at attracting capital investment and realising wider economic benefits from that investment.
30. Scotland already benefits from significant flows of private capital investment, into businesses, infrastructure and real estate. However, there is evidence that Scotland underperforms other countries in terms of overall investment performance over the longer run. This section assesses the historic flows of investment into Scotland. Due to differing data sources, this section starts with a broad overview of investment in Scotland (section 4.1) before splitting investment into three components - business investment, private infrastructure and real estate (covered in sections 4.2 - 4.4).

### 4.1 Scotland's Headline Capital Investment Performance

31. Overall investment in the Scottish economy is measured in the [Scottish Government Quarterly National Accounts](#) under the term "business investment", or private "gross fixed capital formation". This measurement covers the economic definition of investment, as mentioned earlier in section 2.1, which relates to the investment in new long-term assets (such as new office buildings, wind farms or business machinery) which help produce more output in future.
32. Recent levels and growth in business investment, as measured by private gross fixed capital formation are shown below (Figure 4). The average annual growth figure over the most recent ten years for which data is available is 3.3%. However, this is volatile from year to year – over this period in Scotland it has ranged from negative 11% to positive 14% in real terms – reflecting the influence of large investments, for example in renewable energy, which may land in some years but not others.

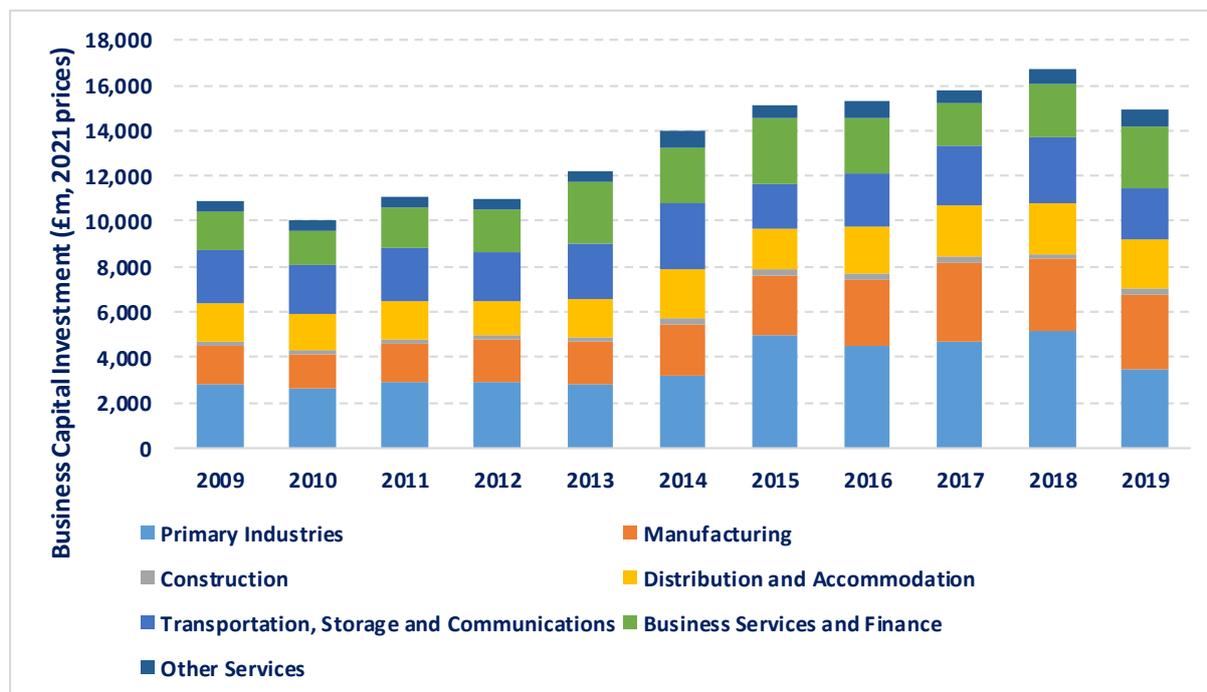
Figure 4 - Business investment in gross fixed capital formation in Scotland



Source: Quarterly National Accounts Scotland (converted to 2021 prices)

33. Figure 5 shows Scotland's overall business investment split by sector. Overall business investment has been driven by growth in most sectors in recent years, with particular increases in primary industries, manufacturing, business services and accommodation/distribution. Production sectors (manufacturing and primary industries) accounted for a disproportionately large share of business investment in 2019 (45%) compared to their share of Scotland's overall gross value added (19%), reflecting the capital intensive nature of these sectors.<sup>7</sup> Services sectors accounted for 53% of business investment in 2019, compared to 75% of Scotland's overall gross value added.

Figure 5 - Business investment in gross fixed capital formation in Scotland, by sector

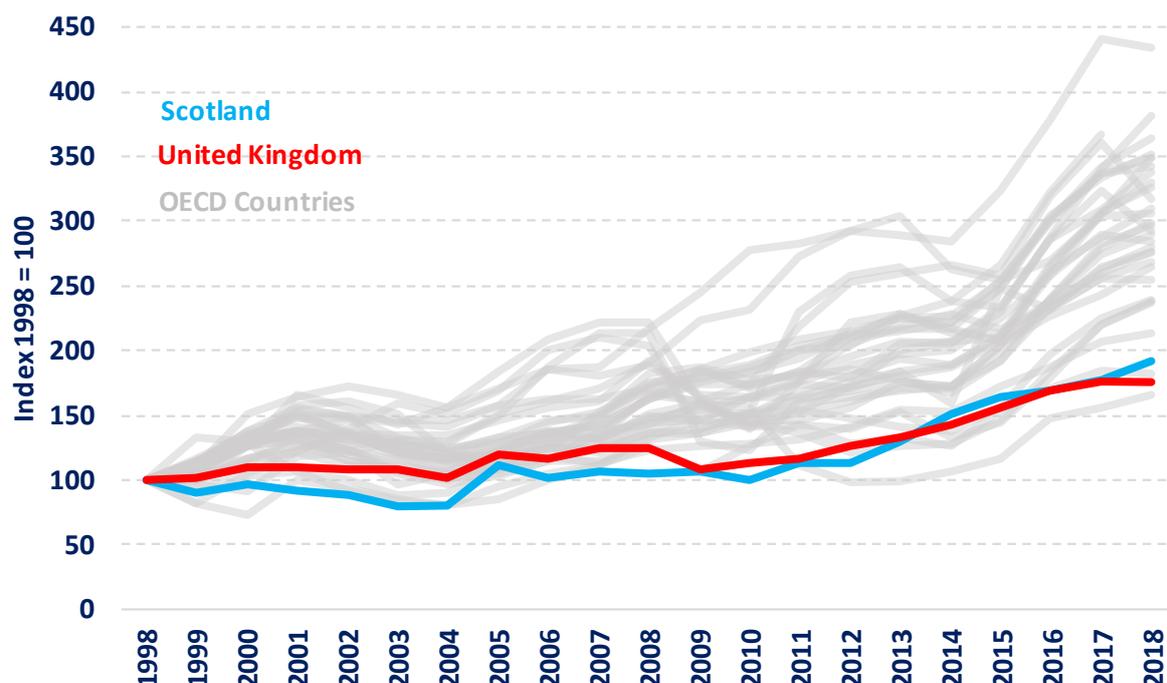


Source: Quarterly National Accounts Scotland (converted to 2021 prices)

34. Business investment (private gross fixed capital formation) can also be compared across countries (Figure 6). Scotland has seen the gap with overall UK investment close in recent years; however, the UK as a whole suffers from relatively low levels of investment. As previously stated, business investment in Scotland is generally recognised to be a factor in economic underperformance and it can be seen clearly from the chart below that growth in this investment has been lower than in most OECD countries.

