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THE INNOVATIVE FIRM'S JOURNEY TO FINANCE

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Glossary of key acronyms

ACF – Angel Co-investment Fund, UK government-established in 2011

AIM – UK Alternative Investment Market for smaller capitalised businesses

BA – Business Angel

BAN – Business angel network

BVCA – British Venture Capital Association

BGF – Business Growth Fund, established by leading UK banks in 2011

CDFI – Community Development Finance Initiative

CEO – Chief Executive Officer

CFO – Chief Financial Officer

Challenger Banks – Smaller banks outside of the largest banking groups providing competition in the UK market

Cleantech – any product or service that improves operational performance, productivity, or efficiency while reducing costs, inputs, energy consumption, waste, or environmental pollution

Digitech – systems, processes, and products which are primarily based on computer software solutions

ECA – Export Credit Agency

ECFs – Enterprise Capital Funds, UK government-established rolling programme of equity funds targeting the equity gap

EFG – Enterprise Finance Guarantee, government-backed loan guarantee scheme

EIS – Enterprise Investment Scheme, UK government tax incentive scheme to encourage equity investments in SMEs

EU – European Union

GFC – Global Financial Crisis of 2007-08

HNWI – high net-worth individual (business angel investors)

Horizon2020 – European Union Framework Programme for Research and Technology Development running from 2014 - 2020

Innovate UK – The UK's innovation agency, formerly the Technology Strategy Board (TSB)

IP – Intellectual property

IPO – Initial public offering, when a business first lists on a stock exchange

IRP – Investment Readiness Programme

KTPs – Knowledge Transfer Partnerships between universities and industry

LEP – Local Enterprise Partnership, there are 39 in England which lead on developing local business support schemes

LSE – London Stock Exchange

Meditech – advanced technologies with human health applications

MSB – Mid-sized Business, or Mid-Cap (mid-capitalised), UK defined as 250-5000 employees and £25m to £500m annual sales turnover

NOMAD – Nominated Advisor, required for the UK AIM public market

OEM – Original Equipment Manufacturer

PE – Private equity, Equity invested in established private companies

PoC – Proof of Concept for a new innovation

R&D – Research and Development

R&T – Research and Technology, often undertaken as a forerunner of R&D

RDF – Regional Development Fund, incorporating Regional Venture Capital Funds (RVCFs) operated privately, using EU funding, with British Business Bank oversight

RGF – Regional Growth Fund, which provides funding for LEP business support schemes

SMART – Innovate UK grant for innovation by SMEs

SME – Small and Medium-sized Enterprise, usually defined as having fewer than 250 employees

SEIS – Seed Enterprise Investment Scheme, UK government tax incentives for seed enterprise investments

UKBAA – UK Business Angel Association

UKIIF – UK Innovation Investment Fund, UK government equity programme established in 2009

UKTI – UK Trade and Investment – the UK's international trade and inward investment promotion organisation.

VCs – Venture Capitalists, organised private investors, typically operating in the UK under a 10 year Limited Partnership

VCTs – Venture Capital Trusts, listed investment vehicles making equity investments into SMEs facilitated by Government tax incentives

Key findings of the research

The study

One rationale of this study is the premise that innovative businesses contribute to economic growth, but that, whilst being more likely to seek finance, they also experience greater difficulties than their less innovative counterparts in raising the external finance that they require to achieve their growth potential. These difficulties are likely to be exacerbated for younger businesses that lack track records and collateral to support external financing. This suggests a need for the business life cycle stages of development approach adopted by the study. A further premise is that innovative firms which are knowledge asset-based (those predominantly developing software/ creative innovations) have better access to finance than those which are capital asset-based (those predominantly developing hardware/physical product innovations) because these latter firms need greater amounts of capital before their innovations are fully commercialized.

The overall aim of the study is, thus, to examine the pathways to formal external finance of different types of innovative business and to identify obstructions in those pathways.

The study was comprised of three main stages. First, a literature review and analysis of two existing data sets (BIS's Small Business Survey of 2012 and British Business Bank's SME Journey Towards Raising External Finance Survey 2014) to inform the design, sample structure and interview guide of a survey of innovative businesses.

The second stage of the study was a depth interview survey of 50 businesses which had been pre-identified as being innovative in their products, services, or processes. The 50 businesses were chosen to allow spread across a range of characteristics which the literature review had shown to be likely to be significant to 'access to finance' issues. These included the age/maturity, size, sector, and location of the firms. The firms were interviewed by research team members using an interview guide designed, as above, to raise matters which were, on evidence from the literature review, likely to be relevant to the study of why and how innovative firms seek to raise finance and of what are their experiences when they do so.

A final stage was a careful analysis and interpretation of the discussion transcripts generated from the interviews.

Key findings

Introduction

The following key themes are drawn from the survey findings. Comment is made on whether these key themes are supported by the existing literature and previous research evidence base.

Simple ‘pathways’ models do not apply in the real world

- Pathways to finance for innovative firms are varied and complex, particularly at earlier stages of the growth cycle – the search for investment may be a continuous or semi-continuous one in which several private and public avenues are simultaneously explored or combined, mis-steps are taken and blind alleys followed, entrepreneurial knowledge and private and public advisory inputs and collaborations can have varied levels and varied value, and the personal circumstances, risk tolerance, perseverance, and personal dynamism of individuals can make a significant difference.

Innovation context, intensity, and categorisation

- There are clear distinctions between product, service, and process innovations and their relationship to business development. Among those surveyed, process innovation was more likely to occur in, and to impact on, manufacturing and testing (e.g. laboratories) businesses. In these cases process innovation was closely associated with capital investment, and this was often a part of innovation project investment that was ultimately outsourced.
- A further key distinction is that R&D intensive, longer innovation cycles often require far higher levels of investment. The study revealed longer and more costly innovation cycles in sectors such as bio/life science, cleantech, aerospace, and advanced engineering, as compared to digitech and software-based sector activities¹.
- Innovative firms cannot be clearly defined as either knowledge asset-based or capital asset-based, with several firms surveyed seeking external financing solutions that leveraged a mix of both types of asset. For example, some R&D intensive firms in engineering defined themselves as predominantly knowledge asset-based, but have previously sought R&D finance involving in-house or contracted out capital investment elements (e.g. to manufacture prototypes).
- Where direct financing has not been available, indirect collaborative financing solutions have been adopted on some occasions. This has involved licensing production or joint venturing where the partner manufacturing or lab testing company secures the capital investment element².

¹ Supporting, but developing a more nuanced version of North et al. (2013) distinction between engineering/digitech and bio/life science technology based businesses.

² This suggests that a greater understanding of innovation requires collaborative, cluster analysis of the project and therefore a project, rather than business interpretation of innovation as knowledge or capital asset based in understanding the findings from Nesta (2012).

The role of collaboration for innovative businesses

- Innovative businesses should not be seen in isolation. They will often seek partnerships with other businesses (to undertake investments) or seek *collaborative arrangements* to secure external funding (e.g. academic partners for European Union (EU) and grant-based funding, external advisers for grant funding).
- Social capital/networks are a crucial factor for new and early stage innovative businesses that lack a track record on which to secure external finance³.
- Collaboration is sometimes encouraged or demanded by the need to find matching funding to secure grant funding (which was important at all stages) and to achieve proof of concept funding.
- The early establishment of networks through the role and experience of the innovative entrepreneur (and core team) is a key success factor. Businesses that were well connected and networked (rather than acting in isolation) were more successful at raising equity and achieving the step change from start-up and early stage financing to early growth stage funding.
- The role of collaboration continues to be important even for mature stage businesses – for example, in using partnerships with academic institutions to secure UK and EU grant funding. Mature Mid-sized Businesses (MSBs) may take a *strategic acquisitions* or *joint venturing* approach to secure project development funding.

Search procedures

- Entrepreneurs will engage in a variety of non-core business activities in order to search for and secure funding for their central innovative business development. At one level, this may mean undertaking consultancy to maintain revenue in the period before innovative activity is marketable. At another level it may mean setting up a business as a vehicle to seek funding; and at another seeking an external funding source that diverts activity from the core business⁴.
- Search procedures may be strengthened by *entrepreneurial learning from experience* and by exhibiting flexibility. The research shows that some entrepreneurs are willing to persevere with the search procedure rather than terminate innovative development:
 - If the search procedure does not result in sufficient funding, entrepreneurs and Chief Executive Officers (CEOs) will continue with their search procedure. This may mean putting innovative and technology development

³ Although the role of collaboration is recognised in the literature, the degree and extent would suggest that it has become a more critical factor (Keizer et al 2002).

⁴ This supports a resource-based view of the innovative business (Barney 1991; Mac an Bhaird, 2010) implying that resources at start-up are critical.

‘on hold’ and slowing it down or changing the funding business model or seeking alternative funding and seeking investments overseas.

- Perseverance, leading to improved selection of funding types and enhanced application collaborations and procedures, can pay. Half of the interviewed entrepreneurs/CEOs who were initially rejected reported eventual success.
- Partial success or failure to raise funding affected businesses ability to innovate – with innovative developments reported as being suspended or potentially abandoned altogether.

Timing and the search process

- Entrepreneurs from early stage innovative businesses can spend considerable time in search activities: finding matched private equity; finding business angel (BA) and venture capital (VC) funding; and in sourcing and supplying information on grant applications.
- Lengthy search activities create two issues: the danger of losing strategic focus and delayed commercialisation. Securing external funding at an optimal time is a crucial factor for innovative entrepreneurs and businesses; delay can cause the loss of first mover advantages and competitive advantage. Interviews revealed evidence of missed opportunities and truncated innovative developments due to timing and delay issues.
- The search process for raising informal equity, business angel, and VC funding is complex. The interview evidence indicates that face-to-face meetings are still necessary with the role of external advisors and consultants important for early and growth stage businesses, particularly in relation to reducing the uncertainty associated with the search process⁵.
- Search procedures are expensive in lost management time and the interview evidence suggests that innovative businesses may pay for external advisers, grant application writers and finders/consultants.

The role of external advisers

- The importance and use of external advisers and mentors has already been mentioned, but their role in the pathways to external finance is a complex one.
- External advisers are a key source of information, but an innovative business needs to know how to use them and to be able to ask the right questions, so that grant and private equity funding can be sourced. Good external advisers save time and, as a source of information, reduce uncertainty.

⁵ The complexity of the search process for BAs and HNWIs is acute for innovative firms (Mina et al 2013). Sector-based hubs and advisers may help to reduce uncertainty and aid the search process.

- Having undertaken expensive search procedures, businesses need to be investor-ready. This itself may account for the very lengthy time (months and years) that some businesses, both early stage and growth stage businesses, spent on searching for external equity finance⁶.
- Not all innovative businesses made use of R&D tax credits. Paid advisers, such as technical experts and accountants, enabled businesses to benefit from R&D tax credits and avoid misconceptions, which were evident in some businesses' responses about qualification for credits.

Serial entrepreneurs are important at start-up and early stage for unlocking sources of external finance

- As with external advisers, serial entrepreneurs can bring both human and social capital through their networks. Serial entrepreneurs bring experience, knowledge and absorptive capacity⁷. They may be brought into new start-ups to give additional management experience and networks/social capital.
- Serial and experienced entrepreneurs know which external sources (grant, debt, private equity, VC, R&D tax credits) are available, relevant and needed. The search and matching process is less uncertain and more strategic as a result.
- They have knowledge of the terms and conditions that VCs and more informal funders will impose, ensuring that the business will be better prepared for the search and matching process.

Mature businesses and MSBs internalise the search process

- Mature businesses and MSBs have the internal expertise necessary to formalise the process of securing external project-based funding. They have the resources to undertake formalised business planning over an extended planning horizon. Interview evidence suggests that this becomes a formalised internal or in-house process with mature MSBs. They have the resources and knowledge to handle bureaucracy and employ directly strategic planners.

Finance sought and the business life cycle

- There is a progression evident in the nature of external funding sought and used through the business life cycle which predominantly relates to different types of equity and VC funding, ranging from small scale high net worth individuals (HNWIs), private equity, and seed capital with early stage businesses through to formal VC, angel syndicates, and formal equity markets including Alternative Investment Market (AIM) and the London Stock Exchange (LSE) with mature businesses and Mid-sized Businesses (MSBs).

⁶ Mason and Kwok (2012)

⁷ The absorptive capacity literature indicates that firms need to be able to absorb and act on advice (Zahra and George, 2002)

- Whilst a progression in types of finance with business maturity is supported by the business life cycle literature, the ‘classic’ model of the funding escalator progression from internal sources through debt and informal equity to formal VC and initial public offerings (IPOs), needs to be modified for innovative businesses⁸. A ‘reverse model’ is more relevant⁹.
- Debt finance is rarely obtained and used at an early stage, even from crowd funding sources, due to the lack of a trading record and risk associated with introducing innovative processes and products. Novel and collaborative approaches to raising private equity are demonstrated with early stage businesses. Debt finance becomes more accessible as businesses mature and build up a track record. For mature businesses and MSBs, formal equity markets including AIM are reported as effective sources of external finance.

The role of public sector grant funding

- Public sector grant funding, matched by internal sources and private equity, was critically important for the start-up and early stage development of innovative businesses interviewed in the survey¹⁰. Innovate UK (formerly the Technology Strategy Board (TSB) was the primary source of such funding for these firms.
- Grants, which frequently play an important role for growth and more mature stage businesses, as well as early stage businesses, often have a matched funding requirement which has a number of implications:
 - Early stage businesses may seek collaborative arrangements to both develop the technology and source matching funds. This may reduce the search time that may otherwise be necessary to find matching funds.
 - Entrepreneurs and CEOs undertaking a search for sources of matching funds may be distracted from developing core business strategies.
 - Continuity of funding becomes an issue once the period of grant funding ends, particularly for innovative businesses that have longer term development horizons.
 - Some innovative businesses are able to move on to informal business angel funding for further development, but funding gaps are still evident for longer term patient capital for subsequent growth and development stage businesses.

⁸ North et al 2013 point to the breakdown of the funding escalator in their study of technology-based small firms.

⁹ The funding escalator is not operating in the ‘classic form’ or smoothly at early and growth stages, there are significant search, timing issues and delays causing gaps, unplanned diversions and lengthening of pathways.

¹⁰ Public sector grant funding is designed to fill the early stage finance gap identified by a number of reports (Rowlands, 2009; NESTA, 2009).

Personal factors versus information asymmetry

- A recurrent observation drawn from interviews with innovative firms is that personal relationships, networks, personalities, and management characteristics were often more important than information contained in formal business plans and financial forecasting (particularly for finding and accessing equity finance).
- For bank funding, the financial track record of the business was the primary concern, whereas for private equity and VC funding it was an understanding of the nature of the business and its market and the 'meeting of minds' that was necessary rather than formal business plan content.
- Some entrepreneurs and CEOs were willing to dilute their equity holdings in order to secure VC and business angel development finance which often meant giving up large equity shares.
- Collaborations were particularly important for grant funding applications, assisting with writing the applications (e.g. academic researchers) and providing matching funding (e.g. academic staff input and investment; joint ventures).

Supply side themes and funding gaps

- Among the start-up and early stage businesses in the survey, commercial bank and debt finance was not attainable due to lack of cash flow to sustain interest payments and minimum trading requirements (of two years or more). It becomes more accessible for more mature businesses.
- Findings from the research suggest that public sector grant funding was well received. Terms and conditions were acceptable, but matching requirements could be problematic for some businesses. At the early stage, grant funding was focused on proof of concept and prototyping. The role of Innovate UK (formerly the TSB) was regarded as important for assisting early stage innovation.
- However, there is a lack of follow-on funding rounds, as early stage businesses may still fall into the early stage equity and debt funding gap. Some surveyed growth stage businesses perceived that grant-based funding is too focused on early stage innovation, rather than taking a more 'whole of innovation life' view¹¹.
- There is a further funding gap for patient capital with longer term horizons in R&D intensive sectors such as life sciences.
- Public equity markets, (LSE main market and AIM) are reported as being buoyant at the particular moment in time and performing efficiently for mature businesses and MSBs which were able to raise the levels of equity they required with acceptable conditions, including those for IPOs.

¹¹ A more holistic approach to innovation finance is advocated by Hughes (2009)

- For mature businesses and MSBs there are a range of equity and debt sources enabling access to the mix of debt and capital financing such businesses may require. Grant funding is also accessible and the role of specialist institutes and organisations have been well received and have helped to improve understanding of the sectors.
- The R&D tax credit system was working well for those businesses that use them, even acting as an incentive to attract businesses from overseas, with many, although not all businesses, that had eligible R&D accessing their benefits. There were also some misconceptions about the trading position of a company and its ability to claim R&D credits.

1. Introduction

1.1 Rationale for the study

Innovative businesses contribute to economic growth¹². However, whilst there is evidence of them being more likely to seek finance, there is also evidence that they experience greater difficulties than their less innovative counterparts in raising the external finance that they require to achieve their growth potential¹³. The **aim of the study** is, thus, to examine the pathways to formal external finance of different types of innovative business and to identify obstructions in those pathways.

An essential caveat is that this is purely a demand side study of the UK market for innovative business finance. No conclusions on the state of the market for innovative finance can be drawn without understanding the supply side. Therefore, this report does not attempt to draw such conclusions. Similarly, recommendations on policy cannot be made without a full understanding of both demand and supply sides of the market. Therefore, this report does not attempt to provide policy recommendations.

Innovative businesses are markedly different from their non-innovative counterparts, and particularly where they are undertaking R&D into new products and services. They typically require external finance for their R&D, or to adopt new processes which may require capital equipment investment. However, for new innovations external financing can be problematic due to a combination of information asymmetries which make it difficult for lenders and investors to assess their value. This situation is particularly exacerbated where earlier stage businesses lack commercial track record and collateral¹⁴. These factors mean that whilst most established businesses seek and use bank debt finance, innovative businesses are far more likely to require more specialist forms of risk finance in the form of equity investments¹⁵.

In this research, innovation is defined in a broad sense as the development of a completely new or greatly improved product, service or process; or as the introduction into a business of a product, service, or process which represents a new or a significant

¹² Lerner (2010) references several major US studies which strongly correlate innovation with growth; see also Cefis and Ciccarelli, (2005), Loof et al. (2012) and BIS (2014) Rates of return to investment in science and innovation.

¹³ Lee et al. (2013) found that amongst external finance seeking UK firms 2010-12, 38% of innovative firms failed to obtain finance compared with 22% of their counterparts. Eurostat (2011) SME data also supports this premise in relation to growth oriented firms during the GFC.

¹⁴ See Hsu (2004), Hughes (2009) and Wilson and Silva (2013) for more detailed accounts.

¹⁵ UK SME finance surveys such as the UK SME Finance Monitor, typically indicate that less than 2% of SMEs seek equity finance, whilst North et al (2013) found that 23% of the UK innovative technology based small firms in their study had sought equity finance.

improvement on the business's products, services, or process prior to the introduction, even though the new or improved product, service, or process has been offered or adopted elsewhere¹⁶. It is thus recognised that the nature and level of innovation can vary considerably (e.g. in terms of degree of market innovation, range of innovation activity, or intensity and length of R&D period)¹⁷ and needs to be better understood in relation to access to finance.

A further important issue is that recent UK research (Nesta, 2012) has shown that since the Global Financial Crisis (GFC), investment into intangibles (such as software and other knowledge-based assets) has increased, whilst investment into capital, hardware-based assets (such as equipment and physical property assets) has remained static. A key question is why this is the case and the extent to which the types of investments required by capital asset-based companies (i.e. predominantly hardware, physical product manufacturing and process innovations) differ from those of knowledge-based (i.e. predominantly software, creative and design innovations) ones. A crucial point here is that the distinction between assets that are knowledge based and assets that are capital based is not always clear, particularly in cases where firms are transitioning through the innovation cycle from initial knowledge development to physical/capital activity in terms of product manufacture or service provision. Therefore, the positioning of the firm along the spectrum between knowledge- and capital-based activity and the stage and direction of investment (whether knowledge- or capital-based) is an essential consideration for the research.

An initial examination of the current post-GFC financing literature in relation to the UK¹⁸ suggests that the investment balance between knowledge asset and capital asset investment may relate to a range of possible drivers:

- (i) bank finance, post-GFC, moving away from funding start-up and early stage businesses and also from patient finance based on property security;
- (ii) the greater attraction to equity investors of fast turnaround digitech-based investments;
- (iii) the lack of attractiveness to private equity (PE) investors of long-horizon capital intensive investment required in key industry sectors such as cleantech, advanced manufacturing, and bio and life sciences;
- (iv) low public and private sector investment to address this potential market gap; or
- (v) that demand for finance in these sectors is depressed (due to factors such as retrenchment or to discouragement¹⁹) or is poorly organised in terms of viability.

¹⁶ Conforming with the broad catch-all definition in the most recent UK Small Business Survey (2013) and the OECD (2005)

¹⁷ UK Innovation Survey, 2013; North et al (2001); Rothwell and Zegwells (1982).

¹⁸ Cowling et al. (2012); North et al. (2013); GLA (2013); BIS (2013).

In taking an exploratory and qualitative in-depth approach to examining the pathways to external finance of innovative firms, this research aims to provide evidence of the degree to which key demand-side and/or supply-side issues affect the access to external finance.

1.2 Methodology

1.2.1 Introduction: research stages

The methodology of the study had three main stages:

- A first stage grounded the study in a background of prior research into the relationship between innovative businesses and the access of these businesses to external finance. This stage consisted of a *review of the relevant published literature* – a range of academic studies, advisory reports to government, and direct government publications related to this theme. This review is included in this report at **Annex A**. The papers and reports which were reviewed are itemised in a bibliography which is appended at **Annex B**. Secondary analysis of two BIS surveys – the Small Business Survey of 2012 and the SME Journeys Towards Raising External Finance Survey of 2014 – was undertaken in order to add additional insights. This stage was used to refine the parameters of the survey interviews – the types of firms which should be interviewed in order to collect relevant data – and to define the questions which should be asked of them.
- A second stage was one of *primary research* in which 50 innovative firms were interviewed in depth by members of the research team.
- The third and final stage was the *analysis* of the outputs of the primary research stage on which this report is based and reconciliation with the existing evidence base.

1.2.2 Literature review

The main themes of the literature and secondary data analysis are summarised:

- Innovation in firms has a wide definition.
- The contribution of innovation to growth both at the level of the firm and their upwards to the level of regional and national economies has been observed – this contribution constituting a rationale for government policy in support of innovation.
- Innovative firms, in comparison with non-innovative ones, are more knowledgeable about financial markets, are more flexible in their market approaches (in that they are more likely to take financial advice and to consider and use more types and sources of finance), are more likely to seek larger amounts of funding, and are more likely to seek finance to fund growth rather than to support cash flow.

¹⁹ Fraser's (2009) discouraged borrowers

- There are variations in the economic value of innovation depending on its scale, nature, and type.
- As a generality, innovative firms may have particular difficulty in acquiring the finance they need to underpin innovative processes. Within that generality, however, the level of difficulty may vary according to a number of inter-related factors: the intrinsic riskiness of the innovation-based proposition; whether the innovation is to develop intangible or tangible assets; and whether the requirement is for investment with potential returns in the shorter or longer term.
- Many research studies have also observed variations in firms' ability to acquire finance according to often inter-related characteristics of: business size; business maturity; business sector; location; whether in family ownership or not; the gender, ethnicity, education, and experience of business owners; and the extent to which firms have access to expert financial management skills and knowledge of sources of finance, either internally or externally acquired.
- There is a wide range of sources of finance – internal, equity, debt, crowd-sourcing, peer-to-peer lending; and micro-finance.
- Needs for finance are determined and triggered by a range of business circumstances – some of which are related to growth and development, others which are more negative (such as needs to restructure or retrench).
- The interaction between firms' characteristics, their reasons for need for finance, and the different types of finance often generates a 'pecking order' in which firms' preferences for types can be theoretically listed.
- This 'pecking order', however, tends to accord with a 'finance escalator' model such that firms at different stages of development and seeking different amounts typically seek finance of different kinds and from different sources at each stage.
- However, the efficiency of that model has been questioned. Pathways to the successful acquisition of finance are obstructed variously on the demand side by the lack of investment readiness of young businesses, by entrepreneurs' belief that they will not get finance (the 'discouraged borrower' concept), and by the lack of firms' understanding of financial markets. On the supply side, credit rationing theory observes that viable proposals may go unfunded because lenders lack sufficient information to make decisions on them – and 'lending gaps' applying to particular levels of funding arise.

In **summary**, a review of literature suggests that this research needed, first, to consider the resources of information, experience, and knowledge which firms can deploy when assessing their finance options and the sources of finance which are likely to be available to them. The review also suggested that each of these can be expected to vary at different stages of firms' development. Table 1.1 (following) shows some of the typical resources of information and sources of finance which the research would anticipate finding:

Table 1.1: Key information and anticipated finance sources by stage

	Early Stage (<£5m)		Growth Stage (£2m-10m)		Mature Stage (£10m+)
	Pre-start	Start-up to early market development	Early growth and development	Later stage	Established maturity
Key resources of financial information and understanding	<p>Prior experience (e.g. experienced, serial entrepreneur)</p> <p>Public advisory sources</p> <p>Social networks/peer group advice</p>	<p>Prior experience (e.g. experienced, serial entrepreneur)</p> <p>Investor advice (NEDs)</p> <p>Public advisory sources</p> <p>Social networks/ peer group advice</p> <p>Business mentors/ incubators/ accelerators</p>	<p>Increasing management team experience</p> <p>Investor advice (NEDs)</p> <p>Accountants/VC finders</p> <p>Local business networks/peer group advice</p>	<p>Recruitment of specialist finance managers</p> <p>Investor advice (NEDs)</p> <p>Accountants/Lawyers/ Brokers/management consultants</p> <p>National/global networks</p>	<p>Highly specialised and expert finance teams/internal fund raising teams</p> <p>Accountants/Lawyers/ Brokers/ management consultants</p> <p>National/global networks</p>
Key sources of finance	<p>Internal funding (3Fs)</p> <p>Credit cards</p> <p>Personal loans</p> <p>‘Proof of concept’ grant funding (e.g. Innovate UK grants)</p>	<p>Internal funding (3Fs, consultancy income)</p> <p>Early stage business angels/HNWIs</p> <p>Technology development grants (e.g. Innovate UK)</p> <p>Public and seed venture capital (VC)</p> <p>Crowd equity and Accelerator</p>	<p>Re-invested profits</p> <p>Bank credit</p> <p>Business angel syndicates</p> <p>Public and private VC</p> <p>Peer-to-peer lending</p> <p>Technology development grants</p> <p>Joint ventures and licensing</p>	<p>Re-invested profits</p> <p>Bank credit</p> <p>Venture capital</p> <p>Potential exit, trade sale, MBO/MBI</p> <p>Corporate/institutional finance (private equity)</p> <p>Business Growth Fund</p>	<p>Re-invested profits</p> <p>Bank credit</p> <p>Large scale venture capital</p> <p>AIM and stock market listing</p> <p>Institutional finance, private equity (PE)</p>

1. Introduction

		finance		(BGF)	
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Source: Adapted from Nesta (2009a), Baldock and Mason (2015) and BIS (2015)

At a second level, the literature review leads to a proposition that an innovative firm's position in respect of each of a variety of 'independent variables' (characteristics of the business, its managers, and its innovation, as in Table 1.2) cumulatively lead to a particular outcome in respect of the 'dependent variable', that is greater or less success in obtaining finance. Investigating the varying significance of these factors – the relative contributions which they make to the outcome of getting finance or not – is one of the main challenges of the research. There are clearly complexities in that challenge – many of the factors are inter-correlated, some may be particularly prominent in particular economic circumstances and not others, and beliefs and behaviours on the supply side, not just the characteristics of the firms themselves, are significant:

Table 1.2: Summary typology of key business innovation and finance characteristics

Businesses typology of innovation and finance characteristics
<p>Innovation:</p> <ul style="list-style-type: none"> • New or improved products, services or processes • New to the national and/or international market, or to the firm only • Short horizon R&D (typically digital software taking 2-3 years) or longer horizon R&D (typically life science, advanced engineering or cleantech, taking 10-15 years)
<p>Asset base:</p> <ul style="list-style-type: none"> • Knowledge asset base, undertaking R&D in any sector, but typically firms which lack tangible or physical collateral with which to secure funding. This may include, but is not limited to, software development and services. • Capital asset based, undertaking R&D in any sector, but typically firms which possess tangible or physical collateral with which to secure funding. This may include, but is not limited to, manufacturing and testing facilities.
<p>Management resource base (human capital):</p> <ul style="list-style-type: none"> • First time manager with no previous experience of accessing finance • Spin-out manager with external finance and customer base linkages • Serial manager with previous experience of accessing finance • Larger management team with specialist skilled Finance Directors and experienced non-executive directors (NEDs), often appointed by or representing existing investors
<p>Management characteristics:</p> <ul style="list-style-type: none"> • Pecking order preferences for external finance, typically preferring debt over equity • Family managed businesses are more averse to using equity finance and potential loss of control • Women-led businesses are more cautious of using external finance • Some ethnic minority owned businesses face cultural difficulties in accessing external finance

Businesses typology of innovation and finance characteristics

Business networking (social capital):

- Willingness to use external assistance can increase the chances of accessing external finance, notably grants and equity finance
- Collaborative relationships with academics and business suppliers/buyers can improve access to external finance

Business characteristics:

- Innovative R&D and creative businesses face information asymmetries with financiers, particularly where funding required is too small to justify due diligence
- Young, small businesses without trading track records and lacking collateral find it difficult to access external finance, whilst larger, more established businesses, are more successful at accessing all types of external finance.
- A business life cycle stages approach which contrasts early (pre and early trading up to 2 years), growth (2-5 years trading) and larger established (trading more than five years) businesses appears most appropriate in relation to studying access to finance
- Service sectors with high churn, such as retail and hotel and catering may find it harder to access external finance
- More peripheral and rural UK businesses may find it difficult to access external finance due to distance and access issues.

1.2.3 Primary research

Introduction

In the primary research stage, of interviews with 50 firms, it was important that *all* the interviewed firms should have some basic characteristics for interviews:

- First, that they should have been, or attempted to be, innovative – having developed products, services, or processes which were genuinely new or were substantially improved variants of existing products, services and processes; or, at a minimum, having undertaken ‘internal’ innovation in which they had substantially developed their product or service range or their production processes in a way which was new and significant to themselves even if the development was not ground-breaking in a wider context.
- Second, it was equally important to the purposes of the study that the firms should have sought external finance either, ideally, directly to finance the innovative development or, at a minimum, to support the firm’s operations during a major innovative development phase.

Beyond that, informed by the literature review summarised above, the research sought, through structuring of the research sample and through design of the study’s interview guide, to allow a variety of underlying variations in firms’ characteristics and experiences in respect of their pathways towards finance to be addressed by the study.

Business cycle stage

The first variation concerned the firm's underlying stage of development – the study adopted a business cycle stages (Churchill & Lewis, 1983) and finance escalator (Nesta, 2009) approach, allied to a management resource-based view (Barney, 1991), in examining and explaining the pathways that innovative businesses take as they assess their external financing needs and the type of finance they require and then proceed to search for and acquire that finance.

In taking this approach, three stages were assumed as being likely to capture business development from early, pre-revenue states to conditions of full maturity:

- 'Early stage' firms, mostly less than 2 years trading age and seeking investment to develop and market products/services: 25 of these firms were interviewed (against a target of 24 – see Table 1.3 following).
- 'Growth stage' firms, mostly trading in the 3-5 years bracket and showing sales and employment growth: 16 of these firms were interviewed (target of 16).
- 'Mature' firms of substantial size, trading more than 5 years, and with an established market presence (this group supplying most of the 'mid-cap' firms which were of interest to the study): 9 of these firms were interviewed (target of 10).

