Department for
Business, Energy
& Industrial Strategy

SCOPING PILOT AND IMPACT EVALUATIONS OF THE NEW INNOVATION FINANCE PRODUCTS

A report by SQW, Enterprise Research Centre and St John's Innovation Centre

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Contents

Executive summary

Background

SQW, working with Enterprise Research Centre Warwick Business School and St John's Innovation Centre, was commissioned to scope the options for evaluating the New Innovation Finance Products (NIFPs) that are expected to be piloted from 2017 and for evaluating the subsequent impact of the products. This report sets out the findings and recommendations from this scoping work.

The scoping work was undertaken at an early stage of the policy, providing an opportunity for the evaluation to inform the overall design, but also presenting a challenge in that the work was conducted in parallel with the later stages of product development (with associated uncertainties over such things as the specific delivery models and average loan sizes – see below for more details). The evaluation framework has been developed based on the most likely models of implementation and with some flexibility for the approach to be adapted. In addition, various scenarios have been considered for key assumptions such as average loan sizes, in order to inform the specific methodological design.

The aim of the study was to develop an evaluation framework for the new innovation finance products, with specific objectives to:

- develop a logic model and theory of change for the standard loan and equity products against which to evaluate the policy
- review the feasibility of different approaches for pilot (focussing on processes of delivery) and impact evaluations
- inform monitoring and data collection to ensure an effective evaluation.

Evaluation issues and challenges

A number of evaluation challenges were identified as part of the scoping work, which are common across the loan and equity products. These included the complicated non-linear nature of innovation and how this leads to intended effects for businesses (including over long and varying timescales), and the heterogeneity of different aspects of the products, including the nature of companies that may benefit (e.g. by sector, size, markets and pace of change in markets). Set against the potential long timescales to outcomes, there was an intention to build in real time learning as far as possible, in particular by using feedback from monitoring and implementation (including digital data collection) to inform future delivery.

There were specific challenges noted in relation to the new innovation finance products:

- Repayable finance for innovation projects have not been tested in a UK context. As a result, there is uncertainty as to the size and nature of the demand for a debt product. There is also uncertainty on the potential size of the loans, which themselves are likely to vary in value depending on companies' requirements. These pose challenges to evaluation planning because this limits the ability to estimate sample sizes. From the perspective of the impact evaluation, the uncertainty and the scale of the product means that an econometric assessment is considered to be feasible for the pilot, and may be difficult to implement even when the product is scaled up (though there is potential to draw on multiple competition rounds). As a result, for the impact evaluation, combinations of counterfactual and theory-based impact evaluation have been considered to enable triangulation of findings from different methods.

- The equity product was at an earlier stage of development at the time of the scoping work. As with the debt product, there are particular challenges in relation to evaluating an equity product, including the long investment timescales, coupled with the long timescales to outcomes, and the relatively small numbers of companies invested in. These points mean that impact evaluation will require 'small n' approaches and that substantial time will need to pass for impact and financial evaluation to provide conclusive results.

These issues and challenges have informed the detailed assessment of evaluation options.

Proposed approaches and timings

Loan product

The purpose of the pilot evaluation will be to assess the demand for innovation loans and the processes of marketing and implementing the loan product (covering issues around interest and demand for the product, and the experiences of customers and unsuccessful applicants), and to make an assessment of early progress in the achievement of intended outcomes. In doing so, the pilot evaluation offers the opportunity to evolve and refine the products and its implementation for scaling up. The key pilot evaluation questions, as identified through scoping with BEIS, Innovate UK and the British Business Bank, are as follows:

- What is the interest in, and demand for, the pilot products? What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?

- How effective are the processes of implementation and what are the experiences of the customer journey?

- What evidence is there of progress towards the achievement of intended outputs and outcomes?

The overall approach to the pilot evaluation should be based on a formative (i.e. process) assessment, and a theory-based assessment of early progress towards achieving outcomes. It will require triangulation of results using a mix of methods and various data sources to complete. These methods and data sources are summarised as follows:

- Analysis of data collected as part of the loan application process to understand the scale and nature of interest and demand for the product. This would use data on the characteristics of applicants and proposed projects to assess the profile of applicant firms (both successful and unsuccessful). In addition, the profile data should be compared to other relevant group(s) of companies, such as Innovate UK single company grantees and businesses supported through British Business Bank Schemes (e.g. Help to Grow).