<sup>7</sup> Quarterly National Accounts Scotland

Figure 6 – Business capital investment, comparing Scotland, with the UK and other OECD countries (index 1998 = 100).



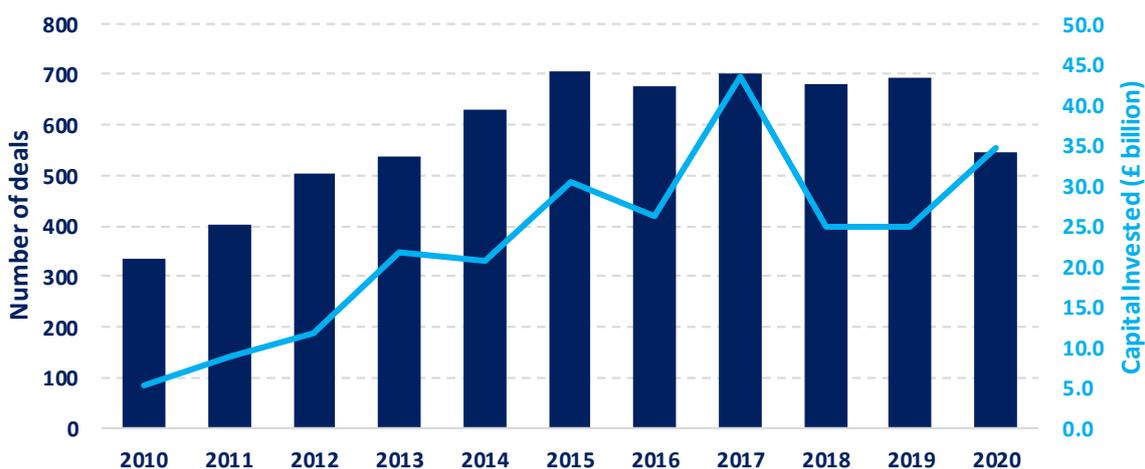
Source: Scotland (Quarterly National Accounts Scotland), UK (ONS), OECD countries (OECD). Note “business capital investment” based on national accounts measure gross fixed capital formation.

## 4.2 Enterprise Investment

35. The following sections focus mostly on the financial definition of investment in the data (unless otherwise stated). The financial definition centres around flows of funding into a business or project to help realise its goals, such as providing finance to an innovative business to help it grow.
36. According to Pitchbook data, investment into Scottish businesses across all types of investment activity (angel, venture capital, private equity, mergers and acquisitions, IPOs) was around £34.8 billion in 2020.<sup>8</sup> Performance has held up during the pandemic – the value of investment increased by around 40% in 2020, though deal numbers were down by around 21% compared to 2019 (Figure 7).

<sup>8</sup> Pitchbook data.

Figure 7 – Capital investment into Scotland’s enterprises, number of deals and value, Scotland 2010-2020.



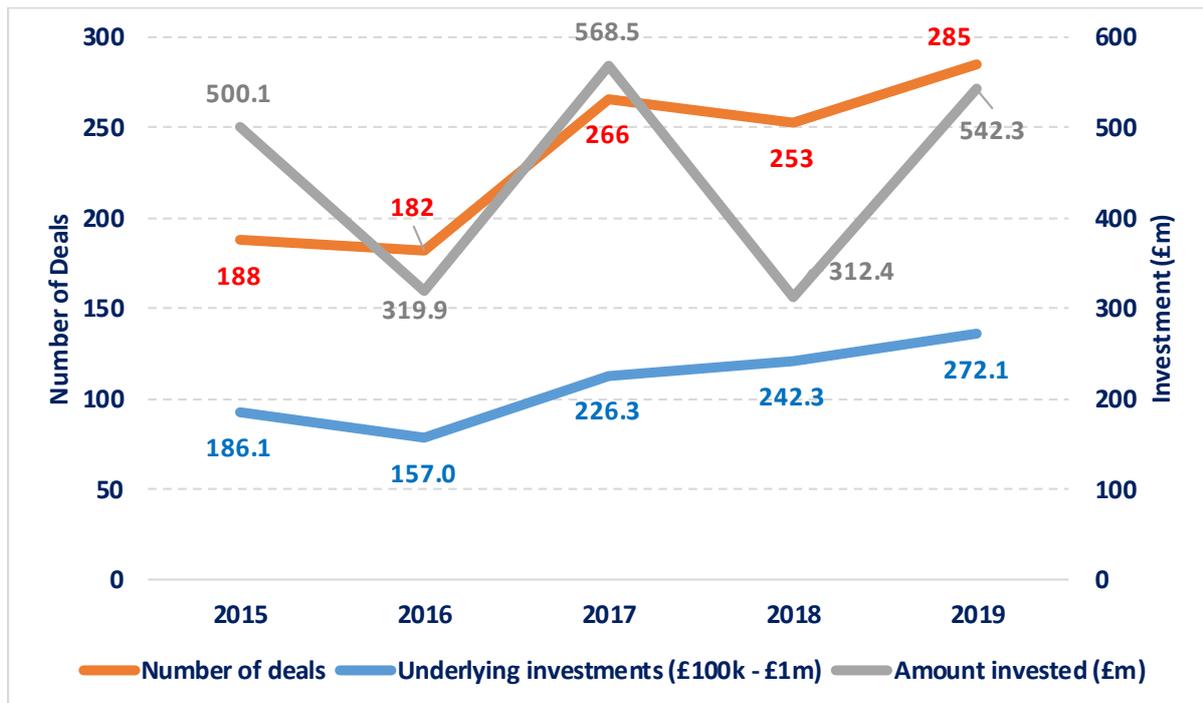
Source: Pitchbook. Figures covers all deal types.

37. The broad measure used above is a good barometer of overall investment activity in Scotland across business growth, new assets, and in changes of ownership. A more targeted measure of investments into high growth businesses in Scotland is provided by looking at the ‘risk capital’ market. This risk capital measure includes only investment that is targeted at high growth and high potential businesses, and reflects to a lesser extent changes in ownership.

38. Scotland performs relatively well in the risk capital market (Figure 8). In 2019, Scotland recorded the highest number of deals on record (285 deals), an increase of 13% on the previous year. These deals were worth a combined £542 million in investment.<sup>9</sup> While the value of equity investment deals varies significantly by year, it is usually dependent on a few large investments. The value of the underlying market, which covers deals between £100,000 and £1m and accounted for 99% of deals in Scotland, has grown steadily over time with a 12% increase in total investment between 2018 and 2019. Scottish investment is dominated by digital, IT and life sciences, accounting for half of Scottish deals in 2019 (Figure 9).