Other variations

Design of the sample and of the discussion guide which was used to structure interviews with firms in the sample also took into consideration a number of other factors. These factors were those which the literature on firms' access to finance had highlighted as important to behavioural preferences and success rates in accessing external finance and primarily include:

- (i) Whether the firm was knowledge asset-based or capital asset-based.
- (ii) The basic structural characteristics of businesses – their size and sector
- (iii) Ownership characteristics and preferences for the use of different types of external finance (e.g. in relation to business ownership by family, gender, and ethnicity characteristics)²⁰
- (iv) Management characteristics in relation to individual and management team knowledge and previous experience in raising particular types of external finance, including knowledge, awareness, and consideration of different forms of non-bank finance and government finance²¹

²⁰ Fraser et al. (2013) Enterprise Research Centre (ERC) White Paper No.4

²¹ North et al. (2013)

(v) The extent of planning and preparation undertaken in assessing, approaching, and applying for external finance²²

(vi) The extent to which external assistance is used in order to assist with finding and accessing finance and the role of networks and social capital in accessing information and external sources of finance²³

(vii) The influence of previous sources of finance in determining future external finance choices – what has been termed as '*path dependency*'²⁴

(viii) The influence of location and proximity to sources of external finance upon access to finance, particularly given that a disproportionately high level of innovation finance is located in the South of England in the London-Oxford-Cambridge triangle²⁵

Design of the sample

To capture this variety, an initial target sample was designed. This had a format as:

Table 1.3 Target sample structure

	Early stage	Growth stage	Mature	Total
Capital asset-based	12	8	5	25
Knowledge asset-based	12	8	5	25
Total	24	16	10	50

It was further required that interviewed firms would be spread across UK regions in order to prevent any particular issues affecting firms in particular regions (should these exist) from biasing the survey findings; and the sample also sought to include minor representation (3 cases each) of women-owned or -led and ethnic minority-owned or -led businesses.

²² Mason and Kwok (2010)

²³ Mason and Kwok (2010); Keizer, et al. (2002)

²⁴ Hirsch and Waltz (2011); Cumming (2011)

²⁵ Mason and Pierrakis (2013); Amini et al. (2012); Fraser (2009)

Sample selection

Having determined a target structure for the sample, the next step was to secure a sample of actual businesses, broadly conforming to the structure, which would consent to interview.

A sampling frame of businesses for initial contact was constructed. This sampling frame had a variety of sources including proprietary databases, businesses surveyed in previous research studies which had consented to further participation in research, and on-line searches (for example, of businesses located on science parks or in business incubators).

Using the sampling frame, researchers from BMG and CEEDR, then undertook a programme of initial telephone interviews using a recruitment script to identify firms which were suitable to take part in the study, to establish some of their basic characteristics, and, if they were willing, to make an appointment to interview them.

From this process, a sample of 50 firms which consented to a follow-up in-depth interview was recruited from around 450 recruitment interviews – a ‘hit rate’ of around one achieved interview per nine ‘recruitment’ calls [with unsuccessful recruitment stemming from a mix of non-eligibility (non-innovative or not sought external finance), actual refusal, or substantive refusal (e.g. respondent not able to find time for interview in the fieldwork period)].

The achieved sample

Key characteristics of the achieved sample are described in the following schedule:

Table 1.4 Characteristics of the interview sample

Number of cases	
Region	
Eastern	5
East Midlands	5
London	5
North East	1
North West	12
South East	13
South West	3
North Ireland	2
Scotland	4
Total	50
Innovated products/services	
Yes	45
No	5
Total	50
Innovated process	
Yes	31
No	19
Total	50
Had complexity in funding process	
Yes	41
No	9
Total	50
Development stage	
Early	25
Growth	16
Mature	9
Total	50

Perception of knowledge or capital asset-based	
Knowledge	35
Capital	3
Both	12
Total	50
Sales in last or current financial year	
Zero	13
<£100k	4
£100k-£499k	6
£500k-£999k	7
£1m-£4.9m	4
£5m-£99m	8
£100m +	4
Not known	4
Total	50
Current employment (including entrepreneur/partners)	
1-4 people	17
5-9 people	9
10-49 people	11
50-249 people	6
250+ people	4
Not known	3
Total	50
Whether sales turnover grown in last 3 years/since start-up	
Yes	29
No	21
Total	50
Whether employment grown in last 3 years/since start-up	
Yes	30
No	20
Total	50
Other characteristics	
Number self-describing as family business	12

Number of women-led businesses	5
Number of ethnic minority-led businesses	3

It can be seen that the achieved sample broadly conformed with expectations – it had some regional spread, a high frequency of product/service and/or process innovation, frequent complexity in the search for finance, close-to-target spread across the early/growth/mature stage dimension (with corresponding spread of sales turnover and employment levels), significant representation of growth companies, and minority representation of family, women-led, and ethnic minority-led businesses.

The dimension on which the anticipated distribution was not apparently achieved was that concerning the ‘knowledge asset’ or ‘capital asset’ base of firms’ operations – with a much higher than anticipated representation of self-perceived ‘knowledge asset’ businesses in the sample. However, as raised earlier and as will be discussed at several points in the report which follows, the simple dichotomy between ‘knowledge’ and ‘capital’ is not one which is easily operable in practice.

Thirty-five out of the 50 businesses interviewed classified themselves as ‘knowledge asset-based’. However, examination of the actual innovations of the 50 businesses showed that only 13 out of the 50 were developing a pure ‘knowledge’ product (a software solution or application in all cases). Of the remaining 37 cases, 11 were involved in design activities (e.g. engineering design) whilst 26 were working on projects which were eventually intended to produce a ‘physical’ outcome or technology (and of these 26, only 3 respondents described their business/innovation as wholly ‘capital asset-based’).

In short, there is a strong tendency for innovation to be seen by innovators as knowledge-based whether or not it has a ‘software’ (intangible asset) or ‘hardware’ (tangible asset) outcome as its final objective. Given this ambiguity, as to where ‘knowledge based-ness’ ends and ‘capital based-ness’ starts, it is suggested that the survey sample achieved sufficient representation along the spectrum which evidently exists in practice.

Undertaking interviews

Having secured an adequate sample of firms to interview, these interviews were then undertaken by members of the BMG and CEEDR research teams. Interviews were structured using a discussion guide of which the design was informed by the prior literature review and was approved by BIS. In summary, the discussion guide addressed:

- Basic descriptors of the business and its innovations.
- The process of deciding that external finance was needed in relation to innovation development.
- The process of applying for finance and outcomes of the application.

- The impacts of getting or not getting required finance.
- General business perspectives on access to finance and on government policy to facilitate this.

Interviews were undertaken, between February 4th and March 25th 2015, either face-to-face on business premises or by telephone. Typically, they lasted for over an hour but ranged from 45 minutes to two and a half hours in duration. Where respondents permitted it, interviews were audio-recorded to assist subsequent analysis. Respondents were all either individual entrepreneurs (in smaller businesses) or senior managers such as CEOs or CFOs (in larger ones).

1.3 Analysis

Following interviews, an Excel grid was constructed in which answers to each question in the discussion guide were set out for each of the 50 firms which were interviewed. This approach allowed interview responses for individual firms to be read horizontally across the rows of the grid and allowed interview responses to a particular question for all 50 firms to be read vertically down the columns of the grid. The content of the grid, assisted by discussions between research team members on particular details of firms, their innovations, and their finance-related experiences, constituted the basic material on which research findings, set out in following chapters of this report, are based.

2. Findings from the survey: characteristics of firms and of their innovation

2.1 Introduction

This is the first chapter of four which present substantive findings from the 50 interviews with entrepreneurs or senior managers of innovative firms which were undertaken and analysed as described in the previous chapter.

Thus, the chapter first observes the ways in which the terms ‘knowledge asset-based’ and ‘capital asset-based’ play out in respect of what the interviewed firms actually do. It notes that strict demarcation between the terms cannot be simply drawn and that firms’ locations in particular sectors do not accurately predict that their innovation projects will fall into one or other category.

The chapter then shows variations in ‘management capital’ – the different resources or individual and collective experience – which were observed between firms at different points of the growth cycle.

Finally, the chapter describes, from varied perspectives, the types of innovation which the interviewed firms were undertaking.

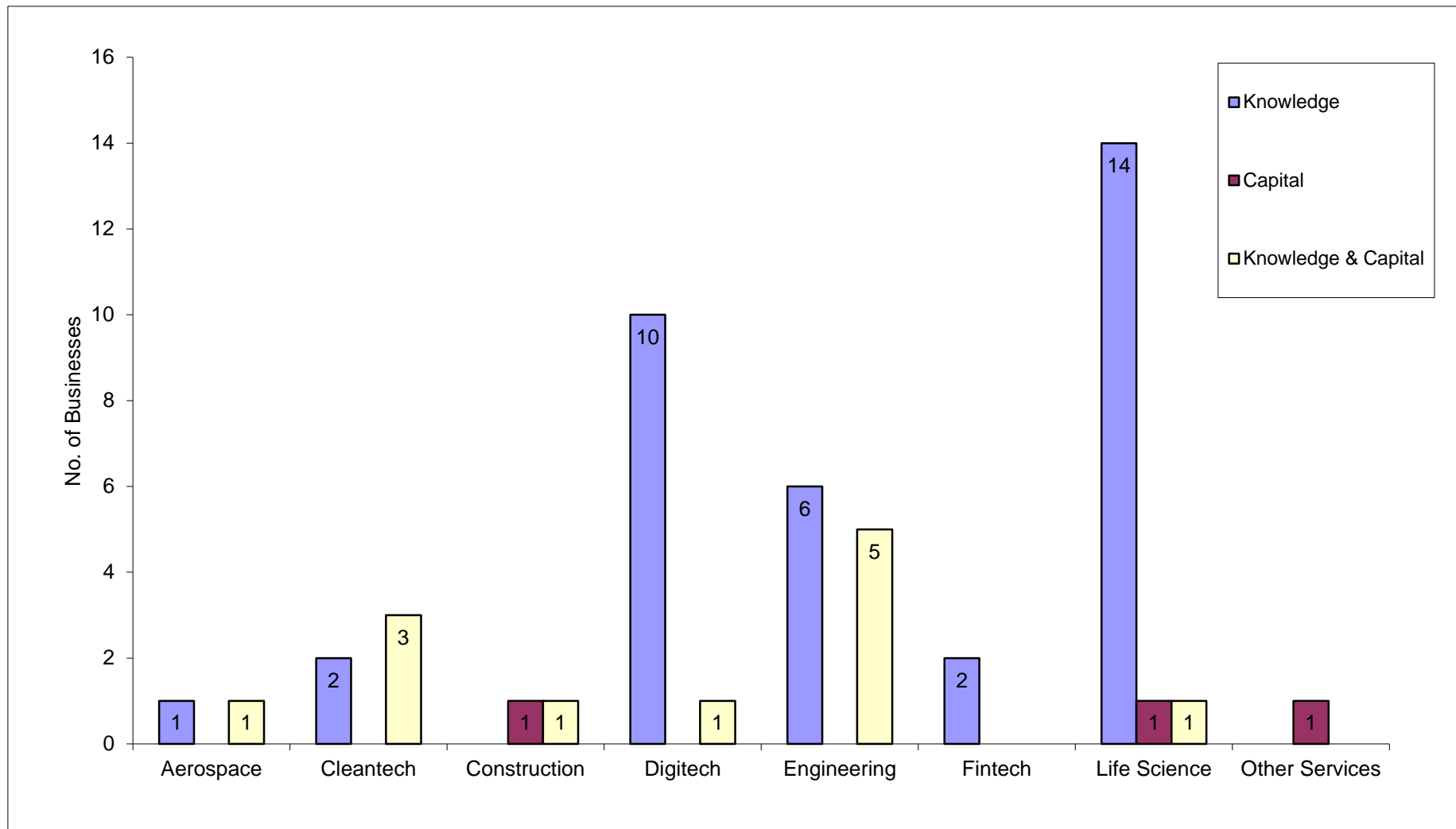
2.2 Sector, knowledge asset- based, and capital asset-based characteristics

Defining the surveyed businesses as either knowledge- or capital asset-based businesses is problematic. On the face of it, businesses which are primarily R&D, computer software and service-oriented may be considered as predominantly knowledge asset-based, since they rely heavily on intellectual property (IP) and human capital input, whilst manufacturing, computer hardware, capital plant, property, and physical infrastructure companies are more likely to be capital asset-based.

However, this distinction does not necessarily reflect how businesses view themselves or measure their value. It was clearly evident from the research (see Chart 2.1) that broad sector does not accurately predict business knowledge and capital asset bases. For example, highly innovative and established manufacturing businesses (e.g. in aerospace and engineering) undertaking extensive and ongoing R&D consider themselves as primarily R&D knowledge-based businesses and Public Limited Companies (PLCs) were

quick to indicate that their market capital value (based largely upon the perceived value of their IP) could be many times their capital asset value on the balance sheet:

Chart 2.1: Knowledge and capital asset business classification by sector (Sample distribution)



Note: Survey n=50 innovative UK businesses; Other Services (art gallery fine printing)

Furthermore, complexity is evident in that the business development model presented by many of the younger early and growth stage businesses was predominantly based upon R&D, with capital investment being undertaken by subcontractors, collaborations with more established laboratories or manufacturers, or clients under licensing arrangements.

Examples from the life sciences and energy sectors demonstrate that difficulties for both early stage and growth stage R&D businesses in raising substantial capital investment have led to changes in their business development model. This means that instead of in-house development utilising capital asset investment, they have remained as knowledge-based businesses with the capital investment (for later stage prototyping, clinical trials and full market production or plant development) needing to be raised by longer-established clients under licence agreements. Whilst this approach makes sense in terms of specialisation in market structure (e.g. specialist laboratories undertake trials) and increasing project ability to raise substantial capital asset finance, it potentially also leads to seepage of IP and revenue out of the UK. Thus, for example a joint venture was undertaken between a UK R&D engineering company and a German manufacturer, with the manufacturer responsible for the capital investment element of the innovation project.

This process of diffusion of capital investment means that the knowledge-based business drivers of innovation typically remain small knowledge-driven businesses, with their investment returns on innovation diluted through collaborative financing arrangements and licensing. The result is that growth is often slowed down by the process of finding collaborators and that capital asset investment takes place in other partner businesses. Therefore, to understand patterns of innovation investment into knowledge asset or capital asset activities it is necessary to examine project finance within the wider collaborative business cluster (rather than restrict the analysis to an individual business).

This evidence suggests that, in order to address the question of whether businesses are finding it harder to access capital asset finance than knowledge asset finance in relation to innovative activity, we need to examine more closely the collaborative approach to project financing that is taking place and, particularly, to consider collaboration in relation to finding 'matching' finance to draw down technology investment grants.

Finally, a number of these out-sources and collaborations are with overseas businesses, with the capital investment being made in two distinct ways. First, in a small number of cases where capital investment was insufficient or inefficient (deemed too expensive) to enable in-house development, products and services were either licensed-in, or outsourced (e.g. for testing and manufacture), resulting in indirect capital investment outflow, in some cases into overseas businesses. Second, in a larger number of cases capital investment contribution was directly made by overseas businesses which raised their own finance (internally or externally) to contribute to innovation through licensing and joint venture arrangements. This finding could be an important factor in understanding why capital investment in UK business innovation as a share of GDP has been stalled and is explored further in the report.

2.3 Management characteristics

Important factors determining types of finance sought and the success or otherwise of finance-seeking approaches are the resources of management expertise and experience possessed by businesses, together with formal and informal networks of which entrepreneurs and managers are part. Table 2.1 below, summarises the character of management in firms interviewed in the study. Subsequent text discusses the observed characteristics of management of the interviewed firms in more detail.

Table 2.1: Summary of management experience by stage

Early stage (n=25):		Number of cases in sample
First time founder	University spin-out, independent innovator/first time in business owner-management	11
Serial Entrepreneur	Previous management experience in sector, investor director	4
Corporate spin-out manager	Experienced managing in sector, but not an owner-manager	4
Training/advice user	Investment readiness programme (IRP), entrepreneurial training, mentoring, incubator/accelerator, BL/Gateway advice	12
Small Management Team	Founder and other director/investors, may have non-executive director (NED) or oversight advisory board	5
Growth stage (n=16):		
Management Team	Clearly defined management team with chief finance officer (CFO) and board	9
External Management	NEDs, advisory chairs/boards, investor input/reporting	4
Training/advice user	VC finders	4
Mature stage (n=9):		

Experienced Teams	Clearly defined management team with CFO and board	8
And sub-teams	CFOs with accounts/finance teams	4
External Management	Fundraising teams, NEDs, advisory chairs/boards, investor input/reporting, audit	6

Note: N=50; Business case numbers where managerial experience factor identifiable. Some categories may overlap as case factors are not mutually exclusive.

Early stage management experience

The surveyed early stage enterprises exhibit a distinction between serial entrepreneurs who are more likely to have a plan for, and knowledge of, where to seek funding and external support as opposed to first time entrepreneurs who were typically less informed and more likely to be in need of external training and guidance.

In the first case, the survey found that a number of early stage founders and CEOs had previous experience, either as founders or experienced non-owner managers. Some were, or are still, active as directors and shareholders in other businesses. Examples include a software entrepreneur with an active role as a manager and shareholder in another business and an electrical engineering founder who had previously set up and run two engineering businesses.

In the second case, a set of first time entrepreneurs/founders with no prior business management experience was identified. Examples from bio and life sciences include university scientists managing spin-out businesses. Many first time entrepreneurs had, however, used external advice. This included a software entrepreneur using a mentor who advised the installation of an Advisory Board, which had proven invaluable. Other forms of support included public services such as Business Link advisors (before it closed down) and Scottish Enterprise, universities (e.g. for grant applications), growth accelerators/incubators (providing mentors and a business environment), private professional services (e.g. accountants, lawyers), as well as personal bank contacts. Others sought informal advice from friends and family. In one case a new university spin-out entrepreneur was grant-funded for an entrepreneurial training course.

Growth and mature stage management experience

One of the distinguishing features of growth stage and mature companies is the existence of clearly defined management teams with a Chief Financial Officer (CFO) role and Board of directors. Some growth and mature businesses also have finance and fund raising teams, whilst some benefit from investors' involvement and advice. Mature stage PLCs benefit from formal audit and, as a general rule, they seek advice from commercial sources for this (as well as for legal and corporate issues).

Later stage high growth and mature businesses tend to report fewer problems associated with raising external finance. It is evident from the survey findings that more mature and more successful businesses benefit from having highly experienced CEOs and CFOs as well as experienced board members with business and financial knowledge and established networks. A number of growth stage firms initially had founders with no previous finance experience but had subsequently recruited highly experienced professionals into the business to compensate for this shortfall.

Examples from the life science sector include founders who were academics and in one case a founder from a design consultancy company. In another example, a high growth business founder who is still transitioning from academic to entrepreneur took on an experienced chairman with a history of successful life science IPOs and large pharma collaborations. Some businesses are spin-outs from large, established, mature companies. One bio-pharmaceutical business had founders who worked all their careers in a large pharmaceutical company and had no prior entrepreneurial experience. They brought in a CEO with extensive funding experience within a year of being established.

In summary, survey results indicate that entrepreneurs' previous experience and their social and business networks influence market outcomes by affecting both who gets finance and what type of finance is sought: opportunities for finance acquisition are significantly influenced by the extent and level of prior experience. Firms with embedded relations and those which have experienced entrepreneurs are more likely to receive financing. Moreover, the type of finance they decide to apply for is often path dependant, based on past success in accessing finance from particular sources.

2.4 Innovation

2.4.1 Introduction

This section explores the nature and type of innovative activity that the surveyed firms had undertaken within the last three years, or were currently undertaking. This covers a broad spectrum of innovation activity and it is important for this study that the type of innovation (e.g. product, service, or process), scale of innovation (whether innovative only to the firm, or more widely, ranging up to being global market leading) and intensity of innovation (typically relating to the length of time for R&D to reach the market) are taken into account²⁶. As noted, the study is also particularly concerned with whether innovation is knowledge asset- or capital asset-based as this may have important repercussions for the intensity, length and cost of innovation and therefore its suitability and attractiveness to different types of investors.

²⁶ North et al. (2001)

Particular consideration is also given to the stage of the business within the business development cycle as this is likely to have an important influence on the firm's position within the innovation cycle and, together with the firm's sector, on the types of innovation taking place.

2.4.2 The nature and types of innovation

First, the range and variety of innovation activities captured in the survey is described (see Table 2.2 following). Having adopted a broad definition of innovation it has been possible to gather information on product, service and process innovations, with many of the surveyed businesses undertaking combinations of these innovations:

Table 2.2: Summary overview of the nature and type of innovation undertaken

Type of Innovation	Sectors in survey	Survey Examples (activity descriptions)
Product	aerospace, cleantech, engineering, life science	Biomass energy production unit Wind turbine efficiency development Carbon fibre aircraft components Carbon fibre satellite components Hand held genetic diagnostic instrument
Service	digitech, construction, engineering	Online investment platform Environmental building service Medical learning development products Customised engineering solutions
Process*	printing, life science, engineering	Improved printing/cutting machinery Acquisition of hardware manufacturing arm Undertaking in-house prototyping Innovative plastics manufacturing process
Knowledge based	digitech, life science	Cloud based software for healthcare Genetic targeting for drug testing Design lightweight medical devices
Capital based	life science, printing, cleantech	Develop breath analyser disease diagnostic Purchase printing and cutting machinery Battery storage for street lights

*Note: Defined as process improvement taking place within the company

The areas of innovation summarised in Table 2.2 are discussed in more detail below.

Product innovation

Whilst relatively few of the surveyed innovating businesses are directly involved in manufacturing or operating their own plant and machinery, many of these R&D-based

businesses are developing prototype products and devices which may eventually be manufactured for potentially global markets. Plans for in-house manufacture occur in examples from the aerospace industry, where a long established MSB will soon be moving into the full manufacturing stage producing market leading carbon fibre aircraft components. They also include: a substantial mature stage life science business that has acquired a manufacturing company to develop their market leading genetic diagnostics testing equipment; a growth stage joint venture enabling manufacture of ice pigging cleaning equipment for the food industry; an MSB that is manufacturing lightweight plastic food and beverage containers.

Service innovation

The survey revealed a wide variety of service innovations. These include digitech businesses that are providing highly innovative online or cloud based services solutions. For example, a financial technology ('fintech') firm has developed an online investment platform to assist businesses and investors (e.g. HNWIs and business angels) to find each other. Another digitech example is provided by a business that has developed unique applications for medical learning and development. Other forms of service innovation include an environmental construction company that is using leading edge developments in renewable materials such as straw bales in property construction, and an electrical engineering business that is providing unique customised solutions to transport engine manufacturers.

Process innovation

It should be noted that the vast majority of respondents reported that their product and service innovations were also impacting on process innovation, for example in making industrial engineering or energy plant equipment more efficient. Process innovation might also be taking place in other businesses under out-sourcing, or collaborative license and joint venture arrangements. Key examples include:

- Acquisition of a hardware manufacturing company to bring this activity in-house and enable effective scaling up of R&D prototyping for innovative medical instruments.
- A management buy-out (MBO) of a plastics manufacturing company in order to produce innovative lightweight plastic containers for the food and beverage sector, and installation of more efficient printing and cutting machinery in a fine art printing business.
- A biomass energy business, now entering into growth stage activity, had intended to build its own demonstrator plant, which would have represented a major step change in the operation of the business. However, inability to raise funds for this has led to a change of business development model, which now requires clients to pay for their own plant which will operate under licence. Another example is from an early growth stage software contract R&D company which is developing in-house prototyping of a cloud-based knowledge management device.

Knowledge- and capital-based innovations

As discussed earlier, it has not been straightforward to distinguish knowledge asset- and capital asset-based innovations. The clearest distinctions are where businesses specialise in R&D and particularly software development, where the costs of prototyping are minimal, and are not directly involved in any form of manufacture. These include a number of medical technology ('meditech') applications and devices, including a novel cloud-based software solution for medical validation processes and a business designing lightweight microchip based medical equipment.

Capital asset innovation is most clearly demonstrated when equipment and plant investment is involved, but often this has only represented a small amount of the overall business asset value. In this sense the clearest example of capital asset innovation is provided by a growth stage business which purchased new, higher quality printing and cutting equipment to provide an improved print reproduction artwork service. There are also examples, particularly amongst growth and more established innovative businesses at later stages in the innovation cycle, where R&D is diffusing from predominantly knowledge-based activity to predominantly capital asset-based activity. This includes a cleantech-energy company that is progressing towards producing a market leading battery storage solution for harnessing solar energy for street lights.

As we have seen earlier, what appears more important is the extent to which innovation projects require capital asset finance and the relationship of this financing between the business and other collaborating businesses. For example a knowledge-based early growth stage engineering R&D business had established a joint venture, with one third of the project cost for the manufacturing, asset-based investment, being undertaken by the other company.

2.4.3 Uniqueness of innovation and wider implications

The survey identified three broad levels of innovative firms. These are described below.

Global innovators

The vast majority of the businesses surveyed that are involved in R&D and new tech platforms consider that their innovation is unique, with many suggesting that this uniqueness extends globally. This perspective is borne out by the international patents, licenses and trademarks that these businesses hold. Examples of global leading technology are provided by an MSB that is designing and manufacturing advanced and efficient aircraft components that are "*transforming the market*", to early and growth stage bio and life science businesses which are "*pioneering*" new uses for gene technology and drug delivery approaches and unique software design uses of digital and cloud technology.

The impacts of these technologies, particularly for the earlier stage businesses, are of course unknown, but the implications are that many will have global application and export potential. There are other examples, notably two cleantech businesses where their

innovative technologies are considered global leaders, but they have thus far operated only within the UK market, suggesting that *“it is simpler at this stage”* and that, at present, *“a sufficiently big market”* exists in the UK.

National innovators

A tier down from the highly globally innovative businesses are the innovative services and solutions businesses which tend to operate and offer innovation in the UK context. These respondents do not view their innovations as leading edge in the sector, since they are niche and customer specific, but some may have the potential to be globally innovative if they take on wider significance. Examples include a specialist environmental building service and an internet search optimisation business that, whilst they *“...do not have a patentable technology, offers unique software coding solutions for clients.”* Other examples include an innovative data management and linked e-learning service for the National Health Service and a transport engineering businesses offering *“...customised client solutions which are transformative to the sector.”*

Firm-only innovators

The lowest tier of innovators are those that have introduced new activities, most notably processes, that are essentially only new to the operation of the business. A good example of this is an established growth-oriented art gallery business that has introduced new printers which enable them to make high quality prints of artwork.

2.4.4 Length and intensity of innovation

Longer, intensive R&D

The length and intensity of the innovations undertaken varies considerably, depending on the nature and type of innovation. Those businesses that were undertaking R&D, particularly in bio, life science, cleantech energy and recycling, and advanced manufacturing and engineering could take between 10-15 years to progress from initial concept to the market.

This is more clearly demonstrated amongst the mature, longer established businesses which have gone through an innovation cycle and were able to describe the whole process. For example, a MSB aircraft parts manufacturer described how initial research into carbon fibre technology had taken ten years of in-house and collaborative work with academics to provide the technology platform on which the current five year of R&D programme (working to a specific order and passing regulatory and safety checks) was based and which would lead to full scale manufacture within the next 12 months.

Two highly innovative green energy businesses also highlighted the long R&D horizons of this sector. One was pre-revenue, operating in the wind power sector and after 10 years was still several years away from commercialisation, whilst another growth stage biomass energy company had taken 10 years for its new technology to reach the first clients,

although three years were lost through financing delay. As will be seen, financing delays, particularly for intensive R&D and capital asset investments have prolonged the innovation cycle in sectors such as life science, cleantech and advanced engineering.

Some of these intensive R&D firms are spin-outs where the initial R&D has taken place at universities or in corporate ventures and has subsequently transferred out. An example of the former (university spin-out) is an early stage life science firm where R&D had taken more than five years before the business was set up as a licensing vehicle for the technology to work in collaboration with other small firms to produce highly innovative drug targeting techniques. Three years on from spin-out, the business was still several years from reaching clinical tests and the full market. An example of the latter (corporate spin-out) is an early stage space technology company where the founder and a small team had worked on a design project for a larger company for two years before being allowed to leave and establish a new business to complete the project. This work has continued, in collaboration with a major aerospace corporation, and is expected to take at least six years to complete, with a further derivative space science project developing lightweight components expected to take a great deal longer.

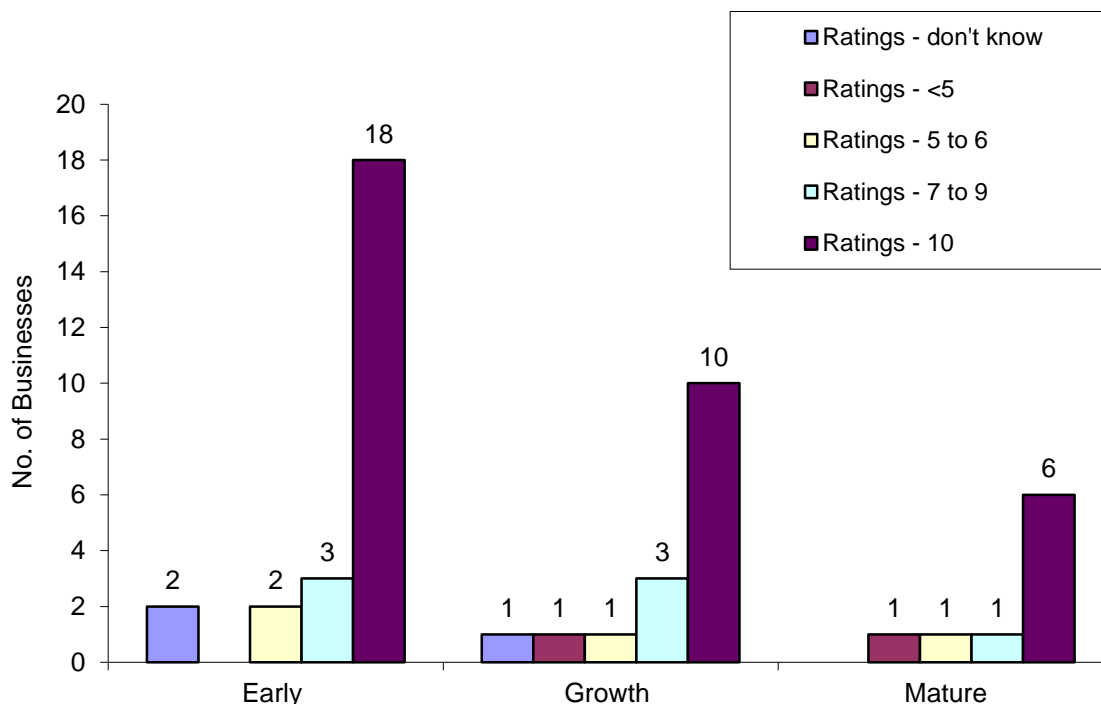
Shorter length, digital R&D

Digital technology companies which predominantly focus on software development for a wide range of applications across sectors as diverse as medical, financial, and retail, typically operate on a much more rapid R&D timescale. For example, an early stage business developing software for health service applications has been able to develop and commercialise its first project within one year and move on to another software project which should take a similar length of time. An early stage financial tech ('Fintech') on-line investment company took two years to develop its software before going live to the market.

2.4.5 Importance of innovation to the firm

Chart 2.2 below summarises ratings given by survey respondents to the importance of innovations to their firms' future prospects.

Chart 2.2: Rating of importance of main innovation to business by stage



Note: Survey n=50 innovative UK businesses

In many of the surveyed cases where R&D is taking place “*the business is the innovation*”. This is particularly the case for early stage businesses which are predominantly tied to one technology platform. Therefore, as expected (Chart 2.2), many of these businesses rate the innovation as 10 on a 10 point scale where this means that it is perceived as critical to the development of the business.