- Surveys and in-depth interviews with applicant firms that were successful and unsuccessful to gather data on motivations for applying to the scheme, its attractive features, implementation processes, drawing on the intended customer journey, and to test issues associated with discouragement (for the unsuccessful firms).

- Interviews/feedback from those involved in implementation from Innovate UK and British Business Bank. This would be to gather feedback on how implementation is working, covering steps of the customer journey and the joint working between the two organisations.

- The theory-based assessment to test the early effects and progress towards outcomes will draw on data collected in the follow-up round of surveys and in-depth interviews with both successful and unsuccessful applicants. The approach would collect data that tested the causal links and assumptions contained within the logic model and theory of change (that are set out in chapter 3 of the report) and to evidence, using contribution analysis, the extent to which any early outcomes/ changes in behaviour were due to the loan product (as opposed to other factors).

- In addition, as part of the pilot evaluation there is scope to implement a Randomised Controlled Trial (RCT) to test different approaches to marketing the loan product. This would involve experimenting with different marketing messages (e.g. emphasising particular product features) to different groups of targeted companies, and then comparing click-through and application rates.

The impact evaluation of the loan product will need to build on the initial assessment of the effects of the pilot. As set out above, the evaluation of the benefits of the pilot will focus on the adoption of theory-based impact evaluation techniques to test the early effects of the theory of change from evidence collected from cohorts of beneficiaries and non-beneficiaries – this may inform revisions to the theory of change. The impact evaluation will focus on assessing the later effects on innovation and business performance. The impact evaluation questions are as follows:

- What has been the 'additional' effect of the loan product on intermediate and final outcomes, covering in particular the effects on innovation behaviour and performance, and business performance?

- What spillover effects can be identified from the innovation projects that have been supported by the loan product?

- Has there been any crowding out of private R&D investment amongst firms supported? Has there been any crowding in/out of lending or other investment by public and private finance providers? Have there been any other third party effects, such as displacement (e.g. of the business/market share of other firms)?

In addition to these evaluation questions, the impact evaluation stage will need to consider and report on the emerging evidence on value for money, drawing on evidence on the repayment of the product and the financial performance across the portfolio of loans.

The overall approach to the impact evaluation will extend the theory-based impact evaluation of the pilot by assessing later stage effects, and will complement this with a counterfactual-based econometric assessment. The recommended methods for the impact evaluation are a triangulation of results from the following approaches:

- A counterfactual impact evaluation is suggested to compare the intermediate and final effects of a beneficiary group with a non-beneficiary group (likely to be established from unsuccessful good quality applicants that meet or are close to quality and credit assessment thresholds). The data should be collected using application forms, monitoring and multiple rounds of surveys, based on cohorts of applicant companies in 2019/20 and 2020/21 (though timings can be flexible). A further benefit of using unsuccessful applicants is the collection of data on what has happened to projects that did not receive loan finance. As part of the counterfactual approach, there is an additional data linking option, though there are weaknesses in the administrative data that mean that this is a complementary, rather than core, method (see the full report for more details).

- Theory-based impact evaluation, drawing on the continued tracking of pilot cohorts from earlier years – covering the progress of their projects and companies. The approach would collect data that tested the causal links and assumptions contained within the logic model and theory of change (that are set out in chapter 3 of the report) and to evidence the extent to which later outcomes were due to the loan product (as opposed to other factors).

- Consideration of third party and indirect effects through the use of the aforementioned methods (e.g. using surveys to estimate displacement and any discouragement/encouragement effects; and using case-based research to assess spillover effects) as well as qualitative research with financiers to consider crowding in/out effects.

The financial assessment will draw primarily on monitoring data on: the value of loans in the pilot and impact evaluation cohorts; the opportunity costs of these loans; repayment data; and data on defaulted loans. It is important to note that for the first loan recipients, final repayments may not be due until 2027, taking into account drawdown, grace and repayment periods. As noted below, the final evaluation is proposed for around 2025, and so at this stage it will be subject to a degree of uncertainty. As the focus of the assessment will be on portfolio level performance (e.g. annual default, annual repayment, etc.) based on a book of loans at different stages of repayment, the degree of uncertainty may be reduced slightly.