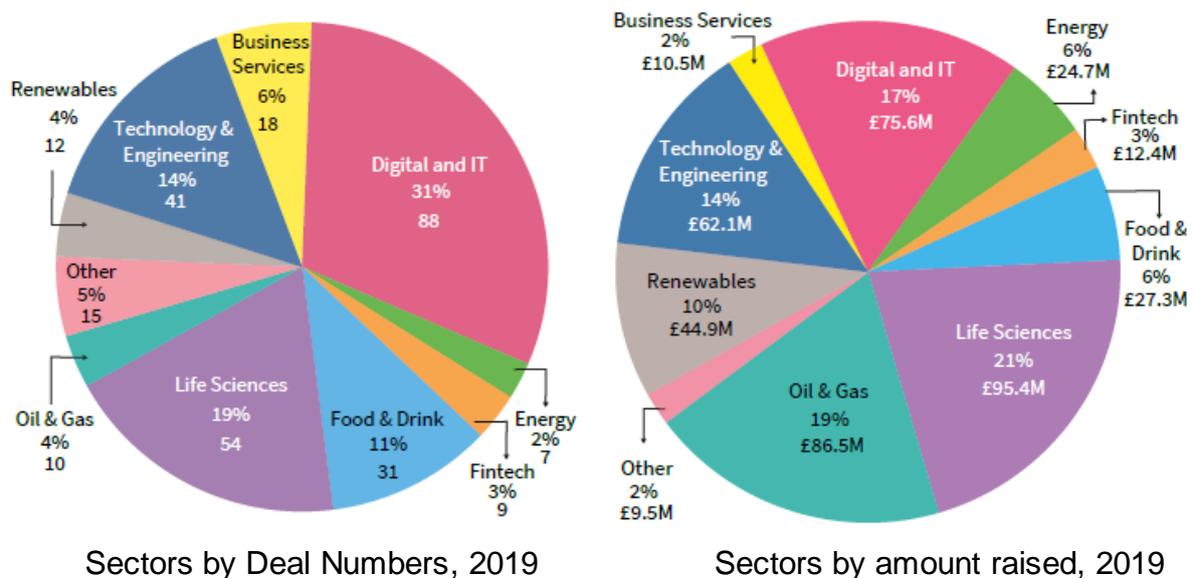
<sup>9</sup> Source: Scottish Enterprise Risk Capital Market Report 2019 (Unpublished). Note these figures are based on equity investment only, excluding private debt investment.

Figure 8 – Risk capital investment 2015-2019, deal numbers and investment £m, Scotland.



Source: Scottish Enterprise Risk Capital Market in Scotland (unpublished). Underlying investments include deals between £100,000 and £1m (where 99% of Scottish deals took place). Amount invested includes all deals (underlying deals + deals above £1m).

Figure 9 – Investment by sector, deals and amount raised, 2019



Source: Scottish Enterprise Risk Capital Market in Scotland (unpublished)

39. Scotland has a particularly strong angel investment market. High levels of angel activity are due to ‘the Scottish model’ of business angel syndicates investing alongside public sector funds. Scottish Enterprise (SE) works with companies with

ambition to scale and those with potential to scale that are strategically important to our economy. SE catalyses investment into the early stage risk capital market by sharing the risks (and rewards) with investors. In 2019/20, this investment activity amounted to £76.2m, leveraging £272m of private sector investment, with over £75m from international investors.

40. The UK's equity markets are highly concentrated in the 'golden triangle' of London and the South East of England which accounted for 72% of all deals, and 79% of all investment in 2018 whereas Scotland secured 7% of all UK deals but only 3% of value (Table 1). This highlights that investment deals in Scotland tend to be lower on average compared to the UK.

Table 1 – Number of deals and value, Scotland and UK Regions, 2018.

	Number of Deals	% of total deals	Value of deals (£m)	% of value
London	2002	52%	5877	57%
South East	483	12%	1232	12%
East of England	288	7%	1078	10%
Scotland	253	7%	312	3%
North West	188	5%	348	3%
South West	180	5%	408	4%
West Midlands	106	3%	338	3%
York & Humber	105	3%	222	2%
Wales	88	2%	105	1%
North East	70	2%	283	3%
East Midlands	62	2%	83	1%
Northern Ireland	43	1%	33	0%

Source: Scottish Investment Bank (2019)

### 4.3 Infrastructure Investment

41. Establishing the size of the private infrastructure investment market is challenging due to a lack of available data, particularly at the Scotland level. Some estimates are provided by the Investment Association, which suggests that its members managed around £45 billion in UK infrastructure assets in 2019, up from £35 billion in 2018.<sup>10</sup>
42. One method for measuring infrastructure investment (at the UK level) is provided by ONS, which uses an experimental methodology to estimate private investment in infrastructure by splitting the "other buildings and structures" component of gross fixed capital formation by market sector.<sup>11</sup> Using this method, the ONS estimates that private investment into constructing new UK economic infrastructure reached

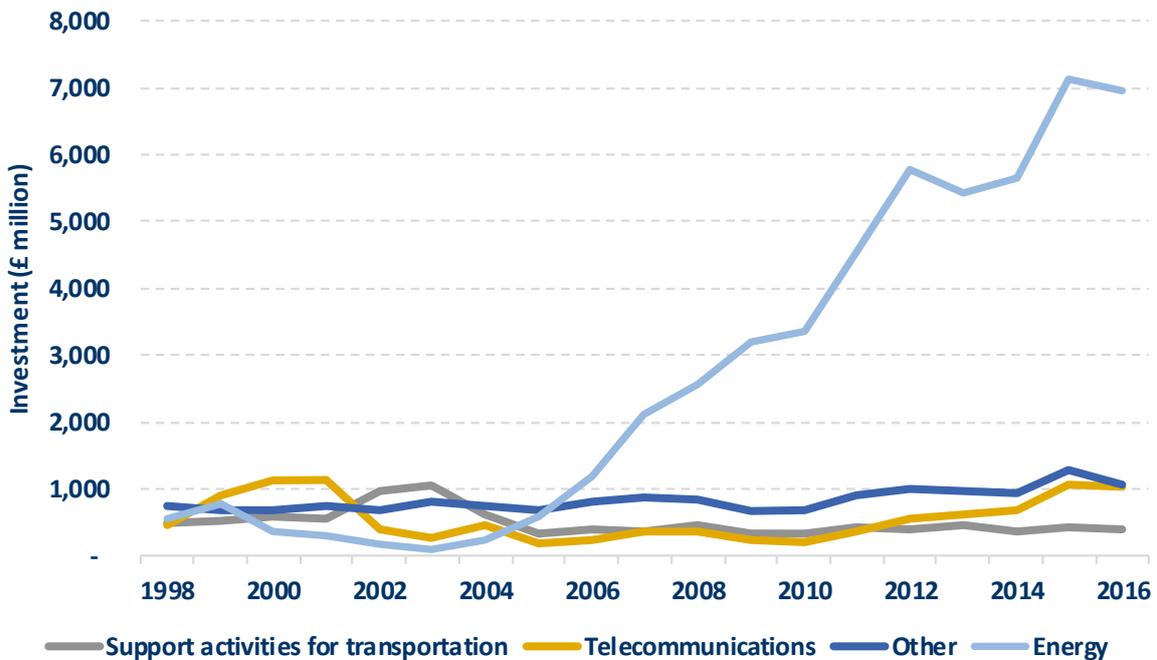
<sup>10</sup> The Investment Association (2020) Investment Management in the UK, 2019-2020. The Investment Association Annual Survey, September 2020 [20200924-imsfullreport.pdf \(theia.org\)](https://www.theia.org.uk/20200924-imsfullreport.pdf)

<sup>11</sup> [Developing new statistics of infrastructure - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/methodology/infrastructure). Covers investment in private economic infrastructure only (excludes public spending on schools, hospitals, etc). ONS exclude oil and gas investments from figures.