Whilst some of the early stage businesses also have other innovations, these are typically derivatives from the main tech platform, rarely involve more than one or two other innovations and are often planned for later development, because of the need to focus on their primary innovation. That said, there is evidence from businesses across all stages of the need to be agile and pivot the use of technologies in order to find market niches. This ranges from early stage businesses, such as a life science business recognising that potential pharma customer interest in genetic research was shifting in requirements, through to a mature MSB exploring new uses for their unique carbon compound materials.

As businesses grow there is evidence that they are more likely to adopt multiple innovations. A good example was a growth stage life science business operating with several different types of innovation. This strategy was seen as a form of insurance to increase the chance that at least one innovation would succeed. There was also the exceptional case of an early stage transport engineering company spin-out which already

had mature technology that it could adapt in multiple innovative ways for different customers to provide a unique service. However, even in these cases there was typically one main innovation and tech platform on which the future of the company was dependent, such as the adoption of 4G communication technology for an electronic engineering MSB.

For those businesses offering services which may be individually tailored and crafted, such as specialist construction work, innovation was considered critically important, whilst for those introducing new processes, such as high resolution digital printing equipment and cutting equipment for a manufacturing process, the importance to these businesses was proportionate to its overall impact and less likely to score highly.

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

3.1 Introduction

This chapter examines the processes which led firms in the survey to seek finance. In the context of this study, some key questions are:

- How do innovation and the need for external finance relate to each other?
- How much funding is sought?
- How do firms decide to apply for finance?
- What types of finance are considered?
- How satisfied are firms with the finance options open to them?
- How confident are they at pre-application stages that satisfactory finance will be available to them?

These questions are considered in turn. Throughout the chapter, distinctions are made between firms at different stages of the growth cycle.

3.2 The relationship between innovation and external finance

Triggers of initial searches for external finance

Due to the purposive selection of businesses for this research, it is unsurprising that innovative activity was a major catalyst and reason for raising external finance. In its simplest format, this related to raising external funds for the purchase of key equipment, building development, or staff recruitment and could be a one-off event (such as in the case of a growth stage art gallery that purchased new equipment to develop high quality art prints). However, in the majority of cases where R&D was taking place, it was far more complex and typically part of a lengthy, ongoing, and, particularly for earlier stage businesses, often uncertain process.

The majority of the R&D businesses, spanning from shorter horizon innovations to long horizon innovations, had sought external finance from the start of the innovation cycle process which, for the early stage businesses, meant from the initial concept of the

business. Whilst some of these businesses had adopted a model of undertaking contract R&D in order to provide an initial income stream, there was usually recognition from the start that external finance to pursue their own innovative R&D would be required.

Early stage

One early stage life science business presents a good example of how external financing was immediately in the mind of the founders and structured their business development model. The business had learned from a previously unsuccessful academic spin-out which had failed to raise sufficient funds to develop the technology in-house and was now pursuing a licensing model which would enable other small R&D companies to take the technology through clinical testing. This reduced their initial external financing requirements, but they still required HNWI investment to provide set-up working capital. Another early stage life science founder, seeking to take forward an academic research technology, recognised from the outset that external funding would be required to outsource lab testing and clinical trials, stating: *“It was realised from the beginning that the company was a vehicle for raising finance.”*

Not all early stage businesses are so clear from the start on their external funding requirements. The survey revealed examples of start-ups that were self-funded and then required injections of external funding, for example an engineer that required prototyping and had gone to Business Link (initially unsuccessfully) and then to a regional development agency to assess their options. This led to university collaboration and potential grant funding. Another example is a self-funded construction business that has recently received a contract opportunity to scale up its innovative building activity and requires external funding for working capital to enable the application of its innovative building process.

Growth stage

The growth stage companies surveyed are characterised by their use of external finance from the very early stage development of the business, particularly where they are R&D-oriented. This includes a wide range of businesses, including digitechs, and more intensive life sciences and cleantech energy businesses. Those founding managers with previous experience of starting businesses and using external finance referred to knowing straight away that they would *“require substantial funding from start-up”* to realise their goals for scaling up the business, but also recognised that their initial estimates could be insufficient.

Several of these businesses (including short horizon digitech and longer horizon life science innovators) also referred to adopting R&D contract research models early on in order to cushion the amount of external finance required and provide a more secure income stream. However, they still required grant or equity funding in order to provide for initial set-up costs, working capital and proof of concept work. In this respect, one contract

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

R&D life science business referred to the crucial importance of academic collaborations in developing highly successful grant applications to Innovate UK (formerly TSB).

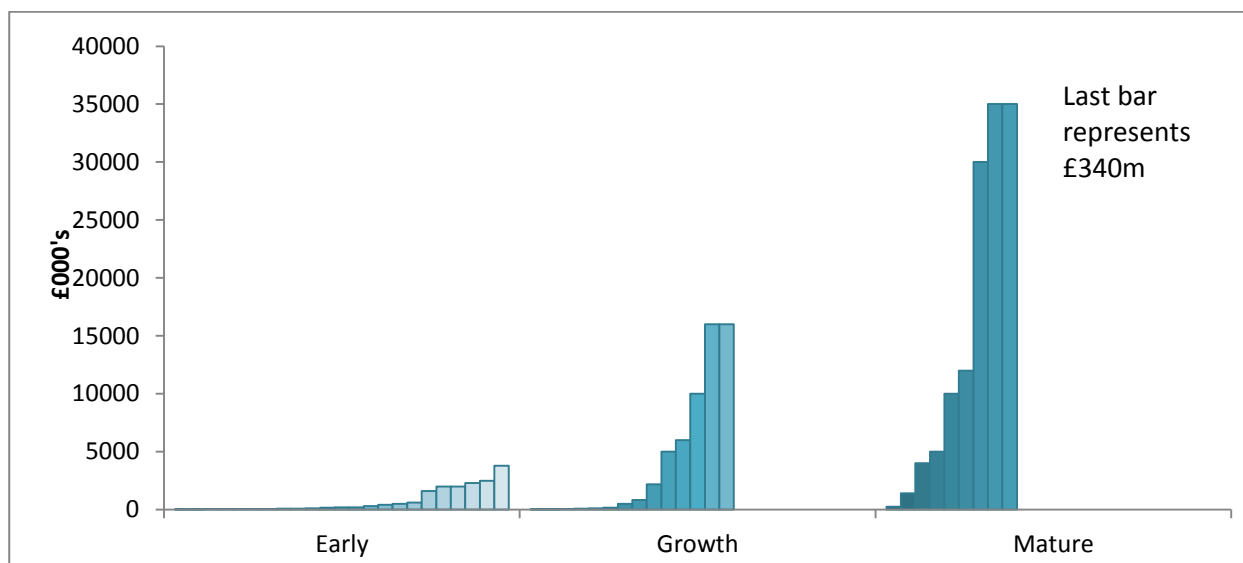
Mature stage

For larger, more mature businesses, innovation cycles and projects typically have fixed budgets and very clear external financing requirements from the outset. For example, a surveyed MSB aircraft component manufacturer had an opportunity to service a substantial contract requiring five years of later stage R&D and pilot production and had agreement with the multinational parent company that they would require external financing of at least one-third of the project cost in place from the start of the project. Similarly, a mature life science MSB had ring-fenced substantial external financing from existing VCs to work in a joint venture with another bio-science business in order to embark on a two year R&D project.

3.3 Amount of external funding required and reasons, by stage

Chart 3.1 illustrates variation in amounts of finance sought by businesses in the sample in order to progress innovative developments at each of the three main lifecycle stages of businesses. Amounts vary from £25,000 at one extreme to £340 million at the other, but the general pattern amongst interviewed businesses, such that younger businesses seek lesser amounts than older ones, is very clear:

Chart 3.1: External funding required by interviewed firms for main innovation for most recent funding round, by stage



Note: Survey n=50 innovative UK businesses

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

A closer examination of the **early stage businesses** surveyed demonstrates a wide range of external funding requirements, with relatively small amounts required for initial demonstration projects and prototypes, but with considerably larger amounts being required for intensive longer term R&D activity, such as in the case of the engineering and space technology companies surveyed. For example, the space technology business required external funding from initial spin-out from a larger company in which the innovative technology platform was developed. Whilst the founders were able to provide around £60,000 alongside £120,000 of subsequent licensing revenue, £2m in external finance has been required for early development, arising from the outset to fund the overheads, staffing, lab costs and testing associated with ongoing R&D.

Growth stage finance typically exhibits a step-up in scale, with, for example, a cleantech business seeking £2.2m to build a biomass energy demonstration plant. Three life science businesses present similar narratives in terms of the range of ongoing R&D funding of between £4-16m required, for example, to progress from an established innovative technology platform through clinical trials and to market. This process required heavy investment either into outsourced specialist R&D labs, or into in-house capital investment for R&D and staffing, as well as ongoing investment into knowledge development.

Investments made by **mature and rapidly establishing MSBs** represent another substantive step up in size and scale. These more established and highly growth-oriented businesses are able to acquire and undertake in-house R&D on a far greater scale than their younger counterparts and to operate multiple innovations in parallel. The example investments for these businesses are focused on their main current activities, but the aerospace company also invests in the order of £10m per annum on exploratory R&D and the rapidly growing cleantech energy and life science businesses are also investing in other projects. Here the figures provided for the main innovations currently taking place typically represent the whole project cycle within the company, from platform technology through to market. This process may involve the strategic acquisition of smaller companies which offer technical R&D support or key elemental advances in the platform technology, as exhibited by one of the surveyed MSB life science companies which has international offices in the US and Austria and “*is always looking for strategic acquisitions.*” This company also mentioned the importance of collaboration, initially working with academics to buy in the genetic science platform technology, but then sharing the enormous cost and risk burden of their complex genetic medicine project in joint venture with another large pharmaceutical company. This arrangement was also designed to facilitate clinical trials and speed up the process of getting to market within a two year period.

A further example, the cleantech streetlight project, has considerable potential. The CEO indicating that the initial start-up feasibility costs to demonstrate the project were merely of £250,000. This stage has now been completed through in-house R&D during the last two years. The unique battery storage product, which will transform the market globally and has multiple potential uses, is now ready for market roll-out. However, roll-out of the initial street lighting scheme itself across the UK will be a significant undertaking, far beyond

their current capability. It will require at least £100m investment for their business to deliver the product to the market and, additionally, licensing out to allow other businesses to undertake installation work.

The largest innovation project surveyed was the aircraft component manufacturer that required £340m in external finance as part of a £520m five year R&D contract to deliver parts for a new aircraft. This funding would build on an existing carbon fibre technology and involve further R&D, prototyping, proofing and testing of parts to pass regulatory certification and move into full production. This would be undertaken in-house, but with advanced financing coming downstream from buyers at stages through the process.

Knowledge and capital asset finance requirements

Overall, it is apparent that as the surveyed businesses progress through the business cycle stages they are more likely to undertake larger amounts of capital asset investment (e.g. for manufacturing prototypes, lab testing, production and service delivery) and that this is more likely to take place in-house for the most rapid growth and mature stage larger sized businesses. An example is a MSB lightweight plastics innovator which required £12m to undertake a MBO acquisition of a UK manufacturing plant in order to make a substantive market entry to meet international client demands in the food and beverage sectors.

For earlier stage businesses, particularly those in the early growth stage, sizeable capital asset investment has been curtailed by difficulties in raising this type of finance (e.g. for lab testing, for in-house R&D involving hardware, and for building prototypes). This has resulted in various forms of collaborative financing solutions, such as through joint venturing, supply-chain finance (from buyers or suppliers) and licensing. Collaborative finance is demonstrably very important to the innovation process at all stages, but it appears to be particularly crucial to many of the early stage and early growth stage businesses that do not have the track records and asset base to raise their own large-scale finance for capital asset investments (see Case A below).

Case A: Early stage life science business: collaborative financing

An academic spin-out life science business, specialising in innovative cell targeting disease solutions. The business has been established four years and is undertaking later stage R&D on an established technology platform developed for 6 years by a previous company which failed to secure sufficient external finance to survive. The current business has learned from past experience and has embarked on a dual strategy of pursuing equity funding and licensing.

Initially, a range of sources of external finance were considered to meet an initial £200k investment to develop their own diagnostics kit. It was acknowledged that further follow-on funding of £1-2m for full production and marketing would be required. However, apart from £40k raised from a HNWI for working capital, “banks and Funding Circle were ruled out

because the business had no trading record, crowd equity was considered but rejected as too complicated and likely to be insufficient on its own to meet our requirements, business angels have not yet provided funding and VCs and potential corporate pharma investors considered the business to be too early stage.”

Whilst the search for equity finance continues, the business has pursued an alternative global licensing approach with small lab re-agent companies that are able to invest in developing variant products based on their technology. During the last year the business earned £31k in licensing income and there are signs that this strategy will initially provide small organic growth, but with considerable future potential for global market development.

3.4 Process of deciding on external funding

The degree of formalisation in the innovation financing process is considered to be highly influential on the eventual success rate of innovative businesses in accessing external formal finance and underpins the rationale for investment readiness programmes (IRP)²⁷. In practice, the degree of formalisation in this process is likely to vary considerably depending upon the experience and expertise of the founder and management team, their use of external advice and assistance, and the stage of the business.

Longer established and mature businesses are far more likely to adopt more rigorous planning and financing processes in order to satisfy their investors and shareholders and to meet regulatory requirements in the case of public limited companies²⁸.

The surveyed *early stage businesses* provide very mixed evidence of formal planning processes with regard to assessing their external financing requirements. Most set out with an idea of the project development costs and timetable to market or sale of the business, but a common experience is that “*we estimated the initial cost of the project far below what it is eventually turning out to be*” and that the “*timescale of the project has extended due to insufficient and timely availability of additional finance required.*” Projects could also be delayed for multiple reasons including technical and regulatory delays and changes in the market preferences of potential buyers, resulting in the need for flexible and adaptable approaches to raising additional external finance. Finding additional finance could require new investors, which, for first time entrepreneurs, could be problematic. Those with accelerator/incubator, trade body/catalyst and equity network linkages (which tended to be the more experienced entrepreneurs) were better placed to deal with this quickly. The less experienced entrepreneurs that had turned to advice from Business Link, Local Enterprise

²⁷ See Mason and Kwok (2010)

²⁸ BIS report into the motivations for UK company listings (2013)

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

Partnerships (LEPs) and private VC finders had mixed experiences, whilst Scottish Enterprise/Gateway services were frequently praised for “*offering advice and effective access to finance.*”

The *ad hoc* nature of many of the early stage businesses is highlighted by their ‘muddle through’ and ‘make do’ approaches which are derived from a lack of experience in managing and financing innovative businesses and inability to see the bigger funding picture. This has resulted in many early stage respondents being unable to assess the amount of time taken to make external financing decisions, since many see this as an unstructured continuum of opportunistic searching, which can take many years. This observation does not preclude the existence of an overriding strategy, but highlights the lack of formal structure applied.

A further important issue here is that, in early stage businesses, it is often the CEO who is the key decision maker. Whilst most were able to describe a scratchy process of developing business plans and supporting financial projections based upon calculation for development time, staff labour costs and overheads, it was evident that “*kitchen table decisions*” and “*opportunist grant applications*” were taking place, with limited and sporadic success. If the CEOs are not serial entrepreneurs with previous management and business financing experience and are not receiving some form of external mentoring or guidance, they are likely to struggle and lose focus, often finding it difficult to divide their time effectively between business development and fundraising. Several CEOs noted that they quickly realised that they required external advisors, as this example of a young, inexperienced first time fintech entrepreneur suggests:

Case B: Early stage fintech first time entrepreneur

The company was founded 1.5 years ago by a young, first time entrepreneur seeking to develop an on-line crowd funding platform for early stage businesses in the UK. The founder CEO had no previous experience of accessing business finance and knew from the start that a considerable amount of equity risk finance would be required to take the initial business concept to the market. Funding was required initially in a first round to employ 3 key staff and develop software, whilst a subsequent round of funding was required to employ 6 more staff and promote and service initial market entry.

The entrepreneur immediately used mentoring services and paid £15k for VC searching services, which were considered “*expensive but necessary.*” After an unsuccessful grant application, external assistance led to accessing a first round of finance from a combination of business angels and private seed VCs. As the founder suggested, the process of seeking equity finance, which “*took many meetings and many months*” was complex, but also quite informal:

“The key decision maker was myself, the founder of the company, with input from mentors and so on, so it wasn’t incredibly formalised. I mean, I had to create a business plan and

look at it and think, okay, how much money do we need to deliver this business plan?"

Obtaining the initial equity funding from a combination of investors has facilitated rapid early growth of the business, enhanced by a further round of funding which included an Innovate UK grant matched by the original investors which recently took two months to apply for and negotiate.

Some key factors in developing successful financial strategies: illustrative examples

A number of key examples set out below illustrate important factors in determining and implementing successful financial and business strategies:

Previous experience and external guidance could make a big impact: For example the CEO of an early stage academic spin-out business went through extensive business management and finance training, which had proven extremely useful in developing the business and financing strategy and also establishing external networking links to potential grant and equity financiers:

"Initially academic research funding developed the technology through proof of concept grants. Once this was established I then gained an ESRC entrepreneurial scholarship to train at Strathclyde University's Hunter Centre undergoing a one year MBA type training camp. This helped me to form the new company, write a business plan and establish important networking contacts with business angels and VCs." (An early stage life science business currently accessing grant funds for early stage drug testing.)

Through a learning process, improved entrepreneurial capabilities become important: A serial entrepreneur who had experience from a previous failed life science business was able to learn from this and devise an effective financing strategy from start-up, based on a more pragmatic slow growth and collaborative licensing approach, which was beginning to gain traction.

Amongst the growth-oriented businesses surveyed, it was evident that their management teams were typically larger than those of the early stage businesses and that, if they had equity investors, they would have established experienced CFOs (typically with accountancy qualifications) and also non-executive directors or chairperson, who may have been appointed by the investors, with considerable experience of business development and accessing finance. These businesses exhibited far more rigorous and formalised planning and financial decision-making practices than their early stage counterparts, particularly as they have to regularly report to their investors. The importance of the external input from VC investors during the growth stage is underscored by this fintech director:

“Our experienced founder initially raised as much as he could possibly get without being overly diluted. I would say our approach was pretty ad hoc and we have increasingly relied on the experiences of the venture capitalists to work out approximately how much money is required moving forward.”

The more advanced growth stage businesses demonstrate the importance of structured strategic development: The following case (case C) extract from the response of an experienced life science female serial entrepreneur/CEO identifies the sophisticated business development and financial planning taking place over a six-month period in an established high-performing growth stage business:

Case C: Experienced serial entrepreneur CEO of a growth stage life science business

A growth stage life science business developing innovative drug delivery solutions, trading for 5 years with sales turnover of £1m and 12 staff, looking to take a major new innovation to market. The company recruited an experienced serial entrepreneur with considerable equity fund raising experience.

“When I took over as CEO we had a prototype device ... I took the decision that we needed to take that to market in order to validate the technology. So, I put a strategy together to do clinical studies and I put a project plan together and we costed the whole business with my finance officer and the management team. We costed all the elements, salaries, overheads, equipment, the cost of running clinical studies, the cost of the external regulatory advice. So, for instance, to do the clinical study, we’ll need a clinical research organisation but we’ll probably only need about six months of their input so we would go out and we would find there are lots of external companies and agencies and so on that we can recruit to do one-off tasks. I then took that strategy and that plan to the board. Last year I wanted to raise £5 million to take the product to market.”

The board subsequently agreed to a plan to raise two tranches of funding, successfully raising £1.5m from an Innovate UK grant, the Low Carbon Innovation Fund and matching angel syndicate funding in the last year. It took three months to make funding applications and within six months all the first round funding was secured. However, the CEO was disappointed with the board for not seeking more funding (at least the £5m proposed) for the initial round, suggesting that *“UK boards should think bigger”* and that underinvestment is a danger to business development. Going for a relatively small initial funding round has meant that the business is now very quickly having to embark on a further funding round of £7m this year.

Established MSBs exhibit a highly planned and strategic approach to innovation projects: They have highly developed management structures and clearly defined roles which will include a CFO and supporting finance team and they may also have a full-time

research funding unit. Ultimately, decisions are made at the board level with guidance from the operations and technical officers and external due diligence, if required. The funding required is often for large scale projects and can involve buying in technical innovations and strategic company acquisitions. Once the decisions are made to go ahead with a project, at a particular size and scale, the type and source of funding will already be known and in many cases it is then just a matter of time and negotiation. The following case (case D) response from a sizeable life science business sets out these processes:

Case D: A mature life science business planning a substantial IPO funding round

A mature life science business, trading for 7 years, specialising in developing innovative targeted genetic diagnostic solutions for the pharmaceutical (pharma) industry. Current annual sales turnover is £20m, with employment approaching 250 staff and the business has experienced rapid growth in recent years, resulting in sales turnover doubling in the last year and an increase of over 150 staff during the last two years. In the last year the business has been undertaking multiple innovations, with its major innovation project requiring £11m of external funding over the next two years, alongside a joint venture specialist lab testing contribution from a large international pharma. The CEO described a highly formalised planning process over a period of two years in which the board had agreed to ring-fence internal investor and trading surplus funding of £4m for the project, with a further £7m planned as part of the funding raised through a proposed AIM listing which had involved several years of planning consultation with market brokers:

“It is a very formal process. So we go through a process, through the board considering the amount of capital we might want to raise, how it’s going to be deployed, what benefit that would have for the business, and then that would be the CEO, CFO driving that process with the chairman of the board. It would then go through some decision gauging processes with the board once that button was pressed. Once it kicks into place, for us it was very quickly, it was just over two and a half months to go from that decision, appointing all the advisers to listing on the London Stock Exchange. It was pretty quick.”

The company subsequently raised over £50m and the project is expected to complete within two years.

The length of time taken to assess suitable external finance sources

The length of time taken to assess financing requirements and select an initial type and source of finance to approach could be relatively short for the earlier stage businesses as they do not have sizeable boards and the more rigorous assessments of innovation projects associated with mature businesses. However, the unsuitability of initial selections such as bank debt finance and their lack of knowledge of equity finance could lead to an ongoing iterative searching process which could take several years.

Even for the more experienced serial entrepreneurs, starting new ventures there was an acknowledgement that it could easily take six months or more to find suitable angel or VC finance, because ultimately “*successful equity investment is about achieving a meeting of minds between investors and entrepreneurs.*”

A particular problem appears to exist for early growth stage businesses that are seeking follow-on finance from an initial HNWI, angel syndicate or seed VC. If the amount of next stage funding required for step change in the business was too much for existing investors, this often led to a period of further equity finance searching, which might not prove successful. These businesses could spend several years searching for funds, whilst the innovation work is slowed. The lack of success in finding suitable sources of finance had led some businesses to eventually change their approach to external finance by utilising collaborative licensing and joint venturing.

For more established growth and mature businesses, the rigours of the internal board and investor requirements could lead to lengthy project and financial planning requirements, which could involve several months of research to present the case to the board. However, ultimately, the choice of external finance was not usually a problem to these businesses. However, in a couple of MSB engineering cases, a first choice of commercial bank finance had not proved suitable and for the plastics innovator, the lack of availability of UK bank finance resulted in a three-year search using VC finders before a fully-funded solution of £12m public, private VC, and Czech bank mezzanine funding was found.

3.5 Range of finance considered

It was made very clear by the CEO/founder respondents from the *early stage businesses* that bank debt finance is not available to businesses without a trading track record and that those that had applied had quickly discovered that this was not a feasible option. It was noted by those that had approached the banks that the Enterprise Finance Guarantee (EFG) still required collateral or personal guarantee in line with the banks conventional lending requirements, which also made it unsuitable in their opinion. Early stage entrepreneurs might consider using personal financing (e.g. savings or credit card), but they were not prepared to offer personal guarantees on loans. Several early stage managers also commented that they had considered crowd debt funding, from platforms such as Funding Circle²⁹, but that they were not eligible because they did not have at least two years' trading record. Other early stage managers were quick to point out that they were well aware of the lack of bank and debt finance options and that, although in some cases these might be more favourable, they therefore only sought grants and equity finance.

²⁹ Funding Circle is a peer to peer lending platform providing an alternative to bank term loan funding. Funding Circle alongside a number of other peer to peer lenders is currently funded on matched commercial terms by the British Business Bank's Business Finance Partnership and Investment Programme.

Grant finance proved particularly popular and a major source of external finance to the early stage businesses, with many of the respondents extolling the virtues of Innovate UK (formerly TSB) in offering substantial grant funding rounds for early stage innovation. It was also noted that these required match funding and potentially could unlock bank loan funding, but that it was more likely that this would be matched by equity funding, mainly from HNWIs, but also from angel syndicates or seed VCs.

The vast majority of these early stage businesses had considered equity finance and in many cases felt that it was their only viable option to raise the substantial amounts of funding that they required, given their lack of trading. Most would therefore consider business angel or private VC funding, which would not require collateral or personal guarantees. There were some concerns about the amount of equity dilution required and ongoing control of the business but, overall, there was recognition that this was the most likely way of raising the finance required. There were also other equity options explored, such as early stage corporate and customer equity or licensing agreements. Additionally, in a small minority of cases, crowd equity finance was mentioned (but not taken up as not fully understood) and beyond this, the survey found a considerable amount of self-financing, mainly in the form of free labour³⁰, but also in a small minority of cases through reconsideration of personal finance (such as the newly-available access to lump sums from private pension schemes).

The surveyed *growth stage businesses* already had external equity investors. However, where these were HNWIs and the investors lacked the funding to follow-on, alternative equity investments were considered. These businesses typically did not seek bank debt finance because the amounts of funding they required were considerable and in many cases they had limited or uneven trading track records and still relied heavily on intangible IP development. This combination led most to pursue further equity finance from a mixture of public, private, and corporate VCs. A risk here was that later stage VCs could dilute and crush existing investors' shares, so an appropriate balance would need to be struck. What was evident was that a number of these growth stage businesses had struggled to find suitable equity finance and had broadened and adapted their financing models to encourage customer investment. This included life science companies licensing new technologies to specialist lab testing facilities and a cleantech energy business licensing the plant build to clients who could afford to raise the c. £2 m. funds required in asset finance.

Mature MSBs are able to consider and seek bank finance. Their established trading position ensures that they are potentially attractive to a wide range of financing options from bank debt through to private equity and raising funds on the public markets through initial public offering (IPO), or, for existing listed companies, through further share issues. The scale of funding required, which can be in excess of £100m, means that fundraising

³⁰ Deakins and Freel (2012) refer to this as 'bootstrapping'

can still prove problematic for commercial banks, particularly for longer term patient capital, indicating a potential role for state aid intervention in the form of large scale grants and loans (which had been explored by one of the surveyed MSBs). The substantial investment requirements of these super-sized innovation projects also leads to the consideration of joint venturing initiatives, such as with large pharmaceutical companies and licensing arrangements in order to provide wider market coverage. Another form of state finance that has assisted MSBs operating large scale projects overseas is export trade credit. This had proved particularly helpful to a construction company in developing major capital projects in developing countries.

The next table, Table 3.1, summarises the range of types of formal external funding considered by the surveyed businesses according to their current stage of development.

Table 3.1: Types of finance considered by stage

<p>Early stage finance considered:</p> <ul style="list-style-type: none"> • Equity: private, corporate and public venture capital (RDFs), business angel, HNWI, customer equity, accelerators (14) • Grants: Innovate UK and catalyst grants, EU funds including FP7 (15) • Crowd funding: peer to peer lending, crowd equity (2) • Licensing agreements (2) • Bank loans (4) • Personal finance: personal credit, pension cashback (3)
<p>Growth stage finance considered:</p> <ul style="list-style-type: none"> • Public, private and corporate VC and angel syndicates (9) • Grants (9) • Licensing agreements and customer equity (1) • Joint Venture (1) • Bank loan finance (3) • Asset finance (1)
<p>Mature stage finance considered:</p> <ul style="list-style-type: none"> • Public equity: IPO and new share offers (3) • Private equity (6) • Joint Venture (1) • Customer equity and loans (2)

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

- State aid loans and grants (4)
- Bank loan finance (3)
- Bank mezzanine (term loan with equity features) finance (1)
- Licensing agreements (1)

Note: N=50 cases, figures in parenthesis represent number of cases in the sample

3.6 Equity funding and family ownership of businesses

Whilst the vast majority of businesses considered and sought external equity (37 of 48 valid responses) it was notable that family owned businesses were far less willing to consider and seek equity finance (6/12, compared to 31/36). In a couple of cases this was because the current project did not require equity finance, but one founder of an early stage business did suggest when prompted that they would consider equity finance in the future. The remainder (which were predominantly early stage businesses) presented a clear message which is in line with previous findings relating to control issues³¹) that they “*want to keep the business in the family*” and “*do not want interference in the running of the business.*”

3.7 Decision processes on type of finance

As noted, the decision on the type of finance to apply for is determined by a number of factors principally relating to management knowledge, in conjunction with external advice, and experience of using available finance and its perceived suitability to the business.

For many of the **early stage businesses** this is not a highly planned or thought through process and tends to be an iterative ‘learning by doing’ activity which can be extremely time consuming. Finding the right type of external assistance quickly is a key to improved business planning and financing strategy and is exhibited by two first time entrepreneurs who have made use of entrepreneurial training and mentoring services. However, these forms of assistance do not necessarily lead to quick results and it could still take six months to get to formal application stage.

The nature of the initial process of finding and applying for finance for early stage innovative firms that require risk equity finance is frequently informal and unstructured. Inexperienced managers may quite quickly make initial enquiries with their banks, as a first port of call, but these initial inquiries usually result in a rapid realisation that this type of finance will not be available. Experienced serial entrepreneurs are aware that bank debt finance is typically unsuitable to them, as they do not have a trading track record. They therefore look to equity finance from business angels and seed VCs, or to collaborative arrangements with potential subcontractors or clients. This process can still take some time to come into focus, as research and initial contacts are made through conferencing and events, such as through trade associations and funding networks. Several respondents mentioned that they did not have much faith in approaching seed VCs directly through their websites and preferred to meet them informally at events, where they might

³¹ BIS, 2011; KPMG Global Family Business Survey, 2014

have an opportunity to give a “*five minute initial pitch*”, and then be able to follow this up with a more formal telephone interview or face-to-face meeting.

A digitech director explained how their experienced serial entrepreneur CEO had immediately known that they required equity finance and had set about arranging a series of approaches and meetings with VCs. The whole process had taken at least six months, but once they found an angel-backed seed VC that knew their search engine optimisation software market there was an immediate meeting of minds and a quite rapid resolution to the process.

A high proportion of the surveyed early stage managers consider grant funding and this was often associated with collaborations with universities. Important drivers for grant applications relate to the ability of the collaborator to lead or assist in the grant proposal and the timeliness of an appropriate grant call, which might only take place every six months. For some businesses getting a match-funded grant from Innovate UK or Scottish Enterprise was the catalyst for a further funding search. One life science CEO referred to being given six months to find match funding which had sparked a search for equity investment in which crowd funding was rejected because “*it would take too long to build up a media story and following and so a Scottish business angel syndicate was approached.*”

For **early growth stage** businesses the decision process could be rapid, if existing investors have sufficient funding to follow-on fund business growth. However, in practice, in many cases this was not possible and what followed was quite often a lengthy period of hiatus in which a search for funding could take over from regular income stream activity. The business plan, financial projections and amount of funding required was often well rehearsed. Often the businesses were still too early stage for bank finance and even with the EFG, this was still not an option and they did not have the income levels to apply for the Business Growth Fund (£5m annual sale turnover requirement). So they selected private or corporate VC finance, including early stage Pharma investment for life science businesses, but typically found that even using external VC finders, it was unlikely to be successful. Some referred to the use of grant funding, but also commented on its disjointed and match funding nature, meaning that this could be problematic. The end result could be that after a period of months, or even up to three years, a different financing approach had been adopted. Examples of this include the adoption of licensing and collaborative finance-raising approaches which are operating in intensive longer horizon R&D sectors such as cleantech and life sciences.