At the time of writing, the pilot for the loan product is expected to run from 2017/18 to 2018/19 (with findings from the pilot expected to inform the full roll-out in 2019/20). It is proposed that the pilot impact and process evaluations provide interim and final reports in March 2019 and March 2020 respectively, which will focus on process issues and evidence of any early effects such as on intermediate outcomes (it will be too early for findings on the effects on business performance and for a financial evaluation). The full impact evaluation will draw on subsequent stages of fieldwork with the pilot cohort, though it is proposed that the majority of evaluation efforts for the impact evaluation are with new cohorts from the scaled up scheme (i.e. from 2019/20). It is recommended that the impact evaluation then runs to 2025 at least in order to assess the outcomes and impacts of the product, with interim outputs in advance of a final report in 2025 (details are provided in the main report).

Equity product

Given the long investment timescales and the likely nature of a fund, the evaluation approaches have been considered for a single fund running over a long period of time. Drawing on British Business Bank approaches to evaluating funds, with which the evaluation may benefit from being aligned, three stages of assessment have been recommended. First, an 'early assessment' should focus on the processes of implementation. Second and third stages, namely 'interim' and 'final' assessments, should shift towards assessing early effects, and then the impact and financial performance of the fund.

For the early assessment, the key evaluation questions are as follows:

- What is the interest in, and demand for, the equity product? What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?

- How effective are the processes of implementation and what are the experiences of the customer journey, including how the role of the fund manager(s) has been/is being used to support company development?

The approach to the early assessment should draw on a mix of methods. Monitoring data should be used to understand sources of enquiries, applications, and, if data are available

and paid for, comparisons to companies securing other equity funding (e.g. through use of private data sources). This should be complemented with interviews that combine a mix of perspectives on the processes of implementation. These should cover interviews with the appointed fund manager(s), with applicant firms on their motivations and experiences, and with a set of informed individuals and experts (such as representatives from other investors, Innovate UK and the British Business Bank).

As the evaluation shifts towards assessing the outcomes and impacts of the fund (in the interim and then final assessments), the key evaluation questions are as follows:

- What early evidence is there of progress towards the achievement of intended outputs and outcomes, including the attraction of other private investment? This is the core question for the interim assessment.

- What are the effects of the product on innovation and business performance of those companies that are invested in? The interim assessment should consider early evidence on this question, covering actual effects to date and expected effects. The later final assessment should seek to answer this question more conclusively.

- What is the financial performance of the fund in terms of returns on investment? This should be covered in the final assessment.

- Is there evidence of wider innovation effects, such as through spillovers? Emerging evidence on spillovers should be collected in the interim assessment, with this question then revisited in the final assessment.

Given the nature of the fund, and the associated challenges, a counterfactual impact evaluation is considered to be unfeasible (as discussed in detail in section 5 of the main report). The recommended evaluation design is to draw on theory-based techniques that enable an assessment of how far the equity product (including both funding and the role of the fund manager(s)) has contributed to the development of companies benefiting, relative to other factors (drawing on the use of contribution analysis). The specific methods should include the following:

- Collation of data on the progress of companies and their performance from the fund manager(s). Financial data, including on company valuations and ownership shares, from the fund manager(s) at the time of the final assessment should be used to inform a financial evaluation of the potential return on investment (this will be 'potential' as given timescales there will still be uncertainty around exits and their values).

- Interviews with the appointed fund manager(s) covering the role of the fund (both funding and support) in helping companies to develop.

- In-depth qualitative interviews with applicant firms on outcomes achieved and the factors that have contributed to these outcomes (including the fund and also other

factors). It is expected that these interviews will focus on mainly those that were successful (equity recipients), but if possible they should also include unsuccessful applicants or withdrawals ('near misses' for investment) in order to provide an alternative perspective.

- Interviews with other key individuals that can comment on the extent to which the fund and other factors have been important in contributing to outcomes; these may include representatives from other investors, and also from other organisations such as Innovate UK and the British Business Bank.

The analysis of the contribution of the fund to the achievement of outcomes will need to be based on the mix of perspectives that form this evidence base. The financial assessment will require evidence on the values of exits and companies where there is still some ownership by the fund, considering at a portfolio level the returns generated. It is noted that by the time of the final assessment there may still be exits that are to come, and so estimates should be made based on expected values.