£10.3 billion in 2016, 68% of which (£7 billion) was accounted for by the energy industry.<sup>12</sup> This investment has also increased significantly over time (Figure 10).

43. Note the estimates used here cover economic infrastructure only (hence excludes public investment in schools, hospitals, etc). The estimates used here also exclude oil and gas. While the ONS publication contains estimates for “mining and quarrying” (£5.8 billion in 2016), it is explained that this relates primarily to oil wells which, while associated with energy infrastructure, are not directly associated with the generation, transmission or distribution of energy, and it is therefore debatable if this should be included in the definition of infrastructure.<sup>13</sup>

Figure 10 - Estimates of market sector investment in infrastructure, selected sectors, current prices. UK, 1998 to 2016.



Source: Office of National Statistics. Note chart excludes sectors which are publicly funded in Scotland (such as water supply). Excludes oil and gas.

#### 4.4 Commercial Real Estate Investment

44. In 2019, the commercial real estate market in Scotland was worth £1.99 billion (approximately 4% of UK market)<sup>14</sup> with almost all of it concentrated in Edinburgh, Glasgow and to a lesser extent Aberdeen. Office real estate accounted for the largest component (48%) of overall commercial real estate investment, followed by retail (28%). ‘Alternatives’ refers to non-traditional real estate investment such as student accommodation and hotels. Growth in commercial real estate has been broadly flat over recent years (Figure 11).

45. A significant proportion of this investment in Scotland is in ‘standing stock’, essentially ownership of existing assets changing hands. However, there may also

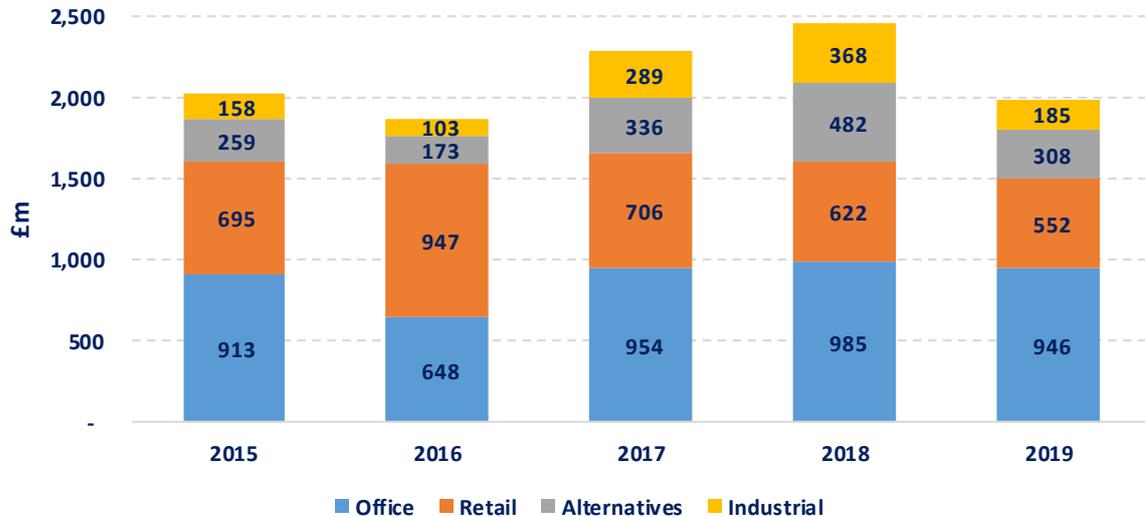
<sup>12</sup> IBID

<sup>13</sup> IBID

<sup>14</sup> CBRE (2020)

be value-creating investment in standing stock through office refurbishment, for example. Whilst this is an important part of the funding market, without which risk and development capital cannot function, it is not the primary part of the investment cycle that drives other economic activity, e.g. in construction jobs or supply chain impacts.

Figure 11 – Commercial real estate investment, Scotland, 2015-2019



Source: CBRE

#### 4.5 Gaps in the Investment Market

46. The evidence presented so far in this section has shown Scotland’s performance in terms of trends in investment over time. Another element of performance that is of particular importance is understanding the gaps in the investment market, i.e. where there are viable businesses/projects that are unable to access finance, or not in the right quantity. Capital investment markets are continually evolving, meaning the scale and nature of gaps in finance change over time. However, at any point in time, the funding gaps reflect the following broad factors:

- Cyclical gaps in lending that affect a range of businesses and projects and reflect changes in economic conditions and regulatory requirements;
- Culture and nature of lenders’ attitudes prevalent at any given time; and
- Long-standing structural gaps that primarily affect certain types of projects or firms (e.g. micro firms, start-ups, innovative firms and growth firms) mainly due to the existence of information asymmetries between lender and prospective borrower.