For **larger, more established businesses** there are far more formalised approaches to assessing external financing needs and the types of finance required. This is particularly the case where private equity investors or public markets like AIM require regular business development reports and financial performance information. Having responsibility to existing investors imposes very strict financial management and reporting practices on these businesses, requiring them to fully research funding requirements and options before being given the go-ahead to embark on an innovation project and allocated budget.

As in the example of a high growth and relatively young cleantech MSB, decisions can still be made quickly if the right opportunity arises, but this requires board and investor agreement and the confidence to move quickly.

3.8 Perceptions of the process of assessing and selecting finance options

Respondents demonstrated very varied levels of satisfaction with their processes of assessing their business external financing needs and the types of finance which might be available. Some clear patterns emerge:

- *Early stage businesses* feel the funding landscape is complex and perceive that it is difficult to find suitable external funding. Whilst most recognise that they require equity finance they can spend many years trying to raise funds with little or no success. There is a lack of knowledge about what is available and some reticence about paying for advisory services and having to pay to present to business angel networks. Grant funds are praised, although finding match funding is not always successful and some are put off by the time consuming and complex collaborative nature of grant applications and the time taken to receive funding decisions. Some unsuccessful grant applicants also complained about the perceived lack of technical expertise of those judging them.
- The more *successful early stage businesses* tend to have experienced serial entrepreneurs, or to have received external expert advice. An important point here is that it is not sufficient to know how to write a business plan and financial projection. The managers need to be able to network and present their case effectively. This is, of course, far easier for serial entrepreneurs who have already established relationships with business angels and VCs. However, even some of the more experienced entrepreneurs recognised that it could take many months to find the right investors, because it is important that there is a meeting of minds and a mutual understanding of the business activity and its aims.
- For *early growth stage businesses*, bank finance was not suitable due to insufficient trading record and nil or negligible annual sales turnover. It was also evident that these businesses often suffered from funding gap periods due to their inability to find suitable growth funding. They were prepared to use specialist equity finance finders and travel to the City, but these efforts were not necessarily successful and the process of trying to get substantial private equity was described as “*complex, laborious and time consuming*” and could take several years, during which the innovation was shut down or slowed down through lack of funds and staffing. In some cases, particularly where substantial capital asset finance was required for plant and equipment, this had eventually resulted in a pivoting of the business development and financing model, often resulting in a joint venturing or licensing approach where the cost of the capital investment could be borne by other larger and more established businesses.
- For *growth stage businesses* there was also typically a very structured approach to assessing financing needs and a reasonable knowledge of where to find the most appropriate finance. However, there were complaints from CEOs that “*the boards of UK businesses do not think big enough in terms of raising growth funding.*”

- For both *early and growth stage businesses* it was noted that the current UK and EU grant funding regime for innovation is very good, but that it effectively “*funds innovations to fail.*” The point being made here is that initial grant funding could be received and the project could successfully deliver the initial proof of concept or prototype, but then the funding stops. Since businesses cannot find alternative finance they wait for the next grant funding round. However, there might not be an appropriate round for many months and there is no guarantee of application success. So without the opportunity of follow-on grant funding, many innovations stop through lack of funding and never re-start and, if they do, the market opportunity might have moved on.
- *Established businesses and mature MSBs* are very content with the current UK finance market. These businesses have highly formalised approaches to external finance assessment and realistic expectations of the sources, types and amounts of finance that they require. They are therefore confident that they will find the most appropriate form of finance and raise sufficient funds for their innovation projects. In particular, these businesses indicated that “...*there has never been a better time to raise funds than currently, with increasing investment from overseas companies into the UK, the EIS and adjustments to the public markets improving the availability of risk capital.*” Furthermore, Export Credit Agency funds were praised for facilitating UK companies to undertake large scale international capital projects through their credit guarantees. It was also noted by an MSB that had received substantial state aid grants and loans that although the negotiations had taken longer than ideal, it was felt that there was now a much better understanding from the government of the financing requirements of the aerospace sector and that the Aerospace Technology Institute was doing a good job.

3.9 Confidence in application success and acceptable terms and conditions

Unsurprisingly, the degree of confidence in the probable success of applications rises with the size and maturity of the business. As previously noted, it is evident that the MSBs interviewed had little or no concern about their ability to raise external finance, mainly on terms that were suitable to them. Indeed they had the size and scale to be able to hold sway over potential investors, which could involve accessing state aid finance in order to keep high value jobs located within a more deprived, low pay UK region. Those experienced serial entrepreneurs with previous success in accessing equity finance were also quite confident that they would be successful again and were prepared to accept the terms imposed by VCs or business angels, provided that they could add value to the business and enable the growth plan to succeed. This also extended to grant applications where some of the business collaborations with top academic institutions were assessed as having at least a 50% success rate because they were collaborating with the top people in the UK and in some cases globally.

However, those who were less experienced in accessing finance were far less confident about the likely success of their formal applications or approaches to potential equity investors. They also had mixed experiences in using external assistance, which had

3. Findings from the survey: pathways to accessing finance – triggers and decision processes

significantly enhanced the chances of accessing finance in some cases (notably for grant applications), but in other cases (notably relating to accessing VC finance) had undermined their confidence. They were also far more concerned about the costs involved in the application processes and preferred results-based commission arrangements (i.e. ‘percentage of funds raised’ arrangements).

Overall just under half (21 of 44 valid responses) were very confident about their applications, with a small minority (7) that were not at all confident, either because they had not applied for the type of finance before, or in the case of grant finance, knew that few applicants would gain awards. It was notable that three out of four women-led businesses providing responses were either not confident or only moderately confident, again indicating their more cautious approach to external finance.

3.10 Summary: pathways to finance – triggers and decision processes

Some key points drawn from an examination of 50 firms in the interview survey are set out in the following panel:

Key findings - Assessing and sourcing external finance:

- Innovative activity was a major catalyst and reason for raising external finance with the majority of R&D businesses seeking external finance from the start of the innovation process
- The types and scale of innovation vary considerably according to business stage, from relatively small proof of concept, initial piloting, and working capital costs (ranging from £25k to £3.8m) at the early stage through scaling up marketing and development activities at the growth stage (ranging from £27k to £16m) to large scale innovation cycles for mature MSBs (ranging from £250k to £340m)
- As businesses progress through the business cycle they undertake larger amounts of capital asset investment and that this is more likely to take place in-house, whereas at earlier stages it is outsourced or undertaken through collaboration with partners (e.g. manufacturers and R&D labs)
- There are clear distinctions between the rigorous and structured business and financial planning undertaken by mature MSBs, by growth stage businesses with private equity, and by early stage experienced serial entrepreneurs when compared to the large proportion of early stage businesses with first time entrepreneurs and limited managerial experience which operate more informally and on a reactive and opportunistic basis.
- The use of external assistance can make an important difference to early stage businesses, proving helpful in business planning, but the use and quality of assistance is patchy, leading to uneven results in attempting to secure appropriate sources of external finance.
- The vast majority of early stage R&D-based businesses recognise that equity

Key findings - Assessing and sourcing external finance:

- finance is their only viable option, alongside grants, since bank and alternative debt finance is not available to pre- and early revenue businesses.
- MSBs have few problems in assessing, selecting and sourcing the external finance they require for innovative activities, suggesting that the current UK capital markets for established MSBs are working effectively.
 - The younger, earlier stage and less experienced entrepreneurs experience most difficulties and most dissatisfaction with the process of assessing and finding external finance.
 - Early growth stage businesses appear to face particular problems in accessing follow-on funding from existing investors and grant schemes, leading to criticism from business owners that early stage finance is *funding for failure*, whilst the boards of some more established growth stage businesses are perceived as not thinking big enough when it comes to scaling project budgets.

4. Findings from the survey: pathways to accessing finance – the application process and outcomes

4.1 Introduction

This chapter examines the application process for external finance undertaken by the surveyed innovative firms. The focus is on the most recent funding round experience of the firm, mostly within the last three years. This is considered within the context of previous funding rounds, since this will indicate aspects of path dependency and possible success predictors. As before, the analysis takes a ‘stage of business’ innovation perspective in relation to the types of finance applied for and to the success rates achieved. Particular consideration is given to the type (product/service or process) and nature (knowledge or capital asset base and intensity) of innovation being undertaken and the extent to which the firm had internal managerial skills and experience relating to external finance applications or utilised external expertise. These factors allow for an assessment of the relative success and failures of applications from different firms at different stages.

4.2 Types of funding and organisational sources initially applied to

Table 4.1, demonstrates the changing nature of external finance applied for at each stage of the business growth cycle. Not unexpectedly, it can be seen that the sources of finance, to which the interviewed firms actually applied, closely mirror the ‘sources considered’ as set out earlier in Table 3.1. Some key features of the table are:

- The greater dependence on grant and equity finance at earlier stages (81 per cent of applications at early stage, 66 per cent at growth stage, and 53 per cent at mature stage).
- The quite limited scale of application for bank finance at all stages.

4. Findings from the survey: pathways to accessing finance – the application process and outcomes

Table: 4.1: Types and sources of funding applied to by stage

Type of funding	Example sources of funding
Early stage (n=25):	
Grants (15)	Innovate UK, EPSRC, EUFP7/Horizon 2020, Scottish Enterprise
Tax incentives (1)	Seed Enterprise Investment Scheme (SEIs)/Enterprise Investment Scheme (EIS)
Banks (4)	High Street, CDFI
Equity (14)	HNWIs, Angels, Public/Private VC, Accelerator, Pharma
Crowd Funding (2)	Peer to peer lending platforms, crowd equity
Growth stage (n=16):	
Grants (9)	Innovate UK, Biomed Catalyst, EUFP7/Horizon
Tax incentives (5)	R&D tax credits (5), EIS (2)
Banks (3)	High Street/EFG
Equity (9)	Angels, Private/Public/Corporate VC, Pharma
Supplier finance (1)	Joint Venture supplier investment
Mature stage (n=9):	
Grants (4)	Innovate UK, EU FP7/Horizon, Regional Selection Assistance (RSA)
Tax incentives (4)	R&D tax credits (3), EIS (1)
Banks (3)	Commercial City Banks
Equity (6)	Private/Public/Corporate/Venture Capital Trust (VCT) VC, Pharma, Private Equity, Public Equity Markets
Buyer/Supplier (2)	Joint Venture supplier investment, early buyer finance

Note: N=50 cases, figures in parenthesis represent number of business cases

4.3 Prior relationship with funding organisations

The prior relationship of the business management team or their advisors with funding providers is a potentially crucial factor, since it may provide insight into selection, success rates, and incidence of path dependency determined by previous external financing experience and current investors.

Overall, as expected³², as businesses progress through the stages of development they clearly establish wider networks of external financing contacts and external advisors which put the longer established MSBs into a considerably stronger position to apply for suitable finance than their less established counterparts.

Early stage businesses exhibit relatively little previous experience of applying for business finance of any type and therefore little previous connection with the funding sources they applied to. Around half had never had any experience at all or only referred to limited informal networking experience, such as chance meetings with potential equity investors at conferences and events. A few referred to contacts with their own banks in terms of personal or initial business banking, whilst the remainder contained some serial entrepreneurs with previous business finance experience (e.g. grant applications and angel and VC connections) and some spin-outs that had established initial financing contacts with academic funds (e.g. from Imperial College and University College London). Others were using external assistance and these included two businesses that had received accelerator-type mentoring support and one that had used a grant fund writer.

Growth stage businesses were more likely to have developed grant and equity financing connections and to have established a business banking track record. This meant that they were already experienced in writing grant applications, notably to Innovate UK and European funds, and could discuss further funding with existing investors as a first port of call. For these businesses the required shift to a more substantial form of investment could provide a barrier, if their current investors could not afford to follow-on fund and could not provide a connection with next stage VC. Some respondents also mentioned concerns over existing investor share value dilution as a potential barrier. Because of the step change in the type of funding required, it was notable that some of the early growth stage businesses had never had any contact with potential VC funds and lacked knowledge about public VC. The growth stage businesses were willing to use and pay for external assistance to help with finding and applying for equity funding.

³² A Resource Based View (RBV) would suggest that greater experience in accessing external finance would lead to improved selection, application and likelihood of success (Mac an Bhaird, 2010).

Mature stage businesses were extremely well networked and experienced in applying for the funding they required. This included applying for substantial commercial bank lending, based on an extensive banking track record and enhanced private and corporate VC funding, either obtained through existing investors or through their VC networks. Some of these businesses already had extensive private equity funding from City institutions whilst others were listed and could raise funds from the public markets (AIM and LSE). There were also a few examples of MSBs that had made step changes in their financing that required new forms of finance. One life science business had recently floated on AIM and had spent over a year in discussions with City brokers to ensure that the IPO was well promoted and timed. Another, an aerospace business, had firstly sought commercial bank finance, but then looked to Regional Selective Assistance (RSA). Although this business had previous experience of applying for this type of state aid, it nevertheless found that their most recent application was far more complex and time consuming (i.e. requiring two years of negotiations) than had been anticipated.

4.4 Preparation time and approach for funding application

The preparation time to apply for finance varied considerably, largely depending upon the type of finance applied for, the degree of expertise and prior experience of the business managers in applying for particular types of external finance and the use of external assistance. For example, applications for bank loans could be quite rapid, but were most likely to be initial discussion approaches, rather than full applications. Formal bank loan applications could take place quickly via the internet, following standard procedures, although it could take a few weeks to prepare business and financial plans, sometimes with the help of accountants or consultants (e.g. Business Link, Scottish Enterprise Gateway, or local enterprise partnership/agency advisors).

Applications to grant bodies such as Innovate UK or EU FP7/Horizon could take several months to prepare, depending on the skill and experience of the management team and their collaborators. For example, an early stage business employed a professional grant writer who charged 4% commission on the value of the grant application, whilst a growth stage business requiring a fast response to a grant call paid 10% of the grant value to a specialist consultant. One highly experienced growth stage business collaborating with leading academics had at least a 50% success rate and could typically progress from grant round to funding within a six month period, and a mature stage business referred to employing a full-time R&D fundraising team which annually brought in £8-10m.

Equity finance was the most complex type to arrange as this involved an unknown time span to find and formally apply for. It was acknowledged that internet applications could be made, but typically the respondents seeking equity finance indicated that it was necessary to network and meet angels and VCs face-to-face. Initial informal meetings with VCs and HNWIs could lead to follow-up interviews and to successful deals. In the case of business angel networks and groups, this could take place via a paid introductory pitching slot, but

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some of the respondents were not willing to pay money for an uncertain outcome. For those early stage or early growth stage businesses with inexperienced managers, it was essential to use external assistance mentors, angel investor champions, consultants, VC finders to help with the production of business plans, financial projections, initial market due diligence and presentational skills, as well as to find suitable funding sources and help with negotiations. Several respondents complained that “*the consultants were good at developing plans, but less good at finding suitable funders.*” One cleantech growth stage CEO referred to paying £15,000 to four sets of VC finders over a period of three years, without success. It was not uncommon for respondents to refer to spending six months or more to find suitable equity finance, and they could approach tens of potential investors (one growth stage business referred to writing to or meeting 65 VCs or angel groups), with prospective deals sometimes falling through because matching grant funds or other investments were not secured³³.

The more successful equity applicants were those that were already well networked and connected, either because they were an established business with existing VCs that could provide further follow-on funding or had links to other suitable VCs, or because they were serial entrepreneurs who could bring their previous experience to earlier stage businesses. An example of the latter is a digitech whose CEO was able to find a suitable public seed VC and secure an initial £500,000 investment within six months. In terms of the costs of applying for equity finance, the most substantial costs were likely to come from the legal fees, particularly where there are multiple investors and complex share arrangements to negotiate³⁴ (although the standard term sheet approach of seed VCs can keep these costs down). For a standard VC investment a typical cost of external fees, which would include both sets of legal fees, could be around 5% of the total investment (typically proportionally higher for smaller amounts sought), but this does not take into account the internal management time and costs involved. Some of the respondent CEOs mentioned that they had worked full-time on equity fund raising for more than a year, in one case three years, and that although this time spent was usually unpaid, “*it represents tens of thousands of pounds in estimated management costs.*”

At the top end of the scale, the MSBs seeking state aid or undertaking IPOs were involved in very lengthy fund-raising periods which required considerable time and negotiation. In the case of the aerospace business seeking grants and loans from the government after quite quickly dismissing their initial option of commercial banks, it took two years to negotiate the state aid deal. For a life science business undertaking an IPO, there was a considerable scouting period, of meeting with prospective brokers, of over a year. However, once they were agreed on undertaking the IPO the main preparation period took

³³ This was also a problem encountered when the Angel Co-investment Fund did not match fund (see British Business Bank ACF report, 2015).

³⁴ This was an important issue raised in the BIS early evaluation of equity funds (2010) and recent early evaluation of the ACF (2015)

less than three months working with external advisors and financial public relations to develop an investor presentation package and admission document for AIM:

“Every word has to be verified because it’s a public company, so every single word has to have a third-party verification by lawyers, a pretty tortuous process, you get all that because everyone needs to get the same information. So there’s quite a lot of prep work and then the board has to sign off. You’re literally signing off in blood that every word is true in this entire document suite and then you make the intention-to-float announcement. Then you go on a road show for three weeks, meeting all these various funds, and then you accrue the orders and then you admit, assuming you’ve raised enough money.”

The overall cost of admission to AIM is considerable³⁵ and includes a market admission fee and payment of various consultants and advisors. New public market entrants are particularly reliant on good quality brokers and Nominated Advisors (NOMADs) who are responsible for ensuring that the business raises sufficient funds and operates correctly within the market. In this particular case they took a 2.5% share of the funds raised, with the overall cost of admission well in excess of £1m.

4.5 Application process requirements: ease and understanding

As previously noted, the ease of application for finance varies considerably. Applications were simplest and most straightforward with banks and grant funders where the requirements were clearly set-out, paper-based, and on-line, whereas applications for equity finance involved a more informal process, as explained by an early stage life science CEO:

“Applications for grants are straight forward, but time consuming, whereas applications for VC are about networking and meeting the right people, rather than formal written applications.”

Bank and alternative debt funding

Bank loan applications require straightforward form-filling which can be undertaken at a branch or on-line and this is similar for alternative debt financing options from Funding Circle and asset finance (hire purchase) companies, which typically require completed standardised online forms which include the last two years’ business trading records. The process was more detailed and took longer (around two months) for an early stage digitech business application to a CDFI:

“We quickly recognised that the banks would not lend to us, as a newly trading business. So we initially wrote to the organisation [a CDFI]. They replied a few weeks later and

³⁵ See BIS (2013) report on the aims and motivations of UK business listings

asked us to submit a full formal written application. A further month later we were invited to a panel interview presentation of the business plan and shortly after that we received an offer.”

Grant funding

Grant funding applications are typically paper-based and on-line, although in some cases for Innovate UK it also included production of a short film and a follow-up panel interview. Innovate UK was praised for having a clearly set out approach (as below), although it was noted that the on-line application system could be improved:

“Innovate UK was a three-stage process - first a video, then a full application which was done online, and then if you’re successful, a presentation in front of a panel where you are asked questions. The online bit was really un-user friendly in terms of the system rather than the questions.”

Equity funding

As we have seen, equity funding is frequently time-consuming, particularly if it requires a syndicate of angel investors. This response from a growth stage life science business trying to raise £1.5m highlights the complexity of the process and the threat it poses to the ongoing management of the business:

“Angel investors are extremely time consuming because you have to do a lot of presentations, so a lot of follow-ups, a lot of questions, a lot of emails, a lot of chasing people who have said ‘yes, they’d be interested in investing’ and then you don’t hear from them for weeks. So, it is a very time consuming business and it is actually a threat to the company because the management team focuses on raising money and while you’re doing that, you’re not running the business ultimately, as effectively as it should be run. So, this constant going out for small amounts of money is a major distraction to the management team.”

For others, finding one VC was the key aim, as this would provide sufficient investment from a single source. However, finding a suitable VC could take many months of networking. The eventual application process could be quite informal at first. A typical process involved meeting the VC at an event, following this up with a telephone call, receiving an initial telephone interview, and then attending a meeting with the VC partners, which would involve some form of presentation. With seed VC the process could be quite quick, moving from meeting to a standard VC term sheet agreement and receiving funding within a few weeks. However, for most earlier stage private and public VCs the process of due diligence and negotiation could take several months. The following response from an early stage life science CEO summarises this process:

“Presentations to VCs are all about explaining the business - team, idea, concept, tech, markets/commercial relevance, financials - all the points of a business plan including when

you'll make money - but an actual physical plan is less crucial. VCs will approach if interested in sector and get wow factor - then need to understand and get a meeting of minds - personalities are important. The majority are quick to dismiss, but the odd investor who is keen can drive process forward. Often don't get feedback or only a 'come back later when more established' response, which is not helpful. If they're interested they'll move to term sheet stage and negotiations - or in some cases ask you for your term sheet."

Investor understanding of applicant businesses

There were also mixed reports on the extent to which the various funding providers understood the applicant business. Those businesses that applied to banks and debt funders suggested that they did not and that these sources were primarily concerned with trading track record. Those that applied for grants were mainly satisfied that these had satisfactory review processes, but some who had unsuccessfully attended panel reviews commented on a need for greater levels of technical expertise. Successful equity funding is all about a “*meeting of minds*” between the business and investors and so the process of finding suitable investors was all about progressing from those who did not understand the business and sector to those who did and potentially could add value to the development of the business. However, it could take many months or even years to find suitable business angel syndicates or VCs and there was some criticism around lack of knowledge and ability to find public VC.

4.6 Application outcomes

The next chart, Chart 4.1, summarises the outcomes of applications for finance for interviewed businesses in each of the three main development stages. Following the chart, the outcomes of finance applications are discussed in more detail.

As noted, Chart 4.1 summarises the types of funding applications that the surveyed businesses had most recently made according to their business development stage. This table demonstrates that persistence pays in respect of multiple applications for grant and equity finance and that these businesses have learned as they go through the process. More experienced business management teams in more mature businesses become more successful in accessing finance, particularly in respect of equity finance. This evidence suggests that the combination of greater management experience, network linkages to equity finance, a greater focus on equity finance, and improving market traction, means that businesses with three to four years of trading become more visibly attractive to private VC, private equity (PE) and corporate equity investors, including foreign investment.

Overall four out of five applicants (40/50) were eventually successful in receiving funding offers for at least some of their required finance. Seven out of ten applicants (35/50) were entirely successful in securing all of the funding that they required. There were no noticeable differences apparent amongst family, women-led businesses, or EMBs.

The vast majority of businesses that had applied for grants and equity funding eventually received at least some, and in many grant cases all, of the funding that they had applied for.

A critical issue here, however, is the time that it takes to obtain the funding, which for grants and equity finance could involve multiple applications by businesses over a period of several years, and highlights the lack of certainty of success for the earlier stage businesses. It is also evident that business angel and VC funding at the **early stage** often does not offer the amount of funding initially required and that VC funding is particularly difficult for early stage businesses to obtain. Some of these business managers reiterated their complaints at not being able to find effective government VC funding. Furthermore, for these early stage businesses bank finance (including crowd source debt finance) was not possible, unless it was through a specialist lender, such as a CDFI.

At the **growth stage**, grant applications remain an important source of funding, with a high proportion of businesses succeeding in obtaining at least half of their required funding. However, these businesses typically mention that they expect no better than a 50% success rate for their applications and therefore it can take time to raise the funds that they require. At this stage there is also a higher proportion of businesses (than of early stage businesses) succeeding in obtaining equity finance from business angels, VCs, and other private equity sources (e.g. City finance houses and Family Offices), and at the levels of funding required at the time. However, once more, bank finance was difficult to obtain. There was also one joint venture case where an early growth stage engineering business had partnered a German manufacturing supplier to develop their leading edge 'ice pigging' pipeline cleaning technology for the food and beverage industry. This joint venture underlines the importance of collaborative financing, particularly where a growth stage knowledge-based company requires extensive manufacturing capital investment (representing £100,000 out of a project cost of £300,000).

At the **mature stage**, grant funding may still be applied for, but is not guaranteed any greater success than at the earlier stages. Equity funding is focused on VC and on forms of private and public equity and is demonstrably highly successful with all business applicants receiving at least the level of funding required and in some cases well above this – notably through recent successful public market IPOs and new share offers. At this stage there is also evidence of substantial commercial bank finance being raised, assisted in the case of a large construction company undertaking overseas projects by the Export Credit Guarantee [arranged through the UK government's Export Credit Agency (ECA)]. There is also evidence of successful supplier financing arrangements through joint venture arrangements and advance payments once projects reach a milestone later stage of development.

4.7 Terms and conditions of offers

The funding offers received were generally accepted by **early stage** businesses, as these were often struggling to find external finance and willing to accept the terms offered. The few examples of debt finance indicated that some finance providers are prepared to offer an unsecured high rate loan to match an Innovate UK grant, which was deemed acceptable to the business applicant. Also, a CDFI was prepared to lend £25,000 to an early trading business at a fixed 8% interest rate five year term loan supported by 100% personal guarantees from the directors. Grant terms were considered highly acceptable and could entail quarterly performance monitoring for receipt of funding tranches. However, they typically required match funding, which was not always possible. One respondent mentioned being pressured to find matching funding within a six month timeframe in order to keep the grant. Equity finance, which was mainly from business angels for the early stage businesses was supported by SEIS/EIS and usually resulted in ordinary shares being offered. These business respondents were generally satisfied with the equity share required, but complained in some cases that they had not secured as much funding as required. For example, one life science CEO referred to receiving £150,000 of VC funding for a 20% share, but ideally required four times this level of funding.

The **growth stage** businesses had no problems with grant funding which, generally, they could match with their own revenues or through equity finance. Their main preoccupation was with the cost of obtaining equity finance. Many of the surveyed managers stated that “*equity finance is the only way that we can raise sufficient funds to develop the business*”, suggesting that equity funding is “*integral to the business model.*” In this respect, there was a grudging acceptance of VC offers which took considerable shares of the business and often with preference rights and considerable dilution of the founders' shares. One digitech manager referred to receiving £500,000 for a 50% share of the business, with the VCs taking preferential shares over liquidation assets and imposing 'leaver rights' over the key director shareholders to ensure that they stay (or lose their shares). A life science CEO mentioned that when they had received investment from the Low Carbon Investment

Fund, the fund had required a seat on the board and had charged the business a monthly monitoring fee. Although some of these measures were considered “*draconian and expensive*”, they were accepted as part of a necessary process. Another life science CEO who had raised £1m in business angel finance for a 25% share was keen to impress that finding the right investor who could finance and add value to the operation of the business was crucial.

For **mature stage** businesses there were few concerns about the charges and terms imposed by their fundraising. The aerospace business that had received substantial state aid loans and grants mentioned that the loans were at the upper end of the market rate but was also grateful for the grants provided. It was also clear that this project could not have gone ahead without this funding. Another example, the provision of the government’s export credit guarantee at a cost of 2% to assist in raising substantial bank finance for an overseas construction project was also highly praised. Finally, those that had raised equity finance through VCs, private equity and the public markets were very happy with the terms of arrangement. For example, a cleantech CEO suggested that they could offer their private equity financiers 10% IRR, whilst those using the public markets extolled the advantages of offering ordinary shares for funding in return for shareholder voting rights.

4.8 Reasons for partial/non offer

The surveyed business managers were asked whether they had been given any reasons for rejections or partial offers. Responses obtained focus on the early and growth stages as the only major complaints from the mature businesses focus on two that had found commercial banking problematic.

A common theme amongst early stage businesses and some early growth stage businesses is that private VCs do not provide much feedback but tend to be looking for more advanced businesses that have achieved market traction. One CEO summed up the frustration felt by these early stage business applicants: “*we only required £200,000, which is insufficient to merit VC due diligence at our stage of development, but if we were trading and at a later stage we wouldn’t need the funding.*” Furthermore, one public regional VC fund was criticised for not adequately addressing the early stage equity gap, as it was rejecting businesses as ‘too early stage’ in the same way as private VCs. The cleantech CEO respondent suggested that public and private VCs might be more willing to invest if there were more technical expertise engaged in the assessment of complex engineering propositions. There was also evidence that business angels were not willing to invest in longer term intensive R&D - indicating that SEIS and EIS were more suited to the shorter

cycle of digitech investments³⁶ - or were asking for unacceptably large shares in the business.

Grant funds did provide feedback on failed applications and in a small number of cases this feedback was criticised. This included one example of exhibiting bias towards later stage R&D, which had not been clear from the outset and two separate perceptions that the reviewers did not understand the technical engineering elements of the proposal. This latter point led one CEO of an early stage heating engineering business to suggest that there might be more iterative dialogue in applications for Innovate UK grants.

A further potentially important observation came from a growth stage life science manager who stated that: *“Grants are good, but if we meet all our objectives there is a need for follow-on funding in order to prevent down-time and competitors catching up.”*

Banks had rejected early stage businesses because they had insufficient track records and this was accepted by these applicants. However, a growth stage life science business that had several years of sales turnover of £1.5m was unable to secure anything close to the £1m loan that they required. The feedback of ‘insufficient revenue’ was considered unreasonable. Further, a manufacturing MSB with substantial annual sales turnover of £68m had failed to raise £12m of bank finance to introduce new production processes. The indication is that large scale patient capital, notably for capital investment was particularly difficult to raise from banks³⁷.

4.9 How the business proceeded if further external finance required

Amongst the subset of surveyed businesses that had received only some or none of the external funding that they required, an important finding is that few businesses are discouraged to the extent where they think of stopping. Rather, the tendency is for: (i) innovation projects to be reduced in scale according to funding input; (ii) to be slowed down or temporarily halted as a result of receiving less funding than anticipated and to enable more time to be spent fundraising; (iii) to seek different types of external finance; and this may include (iv) changing the business model to enable collaborative financing through joint ventures and licensing activity.

Amongst the **early stage** businesses more than half provided detailed feedback on the adjustments that they had made as a result of receiving less funding (in some cases no funding) than anticipated during their most recent funding round. The general tendency for

³⁶ North et al. (2013) suggest that digitech, software engineering innovation cycles are typically within a 3-5 year frame compared to the 7-10 year plus frame of bio and life science innovation

³⁷ In this case the amount required was above the typical Business Growth Fund (BGF) threshold, but probably pre-dated the fund, which was not mentioned.

4. Findings from the survey: pathways to accessing finance – the application process and outcomes

those that had received some of the required funding was to “*cut our cloth accordingly*”, by reducing the scale of activity and taking longer. These businesses were also planning for follow-on funding, which would now be required sooner and in larger quantity than originally conceived. For example a digitech that had received 25% of their required project funding now required “*an additional £1m sooner than expected, within the next 4 months.*”

The process of continuing to seek external finance had led some, notably those that had no success (e.g. with bank and HNWI/angel applications) to look to alternative finance, which typically involved Innovate UK and Scottish Enterprise grants, but also equity finance. Two businesses (a cleantech wind energy business and a heating engineering business) that had failed to obtain Innovate UK grant funding had applied to the Scottish SMART scheme (one specifically going for the mid-stage technology testing award), mentioning how they had learned from their previous application feedback and developed better technical explanations.

The search for equity finance included an electrical engineering business that had applied to their bank for an overdraft facility which was rejected. Since that time the business has successfully secured grant funds, but has required matching equity finance and continues to seek equity funding from VCs. There were also examples of businesses that had sought early stage HNWI and business angel syndicate funding without success. They were now looking at overseas options, such as US investors, who were described as “*more understanding of the bio medical sector*”, or in another case a Polish company that might provide investment into a life science instrument development.

For **growth stage** businesses there were fewer examples of undersupply of external finance for their most recent innovation funding rounds. However, two cases stood out. Firstly, a life science business with established annual sales turnover of £1.5m that failed to obtain an EFG-assisted bank loan on two occasions. There was little feedback, except to indicate that they required a longer, more established trading record and so the CEO mentioned that they will revisit bank finance in 12-24 months’ time. Meanwhile, they are short funded for their key drug targeting projects which require a mix of knowledge and capital asset finance (e.g. to develop their in-house lab testing equipment and technology) and are currently approaching business angel networks for the £1m that they require.

The second case (case E), recounted by a cleantech CEO and presented below, provides a clear example of where an early growth innovative business seeking substantial longer term capital investment has only been able to achieve this through pivoting its financing model and developing collaborative financing arrangements:

Case E: Early growth stage cleantech seeking step-change capital investment

A growth stage cleantech business, established 10 years developing a more efficient approach to biomass fuel production using agricultural waste products. The innovation took seven years to develop whilst the company operated on a contract research basis

and small level funding from a HNWI client (£100k) and the Low Carbon Innovation Fund (LCIF) for prototype work (£190k). The company has a UK patent and is applying for international patents.

Three years ago the decision was made to stop contract R&D trading and focus full-time on fund raising for a substantive capital investment of £2.2m to build a demonstration biomass energy plant. Initial contact with banks indicated that effectively as a pre-revenue business there was no chance of receiving this type of finance. The business was also unsuccessful with applications to the LCIF and regional VC fund and embarked on a 3 year search for equity finance. During this period, as they had no previous experience of raising larger scale equity, they used 4 sets of VC finders. Although they had detailed negotiations and came close to securing City private equity funding at one stage, the search was halted after 3 years.

“It was clear that private finance was not prepared to invest at such an early stage in a long term capital project”.

This led to the management team deciding to change their business model and financing strategy. In the last year the business has pursued a licensing approach whereby customers finance and build their own biomass energy plants, with the cleantech business supplying consultancy on the build and ongoing maintenance services. This new approach has led to four customer orders valued at £6m.

There were few examples of **larger established MSBs** failing to secure the funding that they required. However, these included a digital engineering MSB that failed to secure a grant but was able to make up the shortfall of finance by raising a share issue and an aerospace MSB that experienced initial problems in raising large scale commercial bank finance (in excess of £100m) on suitable terms and subsequently entered into two years of negotiations with the UK government for state aid grant and loan funding. A manufacturing MSB was unable to obtain bank finance for a major capital asset based innovation project and subsequently used VC finders (Grant Thornton) in a three year search for equity finance, which was eventually successful and levered in mezzanine finance from an overseas bank.

Outcome of new applications

Amongst those that had continued to search for external finance - after initially failing to secure some or all of the external finance that they required in their most recent funding round – there was an even split of success. Around half had secured some additional funding, but for the majority the search for further funding continues, particularly with regard to business angel and VC finance, which was leading to wider searches overseas. Most success had come through early stage businesses applying for grants, with one engineering business raising £4m in grants (but still requiring additional matching funding,

which would most likely come from equity investors). Indeed, several respondents, including a growth stage life science business, mentioned that finding matching funding for grants from equity investors was proving time consuming and so far unsuccessful. A small minority of businesses had failed to receive any funding. The most extreme case was a wind energy efficiency innovation business that had taken 10 years to develop and had been totally self-funded by the business founder who now wondered whether the project was worth continuing. Others remained hopeful, with revised grant applications pending decision and potential equity or even bank funding lined up to match the grants.

Where further funding had been found, the respondent CEOs were generally delighted with the terms, although there were issues around finding match funding for grants and in one case it was mentioned that “*having to meet milestones before receiving payments could be burdensome.*” Furthermore, one CEO who was matching VC funding to a successful grant application stressed that they begrudgingly accepted the offer despite having to pay considerable VCs fees out of their offer funds. This process was highly criticised as the VC was effectively taking on little risk and was already backed by EU funding. Perhaps of greater concern was the time-lag that could occur in seeking additional funds, which in several cases had taken 2-3 years and not necessarily led to any success yet. No businesses specifically stated that they were dissatisfied with the type of finance that they had accessed, but a couple of early stage businesses regretted that they had not sought significant external funding earlier on in their development.

Impacts of lack of funding success

This analysis relates mainly to the early stage and early growth stage businesses that have struggled most to raise external finance for their innovation projects. For the majority of these businesses lack of funding has resulted in a slowing down of the innovation development process, in some cases by as much as two to three years. These managers also referred to scaling down of projects and reverting to slower organic growth approaches, which in some cases required a suitable balance between contract R&D revenue and fund-raising activity, which could take out a considerable amount of management time from the day-to-day running of the business.

The slower growth R&D contract income approach is demonstrated by an early growth stage life science business (case F):

Case F: Early growth stage life science business using an R&D contract funding approach

This life science business, established 13 years, developing advanced brain drug treatments spun out of UK university research, has been trading for several years. They currently have £1.4m annual sales turnover and 25 staff and have been seeking step change finance through bank and VC or large business angel syndicate funding of £1m, towards a total project round of £6m (the remainder has been sourced from Innovate UK, Engineering and Physical Science Research Council (EPSRC) and EU grants, matched by

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internal contract R&D income). This round of fund-raising has taken nearly three years and will hopefully be completed with angel investments in the next few months. The length and complexity of this funding approach led the CEO to explain his concerns over the delay in funding:

“We have been able to keep funding projects running through our R&D contract income. However, lack of external funding from banks and business angels, allied to the intermittent nature of grant funding, can lead to slow-down of innovation and can end projects. There is always the concern that competitors will catch up.”

The inability to raise external funding investment for in-house innovation could lead to a considerable reduction in business income potential, due to outsourcing work and purchasing in licensed products and parts, which may come from overseas (case G):

Case G: Early growth meditech licensing-in software, reducing investment and sales income

A meditech business trading for a couple of years, currently with annual sales turnover of £200k and 5 staff. The business sought £300k in HNWI investment, mainly to develop knowledge assets by recruiting skilled software writing staff, but also some capital asset investment into computer equipment. Failure to raise any equity investment over a period of several months enforced a change in the business model. This led to the out-sourcing of software writing to an overseas software house, resulting in the business adopting licensed software components which considerably reduce sales revenue and potential profitability of the business.

“We believe that the business has suffered significantly because it is less profitable selling software which needs licence fees to be paid on its components. We could have developed in-house software where each sale would have been much more profitable. The result is slower growth than if finance had been available.”

The most common theme was that lack of external funding had delayed project development, often by several years and that the search period was costly, both in terms of management time and in some cases the use of external advisors and also the opportunity costs of income from contract work and earlier market entry of the innovation. These impacts are expressed by the following interviewee quotes:

“The impact was huge. It took me two years to get equity finance. So it could have shortened the whole innovation process by two years.” (CEO of an early stage fintech business).

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“This has been incredibly costly to the development of the business. It put us back by a year or two and left us with no opportunity to move forward until further funds are found.” (Director of an early stage life science business).

In a small number of cases, early stage businesses lack of external funding was “very discouraging” and the founders were beginning to question whether the innovation project (effectively the business) was worth continuing:

“The company has been in limbo for many months since receiving the TSB grant, whilst we try to find a suitable investor. If we do not get investment for the Polish business we are currently in discussions with, we may close the business after more than two years searching for investors.” (CEO of an early stage life science medical instrument business).

For a mature manufacturing MSB that had been seeking large scale patient capital investment from UK commercial banks for in-house process development, there was considerable cost from the delay in finance and concern about the lack of help and understanding offered from the banks:

“We are a global UK-owned company with UK international manufacturing. The UK banking community and government should think laterally about wider interests. We were a non-standard business saying ‘support us’ and we will grow, expand manufacturing in the UK, create jobs and become a global leader. We have game-changing technology which is transforming the industry. Not one UK bank was interested in helping us. This caused three years of delays and in the end we had to go to a combination of VC and a Czech Republic bank for finance to fund a UK manufacturing acquisition. The government must put the mechanisms in place to support innovative growing UK businesses.”

4.10 Summary: pathways to finance – the application process and outcomes

Key points of this analysis of 50 firms’ experiences of applying for finance are set out in the following panel:

Key findings – Applying for external finance:

- Equity is the most frequently mentioned type of finance for innovative businesses, but changes in type and source as businesses progress: HNWI/angel investment at early stage; public/private/corporate VC at growth stage; PE and public equity at mature stage.
- Grant funding is used at all stages, but is particularly important for early stage businesses. Problems can exist in match funding grants and in obtaining follow-on funding from grants or other external sources for further innovation momentum and development.

Key findings – Applying for external finance:

- Early growth stage businesses, notably in longer horizon intensive R&D sectors (e.g. life science, cleantech, advanced engineering) face particular difficulties in raising substantial investment for capital asset investments (e.g. due to existing equity investors' inability to follow-on fund and exacerbated by early stage under investment).
- Bank and alternative crowd source debt finance is typically not sought by early stage and even some growth stage financing where there is a lack of sufficient or consistent trading track record of at least two years.
- Collaborative finance is important at all stages, but is particularly important to match-fund early stage grants and to funding substantial capital asset investment for early growth stage businesses (e.g. through joint venture and licensing agreements) and even larger scale investments for MSBs (e.g. pharma joint venture and supplier finance).
- Awareness and use of R&D tax credits increases with stage progression, more frequently mentioned and used at the growth and mature stages, which may relate to management experience and use of tax accountants. They appear particularly useful to long horizon innovation sectors such as life science.
- Difficulties in raising external finance appear to decline considerably for more established and larger MSBs, which can access commercial bank finance, corporate/PE and public equity and there is a general sentiment that the current UK public markets are particularly buoyant and helpful.
- In early stage financing experienced managers (serial and spin-out) and those using specialist external assistance are more successful with their funding applications, particularly where collaborations (e.g. with academics/research institutes for grant funding) are well established.
- Applications to banks and grant funders are relatively straightforward, whereas equity finance is more complex and time consuming, requiring networking experience or external advisors. It can take several years to find suitable early and growth stage equity investors and there were complaints relating to lack of information about government VC schemes.
- Persistence appears to pay, with business managers learning from their experience and developing new external funding models to enable innovation development. This has involved licensing and joint venture approaches and seeking overseas investment.
- The impacts of failure to obtain sufficient external finance are considerable and can reduce, slow down or even stop the innovation project (for several years, or completely). External funding shortages can also enable competitors to catch up, undermining potential market primacy advantages.

5. Findings from the survey: overview

5.1 Introduction

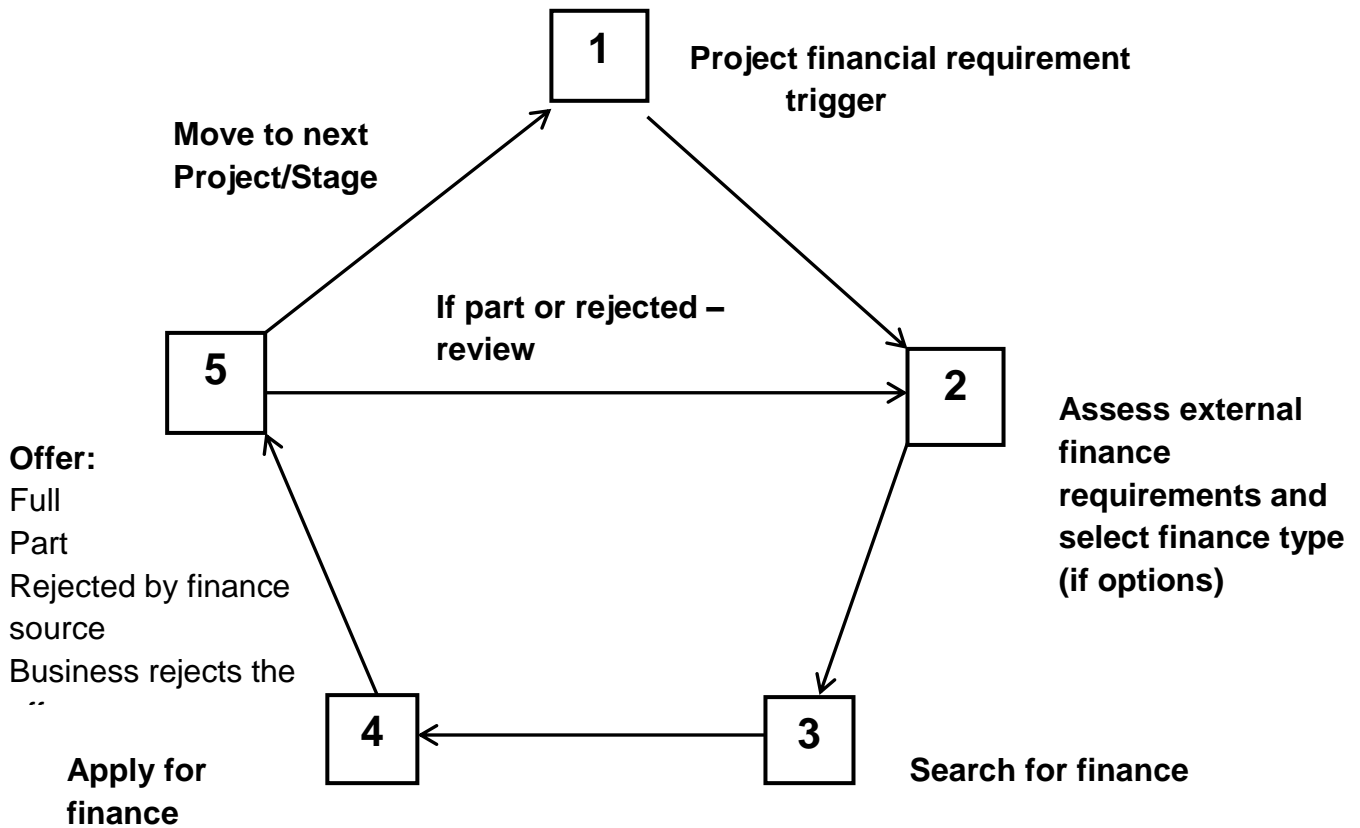
Previous chapters of this report have considered particular elements of innovative firms' pathways to finance – from the triggers which generate need for finance through the application process and on to the outcomes of applications. This chapter takes a more holistic view of the pathways which were observed in the research:

- First, some pathways are characterised in a series of diagrams applying to early, growth, and mature stages. These illustrate, albeit in a somewhat simplified manner, the *whole* of pathways, from the original need for finance to the eventual outcome, which were frequently observed amongst interviewed firms.
- Second, the chapter describes the impacts which innovation activity had on some of the interviewed businesses, these impacts varying according to the firms' success or otherwise in acquiring the finance they needed.
- Third, some important themes which cross-cut the more detailed points made in previous chapters are described. These themes include firms' views on:
 - The availability of external finance
 - The transparency of financial markets and the financial options they offer.
 - The cost of external finance.
 - Indirect public support for innovation.
 - The possible role of government in improving the availability of and access to finance.

5.2 A holistic view: typical pathways at different stages of firms' development

In an idealised and simplified shortened version of the pathway to finance, assuming that the business proposition is viable, the business moves seamlessly from an assessment of financing need and selection of the required finance type through application and successful receipt of all of the funds required. This would conform to the idealised pathway presented – completing the circle of finance for a fully funded business innovation development round at each stage (see Figure 5.1):

Figure 5.1: Idealised pathway to external finance



Source: Adapted from BIS 2010; BIS 2012; BIS 2015; British Business Bank 2015

However, for most of the surveyed businesses, the pathway was actually far more complex and involved multiple iterations over time, due to part or full rejections (only receiving part or none of the funding applied for) and the need to re-assess funding requirements and resultant business innovation operations. There were periods of negotiation, reassessment, further application for different types of finance and in some cases eventual remodelling of business financing in the form of collaborative licensing and joint venture approaches.

Whilst each business will follow its own specific pathway and face its own particular barriers to accessing external finance, it is possible to present generic overview flow-charts of the typical types of pathway characteristics found at each stage. Here we set out the key steps along each stage pathway, providing a commentary of the business management's perceived external financing requirements and processes on the left hand side and their apparent financing options on the right of each of the three following diagrams. Each stage pathway ends with two options, essentially successful commercialisation of the innovation or not, which appears highly dependent upon successful and timely financing in order to maintain innovation momentum and market primacy. For early stage, and even growth stage businesses, that is highly dependent on

one innovation or one innovative technology platform. Failure to successfully establish a market position may well close the business. For the mature MSB that typically has multiple innovations, the failure of one innovation is unlikely to close the business.

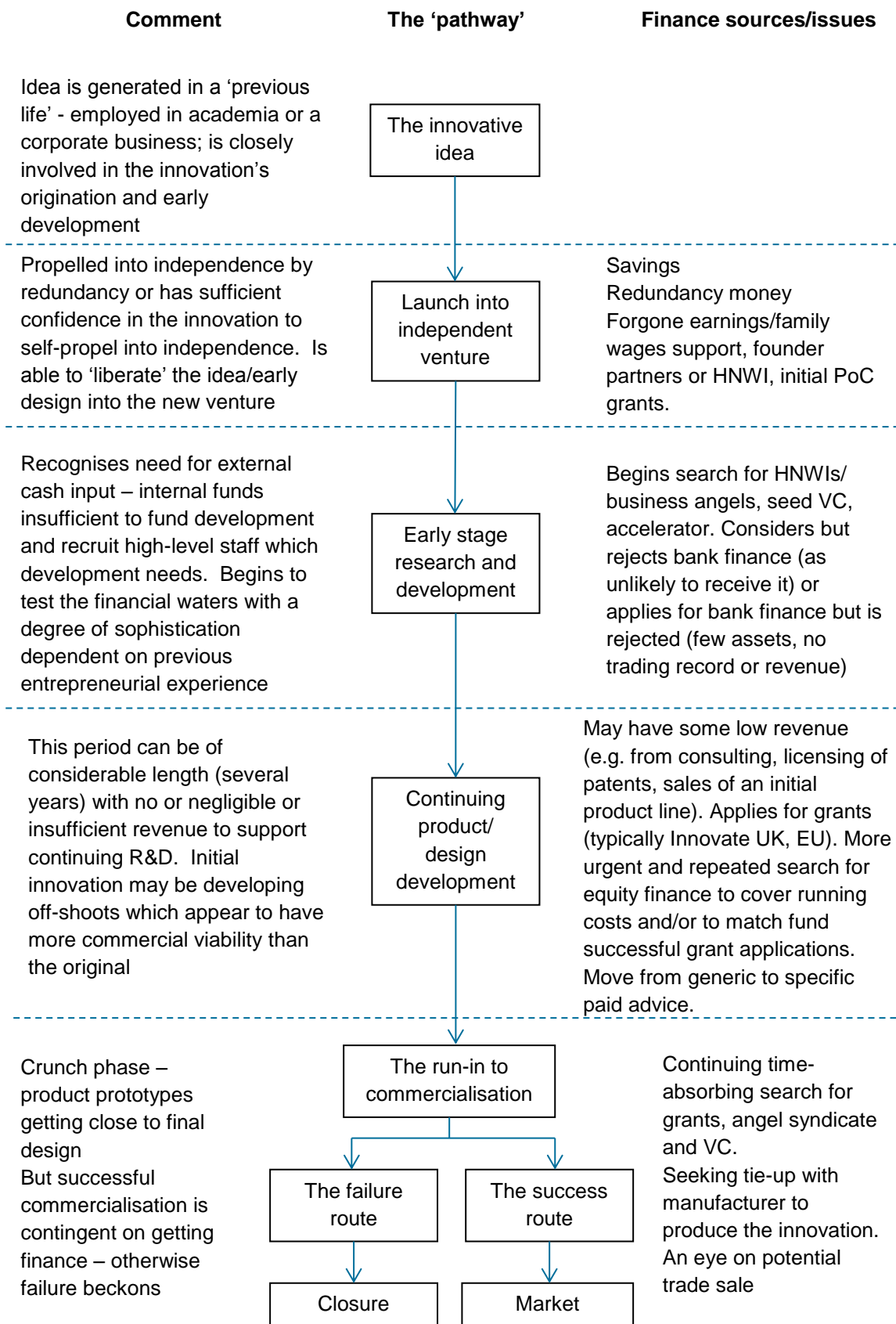
Early stage (sample population-reported external finance range: £25k to £3.8m)

The early stage pathway (see Figure 5.2 following) is typically the most complex, since it encompasses a number of key innovation steps from a germinal idea, which could spin-out from academia or an existing business, and through initial proof of concept (PoC) leading to a new business start-up, which will typically be based on one single innovation or innovation platform. The process from start-up through to early market penetration can take several years and will be determined by the innovation horizon (the intensity and length of R&D), which can be relatively short for digital technology (typically 1-3 years), but considerably longer and more complex for life science, advanced engineering and cleantech (typically 10-15 years).

At the business launch most innovative businesses are self-funded by the founders, but may have initial HNWI funding, or in the case of spin-outs some residual corporate or academic funding. At this stage the business has to decide on a funding model and this is typically determined by the management experience. First time founders typically self-finance and seek external finance in an *ad hoc* manner, depending on perceived needs and tend to act in a reactive rather than planned proactive fashion and to underestimate their external financing requirements. Serial entrepreneurs and those receiving early advice and training are more likely to adopt more formalised approaches and to have a clearer pre-defined view of where to seek finance, based on past experience and their own or advisors network contacts.

An essential problem for most early stage innovative businesses is that they are unable to obtain bank finance, since they do not have the required two year trading track record and are too early stage to obtain substantive equity finance. They therefore tend to struggle to find funding and when they are successful, often fail to obtain the level of equity finance that they need, since individual business angels and small angel syndicates may not have sufficient funds to invest into one single business (preferring to spread their modest equity resources amongst several businesses in their portfolios) and seed VCs typically invest only small amounts in start-ups. This leads to a drip-feed multiple funding round scenario, with a lot of time spent seeking funds. There is heavy reliance at the early stage on grant funding, notably from Innovate UK or Scottish Enterprise, but the requirements for match funding (typically a 60% grant and 40% match) can be problematic, particularly as there is no clear link between successful grant applications and access to debt or equity sources of finance. Some businesses adopt a balancing contract R&D revenue work approach, which enables them to match fund grants, but means that they are not entirely focused on innovation development. A key result of the drip feed and partial grant funded regime is that innovation is often slowed down, down-scaled and can lose momentum and first mover advantage as competitors catch up.

Figure 5.2: Early stage: pre-market, low revenue innovation



Growth stage (sample population-reported external finance range: £27k to £16m)

The growth stage (see Figure 5.3 following) is characterised by businesses that have mostly already reached the market with their innovation, but require substantial step-change funding in order to successfully progress from pilot market activity (within the first 1-2 years of trading) to full market roll-out, including into large international markets. For shorter horizon digitechs a key at this stage is the recruitment and development of sales and support staff, whilst for longer horizon innovation businesses this can involve substantial investment into capital projects which can include building demonstrator plants and developing later stage testing and trialling labs.

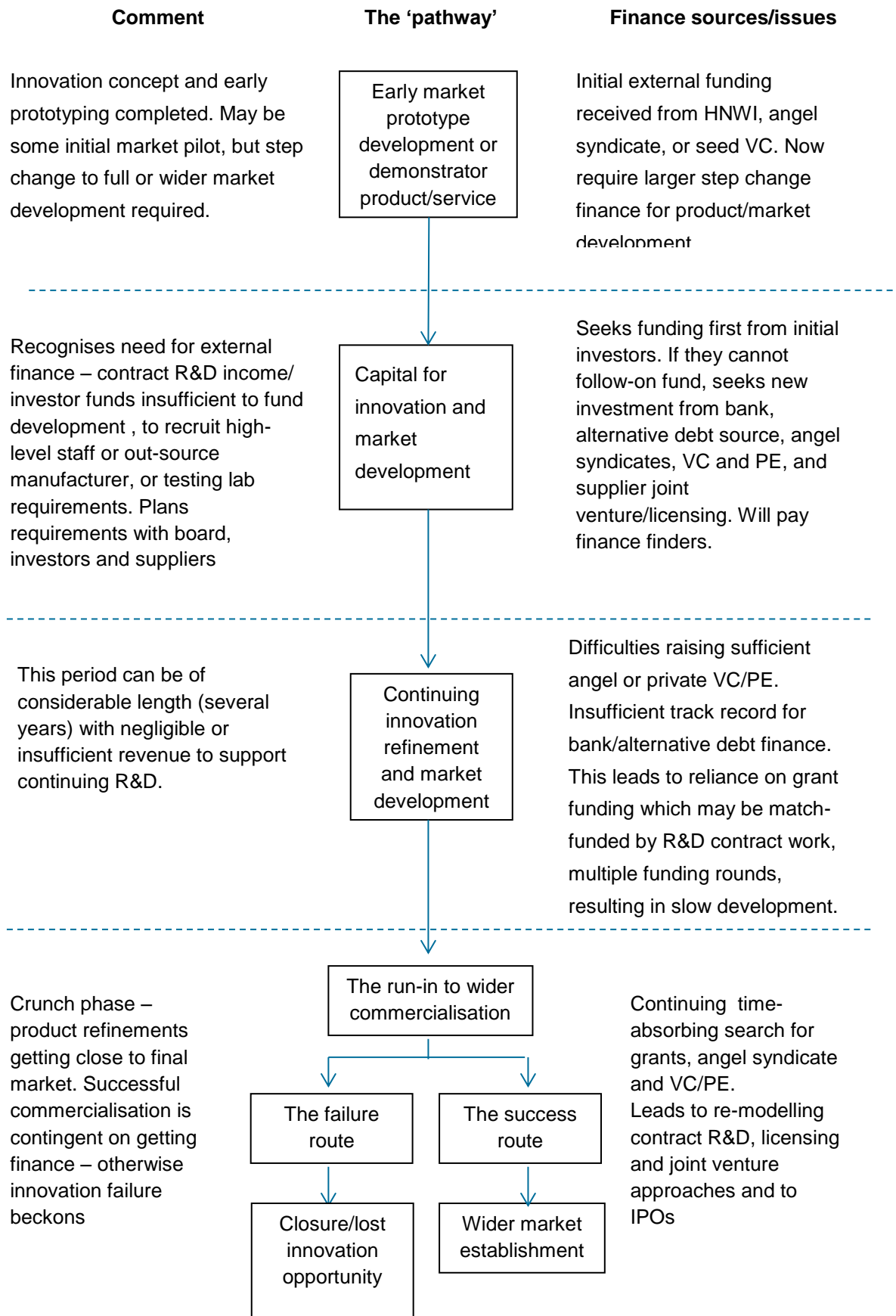
Growth stage businesses typically exhibit established management teams with far greater management and networking experience and usually contain a specialist finance director (CFO). Their existing equity investors, particularly hands on business angels and VCs typically require regular financial reporting and these businesses therefore exhibit a far more formalised approach to assessing their external financing requirements and raising funds. Once external financing requirements are established, over and above re-investment of revenue, they will consult their investors who may be able to provide follow-on funding. However, the substantial size of step-change investment required is often far more than existing investors, particularly HNWIs, seed VC and business angel syndicates can offer. This leads to the selection of additional external finance, which might come from debt or equity sources, or from a supplier in the form of a joint venture. Key factors here are the degree of market traction that the growth stage business has and the network that the managers and their investors have in enabling further investment. This meant that more developed businesses in the market tended to be more successful and those with limited existing investor resources and less developed management teams could struggle.

In practice it was found that early growth stage businesses could require substantial funding of £1m or more. This combined with their uneven trading records over several years meant that they could still struggle to raise bank loan finance, even with the application of the EFG. Also due to their sizeable funding requirements and relatively early stage of development private VC could still be difficult to obtain. This led to the adoption of paid finance finder services and prolonged searches for VC and PE which could take several years and were not always ultimately successful. The businesses that suffered prolonged funding searches were typically longer horizon innovators requiring large-scale patient capital investment (e.g. a cleantech requiring £2.2m to build a demonstration biomass plant).

The problems of raising substantial funding amongst longer horizon innovators led to the adoption of slower growth models involving grant funding matched by contract R&D income and licensing out and joint venture arrangements that shared the cost of innovation with suppliers and clients, but could lead to lower investment returns than originally anticipated and a potential seepage of innovation IP and returns overseas. A problem

related to grant funding reliance has been that there is no guarantee of follow-on grant funding, which can lead to innovation slowing down or being shelved.

Figure 5.3 Growth stage: early market development and market establishment



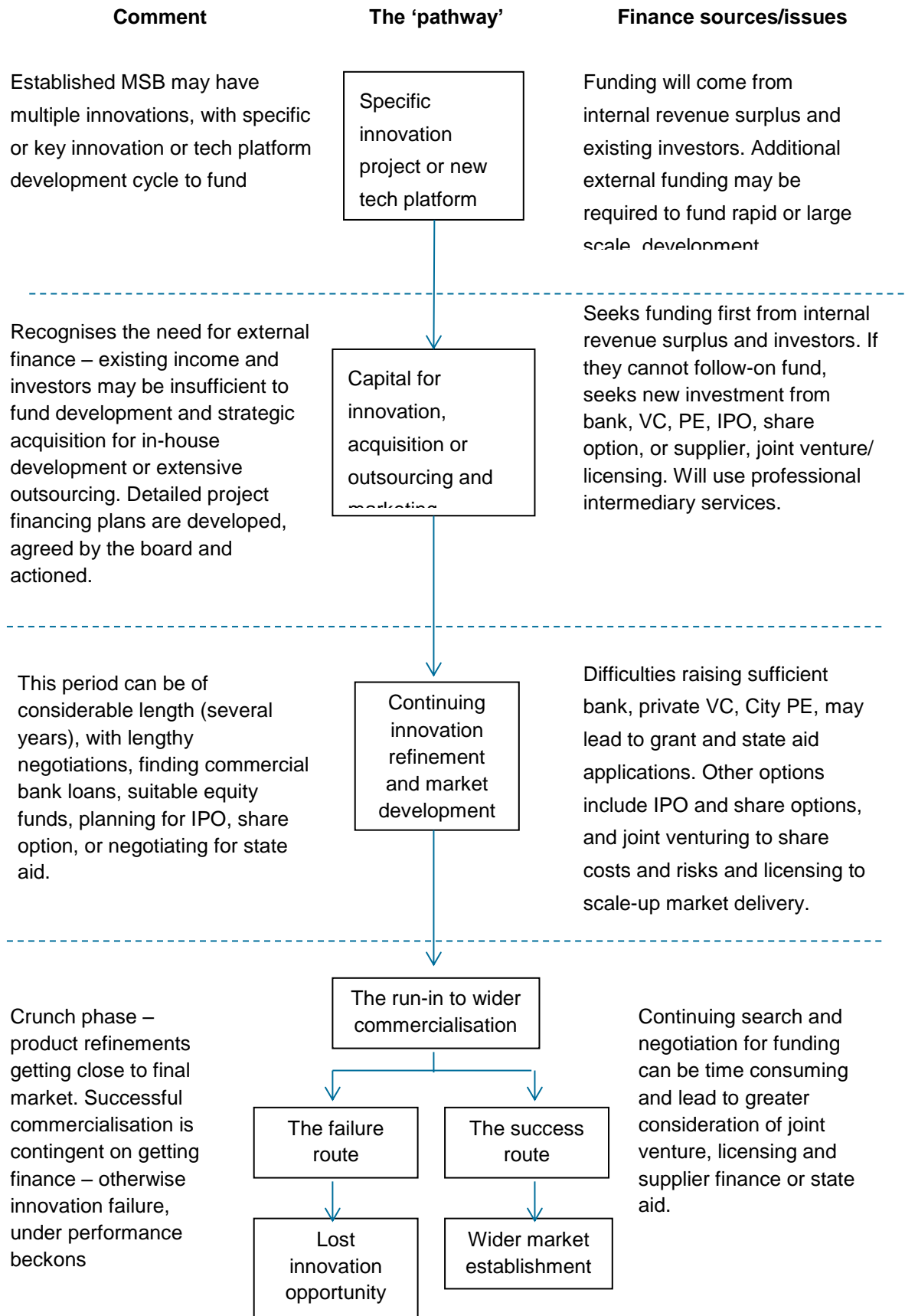
Mature stage MSBs (sample population-reported external finance range: £250k to £340m)

The mature stage MSBs (see Figure 5.4 following) surveyed are characterised by their larger management teams, which often include a CFO with a finance team and in some cases internal teams of grant fund raisers. These mature businesses have highly formalised financial management structures and those that are PLCs or listed companies will have regulatory requirements to provide regular corporate and financial reports and answer to their investors. They are also likely to have multiple innovations or variants of products and services based on their technology platform cycles. Focusing here on a specific main innovation, the pathway demonstrates that detailed plans assessing the full cost and duration of the innovation will be put in place and assessed by their boards. These fully costed innovation projects can range upwards of £100m for longer horizon innovations or large-scale market roll-outs (e.g. developing carbon fibre aircraft components, or rolling-out delivery of energy saving devices for UK streetlights).