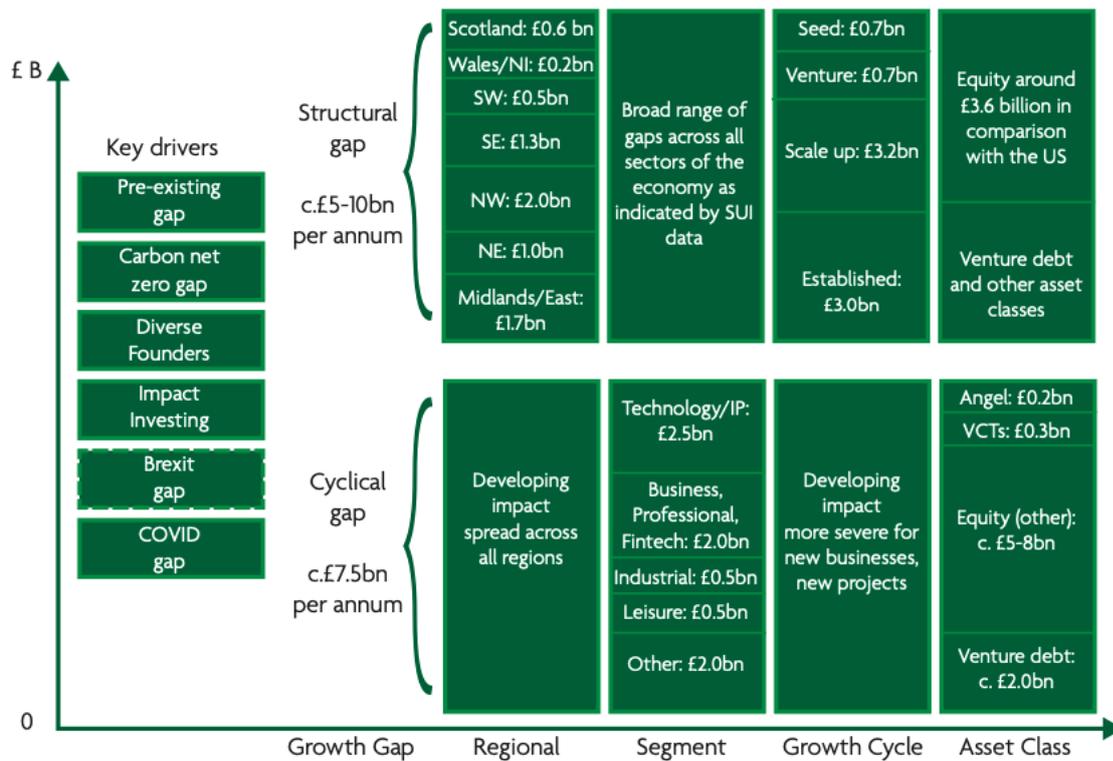
47. Studies have quantified these gaps in the investment market, particularly in the enterprise investment market. A recent report by the Scale-Up Institute (2020) provides estimates of the gaps in the enterprise investment market in the UK.<sup>15</sup> This report suggests that Scotland has a “structural finance gap” of around £0.6

<sup>15</sup> Scale Up Institute (2020), the future of growth capital, [The Future of Growth Capital Report - ScaleUp Institute](#)

billion for high growth businesses each year.<sup>16</sup> In addition to this structural gap, it is estimated that a UK-wide “cyclical” finance gap of around £7.5 billion has developed as a result of COVID-19, EU Exit and wider economic uncertainty.<sup>17</sup> These gaps in finance exist across different regions and nations of the UK across a broad range of sectors and asset classes as outlined in Figure 12

48. The existence of a structural enterprise finance gap in Scotland is also supported by other evidence, with research for the UK Department for Business, Energy and Industrial Strategy (BEIS) (2019) estimating the gap in finance for Scottish high growth firms to be in the region of £0.3 – £0.6 billion.<sup>18</sup>

Figure 12 – Key drivers and dimensions of the growth gap, UK



Source: Scale Up Institute (2020)

49. Gaps in finance develop for a number of reasons which leads to differences in availability of finance for different firms. For example, evidence suggests there are regional disparities in equity finance, with access to capital being more difficult for businesses outside the “golden triangle” of London, the South East, Oxford and Cambridge.<sup>19</sup> That said, after accounting for size of the regional economies, Scotland does perform relatively well compared to these regions, particularly in terms of deal numbers, albeit the value of investment is lower than these regions (as shown regional comparisons in section 4.3).

<sup>16</sup> IBID

<sup>17</sup> IBID

<sup>18</sup> Department for Business, Energy and Industrial Strategy (2019), Equity Finance and the UK Regions. [Equity Finance and the UK Regions \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

<sup>19</sup> IBID

50. The finance market is characterised by investors who tend to invest in particular sectors or types of investments where they have particular expertise or experience. Hence, investment has a fairly strong sectoral picture, and gaps can appear for sectors where there is less investor appetite or focus. For instance, there is a strong market for digital and life sciences sectors in particular, alongside various high growth manufacturing sectors. According to the British Business Bank, the UK tech sector remains the focus for equity investors, with 47% of investment going to tech companies.<sup>20</sup> In Scotland, Scottish Investment Bank data suggests that investment is concentrated in digital/IT and Life Sciences, with around half of deals accounted for by these sectors.<sup>21</sup>
51. Gaps in finance also vary at different stages of business growth. Some evidence in recent years suggests that investments have become fewer and larger, leading to concerns about the supply of capital available for earlier stage investments.<sup>22</sup> However, in Scotland, investments by these angel syndicates has been filling the gap in early stage investment vacated by VCs.<sup>23</sup> Business angel groups, where individuals come together to invest, remain the most active type of investor in Scotland, and have seen consistent growth from year to year, participating in 90 deals during 2019, worth a collective £100 million (up from £67 million across 75 deals in 2018)<sup>24</sup>.
52. Gaps in the private infrastructure investment and real estate markets are harder to quantify due to lack of data available. However, in some cases, private infrastructure investment gaps are estimated through assessing the future needs for such investment.
53. For example, such methods have been used by the UK Climate Change Committee (CCC) to assess the additional investment required to meet future Net Zero commitments. While estimating the additional investment required to reach Net Zero is challenging, as many aspects of the transition pathway will depend on developments in technology, markets and international action beyond any reasonable forecast horizon. The CCC has produced a range of indicative scenarios to try and address this, and estimate how much additional investment may be required to reach Net Zero, against a counterfactual of taking no further action against climate change. Under their central scenario, the CCC estimate Scotland will need to increase its investment to support the transition five-fold in real terms over the 2020s, from around £1 billion per annum this year to a steady state of around £5 billion by 2030.<sup>25</sup> While this estimate does not account for shifting investment from carbon-intensive industries, or for the savings generated

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<sup>20</sup> British Business Bank (2020). Small Business Equity Tracker. [Small Business Equity Tracker 2020 - British Business Bank \(british-business-bank.co.uk\)](https://www.british-business-bank.co.uk/small-business-equity-tracker-2020/)

<sup>21</sup> Scottish Enterprise Risk Capital Market in Scotland (unpublished)

<sup>22</sup> See SQW (2016), the Role of Policy in SME Finance: Demand Side Perspectives, [https://www.sqw.co.uk/files/2714/7370/4192/Access\\_to\\_Finance - Viewpoint FINAL - Sept 2016.pdf](https://www.sqw.co.uk/files/2714/7370/4192/Access_to_Finance_-_Viewpoint_FINAL_-_Sept_2016.pdf)

<sup>23</sup> See Mason, C., Botelho, T., & Harrison, R. (2016). The transformation of the business angel market: empirical evidence and research implications. *Venture Capital*, 18(4), 321-344.

<sup>24</sup> Source: Scottish Enterprise Risk Capital Market in Scotland (unpublished). Note the amounts contributed by each separate investor in a deal are not usually disclosed, hence these figures cover the deal totals for all the deals in which each type of investor participated.

<sup>25</sup> Climate Change Committee (2020) [Sixth Carbon Budget - Climate Change Committee \(theccc.org.uk\)](https://www.theccc.org.uk/2020/06/06/sixth-carbon-budget/). Estimates are in real 2019 £s, under the *Balanced Pathway* scenario.

by more efficient low-carbon alternatives, it provides an indication of the scale of the challenge and the direction of travel.

#### **4.6 Modelling the impacts of Increased capital investment**

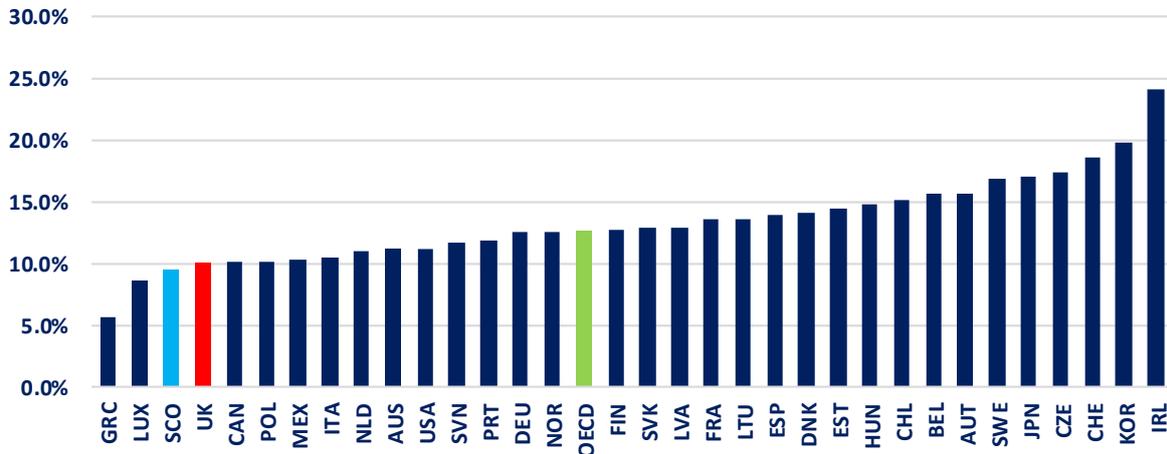
54. The Global Capital Investment Plan covers a broad range of different forms of investment, including investment into business through equity, infrastructure and real estate. Robust evidence on the economic impacts of government action in these different areas is varied and often not available. Combined with the on-going economic uncertainty caused by the pandemic and EU exit, this makes it difficult to provide an estimate of the benefits to the economy of implementing the plan.
55. Given these complexities, an illustrative scenario analysis using the Scottish Government's Global Econometric Model (SGGEM) has been undertaken to highlight the potential economic impacts that increased private sector business investment (private gross fixed capital formation) could have over time on the Scottish economy.
56. SGGEM is a large scale structural global econometric model, created for the Scottish Government by the National Institute of Economic and Social Research (NIESR) and is based on an adaptation of NIESR's own National Institute Global Econometric Model (NiGEM). NiGEM is used by a number of organisations, such as the European Central Bank and the Bank of England.
57. The model covers over 60 countries and regions, and includes over 5,000 variables. Each economy is linked through trade and competitiveness, and they are determined simultaneously. The core of the model consists of a production function determining output in the long term, which is based on the labour force, productivity, and the capital stock. There are also integrated models of the labour market (including wages, consumption, personal income and wealth), government, financial, and non-financial sectors, and international trade. The model uses historical data to determine the speed of adjustment back to equilibrium in response to a shock.
58. As is standard practice with the application of such models, the approach is to simulate a scenario where some form of "shock" is applied within the model and then compare the results from that scenario to a baseline where no shock occurs. In this case, the modelled scenario has two components. First, a positive and permanent increase in the level of private sector business investment is modelled to identify the direct impacts on economic activity. Second, sensitivity analysis has been carried out to observe any possible additional indirect economic impacts that could arise if aggregate productivity in the economy is assumed to have increased as a result of these higher levels of investment. The change between the baseline and the scenario then provides the illustrative impact of increasing the level of private sector business investment, both directly on economic activity and indirectly through improving levels of productivity in the economy.

#### **Modelling the direct impacts**

59. Initially a positive and permanent increase in the level of private sector business investment is modelled over the next decade with the level around 30% higher by the end of 2030 than it otherwise would have been. This 30% increase would bring Scotland broadly in line with investment levels for the OECD overall (as expressed

as a percentage of GDP, in order to compare across economies of different sizes). Figure 13 shows levels of business investment as a % of GDP for Scotland, the UK and other OECD countries.

Figure 13 - Business investment as a % of GDP 2018, OECD countries



Source: Quarterly National Accounts Scotland (Scotland data), ONS (UK data), OECD (OECD data).

60. This higher level of business investment is associated with a permanently higher level of private sector business capital stock in the economy and provides a modest, but persistent, increase in economic activity with the level of GDP around 1.1% higher by 2030 (£1.8 Billion in 2019 prices). This is around an additional £12.2 billion worth of economic activity being generated cumulatively across the scenario horizon.

### Modelling the indirect impacts

61. In addition to modelling the direct impact of a 30% increase in the level of private sector business investment, additional sensitivity analysis has been carried out to observe additional indirect economic impacts if aggregate productivity in the economy is assumed to have increased as a result of these higher levels of investment.

62. While there are no firm estimates of the extent to which productivity increases following a rise in aggregate private investment (private gross fixed capital formation), a positive productivity impact would be expected from economic theory and evidence. Increasing business investment particularly in areas like research and development should increase innovation and make businesses more productive. Evaluation evidence of co-investment funds in Scotland, for example, finds a link between co-investment funding, increased R&D and higher productivity.<sup>26</sup> Similarly, investing in new infrastructure, such as digital infrastructure, can help boost productivity in the wider economy.<sup>27</sup> Due to a lack of available aggregate estimates for Scotland, the modelling scenarios take an

<sup>26</sup> For example, Scottish Enterprise (2014) Economic Impact of the Scottish Enterprise Seed Fund, <http://www.evaluationsonline.org.uk/evaluations/Documents.do?action=download&id=719&ui=browse>

<sup>27</sup> See for example Scottish Government (2018). [Infrastructure investment: evidence summary - gov.scot \(www.gov.scot\)](http://www.gov.scot)

illustrative approach by showing the additional impact increases in productivity could have.

63. In general, assuming that aggregate productivity is also increased as a result of the higher levels of private sector business investment in the economy, the long term economic benefits are heightened. Table 2 shows that for every 1 per cent increase in the level of productivity in the economy, there is evidence that by 2030, GDP is increased by around 0.4 p.p.

Table 2 - Summary of the illustrative modelling scenarios

	<i>Increase in Private Sector Business Investment</i>	<i>Increase in level of Productivity</i>	<i>Impact by 2030 (% change in the level)</i> <i>GDP</i>
Scenario 1	+30%	0%	1.1%
Scenario 2	+ 30%	+ 1%	1.5%
Scenario 3	+ 30%	+ 2%	1.9%

Source: Scottish Government Global Econometric Model

64. Overall, the direct impact of increasing private sector business investment to similar levels seen elsewhere in the OECD (as a % of GDP) and the indirect impacts of potentially higher levels of productivity, could permanently increase the level of GDP by around 1.9% by 2030 (around £3.1 billion in 2019 prices). This could also increase average earnings in Scotland by 4.9%, around an additional £1,400 a year to the average Scottish employee in today's prices.