At the mature stage, the majority of MSBs are able to select from a wide range of commercial and equity finance and obtain the full amounts that they require, usually on acceptable terms. It is notable that commercial bank finance could still be problematic for amounts that were above £10m [above the upper ceiling of the Business Growth Fund (BGF)]. However, in the vast majority of cases, the preferred source of finance was equity and the consensus was that the UK finance markets are working well for these businesses. Private equity from the City and IPO and share options all provided substantial innovation funding. There was also clear evidence that these businesses are willing to pay for highly specialist expensive intermediary services such as VC/PE finders and public market brokers.

Large scale project funding at this scale can be very complex and time consuming, but is typically ultimately rewarding. It could take several years to find equity and bank finance, or to negotiate for state aid (grants and loans), but ultimately the full funding was secured and the projects went ahead as anticipated. Whilst these larger businesses were far more likely to undertake work in-house and to invest internally in capital equipment and strategic business acquisitions, they were also willing to joint venture and licence out activities if it enabled faster and more cost effective product/service development and faster up-scaled market development.

Figure 5.4 Mature stage: MSB specific innovation finance



5.3 The importance of an effective innovation/finance solution

Some typical innovation/finance pathways were set out in the previous section and it was observed that these could lead to success or failure in the attempt to make a commercial success of innovation. That these pathways were important, sometimes critical, to firms' survival and prosperity is emphasised in this section which describes some of the *impacts* of greater or lesser ability to access finance as seen in the firms which were interviewed. Essentially, at all stages of business maturity, the speed and scale of impact is considerably increased in those examples where full funding has been received within a reasonable timescale.

Examples of impact: early stage firms

At the **early stage**, many businesses were pre-revenue and the best gauge of their advancement relates to the speed of progress of the R&D taking place and an ability to recruit key additional staff to undertake technical work in-house, or to subcontract work out to specialist service providers (e.g. manufacturers to build prototypes and specialist laboratories to run trials and tests).

The first tabled example was a pre-revenue digital technology business (developing interactive project displays) with two founders that received Innovate UK grant funding, matched with seed VC. This funded a £120,000 project, enabling the founders to move from part-time to full-time R&D, speeding up the innovation process and allowing more rapid market entry. Their first sales have been achieved, just six months after funding.

Other examples of fully-funded early stage business projects include an aerospace spin-out from a larger organisation (designing lightweight spacecraft components) that received an Innovate UK grant and VC funding amounting to £600,000 for later stage R&D and key staff salaries. This has generating eight jobs, initial revenue (£25,000) and excellent prospects for accelerated growth in the next three years, leading to a potential trade sale.

There were also examples of businesses that had been part-funded, leading to scaled-down and slowed-down projects, whilst a suitable balance between further fund-raising and R&D took place. One such example is a digitech (developing smartphone/tablet software to enable personal gaming design) that had received Scottish Enterprise grants of £100,000 and additional HNWI investment. This was for initial R&D and staff salaries, which can lead to early market application and support application for a substantial £4m VC investment for market roll-out, when the market is proven. Overall, the founder CEO is happy with progress:

“We lodged our first accounts with little to show yet, just £150,000 in sales and five jobs created. However, we’re on the verge of announcing our first international brand partnership and about to go to games developer conferences in San Francisco and Texas, which are both supported by UK Trade and Investment (UKTI).”

There were also other cases of businesses that had received Innovate UK grants, but had not yet been able to achieve matching funding and were therefore being slowed down:

“Business growth has stopped. We almost had to stop innovating and just do standard bits of consultancy - little bits of engineering projects. We’ve pretty well exhausted any funds we can put into innovation. We are sat on a big grant offer from Innovate UK which we can’t pursue. A big danger is that other companies will leapfrog ours and we may just never get to do it. The grant offer will expire one day.” (Pre-revenue engineering R&D business).

For others such as a slow-growth life science business (specialising in new genetic treatments) that had adopted a licensing model, there was a recognition that the substantial investments required from grants and VC (probably in excess of £2m) were unlikely to be achieved, based on previous experience running a similar business, and that it was better to look for collaborative financing solutions. Their licensing approach was beginning to bring in a small amount of revenue (£31,000) with good prospects for growth in the next year.

Examples of impact: growth stage firms

For **growth stage** businesses the potential step-change in the business could be considerable. One example is an established life science business (developing innovative antibody medicines) that was in year six of its innovation cycle at late stage clinical trials for which it had received £10m in VC investment (building on £30m from earlier rounds) from a number of European private and corporate/pharma funds. The success of this stage of funding had led to over £50m in advanced orders and 15 new jobs so far. Another example of a fully-funded growth stage innovator is a digitech (search engine technology) business that has received £180,000 in Innovate UK grant and matching business angel investment (out of a project cost of £300,000) resulting in the recruitment of 13 new staff to assist with R&D software refinement and export market growth into the US and Far East markets, which has so far doubled annual sales turnover to £1m.

There are, however, examples of growth stage businesses that have struggled to obtain the significant funding that they have required for a step-change. A cleantech business seeking to raise £2.2m in debt or equity funding to build a demonstrator biomass energy plant had failed to receive any investment over a three year period, resulting in a complete standstill in business development in that period. This had led to a change to a licensing approach, requiring the customer to raise the capital investment (typically through asset financing) to build their own plants, which the cleantech business would service. This change in the business model has resulted in £1.5m in orders over the last year, with several more orders forecast in the next year.

Examples of impact: mature stage firms

Mature stage businesses were successful in obtaining all of the funding that they required, although the complexity and size of funding required could lead to lengthy delays. In the worst case example, an engineering (advanced lightweight plastics) manufacturer experienced a three-year delay, when UK banks and VCs were initially unable to fund the £12m MBO which would provide a UK manufacturing base. The business has subsequently doubled sale turnover to £130m and created an additional 135 full-time jobs in the UK. This project would not have gone ahead without the catalytic funding received from UK government assisted VC, supported by private VC and a Czech bank.

Amongst the larger MSBs, substantial external funding could generate and safeguard considerable numbers of jobs. The Aerospace business (designing and manufacturing carbon fibre aircraft components) received £120m in UK government state aid grants and loans out of a total project cost of £540m to fund a five year late phase R&D-to-market project. This potentially safeguarded 5,000 jobs, but has also subsequently generated more than 500 new jobs and provided the company with a long-term future, with rising sales orders and recruitment requirements.

5.4 Some cross-cutting themes

Finally in this chapter, research amongst the 50 interviewed firms revealed some perspectives on firms' relationships with financial markets which comprise generalised views on the actual and potential efficiencies of those markets. These are described below. In each case, as throughout this report, variation according to main stages of business development is observed.

5.4.1 External finance available to firms

Overall, the views expressed by the surveyed innovative businesses demonstrate that the UK finance market operates far more effectively for larger, later stage businesses and that there are particular problems for early stage and early growth stage R&D and capital intensive businesses.

Early stage innovative businesses had mixed views of the performance of the UK finance market. The majority were "*dissatisfied*" suggesting that the debt and equity commercial markets were not meeting the needs of businesses, particularly in the case of bank and alternative crowd source debt finance, but also in relation to the still under developed UK equity finance market for early stage businesses. The availability of equity finance was referred to by some less experienced founder/managers as a matter of networking and who you know, whilst for those requiring patient capital investment over 10-15 year horizons the current UK equity market is perceived as an area for improvement.

"Private sector funding is highly networked, difficult to break into without paying for services and spending a lot on networking." Life science CEO.

The main **strengths** in the UK early stage finance market relate to a good supply of grant funding for early stage proof of concept and prototyping (e.g. from Innovate UK and Scottish Enterprise) and the encouragement of tax incentives, with several respondents mentioning SEIS and EIS and a few mentioning R&D tax credits. Innovate UK was described as “transformative” in assisting early stage innovation, whilst Scottish Enterprise grants and competitions for innovation (e.g. SMART, Scottish Edge and Entrepreneurial Spark) were viewed as leading the way. The roles of sector specialist organisations like the Biomedical Catalyst and the Aerospace Institute, along with the Mayor of London’s Med City were highly praised for bringing funders together and University Knowledge Transfer Partnerships (KTPs) had led to a number of successful R&D collaborations.

The main **weaknesses** presented were that the UK grant funding regime was perceived as bureaucratic and there were some concerns (amongst the businesses interviewed) that it is favouring more established later stage grants. It was suggested that the UK grant regime could be more selective at the early stages of investment and provide adequate follow-on funding to enable the best innovations to reach the market:

“Government ... funds too many start-ups/innovations but should select prospects better and then ensure that money is available to get them to market ... in many instances initial development money is wasted because good developments fall into a gap between development of prototypes and full production.” Meditech CEO.

Whilst a few more experienced managers and those in digitech businesses suggested that the supply of angel and seed VC had improved, others who were less experienced or in more intensive longer horizon intensive R&D sectors such as life science and engineering were critical of undersupply of funding. There was also criticism of the lack of clarity in public sector support, both in terms of the provision of Business Link³⁸ and LEP-type advice and information about government equity schemes.

For **growth stage** businesses, key factors appear to be the maturity of their development and the sectoral R&D intensity. Early growth stage businesses that lack sufficient market traction to attract private VC or enable bank lending with EFG complain that the UK still exhibits a huge finance gap and is far behind the far longer established and larger US equity market. This position is particularly exacerbated for long horizon R&D intensive sectors like life science, engineering and cleantech where several early stage CEOs commented that there is a lack of patient finance in the UK and that this has worsened since the GFC.

“VCs in the UK tend to want to invest in low risk businesses so there’s more money available for what I call working capital. So when you’ve got a product that’s ready for

³⁸ Business Link was referred to on several occasions, although it is acknowledged that the regional services have been closed down in 2011 and superseded by Local Enterprise Partnerships (LEPs)

market and it's a question of getting it out there and so on, there's money available for marketing, for increased capacity to increase production capacity, for working capital, that works, I think, reasonably well, but not for the development, the higher risk capital. I went to Boston on a Health Mission a few years ago, we went to an incubator building ... in Boston. There were 200 businesses in that particular building and they had attracted \$4 billion dollars' worth of investment the year before, which was more than the whole of the UK had had in all of the start-up and all of the innovative businesses that year.” (Life science CEO).

On the other hand, for more rapid development digitech sectors, the current growth stage equity market appears to be better than ever and the current EIS tax regime appears to be assisting this:

“I think in the UK it's worked reasonably well. There is ... a handful of professional VCs who have enough capital to start a business and follow. So, typically, maybe start with half a million, but follow through to £5 million or more. I think we have had over £10 million invested now.” (Director of a digitech).

The **strengths** of the UK finance market for growth stage firms relate more to the abundance of current VC finance for digitechs, spurred by short horizon EIS supported investments. There was also praise for R&D tax credits and public grant funds, including regional grants from Scottish Enterprise and Local Enterprise Partnerships³⁹, with Innovate UK seen as “*exceptionally clear and responsive*”, and encouraging useful collaboration:

“As a result of our success through Innovate UK we've been asked to collaborate on a number of other people's Innovate UK projects. Firstly, it opened up a network of people that we weren't already engaged with. Secondly, it's given us the confidence that we know how to approach those projects and how to approach the process.” (CEO of an engineering business).

There was also mention of the UK Patent Box as motivating innovative businesses to stay in the UK⁴⁰.

However, for those businesses seeking substantial step change growth finance there were **weaknesses**. They cited personal experience of difficulties in obtaining debt finance, including EFG loans and private sector VC. This particularly affected longer horizon, intensive R&D sectors such as life science and engineering, where a combination of insufficient trading records and demand for substantial risk finance, often at well above £2m was unmet. These CEOs complained that private VCs were too conservative, seeking later stage investments with more evidence of market traction, whilst the BGF was

³⁹ LEPs can offer grants through the Regional Growth Fund (RGF)

⁴⁰ UK Patent Box offers a lower 10% corporation tax on UK and European patents

unsuitable and that “...grant funding lacks coherent follow-on funding rounds.” It was also recognised that successful grant application requires particular writing skills, which some less experienced businesses with excellent fundable projects might not possess. Those managers with less experience also complained about the “*lack of visibility of government equity schemes and their conservative investments.*” Overall, there appears to be a lack of linkage between grant funding and matching funding from debt or equity sources.

For **mature stage** businesses, raising funds has not been particularly problematic and there is widespread support for the state of the current UK finance markets for these businesses. The range and supply of bank and equity finance appears to be good and there is also praise for the grant funding regime where Innovate UK (including specific mention of their Biomedical Catalyst) funds, along with EU schemes such as FP7/Horizon and Eurostars, have all proved useful. Key **strengths** are seen as the improving understanding of sectors through the operations of the Biomedical Catalyst and Aerospace Technology Institute, excellent grant funding regimes operated by Innovate UK and EU, very buoyant private and public equity markets and improving willingness of commercial banks to lend (post-GFC). There was also mention of the greater assistance from UK Ambassadors to support overseas contracts. **Weaknesses** involved: government bureaucracy in slowing down grants and state aid loans, “*which could lead to projects lost to overseas competitors*”; a perception that there is still insufficient private VC at the later stage in the UK at the £20m plus scale; a complaint that raising funds from a share issue on the LSE is very expensive for a relatively small cap listing; and that the excellent Export Credit Agency (ECA) operation could be streamlined to have more standardisation between countries.

The perceived strengths and weaknesses in current UK financial markets for innovative UK firms are **summarised** in Table 5.1:

Table: 5.1 Current overview of the UK innovation finance market, by stage

Perceived Strengths	Perceived Weaknesses
Early stage:	
R&D tax credits, SEIS and EIS	Grants too bureaucratic
Grants e.g. Innovate UK	Poor support and clarity on government funds
University collaborations, Knowledge Transfer Partnerships (KTPs)	Poor patient capital supply e.g. engineering
Increasing angel and VC funding	
Sector support e.g. Biomedical Catalyst, Aerospace Technology Institute	
Growth stage:	

Perceived Strengths	Perceived Weaknesses
R&D Tax credits, EIS Grants: Innovate UK exceptional Digitech VCs UK Patent Box	Lack of continuity of grants Lack of patient capital e.g. VC, banks (EFG) or Business Growth Fund (BGF) Small number of specialist VCs in Europe
Mature Stage:	
R&D tax credits Grants e.g. Innovate UK and EU Public and private equity markets Banks more willing to lend Sector support e.g. Biomedical Catalyst, Aerospace Technology Institute	Grants and state aid laborious and slow Still more need for large VC (£20m+) High cost of public share issues Streamline Export Credit Agencies (ECAs)

5.4.2 Transparency of access to external financing options

The general consensus from the surveyed businesses of all sizes and stages is that there is plenty of information and advice on funding available to the UK's innovative businesses, and that this has improved in recent years, particularly with the growth of incubators and accelerators, linkages between Innovate UK and Local Enterprise Partnership organisations (e.g. through workshop events), and access to internet information. However, for smaller, earlier stage businesses and those with less experience of accessing external business finance there are problems in finding the right kind of advice and information and assessing its value. This view was succinctly encapsulated by an early stage engineering CEO:

“The issue with small businesses is they’ve got lots of things to do, so, while there is a lot of information out there, they won’t have the capacity to actually evaluate the best thing for a particular scenario. It does take effort and time to get external funding.”

A crucial absorptive capacity issue particularly facing new and early stage businesses is finding the right organisation and type of advice. This was indicated by an early growth stage digitech manager:

“If you know who to ask, it's clear. Dealt with Access to Finance in Manchester, but without somebody introducing me to them, I wouldn't have known that they existed. I've come across a lot of small business owners that say they've no idea where to get finance, but as soon as they're introduced to Access to Finance, it all becomes clear. It's just that step of joining people up or making them aware that those kinds of organisations exist.”

Whilst the availability of grant funding was generally considered to be good, some respondents mentioned that grants can appear “*complex and time consuming*”, particularly in the case of EU grants, whilst “*Innovate UK grants are very competitive*” but “*Catalyst funding is highly bureaucratic.*”

Further, earlier stage businesses were particularly concerned with the continuing lack of availability of risk finance for innovative businesses, particularly for non-digital and longer horizon advanced engineering and life science sector activities. Several respondents referred to a major funding gap between initial grant and seed funding for proof of concept work up to £5m or more for progression to, and establishment in, the market. This financing gap is believed to be caused by risk aversion and lack of incentive to invest in more complex, longer horizon innovations and the disorganised and complex supply of risk funding, which is highlighted by difficulties in forming business angel syndicates. There were also complaints from less experienced managers in accessing equity finance amongst the early stage and early growth stage businesses that accessing private VC and business angel network finance is difficult, as it is “*networked and potentially time-consuming and expensive to penetrate*”, whilst “*public VC is not publicised and often goes unnoticed*” and “*does not have sufficient base and visibility in the North of England.*”

For the larger mature stage businesses, access to finance had not been a particular issue. However, there was general recognition that more should be done to publicise government funding schemes and to clarify state aid restrictions that might relate to government financial assistance to larger businesses.

Overall, there is a view that early stage and growth funding is improving, but is still insufficient and overly complex. Examples were given of early stage funds being too small and the constant ongoing battle to find follow-on funding – which also deflects management time from day-to-day business development. This has resulted in under-funding of projects and a slow drip feed which undermines project development, particularly in the longer horizon intensive R&D sectors⁴¹.

5.4.3 Views on the cost of external finance

The surveyed innovative business managers were asked to calculate the overall cost of seeking external finance to their business. This involved estimating the amount of management and staff time taken up in the process, as well as the costs of advisors, legal fees and set-up and maintenance fees from the funder. Unsurprisingly, this cost varied considerably, depending upon the type of funding being sought and the degree of success achieved (with application failures leading to prolonged searches). The overriding message which came through was that seeking external finance is typically very expensive for all types and sizes of business, but generally becomes relatively less expensive for later stage mature businesses which are better organised, more experienced, and more

⁴¹ This is in-line with the findings of the North et al. (2013) financing UK technology based small firms study

efficient in practice. It is also clear that grant and debt finance are considerably less time-consuming and expensive to apply for and secure than equity funding.

For early stage and early growth stage businesses the overall cost of seeking external finance could be considerable. Some respondents, particularly equity finance seekers, referred to spending many months and even several years of unpaid management time searching for funding. One cleantech CEO referred to a three year search, which involved four sets of VC and private equity finance advisors, at a total cost of £15,000. Once equity finance was secured, the overall costs including estimated management time were considerable, often amounting to 10% of the funding received for equity finance of less than £2m. There were also opportunity costs in terms of time spent seeking finance as opposed to developing the business and including loss of contract research income.

For grant finance seekers, the application process could be time-consuming, particularly for first time applicants. Most were able to prepare applications within 5-15 working days (which could approximate to up to £5,000 in management costs), but this could span several months and some applications required accompanying films and attendance at presentations. Some inexperienced grant applicants mentioned paying professional grant application writers between 4-10% of the grant value in order to ensure that competent and timely applications were made. Bank and alternative debt finance (e.g. peer to peer lending platforms) was relatively easy to apply for but rarely successful and the set-up costs, loan maintenance fees, and interest rates were naturally set high (8% or above), and often required guarantees (25% for EFG). Applications to CDFIs were more complex and involved presenting to lending advisory panels, but could secure relatively inexpensive small term loans (with borrower guarantees).

For larger, more mature businesses, external finance could still be very expensive. An aerospace business referred to securing government state aid loans which took two years to negotiate and were set at the upper end of market interest rates. More typically, these businesses were able to secure sizeable equity funds, including IPO and public market share issues, bringing the cost down to around 5% of funding raised (e.g. a £20m IPO cost £1.4m). However, it was noted that management time taken up with reporting to shareholders can be considerable and probably raises the overall proportional costs to between 10-15% per annum, which several MSB CEO/CFOs suggested was a norm. It was also evident that these businesses were more likely to employ finance teams tasked with fundraising. For example a small team of full-time in-house grant application writers could raise upwards of £8m per year at a salary cost of well under 5% of value.

5.4.4 Use of R&D tax credits

The majority of surveyed businesses use the R&D tax credit scheme⁴² and find it very valuable. Some claim that it motivates their business to do more R&D whereas others emphasise benefits associated with improved cash flow. R&D tax credits reduce the cost of R&D because businesses are able to claim the money back. Knowledge and use appears to increase with business stage maturity (used by 12 of 22 valid early stage responses, 9/15 growth stage and 7/9 mature stage) and experienced entrepreneurs and those businesses that benefit from specialist finance knowledge, through in-house or external accountants, tend to be more frequent beneficiaries.

However, a significant minority of respondent managers are unaware of the potential benefits of R&D tax credits and mistakenly think they are difficult to qualify for, underestimate their potential benefits, or simply do not think the scheme applies to their business. Several business owners were either unaware or unsure whether their businesses are eligible for R&D tax credits. Often R&D functions will be spread across numerous aspects of the organisation, with some individuals playing more active roles than others. Sometimes it may even be difficult to identify the specific job roles within a business as qualifying R&D expenditure. Often web developers, systems engineers, product designers or even CEOs may be more involved in day-to-day R&D activity than a dedicated R&D manager.

There is widespread use of R&D tax credits across all sectors in which interviewed businesses were located. However, they are most widely used by the bio-life science sector where the majority of businesses use the scheme, as well as some cleantech and engineering businesses, suggesting that they are well-suited to assisting longer horizon R&D. They are also used by software firms since the scheme is relatively broad and includes some aspects of software development. Businesses that engage in manufacturing and R&D seem to benefit from R&D tax credits because they lower the marginal cost of projects. However, the CEO of a construction MSB noted that they only use the scheme to a small extent and is an untapped source of funds for their business and that underuse could be more widespread because the scheme is not widely promoted or known about in their industry. *“Our tax advisers did not mention R&D tax credits and they seem more relevant to pharmaceuticals even though our company does a fair amount of R&D.”*

Generally, **firms were positive about the current design of R&D tax credits**. Many firms stated that *“the process of claiming R&D tax credits is seamless and easy.”* Some

⁴² R&D Tax Relief is a corporation tax relief that can reduce company tax or even lead to a cash payment from HMRC; if a company is small or medium-sized (i.e. an SME), and it has made a tax loss, then it may be able to receive a tax credit instead, by way of a cash sum paid by HMRC. For SMEs, from 1 April 2012, the R&D tax claim enhancement (the enhanced deduction) was increased to 225% of the qualifying R&D expenditure incurred.

even chose to relocate to the UK given the conducive business environment, one aspect of which is R&D tax allowances:

"One of the main reasons for relocating the company from Europe to England is the business environment in England compared to elsewhere in continental Europe. So, the tax credits more generally, but of course the R&D tax credit for example, and the taxation levels and many different aspects are actually quite conducive to this kind of business, here in England." (CEO of a bio-life science business).

Businesses that benefit from the R&D tax credit seem to be highly innovative and their innovation activities usually have industry-wide and international significance. This is not surprising as the company can only claim R&D relief if an R&D project seeks to achieve *"an advance in overall knowledge or capability in a field of science or technology through the resolution of scientific or technological uncertainty"* – and not simply an advance in its own state of knowledge or capability. Hence, those innovative firms which have introduced innovation significant only to their business would not normally qualify for R&D tax credits.

There were, however, some more general misconceptions about R&D tax credits. In summary, these were:

- That the business has to be profitable for them to be worthwhile.
- That companies conducting research for partners as subcontractors cannot claim for R&D work.
- That the receipt of grant funding disqualifies businesses from receipt of the credits.

In addition, firms were frequently confused as to the expenditures (revenue and capital) which are eligible for R&D tax relief.

5.4.5 The role that government could play to improve finance range and access

Having given a summary overview of the UK external finance system and markets for innovative businesses, business managers were invited to suggest how the UK government might improve the range of finance available and access to it. The responses were varied, but broadly fell into the following categories: (i) oversight policy; (ii) business advice and developing collaboration; (iii) improving access to and availability of particular types of finance. **It is emphasised here that the points made here are the reported views of firms, not those of the report authors.**

(i) Oversight policy

There was a general consensus that the UK government has an important role to play in making the business innovation environment as encouraging as possible. This requires the government to have a facilitating role, providing globally-competitive tax incentives to encourage investment into innovation and particularly to encourage more investment into

early stage and early growth stage funding, with a focus on more R&D intensive longer horizon engineering and life science activities where there is a shortage of patient finance⁴³. There is also a perceived shortage of later stage VC at above the £20m level.

Interviewees noted that an essential element of government policy should be to simplify accessibility to different forms of finance. There is currently a confusion of multiple government-assisted organisations with overlapping activities which is particularly problematic for early stage, inexperienced business managers to understand. The key suggestion here is that public schemes (whether tax incentives, grants, loan schemes or VC) should be far more visible and presented in an organised structure that businesses can easily understand. It was suggested that this should be accompanied by easily accessible free training and advisory information.

(ii) *Business advice and collaboration*

It was recognised that there are lots of organisations (e.g. incubators and accelerators) now providing information and advice on access to finance for innovative businesses. Catapult centres and Sector Catalysts were particularly highlighted as bringing organisations together, whilst more generic advice (e.g. from Business Link, regional agencies and more recently from LEPs) was criticised for being “*off-the-shelf and not sufficiently specialised.*” Assistance with collaboration was highlighted with the suggestion that more could be done to provide contact lists of academic and original equipment manufacturers (OEMs) to facilitate access to potential collaborators. There was also strong support amongst early stage businesses for free advice with initial grant applications and investment readiness training. A mature aerospace MSB CFO emphasised the importance of improving collaboration, stating that: “*The Aerospace Technology Institute was working well, particularly in bringing together UK government departments, but there is far greater need for collaboration between industry and academia to unlock EU funding.*”

(iii) *Improving the range of, and access to, types of finance*

Generally, it was considered that the availability of external finance was improving for seed and particularly later growth and more mature stage funding. However, there still appears to be a “*hollow middle*” where financing gaps exist between the provision of initial proof of concept funding (typically through self-financing, public grants and initial HNWI investments) and the availability of later growth stage financing by private VCs and most VCTs at the stage when the business has achieved market traction and when bank finance might also become more available. This funding gap was thought to range from tens of thousands of pounds to upwards of £5m and to affect more capital intensive, longer horizon R&D activities in engineering and life sciences. A particularly crucial gap appears

⁴³ Addressing the Rowlands (2009) gap of up to £10m

to be for significant step change early growth funding which requires patient capital investment of between £1m to £5m or more.

Debt finance was considered largely inaccessible to early stage businesses and there was widespread support for greater accessibility. One suggestion to make commercial bank finance more accessible throughout the UK was for regional commercial banking, along the lines of the German Sparkassen banks, with greater emphasis on localised relationship banking, rather than centralised decision making in London. This could operate alongside a greater effort to address the perceived imbalance of innovation finance available in the North of England when compared to London and the South (where the majority of UK VC and PE providers are based). There were also calls for more to be done to encourage SME bank lending, the provision of innovation loans and greater assistance with meeting loan guarantee requirements. One mature construction MSB CFO mentioned that the Export Credit Agency operation is particularly helpful to their large-scale overseas capital funding projects, enabling projects to take place in risky developing nations. They did suggest, however, that the ECA might benefit from some standardisation and simplification.

Grant funding has been highly praised, but was also viewed as complex and time-consuming to apply to for first-time applicants. There were perceptions by some that funds take too long to receive, can be overly bureaucratic, fragmented and sub-scale. It was suggested that for applications there could be a national record database, which could be password protected for individual businesses to download their details and update over time. This would prevent a lot of repetitive form-filling for grant applications. A further suggestion was that there should be greater focus and co-ordination in delivering suitable follow-on grant funding in a more timely fashion to applicants who had met their first round milestone criteria. There was also an observation that grants require a higher standard of technical assessment. Raising awareness of suitable grant funding across a range of UK and EU funds was raised and even some larger MSBs suggested that grant funding could be promoted through a one-stop on-line platform.

Equity funding is widely perceived by the early stage businesses as time-consuming to find and expensive to obtain. There is acceptance that this type of funding is often most suited to early stage innovation risk finance, but businesses perceive that there is still insufficient funding of this type available in the UK, particularly for more patient capital sectors such as engineering and life sciences. It was strongly suggested that more could be done to encourage early stage equity investment through enhanced size of SEIS and EIS and longer investment incentives suited to more capital-intensive sectors (biased towards higher tax relief for longer term sustainable businesses). One CEO mentioned that the low level of the SEIS cap for businesses acts as a disincentive to further investors who are unable to take up this option (if the company's quota is full). For inexperienced equity finance seekers equity finance is difficult to find and they requested better organised business angel networks in the UK, more visible, better promoted public VC, better provision of funds in the North of England and outside of London and the South and East,

with the size and scale to meet growth finance requirements⁴⁴, better public VC technical knowledge and willingness to invest in early stage businesses (and not follow the same risk averse strategy of other private VCs), and a “*Which type assessment of VCs*” which could help guide them to suitable funders.

Overall, there was support for more government effort to lever out funding from the City, corporate and Pharma investors at earlier stages, with a suggestion that the Biomedical Catalyst was taking steps in the right direction. The UK BioIndustry Association (BIA) was also mentioned as very helpful and their promotion of a Citizens Innovation Fund along the lines of the current French scheme was recommended⁴⁵. One CEO also suggested examining how to release a small percentage of public pension funds into UK early stage innovation investment. Furthermore, a range of measures could be taken to align VC activity better to early stage, longer horizon sectors, such as increasing the length of the VC LP legal term requirement of 10 years, providing tax incentives for VCs, improving the targeting of public VC for early stage businesses (and “*avoiding potential duplication of private VC activity, by acting as private VCs*”) and improving the IPO exit market conditions further (which would provide greater incentive for VCs).

5.5 Overview of the UK finance market

Key points made in respect of firms’ views of UK finance markets chapter are summarised in the following panel:

Key findings: Summary overview of the UK finance market

- The UK finance market operates far more effectively for larger, later stage businesses. There are particular problems for early stage and early growth stage R&D and capital intensive businesses.
- Based on businesses difficulties in obtaining finance, there is a significant gap in funding for businesses seeking patient capital investment (e.g. in bio/life science and engineering) after proof of concept through to achieving sustainable market traction; a funding gap ranging upwards of £5m.
- Plenty of information and advice on funding is available to innovative UK businesses. This has improved recently with the growth of incubators, accelerators, and linkages between Innovate UK, Local Enterprise Partnerships, and internet

⁴⁴ This might require, for example, larger scale ‘HS3’ area type multi-regional funds with sufficient scale and outreach to assist the wider Northern region. This might come from new super-sized ECFs or follow-on funds to UKIIF and could attract more private equity into the wider region over time.

⁴⁵ See UK BIA (2012) Citizens’ Innovation Funds: engaging the public with innovation <https://www.biocity.co.uk/file-manager/Group/reports2012/2012-09-14-citizens-innovation-funds-bia.pdf>

Key findings: Summary overview of the UK finance market

information. For smaller, earlier stage businesses and those less experienced in accessing external business finance there are problems in finding the right kind of advice and information and assessing its value.

- Seeking external finance is expensive for all types and sizes of business, but is relatively less expensive for later stage mature businesses which are better organised, more experienced, and more efficient in practice. Grant and debt finance are considerably less time-consuming and expensive to apply for and secure than equity funding, but equity finance is necessary to many innovative businesses, particularly early stage businesses.
- R&D tax credits are widely supported and used by innovative businesses, particularly more mature businesses. They are viewed as an effective way of delivering innovation funding, particularly for longer horizon R&D. The scheme could be better promoted and confusion over eligibility, particularly amongst less experienced business managers and those not receiving expert tax accountant assistance, leads to under-use. The separation of R&D capital allowances may also lead to under claiming and less investment into capital asset investment for innovation.
- Interviewed firms suggested that there is a crucial role for the UK government in facilitating a globally-leading environment for innovation. In their view, this requires: (i) better co-ordinated policy for finance; (ii) enhanced tax incentives to leverage more early stage longer horizon investments; (iii) greater promotion and visibility of public funding schemes; (iv) more effective free support to early stage innovators; (iv) a more joined-up grant funding regime providing timely follow-on funding into later stages of innovation, with greater linkage to matching debt and equity finance sources; (iv) greater leverage of EU funding opportunities; (v) greater assistance with collaborative R&D; (vi) improved organisation of business angel networks; (vii) more substantive and visible provision of VC outside of London, the South and East; (viii) better debt funding provision for SMEs.

6. Policy issues

6.1 Introduction

A literature review and in depth interviews with 50 innovative firms are not, in and of themselves, a sufficient basis for making recommendations on national policy. However, reflection on findings of the study allows a discussion of the key funding issues observed in the research which may contribute to and enhance the evidence around which these decisions are made.

The study has confirmed that innovative businesses are different from their non-innovative counterparts, typically requiring more and larger amounts of external finance. It has also demonstrated that innovation funding is often complex and typically most problematic at earlier stages of innovative business development. The journeys (or pathways) to external finance are influenced by multiple factors which may vary with each individual case and over time as businesses become more experienced at accessing types of finance and more attractive to financiers as they prove their market value. Amongst the multiple factors influencing the success or not of innovative firms' journeys to accessing external finance, the following key interrelated factors stand out:

6.2 Current availability of finance for UK innovation is leading to changes in business models

The current UK financing system appears to favour knowledge-based activities during early and early growth stages of business development. Equity finance has become more available to earlier stage financing, but with a preference for shorter horizon knowledge-based investment which requires smaller levels of investment for businesses to reach maturity and therefore offers faster returns. In contrast, potential patient bank debt finance requires maturity of trading track record and asset-based collateral to support loans, making it unsuited to most early stage and early growth stage businesses.

The survey found a number of businesses across a range of sectors that were content to remain small and R&D-focused, supported by grants and small-scale equity finance, seeking moderate growth through licensing activities or an early trade sale rather than more rapid growth and acquisition activities through capital investment that would bring production in-house. Whilst some managers were satisfied with an early trade sale approach, indicating that their market specialism was in early stage innovative R&D, others were frustrated that they had been unable to secure sufficient capital investment in the UK to provide step change growth finance that would enable their business to acquire in-house production capabilities and scale-up the business.

This failure to secure mainly early growth stage patient capital finance, ranging from £1m to upwards of £10m, had held back business development and in several cases led to a switch to remaining as knowledge-based service providers, mainly through licensing and joint venture activities. This resulted in capital investment being made by other, often larger businesses with greater capital asset value⁴⁶, and seepage of IP and project value generation in some cases to overseas companies (e.g. European manufacturers and pharmaceutical companies).

The need is essentially for substantial patient capital investment through debt, mezzanine or equity finance to enable viable UK innovative businesses to scale-up through the acquisitions, key equipment purchases, and plant developments that will facilitate their growth. A particular problem exists for those early growth stage businesses that do not have sufficient market trading record or collateral to attract debt or equity finance, notably because early stage seed equity providers are unable to provide the substantial step change investment required.

6.3 Grant funding is used and praised, but there is a perception by some that further funding could be made available

Grant funding is used by businesses at all stages of development, but particularly by early stage businesses and notably through Innovate UK. This funding, alongside Scottish Enterprise (e.g. SMART awards) and European (Horizon2020) funding was highly praised, particularly in playing a catalytic role in developing innovation from proof of concept. Furthermore, integration of Innovate UK's activities with sector specialists through initiatives such as the Innovate UK Biomedical Catalyst were considered highly effective in channelling funding resources into appropriately directed funding rounds. However, there were some complaints amongst early stage first time applicants that the grant system is "*bureaucratic with a lot of form filling*" and could benefit from simplification (see section 3.8 relating to perception of application processes and 5.4.5 on suggested improvements for funding processes).

Furthermore, Innovate UK's model of match funding (typically requiring 40% matching) had proved problematic for a number of successful applicants that had subsequently failed to obtain matching funding for early stage projects (see section 3.8). The inability to attract funding from other sources has caused considerable delays in undertaking funding searches and had been particularly problematic for more intensive longer horizon R&D (e.g. advanced engineering and cleantech sectors). In this respect, it was found that R&D contract businesses were better placed to benefit from grants as they could self-fund the matching requirement (see Case F).

⁴⁶ Supporting Fraser et al (2013) finding that post GFC capital investment favours large asset rich companies

It is acknowledged that Innovate UK offer both face-to-face and online showcasing platforms - the 'GrowthShowcase' - to help make these connections and to assist businesses in securing match funding. However, the survey evidence provided suggests that, for some businesses, match funding remains problematic.

A further problem was highlighted (by Case F and in sections 3.8, 5.4.1 and 5.4.5) as the failure of businesses to secure follow-on funding for projects, where an initial grants stage of work has been successfully completed, meeting all milestone requirements, but which then required further stage funding. It was reported that the need to attract additional funding could result in project delays whilst financial providers are sought. This could result in projects being halted or even closed down, and for those continuing the risk of loss of market primacy.

The basic suggestion here is for a coherent and integrated whole of innovation life approach which recognises that businesses should not become dependent on public funding to bring innovation to market. There is a danger that insufficient early stage funding from any financial provider is simply "*funding for failure*" unless it is seen as part of a more expansive staged funding programme which both encourages and links with matching funding (debt, equity or alternative sources) and offers opportunities for timely follow-on funding for successful stage projects.

6.4. Connectivity and collaboration are important for UK innovation finance

This research has demonstrated that connectivity between innovative R&D businesses, academic research institutions and buyers and suppliers is often a key part of innovation finance. The most successful examples of collaborative finance tend to be exhibited by growth and more mature, later stage businesses that have developed trusted relationships with academic institutions and business clusters (notably supplier manufacturers and testing laboratory services), leading to joint venture and licensing arrangements which share the costs and risks of innovation financing. At earlier stages of development, connectivity is more difficult for first time entrepreneurs, but can be overcome by specialist sector support through incubators and accelerators, where there are opportunities to learn from other similar types of businesses and there is assistance with establishing links to academics and potential supplier services and buyers. Some of the more successful early stage collaborations also occurred through spin-out linkages with academic research institutions and larger businesses, which notably led to successful grant applications.

A key challenge is to facilitate further collaborative activity. This study would suggest that a critical focus may be at the early stage and also early growth stages of development for businesses with first time entrepreneurs and those with limited experience of academic and business partnerships. The study revealed that many of these businesses struggled to find sufficient funding but then, often over considerable periods of time, discovered that

collaborative approaches through joint ventures and licensing provided a successful financing model for their progression. The indications are that support may be best provided by sector and stage experts, initially through early stage incubators or accelerators with linkages to science parks, university research institutions and mentoring services. Knowledge transfer partnerships and grant funding collaborations with universities have an important role to play in early stage innovation, whilst at the early growth stage there is a particular need for buyer and supplier linkages.

6.5 Finance gaps remain for early and growth stage innovative businesses

The survey evidence suggests that there is a considerable amount of finance available for initial early stage seed development through grants, HNWI, business angels, seed VCs and accelerators. Furthermore, the UK finance markets are currently working particularly well for established, more mature stage businesses, notably due to recent improvements in the availability of private VC and equity, alongside more liquid UK public markets, supporting successful IPOs and new share options.

However, there is still evidence of a persistent *hollow middle*, where viable innovative businesses are struggling to find sufficient funding to progress from initial proof of concept R&D, through initial piloting of products and services and growth stage market development to a position of stable market establishment. At the early stage the problem is particularly evident where more substantive development funds are required (ranging from £200,000 to £2m) which cannot be met sufficiently by grants without matching funding, or by business angel networks, or through debt finance. It appears that bank debt finance alongside alternative crowd source debt finance (e.g. peer to peer lending platforms) is typically not sought by businesses that have not achieved consistent market traction, with at least two years of trading record, whilst private VCs are also unwilling to invest at this early stage.

This problem also extends into the early growth stage, where businesses seeking between £1m to upwards of £10m found difficulties. It stemmed from their requirement for substantial step change funding, which was usually beyond the follow-on financing capabilities of their existing HNWI, angel and seed VC investors and their lack of suitability for bank debt finance. Here the EFG was unsuitable in most cases because the businesses did not have sufficient trading track record or collateral, whilst the BGF was out of reach also because the businesses did not have annual sales turnover of at least £5m. It is only when innovative businesses reach 3-4 years of trading and establish demonstrable market traction that they appear to become attractive investment propositions to private VCs.

These two finance gaps may vary over time, but persistently occur in the UK economy (see for example: SQW, 2009; Rowlands, 2009; Deakins and Freel, 2012; GLA, 2013;

North et al., 2013; British Business Bank, 2015b) and have been exacerbated by banks and private VCs withdrawal from early stage and early growth stage financing since the GFC (in the case of private VCs, Mason and Pierrakis (2013) suggest that this trend extends back throughout the last 10-15 years).

This suggests that a more coherent and cohesive finance escalator for the UK's innovative businesses, which minimises sub-scale funding, may be necessary. For the early growth stage the issue relates to the scaling up of business size through larger scale finance and investments. Whilst mature stage businesses are currently positive about their supply of finance, it should still be noted that their pathway to finance could still be complex and challenging. A major reason for this was the scale of finance required.

Lastly, it is also clear that entrepreneurs felt a need to be better informed about their financing options. A common complaint was that government VC schemes could be better advertised, as they tend to promote to financial intermediaries rather than to the businesses themselves. There is a corresponding requirement for financial intermediaries (e.g. accountants and lawyers) to be better informed and up to date on government schemes. Furthermore, the surveyed businesses only had limited knowledge about crowd source funding and the relative suitability of crowd equity (typically seed funding of up to £100k, so too small), peer to peer lending (typically only available to businesses with a trading track record, so unsuitable) or alternative crowd donation (typically where there is a common social or commercial interest, so potentially more suited to established businesses and social enterprise start-ups).

6.6 R&D and capital investment intensity, allied to business size and trading maturity, are key determinants of funding success

This research examined the nature of different forms of innovation and found that few of the surveyed innovative businesses were purely undertaking process innovations, because the key driver of innovation was knowledge-based activity. Indeed, relatively few of the surveyed businesses in early stage innovation undertook capital investment into process activities, with many preferring to outsource these activities (e.g. pilot manufacture and laboratory testing). Therefore, the trend was for more established growth and mature stage businesses to undertake more capital intensive activities in-house, when they had sufficient assets to support applications for the larger scale investments required.

Allied to capital investment requirements is the intensity of R&D, with shorter horizon investments into knowledge based software developments (digitechs) which typically take 2-3 years to reach the market and can be developed within the market framework (e.g. through ongoing online service upgrades), tending to receive the funding that they require. In this respect the roles of SEIS and EIS were praised as encouraging increasing amounts of seed and early stage HNWI, business angel and seed VC financing into the market. This contrasts with the longer horizon more intensive R&D businesses surveyed, in

sectors such as life science, cleantech and advanced engineering. These businesses sought larger amounts of funding over considerably longer periods, typically taking between 10-15 years to reach the market. During the early stage development these longer horizon R&D businesses often failed to secure the amounts of risk finance that they sought from business angels and VCs and were forced into a drip feed series of funding rounds. These were time consuming and deflected management time and resources away from innovation, slowing the process of development down by as much as 2-3 years. A similar story emerges from the early growth stage firms with more intensive R&D and capital investment requirements, where the substantial step-change investments required (which may exceed £10m) proved difficult or impossible to obtain. The size of external funding required, relatively early stage of their market development and length of time to repayment, combined to make these businesses unattractive to debt and equity financiers.

R&D tax credits were found to be particularly helpful for longer horizon innovation and their use was particularly evident amongst the surveyed life science businesses. However, there was also a progression towards greater use amongst the more established businesses that use specialist tax accountants, with some confusion around eligibility and evidence of underuse amongst earlier stage businesses.

6.7 Demand-side failings are apparent

The stages of business development approach adopted by this study strongly contrasts the more formalised and successful access to finance pathways taken by more mature businesses with highly experienced and networked management teams, with the *ad hoc* informal and erratic success of the early stage business pathways⁴⁷. At the early stage business formalisation through business financing strategy and planning is most evident amongst serial entrepreneurs, spin-out business managers, and those receiving training and advice. However, the use of external assistance was not always successful, with early stage businesses reluctant to pay for specialist services and concern about the quality of advice offered. Ultimately, the greatest success was experienced by those with the best access to finance networks, such as serial entrepreneurs with previous experience, spin out managers with linkages to industry clusters (e.g. buyer and supplier businesses and academic institutions) and those using mentors and advisors that were well networked.

Conversely, a great deal of the failure to access funding can be attributed to demand failures where businesses applied for the wrong type of finance, such as bank finance when they did not have sufficient trading track record, or did not know how to apply effectively for grant and equity finance. There is evidence that '*persistence pays*' and the early stage businesses learned from their initial grant application failures and, over time,

⁴⁷ These findings support the resource (RBV) (e.g. Barney, 1991)) and knowledge (KBV) (Uzzi, 1999) based theories of management and networking presented in the literature review.

sometimes with the help of professional grant writers or improved industry and academic collaborators, became more successful. With regard to equity finance the key was to be able to access the VC and angel networks and to get direct exposure to these investors, as it appeared that online applications were seldom successful.

The challenge is to reduce early stage business demand failures. First time entrepreneurs in particular need to know where they can find trusted quality advice and training which is affordable. This could reduce a lot of wasted time and effort, leading to a quicker assessment of viable business propositions worthy of assistance, and through training and mentoring to a higher standard of management and knowledge of financing options. The provision of IRP services also needs to offer appropriate linkages to suitable investors and this was a perceived failing of current services that “*they improve planning, but fail to find investors.*” Since angel and VC investment is highly sector and stage specific and successful investment requires a “*meeting of minds*” between entrepreneurs and investors, this is not expected to be a quick and easy solution. However, access to the right types of investors in combination with correct supporting documentation (business plans, market research and financial projections) and presentational skills is essential.

These are challenges which may well be met by the Government backed Business Growth Service⁴⁸, incorporating the Growth Accelerator, which aims to assist potential high growth innovative SMEs in England. This provides up to £2,000 in matched funding assistance towards leadership and management training and includes masterclasses and growth coach mentoring. A key area of assistance is access to finance, covering selection, business planning, presentation pitching, negotiation and legal arrangements, with associated management leadership training and guidance. This is a developing service, which was not mentioned by any of the surveyed businesses. It is possible that with improved promotion and knowledge of the service this may provide considerable assistance, particularly if it is able to direct businesses to appropriate equity investors, which has been a failing of some assistance recorded in this study.

⁴⁸ Further information on the Business Growth Service and Growth Accelerator can be found at: <http://www.ga.businessgrowthservice.greatbusiness.gov.uk/the-partnership/>

Annex A: Literature Review

Introduction

In order to inform the design of the study and interpretation of its results, a review of the main published literature on the relationship of innovation in firms to the access of innovative firms to finance was undertaken. The papers and reports which were reviewed for this purpose are itemised in a bibliography appended to this report. This short account of the literature summarises that considerably longer initial review. Because it is a summary, this section makes particular reference only to a sub-set of the full list of the papers and reports listed in the bibliography, even though all the material reviewed contributed usefully to the points which this summary makes.

In addition, a secondary data analysis was undertaken on two surveys – BIS's Small Business Survey (SBS) of 2012 and British Business Bank's SME Journey Towards Raising External Finance Survey of 2014 – to identify the additional information which these surveys were able to add to the literature review. The key points of this analysis are also included in this chapter.

Defining innovation

A first concern of the literature review, and indeed of the project, was to define 'innovation', particularly as it occurs in SMEs. The literature review identified some key perspectives on innovation:

- Innovation as comprising significant technological advances in industries, these advances being closely associated with R&D expenditure, location of firms in 'high technology' sectors, and patent and trademark registrations (for example, Pavitt et al, 1987; Thwaites and Wynarczyk, 1996; Bullock and Milner, 2003).
- Innovation as being the successful exploitation of ideas (DTI, 1998).
- Innovation as having a wide range of scales – from internally-significant innovation such that a firm simply introduces products, services, or processes that are new only to the firm itself to 'externally-significant' innovations which have profound impacts on global markets, economies, and societies (OECD, 2005).
- Innovation as being capable of being divided into two broad types – the first type being 'knowledge asset-based' innovation such that the innovation generates an intangible output, such as a software application, the second type being 'capital asset-based' such that the innovation generates a tangible output, typically a new or improved physical product or a new or improved process technology.

Where surveys have been used to seek to measure the scale and distribution of innovation in the economy (e.g. BIS, 2013 or BIS, 2014a) varied questions have been asked of firms' managers, these questions concerning the introduction of new or improved products or

processes, improvements in organisation, business structure, and marketing approaches, and activities such as R&D, training, and participation in acquisition of machinery and equipment linked to innovation.

Faced with this variety of perspectives, this research has taken a fairly open approach to innovation such that firms which were interviewed in the study could be included as being innovative both in cases where they had introduced a product, service or process which was new only to the business and in cases (the larger part of the sample) where the firm believed it had developed a completely new or a significant improvement on existing products, services or processes. The research was also designed to capture the distinction between knowledge and capital asset-based innovation although, as will be discussed later, the distinction is not always a clear-cut or wholly meaningful one.

Innovation, the economy and access to finance

Whatever precise definition of innovation is adopted, however, further important questions are those of whether innovation is important to economic growth and, if it is, whether the finance which innovative firms need is available to them.

North et al. (2001) recognise linkages between innovation and competitiveness and its links with economic growth in industrial clusters, cities, regions and nations. Innovation may be seen as the engine of economic growth and improved living standards, with recent UK evidence suggesting that private rates of return from innovation average around 30% with social returns at 2-3 times this level (BIS, 2014) and that firms that invest in R&D have 4% higher productivity than non-investors, with persistent R&D investors performing best (13% higher productivity) and with better value added per employee and more export activity (Cefis and Ciccarelli, 2005; Loof et al. 2012).

Thus, the policy justification for focusing on innovation is deep-rooted, with access to finance being perceived as a crucial facilitating factor. Lerner (2010) established that the rationale for government support is based on widespread econometric evidence (Abramowitz, 1956; Solow, 1957) that innovation is positively correlated with economic growth and that new and small firms stimulate R&D (Acs and Audretsch, 1988), leading to a case for public intervention to provide effective early-stage risk finance through venture capital (VC) provision for these firms.

However, despite these positive impacts on the economy, recent research shows that innovative firms whilst being more likely to apply for finance, persistently find access to finance more difficult than their non-innovative counterparts. Lee et al. (2013), drawing evidence from 12,000 UK SMEs found that, in 2010-2012, 35% of those firms undertaking at least one innovative change in the last 12 months had sought external finance, compared to just 25% of non-innovators and that this differential had increased since the Global Financial Crisis (GFC) recession (28% to 23% in 2007/08). They also found that whilst all SMEs had found it harder to access finance since the GFC, this was exacerbated for innovative firms, with 38% of innovative finance seekers unable to obtain finance

compared with 22% of non-innovative finance seekers. Similarly, Lee et al. (2014), in their more tightly defined study of 10,000 UK employer SMEs which had introduced an industry-level innovation in the previous 12 months, found that these firms were more likely to be turned down than their non-innovative counterparts.

More recent evidence from Demirel and Mazzucato (2012) highlights that whilst R&D activity in small firms may be a strong generator of growth it is nuanced, favouring those that persistently patent and those with a demonstrable market niche. However, the British Business Bank (2014 and 2015 forthcoming) has found that software companies choose not to patent, using trademarks instead to protect their intellectual property (IP). Further, an examination of 3,095 UK and US SMEs and MSBs in the early 2000s (Mina et al., 2013) suggests that the innovative firm's level of demand and access to finance is strongly correlated with the type of innovation being undertaken, indicating that the higher the risk profile of innovation undertaken, the lower the likelihood of funding and that product and process innovation is more likely to attract external funding than organisational innovation. Overall, it is clear that innovation stretches beyond R&D and that it is important to determine the type and extent or intensity of innovation being undertaken.

North et al (2001) conclude that whilst a wider view of innovation within the firm might be desirable, what is most important is the degree and type of innovation (Rothwell and Zegwels, 1982; North and Smallbone, 2000), as this will determine the likely impact on the local and wider economies.

Developing this point, the nature and quality of innovation appears most important, with more recent research focusing on the distribution between R&D and the broader *intangible asset* types of innovation which drive potential high growth and which are likely to have greatest impact on the UK economy. As we have discussed, there is a strong correlation between innovation, demand for finance, and difficulties in obtaining finance. A major explanatory variable associated with the problems of access to finance is the intangible nature of a great deal of innovation, which potential funders find difficult to value (North et al. 2013; Sameen and Quedsted, 2013; Hughes, 2009; Carpenter and Peterson, 2002).

Nesta's Innovation Index (2012) highlights the importance of considering investment into intangible assets as a measure of innovation activity, over and above measuring R&D. The report presents intangible investment as a measure of innovation between 1990 and 2009 and established that, in 2009, of the UK's £124bn⁴⁹ invested into intangibles (representing 12% of gross value added in the UK private sector), R&D only represented 13% of expenditure. Nesta's intangible assets also include design, organisational improvement, training and skills development, software development, advertising and market research, and IP rights. There was considerable variation by sector, with manufacturing, finance and

⁴⁹ Nesta (2012) found that since the early 2000s, annual UK investment into intangibles has been greater than that into tangible assets (e.g. equipment and buildings), with UK tangible investment at £93bn in 2009.

personal services being the most intangible-intensive industries (in terms of the greater contribution of intangible investment to gross value added), whilst intangible investment was much more prevalent in services than R&D, and also much less concentrated into just a few firms. Key examples of important intangible investment contributions within services include financial services investing disproportionately more than the average industry into software and organisational intangibles and business services investing disproportionately more on training and skills development.

Goodridge et al. (2012 and 2014) find a range of intangible investments (e.g. training, organisational capital, software, design, marketing/branding, as well as R&D), whilst Corrado et al. (2005) categorise intangible investment into: (i) computerised information; (ii) innovative property (e.g. R&D, product development); and (iii) economic competencies (e.g. training, market research, brand development, organisational capital and structures).

An important finding from the Nesta Innovation Index (2012) is that investment into tangible assets suffered more during the recession than investment into intangibles. A number of pieces of recent research substantiate the existence of the 'Rowlands gap' (2009), originally supported by SQW (2009), which suggested a shortfall in funding for businesses requiring longer-term intensive R&D including patient capital requirements for capital equipment investments, ranging from £2m to upwards of £10m. Key sectors thought to be affected are bio- and life sciences, renewable energies and low carbon activities and advanced manufacturing. This shortfall seems to have been exacerbated in the aftermath of the GFC by three factors: firstly, an unwillingness on the part of the banks to provide patient capital for long term capital equipment investment to established businesses, including MSBs, as they are no longer willing to underpin debt through property (GLA, 2013); secondly, the trend towards later-stage, less risky equity finance investments by private VCs, often at above the £10m level (Mason et al. 2010); and, thirdly, the preference of seed and earlier stage investors, both private and public, to invest in low-cost faster maturing digitech investments (North et al. 2013; British Business Bank 2014 and 2014a forthcoming). This analysis is borne out by Nesta's (2014) finding that in 2011 UK intangible asset investment recovered to £137.5bn, whilst tangible asset investment was flat at £89.8bn. This suggests that an important consideration for this research is the extent to which innovation relates to knowledge based assets (such as IP and software) as opposed to technological capital-intensive assets (relating to hardware and equipment).

Thus, a review of the relationships between innovation, the economy and access to finance suggests, in summary, that:

- Innovation by firms brings significant economic and social returns in addition to returns to firms themselves.
- There is, therefore, a case, supported by econometric evidence, for government intervention in support of innovation.

- One form of possible intervention concerns innovative firms' access to finance since, as a generality, innovative firms may have particular difficulty in acquiring the finance they need to underpin innovative processes.
- Within that generality, however, the level of difficulty may vary according to a number of inter-related factors – the intrinsic riskiness of the innovation-based proposition, whether the innovation is to develop intangible or tangible assets, and whether the requirement is for investment with potential returns in the shorter or longer term.

Business characteristics, access to finance and innovation

As the previous section notes, **there are broad interactions between innovation, the economic contribution of innovation and access to finance**. However, a range of more particular factors which influence those interactions can be considered. A wide variety of research studies have thrown light on these and that research is briefly reviewed below. In doing so, it will be noted that while this analysis picks out a range of individual themes (such as company size, company age, sector and so on), these themes are often inter-related (smaller firms typically being younger on average and more frequently found in some sectors than in others, for example). The literature is not always able to distinguish clearly which of the associated factors is causally related to differential ease of access to finance.

It should also be noted that the emphasis of most studies reviewed here is on the relationship between business characteristics and access to finance, with business innovation, the third 'leg' in the tripartite relationship which is the subject of this study, often being absent from the analysis or being essentially a matter of inference.

With those introductory comments in mind, the main factors which have been considered in the research literature are:

- *Business size*: Various studies have found evidence that access to finance improves with increasing business size (and its frequent corollary of business age) and have observed the particular problems faced by start-ups and young businesses which lack collateral and trading record (for example, Cosh et al, 2009; Michaelas et al, 1999; Chittenden et al, 1996). Further up the business size spectrum, other research (BIS 2010a, 2011) has found that mid-sized businesses were more often able to get the finance they needed but, since the recession, with more stringent terms and costs attached to the finance.
- *Business maturity*: Research using the UK SME Finance Survey (by Cosh et al, 2008) has found that, while younger businesses were more innovative and growth-oriented, they were less likely to receive external finance than their counterparts, with mature businesses, those trading for more than 10 years, being likely to be more frequently successful in their applications. This suggests that a business growth cycle or stages approach is valuable in understanding access to finance. The British Venture Capital Association (BVCA, 2013) has a well-established categorisation (see next page) which defines the cycle of business financing

requirements, from pre-start business conceptualisation to mature finance for well-established trading businesses, which provides a useful guide for the three broad stage definitions developed for this study (i.e. early stage up to 2 years trading; growth stage mainly between 2-5 years trading; mature stage businesses, trading for more than 5 years, with a specific focus on larger mid-sized businesses (MSBs) with 250 plus employees and annual sales turnover of more than £25m):

Table 1: Business cycle stages of financing

Stage	Description
Seed	Financing is used to develop a business concept e.g. production of a business plan, prototyping, or additional research prior to bringing a product or idea to market
Start-up	Financing for companies' product development and initial marketing. Companies may be in the process of being set-up or may have been in business for a short time, but have not yet sold their product commercially.
Other early stage	Financing for companies that have completed product development and require further funds to initiate commercial manufacturing and sales.
Late stage venture	Financing for companies that have reached a fairly stable growth rate; that is, not growing as fast as the rates attained in the early stage. These companies may or may not be profitable, but are more likely to be so than in previous stages of development.
Expansion/development	Financing for the growth and expansion of an operating company which is trading profitably. Capital may be used to finance increased production capacity, market or product development, and/or to provide additional working capital.
Replacement	Other private equity to enable part or total of another investor's shareholding
MBO/MBI	Management buy-out or buy-in, acquisition of company ownership
Other mature funding	Includes refinancing of bank debt, bridging finance towards an IPO, IPO, rescue finance, and public to private de-listing.

Source: BVCA (2013) – adapted version, incorporating Deakins and Freel (2012)

- *Business sector:* Various research studies (for example, Cosh et al, 2008; the Scottish Government, 2008; the UK SME Finance Monitor, Q4, 2013) have shown different rates of success in obtaining finance according to businesses' location in different sectors (although the correlation between sector attribution and size may explain some of the differences). Typically, most difficulty in accessing finance has been found for businesses in retail and wholesale, hotels and restaurants, construction and manufacturing sectors. More particularly, it has been shown (by

North et al, 2013) that younger technology-based small firms and (by Fraser, 2011) that businesses in certain creative industries like software and Other Creative Content sectors (consisting of Publishing; Video, Film and Photography; and Radio and TV) have particular difficulty in accessing finance.

- *Spin-outs*: An exception to the proposition that small, young businesses have financing difficulties may, however, concern ‘spin-outs’ from Universities or from larger existing companies. In these cases, company formation may constitute a ‘soft-start’ in which the new business has an existing customer base and underlying investment and is, thus, more feasible for bank debt finance (i.e. has a demonstrable customer trading track record, or sales orders suitable for invoice financing), and more attractive to venture capital or other equity investors (see, for example, North et al, 2013; HEFCE survey, 2014; Minshall and Wicksteed, 2005; and Logan and Brew, 2004).
- *Location*: Further research has found regional variations in access to finance. With regard to debt finance Fraser (2009) found lower bank application success rates in the North of England and the West Midlands, whilst more recent NIESR (2013) data the only found significantly higher rejection rates in London, which may be explained by this region’s higher business churn. With regard to private equity and private venture capital, this type of funding is concentrated in the London-Cambridge-Oxford triangle (Mason and Pierrakis, 2013; BVCA, 2013; Amini et al, 2012). This is explained by the clustering of innovative businesses in these three UK regions (London, South East and East of England)(British Business Bank, 2014c) and has led to some debate about the relative influence of demand and supply-side factors. More generally, research has also observed that access to all types of finance is more difficult for businesses located in rural areas (Smallbone et al, 2002; CRE, 2011).
- *Family ownership*: Where business ownership and control lies with members of a family unit, and particularly where ownership spans two or more generations, then some of the observed characteristics of these businesses – independent, long-established, conservative in relation to investment and growth and with considerable internal financing capability – may be disposed to higher success rates in getting external finance should it be sought (IFB, 2011). This finance may, however, more typically be bank debt financing given the observed reluctance of family businesses to give up equity (BIS, 2011; KPMG Global Family Business Survey, 2014).
- *Gender*: Some studies have found that women-owned businesses more frequently experienced difficulties in accessing finance (Scottish Government, 2008) and that women were more likely to perceive barriers to external finance than men (Roper and Scott, 2009 and may be more risk averse (Cumming, 2012).
- *Ethnicity*: Research (for example, Smallbone et al, 2002; Fraser, 2009a) has revealed that businesses owned by members of some ethnic minorities (most typically, entrepreneurs with African, Caribbean, and Bangladeshi ethnicities) had particular difficulties in acquiring finance, some of this difficulty relating to the entrepreneurs’ low levels of use of, or access to, public or private advisory services.