## 5. Identifying priorities

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### 5.1 Developing an analytical framework to understand Scotland's priority areas for capital investment

65. The previous sections have shown that capital investment already brings significant benefits to the Scottish economy but that there is further potential to use capital investment to drive economic spillovers and help shape Scotland's future economy in line with the Scottish Government's values and priorities. This section analyses one of the key areas in which the Scottish Government and agencies can influence the capital investment market – the choice of which sectors to focus resources on. The main plan document sets out four priority areas that have been selected. This section of the methodology note provides more detail on how these areas were chosen.
66. The Capital Investment plan identifies four key priority areas – Net Zero, high value manufacturing, life sciences and digital. This section outlines the analytical work to help inform the choice of priority areas.
67. This analysis builds on the methodology used to outline the key priority sectors in [Shaping Scotland's Economy: Scotland's Inward Investment Plan](#) (Scottish Government, 2020), which identified the sectors in Scotland's economy which are globally competitive, crisis-resilient and likely to offer growth which benefits the broader economy and society as well as the business itself.
68. Using the same analytical approach, we have identified those global capital investment flows which are strongest in terms of deal numbers and value, and matched them to globally competitive sectors in Scotland's economy.

### 5.2 Understanding Scotland's comparative advantage

69. Comparative advantage is a concept that has been borrowed from trade analysis. For trade it describes the areas in which a country can produce a product or service more efficiently than other countries, relative to other products or services it could produce. To use this concept in practice it is helpful to calculate a Revealed Comparative Advantage (RCA) indicator which provides a measure of comparative advantage by observing past and current trade flows.
70. The same concept can be applied to establish which sectors a country has an advantage (or disadvantage) in when it comes to cross-border investment flows. This is a convenient metric for understanding a country's strengths as it can be observed directly from capital investment data. The formula used is as follows:

$$RCA_{sector}^{Scotland} = \frac{Cap\ Investment_{sector}^{Scotland} / Cap\ Investment_{total}^{Scotland}}{Cap\ Investment_{sector}^{Europe} / Cap\ Investment_{total}^{Europe}}$$

71. Essentially this calculates the degree to which Scotland attracts deals in a sector as compared to the European average. The comparison here is to Europe rather than all global projects since European countries are considered to be more

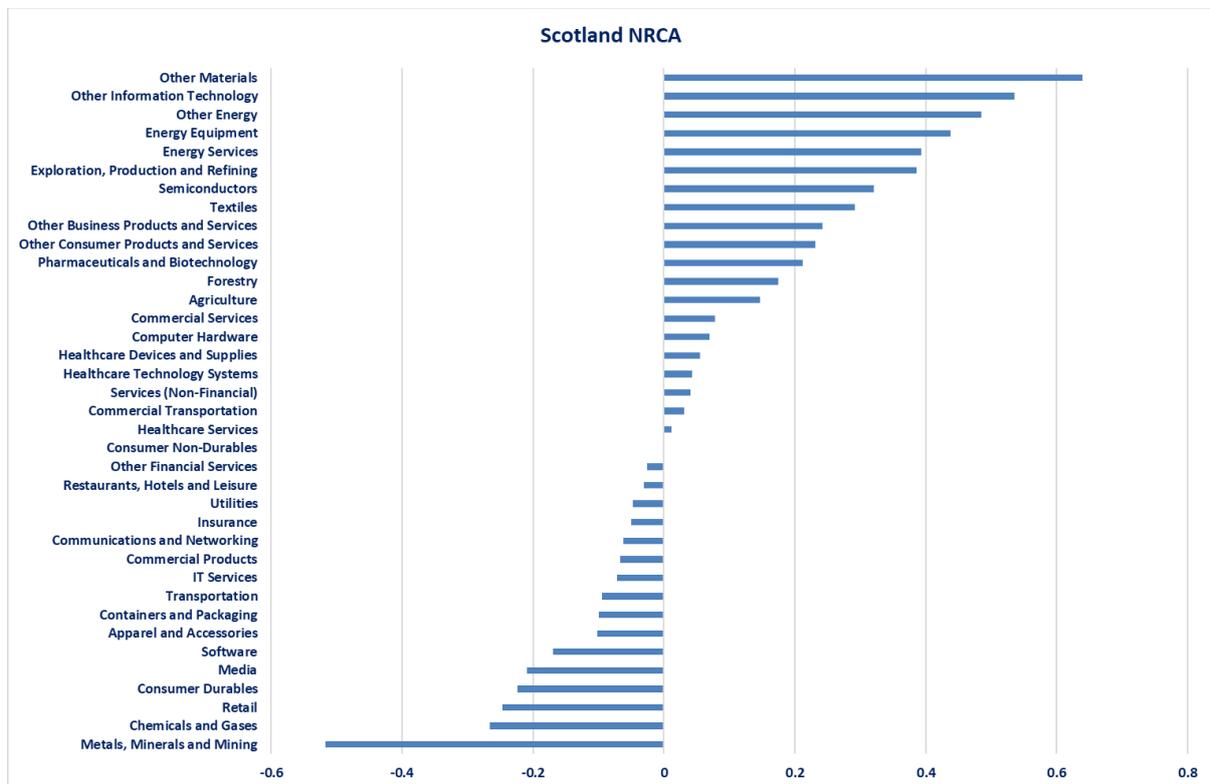
appropriate comparators to Scotland (given they are closer in income levels and geography).

72. In practice it is more intuitive to use a normalised version of the index, called the Normalised Revealed Comparative Advantage (NRCA) indicator, as this is bounded by -1 and 1 with a negative number indicating a comparative disadvantage and a positive number indicating a comparative advantage. This is defined as:

$$NRCA_{sector}^{Scotland} = \frac{RCA_{sector}^{Scotland} - 1}{RCA_{sector}^{Scotland} + 1}$$

73. Figure 14 shows this index calculated for Scotland using data from 2015-19.

Figure 14 - Scotland's revealed comparative advantage in capital investment by sector



Source: Office of the Chief Economic Adviser analysis using data from Pitchbook.