- *Education and experience:* A ‘resource-based view’ (RBV) emphasises the importance of the education and experience (human and social capital) of entrepreneurs as a key factor in the degree of success in obtaining finance. Inter-related factors include the prior educational achievements of finance-seekers (Cosh et al, 2008) and whether entrepreneurs are first-time seekers of finance or are experienced serial entrepreneurs who know the most likely sources of finance and have existing track records of having successfully accessed those sources (see, for example, BIS 2012; BIS 2013; British Business Bank, 2014; North et al, 2013; Baldock, 2014).
- *Internal and external resources:* A further set of research, again taking a resource-based view, suggests that businesses which are more successful in acquiring finance are those, typically larger ones, which have specialist, experienced financial management internal to the business, or, where this is lacking, are able to access external expert advice as a substitute (Storey, 1994; Lam et al, 2007; North et al, 2013; BIS, 2012, 2013, 2014; British Business Bank, 2014). The role of social networking capital in accessing finance is likely to be advantageous to younger business development (Uzzi, 1999) and extends to informal and formal business linkages, such as through network brokers (Huggins, 2001), which can lead to collaborative financing opportunities for joint venturing, licensing and buyer/supplier financing arrangements.

Type of finance

As well as understanding the characteristics of businesses which are disposed to greater or lesser difficulty in acquiring finance, the research also needs, of course, to be aware of the kinds of finance which are, at least notionally, available to businesses. The literature review observed a range of financial sources and made some distinctions between them.

Internal, external, debt and equity finance

Deakins and Freel (2012) provide a clear distinction between internal finance and external finance. *Internal finance* is that provided by founders, family and friends, often referred to as the ‘3Fs’ and over time will also relate to retained profits and earnings which may be re-invested in the firm. *External finance* may be drawn from a wide range of sources, but principally in the UK this will be in the form of debt finance from a bank, typically in the form of a term loan or an overdraft facility. Additionally, Deakins and Freel also point to a range of other forms of debt financing including trade credit (i.e. short-term supply-chain buyer and supplier loans), hire purchase and leasing schemes, and factoring (including asset-based finance such as invoice discounting).

However, as North et al. (2013) highlight, whilst the vast majority of firms in the UK rely heavily on debt finance for their external financing requirements, more innovative firms, particularly younger, less-established firms that lack trading track records, have insufficient collateral, and IP that is difficult to value. In these cases, equity risk finance is an important form of external finance. Whilst the Small Business Surveys (2003-2012) and UK Finance Monitor consistently demonstrate that fewer than 2% of UK SMEs seek and

use equity finance, North et al. (2013) found that 23% of their survey of 100 UK Technology Based Small Firms (TBSFs) had sought equity finance and that this was a particularly important form of finance for younger and higher growth-oriented firms.

Formal and less formal equity finance

Equity finance can be defined as informal where High Net Worth Individuals (HNWIs) invest into businesses, but where business angels act in syndicates or as capital finance groups, angel finance becomes more formalised. Recent years have also seen a growth in seed equity and convertible loan financing taking place through seed venture capitalists (VCs) and accelerators like Seedcamp⁵⁰ and TechStars⁵¹ which typically focus on digital technologies and have largely been located around London's Tech City (British Business Bank, 2014)⁵². Start-up businesses receive intensive mentoring and assistance alongside initial small-scale investments, with the most promising portfolio businesses progressing to more substantial seed and early stage investments (GLA, 2013).

At the upper end of the scale, private venture capitalists (VCs) and private equity (PE) institutional investors, including pension funds and Family Offices, are highly formalised, typically funding potential high growth businesses that are already trading with growth/expansion and management buyout finance. Businesses seeking growth finance, particularly for strategic acquisitions may also undertake (IPOs) through listings on the public stock exchanges (BIS, 2013; Baldock, 2013). In the UK the main feeder market for younger, less well-established, smaller cap companies is the Alternative Investment Market (AIM), whilst for the mainstream larger cap businesses with values well in advance of £100m there is the opportunity to list on the main London Stock Exchange (LSE). Listed companies can raise additional finance through additional share offerings on these exchanges.

Bank and debt finance

The majority of established businesses seeking external finance are typically successful in receiving at least some of the required finance and mainly in the form of bank debt finance. The SBS 2012 (BIS, 2013) found that, of the 24% of SME employer businesses that were seeking finance, almost four-fifths sought bank finance (48% loans, 35% overdrafts, 6% invoice discounting and 3% mortgages, with some overlap between categories). Viable applications which lack sufficient security may be assisted by the Enterprise Finance Guarantee (EFG), a government scheme which underwrites 75% of the loan, reducing the amount of security required. Research by Durham University (BIS, 2013b) found that the EFG plays an important role but makes up less than 2% of the total bank lending market. Returning to the SBS 2012 survey, almost one-third of applicants (32%) received no

⁵⁰ London's first accelerator, established in 2007: <http://seedcamp.com/>

⁵¹ <http://www.techstars.com/>

⁵² 15 out of 25 UK accelerators listed are located in London:
<http://www.entrepreneurhandbook.co.uk/business-accelerators/>

funding from the first source approached (42% of loan applications, 37% of overdrafts, but only 22% of asset finance and just 10% of leasing applications). Some applicants do apply to other providers with the eventual outcome being that 68% received all funding required, 7% received at least some, 4% were still pending decision and 21% received no funding. Amongst the 76% of employer SMEs that did not apply for funding one in seven were discouraged by prevailing economic conditions or concerns that they would not present a viable application. Additionally 7% of applicants received grants and 3% sought credit card finance. The problems experienced in accessing formal external finance were greater amongst micro-businesses (1-9 employees) where 35% of applicants received no funding and amongst younger businesses. It is notable that the Federation of Small Businesses annual members survey 2012 (which is dominated by smaller businesses) found that 18% used company credit cards to raise finance, whilst one-fifth used personal credit cards⁵³.

New non-bank finance

The GFC resulted in a major contraction in the availability of commercial bank finance (Fraser, 2009; Cowling et al., 2012). Whilst in the short term this created a major shortfall in commercial finance, which was paralleled by a loss of investor confidence and severe decline in private venture capital (BVCA, 2010), these shortages also gave rise to the emergence of new forms of finance for businesses in the UK. Davis (2012) provides a summary of these emerging forms, drawing attention to increasing use of asset-based finance by banks and alternative funders, but notes that this is not an adequate replacement for the patient capital of mature growth businesses which might require substantive longer-term loans and for which mezzanine finance which combines term loans with equity options could be a more suitable option. At the seed and early-growth stage crowdsourcing equity, which has been available in the UK since 2011 through Crowdcube and Seedrs, has already grown to a £28m annual market (Collins et al. 2013), whilst peer-to-peer lending (P2P) has seen considerable support from the British Business Bank's Business Finance Partnership for non-bank finance, with the emergence of brand leaders such as Funding Circle and Zopa providing finance for young businesses with a trading record of at least 24 months.

Alternative forms of finance, microfinance, and grants

There is considerable evidence that for a minority of young, small, social and innovative enterprises, alternative financing, bootstrapping and bricolage approaches are used (Mac An Bhaird, 2010 and 2015 forthcoming; Sunley and Pinch, 2012). North et al (2013) found that one-quarter of surveyed UK TBSFs had sourced grant finance, particularly in the early seed/ prototyping stages of innovation and notably through the Technology Strategy Board (now Innovate UK) or Scottish Enterprise SMART awards and EU FP7 grants enabling industry and academic collaborations.

⁵³ FSB 2012 and 2014 surveys define personal credit card finance as informal

Deakins and Freel (2012) draw attention to the role of micro-finance, notably through Community Development Finance Initiatives (CDFIs) which act as wholesale financiers of SMEs, particularly for community/social enterprises in deprived areas. These potential high-risk loans operate where bank loans are not accessible (theoretically assisting viable, but non-bankable propositions) and are usually accompanied by mentoring to improve financial absorption and investment outcomes. A BIS (2010b) study indicated that the number of CDFIs in the UK has stabilised at around 80, whilst recent studies demonstrate that they have been playing an increasingly important role in replacing mainstream banking for micro and small businesses in the post-GFC period (GLA, 2013). CDFIs typically offer loans at below £25k for established businesses but also offer affordable start-up soft loans at below market rates for new-start businesses (up to two years trading) which are typically capped at £10k. CDFIs have also become an important delivery vehicle for the government's Start-up Loans Scheme for entrepreneurs aged 18-30 which seeks to address the more acute financing problems that young entrepreneurs face⁵⁴.

The Charity Bank⁵⁵, launched by the government in 2002, assists with loan finance for charities and social enterprises at between £50k and £2.5m and has recently received £14.5m from Big Society Capital based on greater need for social lending revealed in a 2013 Technology Trust survey: *"... while almost two-thirds (65%) of respondents consider that loans could help charities further their mission, less than a third (31%) of those who approached high street banks for a loan ended up taking one, 29% had their application turned down and 40% were offered a loan but did not take it up because it was too expensive or the conditions were too onerous."*⁵⁶

Triggers and determinants of finance selection

Given the variety of characteristics of firms which seek finance and the varieties of finance which are notionally available to them, further research focuses on the varied triggers which lead businesses to seek finance in the first place and on the varied factors which lead businesses to seek finance of different types.

Initial triggers or requirements for finance have been identified as including needs for R&D investment, for new equipment acquisition, for key staff recruitment, for new premises requirements, or for company acquisitions (BIS, 2013). Other triggers may include changes in external market conditions, business restructuring or retrenchment, or re-financing to reduce debt gearing.

⁵⁴<http://www.cdfa.org.uk/2013/01/09/cdfis-join-expanded-start-up-loans-scheme-to-create-the-next-generation-of-entrepreneurs/>

⁵⁵ <http://www.charitybank.org/charity-loans>

⁵⁶ <http://www.charitybank.org/news/big-society-capital-makes-biggest-single-investment-date-charity-bank>

The firm's pecking order choice (Myers and Majluf, 1984) of external finance will then essentially be governed by a number of factors (which may be internal or external to the firm), starting, as above, with a trigger requirement for finance, assessment of external finance needs over and above the internal financing available, the entrepreneur's or management team's knowledge and experience in accessing external finance and the availability of different types of finance in the market depending on the macro-economic environment and stage position of the business within the growth cycle (Berger and Udell, 1998).

Myers and Majluf (1984) suggest that ideally the pecking order choice for the vast majority of external finance seeking entrepreneurs will initially be for debt finance rather than to concede equity share. However, as Berger and Udell (1998) establish, the availability of debt finance for young and innovative companies may be limited. North et al. (2013) found that bank debt finance was only likely to be available to new and young UK TBSFs trading for less than two years if they were 'soft start' spin-outs that already had established customers and market traction. The entrepreneur or management team's choice of type of external finance will also be governed by the reason for seeking finance. For example, equipment may be acquired through asset finance arrangements such as hire purchase loans and leasing arrangements, whilst property purchase or development would suggest commercial mortgage requirements. At the top end of the scale, MSBs may seek to raise finance for large scale innovation projects and acquisitions by floating on the public markets (IPOs) or by issuing new public share offerings (BIS, 2013).

Ultimately, as many recent studies have shown (BIS, 2010, 2011, 2012, 2013; British Business Bank, 2014 and 2014a), the eventual selection of external finance will be down to a combination of the company seekers' knowledge and experience and the availability of appropriate and acceptable types of finance in the market at a given time (which will be influenced by macro-economic conditions). This nuanced approach has been explored by Baldock's (2013) qualitative research using a 'decision factors matrix' which attempts to set out the interplay between: the entrepreneur's knowledge, experience and goals (e.g. whether a serial entrepreneur, first time finance seeker, or wishing to be a lifelong entrepreneur with the same company); the firm's management resource base, investor base and use of external advice (e.g. wider management team, non-executive directors (NEDs), external advisors); and the wider macro-economy and supply of finance. Whilst this model was used to demonstrate the overriding role of macro-economic conditions in determining the supply and cost of private and public equity and the conflicting roles and goals of lifelong entrepreneurs and VCs in the selection of IP, trade sale or private equity continuation, the model could easily be adapted to other stages in the financing life cycle.

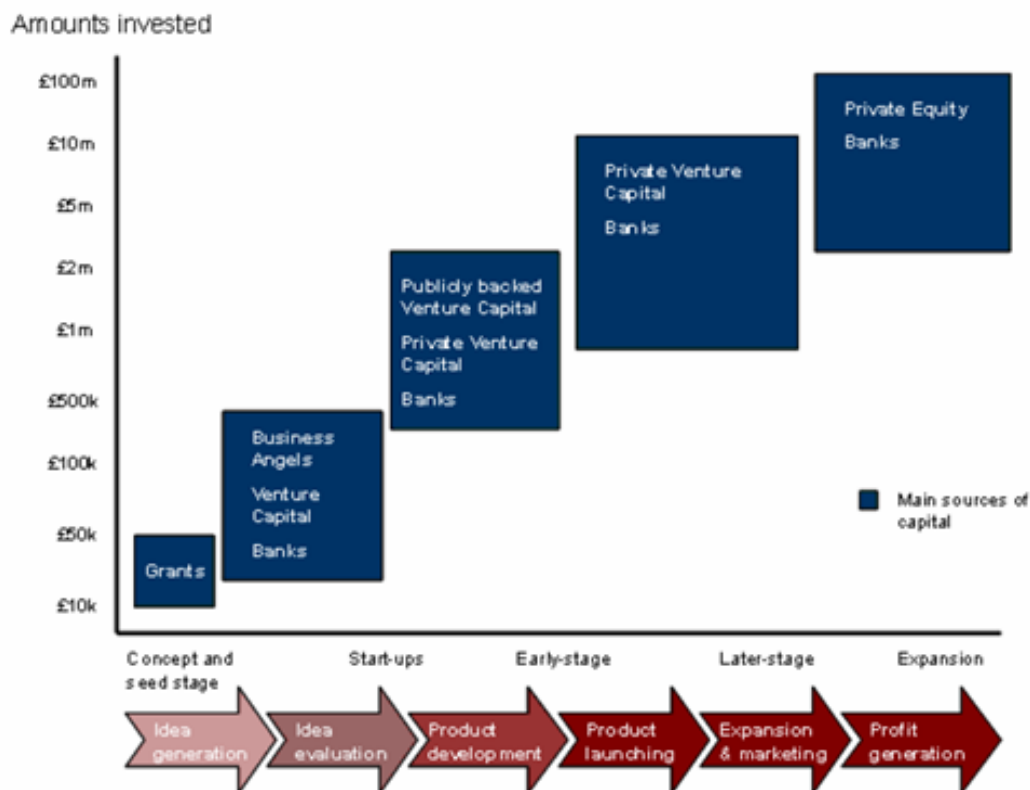
Finally, as Mason and Kwok (2010), Amini et al. (2012), North et al. (2013) and many previous studies in the UK indicate, as the business finance market evolves and new, young, innovating and restructuring firms continue to require external finance, there is a need to ensure that these businesses can find and successfully apply for appropriate types of finance and are able to understand the range of financing options available to them.

However, whilst firms may make choices as to what types of finance they seek, it is not, of course, the case that they will make the right choices or that they will get the supply-side response they need. Key determinants of success include:

- What is the degree of viability of the applicant firm?
- What is the business track record and relationship with financiers?
- What types of finance are suitable for the business stage in the growth cycle?
- Have all suitable types of external finance been considered?
- Has the business suffered from market failure, taking into account adverse selection, agency failures and moral hazard issues?

In more detail, Berger and Udell (1998) present a conceptual framework of declining information opacity of young firms as they progress through early stage financing. This underpins the finance escalator model (Nesta, 2009a) (see Figure 3.1 following). This model suggests that different forms of equity and debt finance are suited to businesses at different stages of development, from businesses at the very early business inception stage to businesses which are more established and understood by financiers. Even before the GFC, with the failures of early stage VCs in the UK and the increasing requirement for public hybrid VC funds there were signs that the mechanism was sub-optimal (Murray, 2007; Mason and Brown, 2013). The additional onset of the GFC and the resultant squeeze on finance through credit rationing (Cowling et al. 2012) and a more cautious approach by investors (North et al. 2013) exacerbated the pressures on an already-stressed finance escalator for seed and early stage business development leading to it becoming broken and fragmented (Mason et al. 2010; Gill, 2010; North et al. 2013).

Figure 1: SME Finance Escalator



Source: NESTA (2009)

Whilst there would appear to be strong evidence of market failures, various commentators (Van Der Schans/British Business Bank, 2014; GLA, 2013; North et al. 2010) point out that a market failure can only exist where viable business propositions are under-funded. The importance of having a sufficient and trustworthy track record is therefore crucial, although with the decline in relationship banking in the UK in favour of centralised credit scoring processes, *human capital* relationships with bank managers are likely to be less influential in the current era (Deakins et al., 2008; North et al. 2010). Oakey (2003) emphasises that the role of public policy in addressing market failure is to assist the definitely *immediately fundable* only as a last resort when all other private funding streams have been exhausted, so as to avoid crowding-out and that it is the marginal *probably fundable* group that policy should focus on assisting. Therefore, resultant public policy interventions require careful consideration of potential pitfalls (Murray and Lingelbach, 2009; Lerner, 2010) which may result from a combination of poor policy-making and agency failures from poor management (Akerlof, 1976).

The development of a more efficient seed and early stage financing escalator or pipeline (Mason and Pierrakis, 2013; Mason and Brown, 2013) requires a carefully integrated policy to develop the VC and equity finance ecosystem in the UK (Hughes, 2009), taking into account both the supply-side mechanism and also the potential demand-side failures

in relation to investment readiness (Mason and Kwok, 2010). Particular issues include the resource-based knowledge of small firm management (Mac an Bhaird, 2010; North et al., 2013), the pecking order financial preferences of entrepreneurs (Myers and Majluf, 1984; Norton, 1991), and signalling issues which may particularly affect the ability of entrepreneurs in more peripheral areas to find and obtain funding (Mueller et al. 2014).

Table 2, based on recent research into the UK equity finance market (Baldock and Mason, 2015) for innovative businesses presents a summary of the evolving post-GFC funding pipeline of public and private funding in the UK:

Table 2: Changes in the formal and informal equity finance ecosystem spanning seed to later stages investment, 2007/8 to 2012/13

Equity Finance Stage	2007/08 – funding range:	2012/13 – funding range:
Later stage/ MBO/MBI	AIM IPO Corporate VC (£10m+)	AIM IPO Corporate VC (10m+, some earlier stage Pharma investments) Business Growth Fund (£2-10m) Institutional VC (£1m to 20m) VCT (£1m to £25m)
Early/mid stage	Institutional VC (£100k to £10m) VCT (£1m to £10m+) Hybrid public VC, including ECFs (£250k to £2m)	Hybrid public VC, including ECFs (£50k to £2m, some exceptions to £5m+) ACF (£200k to £2m) Angel network syndicates (£100k to £500k)
Seed/Start-up	Angel network syndicates (£25k up to £250k) HNWs (up to £100k)	Seed VCs, including ECFs (£50k to 500k) Angel Capital Groups (£25k to £100k) HNWs (up to £100k) Seed equity platforms (up to £100k) Accelerators (up to £50k)

Note: Bank debt finance is often included in the original model, but in practice has only been available to soft start-ups with consultancy income, or substantive business or founder collateral e.g. from a spin out, but these are now exceptions to the rule and few businesses with less than two years trading record will get any form of bank debt finance (GLA, 2013; North et al. 2013). Excludes grant funding e.g. from the Technology Strategy Board/Scottish Enterprise (Mason and Brown, 2013).

Pathways to external finance for innovative firms

Within this conceptualisation of firms' choice processes when seeking external finance (determined by particular triggers, influenced by a variety of internal characteristics of the

firm and by external conditions, and having typical patterns matched to the firm's maturity) other research has considered the actual processes of seeking finance and getting or not getting it.

Customer journey models (BIS 2010, 2012a; British Business Bank, 2014a) have typically tracked the sequential steps which businesses take to secure finance from the initial management decision to seek finance, through finance selection and finance-seeking stages, to finance acceptance and, perhaps, to further iterations of the sequence as needs for further finance arise.

However, consideration of this somewhat stylised 'sequential steps' model has suggested that many factors influence the success or otherwise of the customer journey. On the 'demand' side, that is, in relation to businesses themselves, a variety of factors determine whether or not the steps are taken smoothly or are hesitant or interrupted. Some of these factors, such as the experience of the entrepreneur and the stage of business development, have been briefly discussed above, but the literature examining firms' journeys towards finance identifies other phenomena which need to be put into the explanatory mix, such as:

- The *investment readiness* of businesses – for young, small, and early stage firms, lack of trading record and frequent absence of any substantial collateral which inhibit their 'investability' (GLA, 2013).
- '*Discouraged borrower*' theory identifies businesses which don't access finance because they perceive that finance will be unavailable to them and expect rejection by lenders and financial institutions (Kon and Storey, 2003). This may be more prevalent for minority groups of entrepreneurs, female business owners for example (Wilson et al, 2007). This may also be governed by general perceptions, frequent since the 2008 recession, that 'banks are not lending' with perceived success rates being significantly lower than actual finance approval rates (British Business Bank, 2013).
- Consideration of the concept of '*absorptive capacity*' focuses on the firm's ability to acquire, process, and act on *information* (Cohen and Levinthal, 1990; Zahra and George, 2002). Thus, conditions of uncertainty, such as in the post-recession environment, place a premium on a firm's ability to process information. A literature review suggests that factors such as access to information, the skill sets of staff, the ability to process information, and the capacity of firms to learn from experience, all contribute to determine whether an innovative firm will be aware of, and seek, different forms of external finance. This gives rise to potential path dependency based on previous experience of external financing and the influences of those financiers (Hirsch and Waltz, 2011).

In addition to demand side issues, financial markets may also exhibit failure or weakness on the *supply* side:

- *Credit rationing theory* observes that, in principle, entrepreneurs and small firms with good and viable proposals should be able to raise the finance they need from

credit providers. However, as suggested by Berger and Udell (1998), at an early stage, funders' information on SMEs is opaque – lenders lack sufficient information to make accurate decisions – with the result that some good proposals may not be funded. A BIS (2012) report indicated that whilst most SMEs that are seeking finance achieve it, there are structural failures which restrict viable applications from SMEs and which suggest that there is a lending gap for SMEs without a track record or security and an equity gap for those SMEs seeking external investments of between £250k and £5m. Similarly, the Rowlands' Inquiry into SMEs' financing considered that the existence of imperfect information for investors and the lack of track records in some SMEs contributed to structural market failures and concluded that there is a funding gap (both debt and equity finance) for companies seeking between £2m and £10m in growth capital (Rowlands Report, 2009).

- Examination of *debt market failure* notes two main points. Firstly, that credit rationing theory, as above, observes that banks and other credit providers may have incomplete information when assessing risk in applications for finance – and thus, in the absence of adequate information, err on the side of caution and use evidence of track record and provision of collateral as screening mechanisms. Secondly, that this underlying tendency has been exacerbated since the recession and banks have become even more cautious. The Enterprise Finance Guarantee (EFG) is designed to lay off bank risk on to the government but take-up of the Guarantee is only a small part of the wider small business bank lending market (Allinson et al, 2013)⁵⁷.
- Similarly, examination of *equity market failure* points to finance gaps in equity markets also, frequently, as a result of inadequate information – in this case, because the due diligence procedure required for equity investments by venture capitalists is not economically viable for smaller amounts of equity. For example, a report for the British Business Bank (BIS 2013) suggests that there is a gap for SMEs seeking equity finance of between £250k and £5m. Business angels have become more important as providers for small amounts of equity and, therefore, make an important contribution to filling the SME equity gap (Mason and Harrison, 2011), but there is also evidence that angel syndicates drift into larger funding deals leaving smaller investment requirements unfunded (Harrison et al, 2010); and other work by the British Venture Capital Association (BCVA 2013) shows that, within an increasing total of venture capital funding in 2012, compared with 2011 and 2010, there was a decrease in early-stage funding and especially of seed capital. More recent British Business Bank (2015b) equity tracker data suggests that since 2011 UK seed investment has increased considerably to the end of the third quarter (Q3) of 2014, notably through crowd funding and Enterprise Investment Scheme (EIS) and Seed EIS private investor tax incentives⁵⁸. There has also been considerable year on year increase in UK growth stage funding in this period, whilst venture funding (operating between the seed and growth stages) has lagged behind – growing in 2012 and 2014, but declining in 2013.

⁵⁷ Allinson et al (2013) indicate that around 2% of bank loans use the EFG

⁵⁸ See HMRC EIS data: <https://www.gov.uk/government/collections/enterprise-investment-scheme-eis-statistics>

Secondary data analysis

As noted in the introduction to this chapter, two surveys (BIS's SBS 2012 and SME Journey Towards Raising External Finance 2014 survey) which contain data on firms' financial journeys and on their innovativeness were analysed in order to add further information to this literature review.

These analyses allow the distributions of innovative firms to be described – with associations being found between innovation and size and age of firms and their locations, sectors, and growth ambitions.

In line with literature review findings, the surveys suggest that innovative firms are more likely to seek finance (and to do so on more occasions). However, the hypothesis of the literature review that innovative firms have greater difficulty getting finance was not supported; and survey analysis which compares the access to finance of capital asset-based and knowledge asset-based firms also does not support the literature review proposition that the former have greater difficulty in getting finance than the latter.

Thereafter, the two survey analyses examine a range of characteristics of firms' approaches to, and experiences of, financial markets. A general picture emerges in which:

- Innovative firms are more knowledgeable about those markets
- Innovative firms are more flexible in their market approaches – more willing to take external advice and to consider and use more types and sources of finance
- Innovative firms may be more likely to seek larger amounts than non-innovative ones
- Innovative firms are more likely to seek finance to fund growth and less likely to seek finance to support cash-flow
- Innovative firms were more likely to be 'discouraged borrowers' – firms which need finance but don't seek it. The main reason for this amongst innovative firms was because of recognition of the risk involved which they believed potential investors would often not be prepared to take on.

Literature review: key messages for the research programme

In summary, a review of literature on the relationship between firms needing finance and financial markets suggested that the research study reported in this document needed, at a first level, to consider the resources of information, experience, and knowledge which firms can deploy when assessing their finance options and the sources of finance on which they most typically rely – with both of these being expected to vary at different stages of firms' development. Table 3 shows some of the most typical resources of information and sources of finance which the research would anticipate finding:

Table 3: Key information and finance sources by stage

	Pre-start	Early stage	Early growth and development	Later stage	Maturity
Key resources of financial information and understanding	<ul style="list-style-type: none"> • Prior experience (in the experienced entrepreneur case) • Public advisory sources • Social networks/peer group advice 	<ul style="list-style-type: none"> • Prior experience (in the experienced entrepreneur case) • Public advisory sources • Social networks/peer group advice • Business mentors/incubators/accelerators 	<ul style="list-style-type: none"> • Increasing management team experience • Accountants • Local business networks/peer group advice 	<ul style="list-style-type: none"> • Recruitment of specialist finance managers • Accountants/management consultants • National/global networks 	<ul style="list-style-type: none"> • Highly specialised and expert finance teams • Accountants/management consultants • National/global networks
Key sources of finance	<ul style="list-style-type: none"> • Internal funding • Credit cards • Personal loans • ‘Proof of concept’ grant funding 	<ul style="list-style-type: none"> • Internal funding • Early stage business angels/HNWIs • Technology development grants • Public and seed venture capital • Crowd equity 	<ul style="list-style-type: none"> • Re-invested profits • Business angel syndicates • Venture capital • Peer-to-peer lending • Technology development grants • Joint ventures 	<ul style="list-style-type: none"> • Re-invested profits • Bank credit • Business angel syndicates • Venture capital • Potential exit and trade sale • Corporate/institutional finance • Peer-to-peer lending 	<ul style="list-style-type: none"> • Re-invested profits • Bank credit • Business angel syndicates • Large scale venture capital • AIM and stock market listing • Institutional finance

However, the literature review suggested that the research would also need to account for the many other factors which sophisticate this simple description. These factors, as noted in previous sub-sections of this chapter, include:

- The accurate identification of innovative firms needing finance as a sub-set of the generality of firms needing funding – based on a workable definition of what constitutes ‘innovation’.
- The ability to distinguish a further division of innovative firms – that between innovative firms which develop ‘intangible’ or ‘knowledge’ assets and those which develop ‘tangible’ or ‘capital’ assets.
- The ability to recognise that the likelihood of innovative firms acquiring finance is likely (as with any firm seeking finance) to vary according to a variety of ‘structural’ or resource-based characteristics of firms and their owners and managers – including firm size, sector, location, prior entrepreneurial experience, informal and formal business linkages, family ownership or not, the gender and ethnicity of owners and so on.
- Varying concepts which help to explain patterns of finance-seeking and of finance-acquisition (or not), including theories relating to ‘discouraged borrowers’, to ‘absorptive capacity’, to ‘path dependency’, to ‘credit rationing’ and to failures on the supply side of debt and equity markets.

The main factors which the literature review suggested are in play when innovative firms seek finance are summarised in Table 4. In essence, review of literature on this theme leads to a proposition that an innovative firm’s position in respect of each of a variety of ‘independent variables’ (characteristics of the business, its managers, and its innovation, as in Table 4) cumulatively lead to a particular outcome in respect of the ‘dependent variable’, that is greater or less success in obtaining finance. Investigating the order of precedence of these factors – the relative contributions which they make to the outcome of getting finance or not – is one of the basic challenges of the research. There are clearly complexities in that challenge – many of the factors are inter-correlated, some may be particularly prominent in some economic circumstances and not others, and beliefs and behaviours on the supply side, not just the characteristics of the firms themselves are significant:

Table 4: Summary typology of key business innovation and finance characteristics

Businesses typology of innovation and finance characteristics
<p>Innovation:</p> <ul style="list-style-type: none"> • New or improved products, services or processes • New to the national and/or international market, or to the firm only • Short horizon R&D (typically digital software taking 2-3 years) or longer horizon R&D (typically life science, advanced engineering or cleantech, taking 10-15 years)
<p>Asset base:</p> <ul style="list-style-type: none"> • Knowledge asset base, undertaking R&D in any sector, notably involving software development • Capital asset based, hardware equipment development associated with manufacturing and testing facilities
<p>Management resource base (human capital):</p> <ul style="list-style-type: none"> • First time manager with no previous experience of accessing finance • Spin-out manager with external finance and customer base linkages • Serial manager with previous experience of accessing finance • Larger management team with specialist skilled Finance Directors and experienced non-executive directors (NEDs), often appointed by or representing existing investors
<p>Management characteristics:</p> <ul style="list-style-type: none"> • Pecking order preferences for external finance, typically preferring debt over equity • Family managed businesses are more averse to using equity finance and potential loss of control • Women-led businesses are more cautious of using external finance • Some ethnic minority owned businesses face cultural difficulties in accessing external finance
<p>Business networking (social capital):</p> <ul style="list-style-type: none"> • Willingness to use external assistance can increase the chances of accessing external finance, notably grants and equity finance • Collaborative relationships with academics and business suppliers/buyers can improve access to external finance

Business characteristics:

- Innovative R&D and creative businesses face information asymmetries with financiers, particularly where funding required is too small to justify due diligence
- Young, small businesses without trading track records and lacking collateral find it difficult to access external finance, whilst larger, more established businesses, are more successful at accessing all types of external finance.
- A business life cycle stages approach which contrasts early (pre and early trading up to 2 years), growth (2-5 years trading) and larger established (trading more than five years) businesses appears most appropriate in relation to studying access to finance
- Service sectors with high churn, such as retail and hotel and catering may find it harder to access external finance
- More peripheral and rural UK businesses may find it difficult to access external finance due to distance and access issues.

In summary, the study's *research design* (one which included a range of firms across the size/maturity spectrum and which had been pre-identified as having displayed some degree of innovativeness) and the study's main *research instrument* (a guide for discussions with these firms) have both been strongly influenced by the review of literature summarised in this section. It is believed, therefore, that the subsequent programme of primary research with firms, of which results are set out and interpreted in following chapters of this report, has been valuably informed by a wealth of previous evidence on, and insights into, the relationship between innovative firms and financial markets which is the essential theme of this study.

Annex B: References

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