### 5.3 Identifying opportunity areas

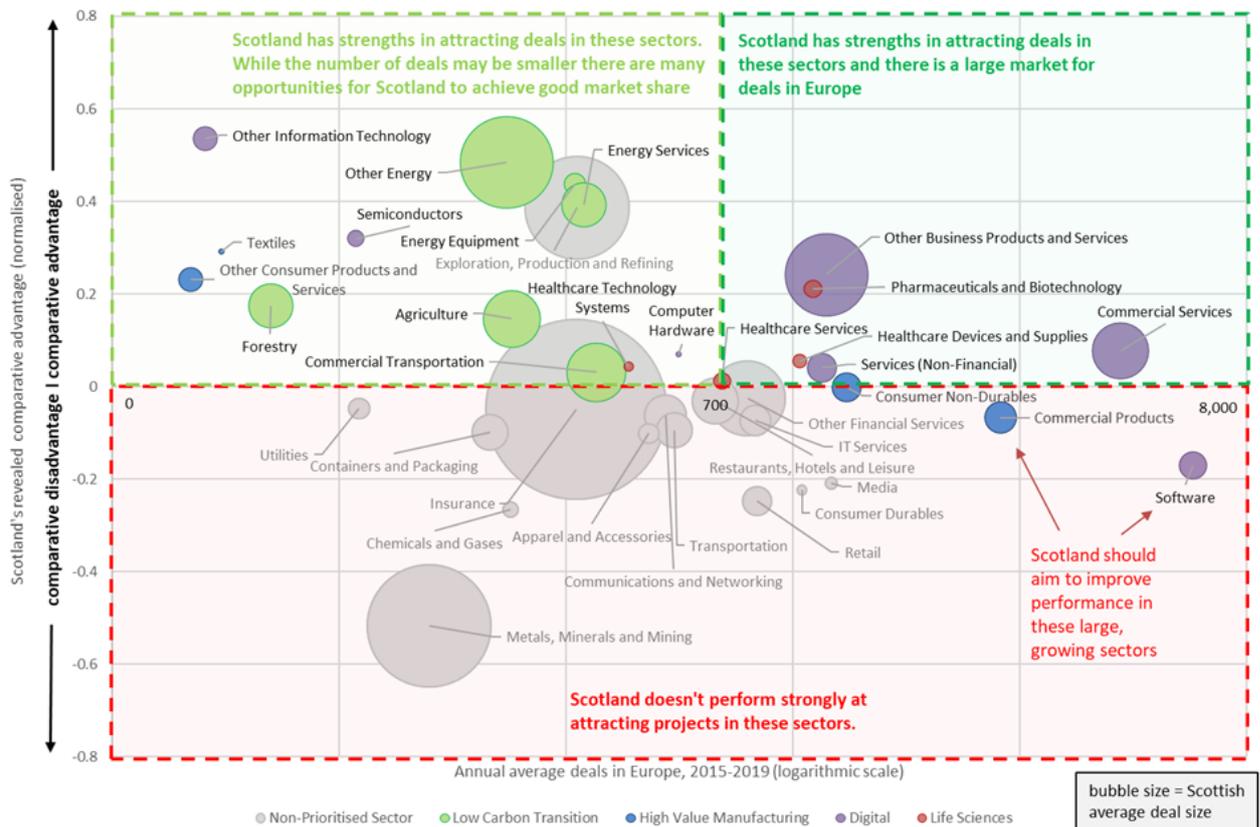
74. This section outlines the opportunity areas for Scotland by combining data on European investment flows with the revealed comparative advantage analysis above. Combined, the analysis identifies those sectors which are strongest in

terms of deal numbers and value, and matched them to globally competitive sectors in Scotland's economy. This is summarised in Figure 15.<sup>28</sup>

- The sectors in the top right quadrant are those which the analysis identifies as strengths for Scotland, and where there is also a large market for deals
- The top left quadrant are sectors where Scotland again has strengths and, while they may not have such a large market for deals, there is the opportunity for Scotland to achieve significant market share in the sector
- The sectors in the bottom half of the chart are generally not prioritised as they are not identified as substantial enough strengths to compete in international markets. However, there are some exceptions for 'commercial products' and 'software' sectors, both of which are very large and where Scotland has some particular strengths in underlying subsectors.

75. Note also that the x-axis of the chart is a logarithmic scale. Given the x-axis values (average deals in Europe) has a wide range of values (from 100 to near 8,000), this makes it harder to visualise all sectors on one chart. The logarithmic scale reduces the size of the x-axis to a more manageable range by presenting values by orders of magnitude rather than a standard scale.

Figure 15 – Scotland's strengths and sectoral themes for capital investment



Source: Office of the Chief Economic Adviser analysis of Pitchbook data

<sup>28</sup> The chart uses data from Pitchbook on the number and size of deals in Scotland and Europe. This data covers all types of enterprise capital flows, from venture capital and private equity deals to M&A and IPOs. For more information on the data and methodology behind the chart please see the Technical Methodology note published alongside this plan.

76. These opportunities can be grouped into four sectors :

- Low carbon transition,
- Health and life sciences,
- Digital,
- High value manufacturing.

77. This analysis finds the strongest deal flows in the same sectors as identified in the Inward Investment Plan analysis. This underscores them as the best opportunity we have to use the global economy to build on our domestic strengths.

78. These four sectors are the most likely drivers of future economic demand in the economy. They are broad, and that is deliberate. Whilst the focus has to be on those sectors which can drive growth and recovery precisely because they are already strong, this approach leaves space for different sub-sectors to develop and come to the fore, for particular regional clusters of expertise to be brought out, and for the broader macro-economic and regulatory frameworks to change (e.g. around nature based technologies and solutions to climate change).

## Annex 1 - Infrastructure Investment Definition: Public vs Private

As discussed in section 2.1, the Global Capital Investment Plan is focussed on increasing investment into areas where private investment is already present. This annex provides more information on the distinction between public and private funding across different infrastructure sectors.

<b>Sector / Asset Class</b>	<b>Powers</b>	<b>Ownership</b>	<b>How is it funded?</b>	<b>Key sources of finance provided on commercial terms</b>
Transport	Key devolved powers: Passenger and road transport covering the Scottish road network; Setting the strategic direction and funding priorities for rail in Scotland; Air and sea powers covering ports, Provision of freight shipping and some ferry services.	Private and Public	User charges, taxation, public private partnership	Private corporate, Scottish Government investment banks. Local Authorities through prudential borrowing.
Waste	Devolved	Private and Public	User charges, taxation, part funded through Scottish Government (grants and loans),	Private corporate, Scottish Government / investment banks, Local Authorities
Digital Connectivity	Devolved but SG also significant investor i.e. through Digital Scotland Superfast Broadband (DSSB) programme and Reaching 100% programme.	Private	User charges, SG part funded (grants, loans)	Private corporate, Scottish Government
Energy (Infrastructure)	Reserved – Regulated by Ofgem through the Gas, Electricity and Energy Acts	Private	Funded as a regulated monopoly with costs recovered from consumer bills	Mostly funded as a regulated monopoly with private investment from a variety of sources, mainly pension funds, infrastructure funds and sovereign wealth funds. Some discrete innovation projects are funded through the public sector
Energy (Low Carbon Heat & Energy Efficiency)	Scottish Ministers have powers in the low carbon heat space and building standards for energy efficiency.  Market support for low carbon heat is reserved to the UK Government	At a building level, low carbon heating systems are primarily owned by building owners, although a subscription model for heat is emerging in the market.	Low carbon heat solutions are, for the most part, not competitive within the market.  UK Government subsidy schemes have supported the roll out to date by offering tariffs	Public loan schemes such as Home Energy Scotland.  Consumer finance.  Private sector project finance for large scale projects.  Public Works Loan Board and Salix

		Larger scale low carbon heat projects such as heat networks are owned by a mix of public (local authorities/housing associations) and private investors (such as SSE Enterprise, Veolia, Engie).	for certain technologies.  Capital costs for equipment are supported through SG grants and loans.	finance for public sector projects.
Energy (Technology Development & Innovation)	Both	Private sector ownership of projects, in some cases with a public sector stake.	Supported through grant at a Scottish and UK level – Enterprise Agency/Innovate UK/Direct SG funding.  Public sector commercial finance for projects has been provided through the Energy Investment Fund.	Mostly risk capital. VC, Private Equity, High Net Worth Individuals, Angel Investors.  Some corporate investment in transitional industries like oil and gas.

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