Recommendations on monitoring

Loan product

It is expected that the loan product application process will be managed by Innovate UK, and this will draw on their existing processes. The review for this study indicated that the data collected for this are relevant and almost comprehensive. There are four further elements of data that should be included, which would: facilitate matching to a comparison group drawn from administrative data (points one and two below); provide baseline data on innovation behaviours (points two and three below); and provide further historic observations on key metrics to facilitate a more robust analysis between the beneficiary and comparison groups. These four elements are:

- age, i.e. when the company was incorporated
- innovation behaviours, replicating core questions contained within the Community Innovation Survey on whether the company has undertaken product/service or process innovation in the last three years
- further data on innovation behaviours to act as a baseline on whether the company has used partnerships for innovation (again drawing on the Community Innovation Survey for the specific questions)
- actual data on turnover, employment and R&D expenditure for two complete years (the current form only asks for one year's data).

For the on-going monitoring of innovation projects, it is recommended that core aspects of outputs and company metrics need to be incorporated into the monitoring processes of Innovate UK as these are currently not covered. This should cover those 'outputs'

identified in the logic model (in chapter 3 of the full report). In addition, on an annual basis the company 'projections' for core metrics that are collected at application (e.g. turnover, R&D and employment) should be revisited to gather data on 'actual' performance. At project closure (and thereafter, e.g. if there is a post-project round of data collection[1]), data should again be collected on these indicators. A full list of core indicators for monitoring and evaluating the performance of the loan product can be found in the Annex to this report.

On the financial side, data should be collected on a number of aspects to inform evaluation, in particular for a financial assessment of the loan product. This includes data on agreed loan values, amounts drawn down, repayments (of interest and principals) and any missed repayments/defaults.

Equity product

The collection of monitoring data for the equity product will need to be agreed with the appointed Fund Manager(s). There are a number of stages when monitoring will need to be undertaken, which are set out below (see also list of core indicators for the equity product in Annex):

- enquiries and applications, e.g. on contact information, business metrics and company characteristics for those companies going some way through the process (i.e. 'near misses' or late withdrawals) as well as successful applicants
- milestones associated with the investment and progress against these for beneficiary companies
- metrics on company development for all beneficiaries, e.g. covering employment, R&D expenditure, turnover, exports and new investment/finance raised
- financial metrics on the portfolio's financial performance, e.g. for each company the current valuation, share of ownership, and expected valuations.

[1] Following the completion of the closure report and finance close, there is normally no on-going contact with the beneficiary. However, Innovate UK's contracts include a stipulation that the beneficiary can be contacted for up to five years following completion, which could include a post-project review.

1. Introduction

The 2015 spending review and autumn statement indicated that: "The Government will introduce new finance products to support companies to innovate following best practice in countries such as France, Finland and the Netherlands." Following this announcement, the Department for Business, Energy and Industrial Strategy (BEIS) has been working with Innovate UK and the British Business Bank (BBB) to develop new innovation finance products that, alongside other public and private sources of funding, are intended to broaden the range of finance options for innovation.

SQW, working with Enterprise Research Centre and St John's Innovation Centre, was commissioned to scope the options for evaluating the pilot products that are expected to be launched from 2017 and for evaluating the subsequent impact of the products. This report sets out the findings and recommendations from this scoping work.

The scoping work was undertaken in parallel with the later stages of product development. This provided an opportunity for the evaluation to inform design; and also a challenge in that certain aspects of the policy were under development.

Objectives and approach

The study objectives were to develop a pilot and impact evaluation framework for the new innovation finance products, specifically:

- Develop a logic model and theory of change for the standard loan and equity products against which to evaluate the policy
- Review the feasibility of different approaches for pilot and impact evaluations
- Inform monitoring and data collection to ensure an effective evaluation.

In meeting the objectives, it was important to consider how the role of early evidence could inform ongoing learning with respect to developing innovation finance products.

The research methods used to undertake the study included:

- An inception meeting to discuss and clarify the requirements and scope of the study
- Scoping discussions with representatives from: BEIS; Innovate UK; British Business Bank; HM Treasury; and UK Government Investments

- Desk-based review of: background to NIFPs; UK and international literature with particular focus on evaluation practice, including other innovation finance products[2]
- Development of anticipated theories of change and logic models for the standard loan and equity products
- Development and appraisal of evaluation options for the pilot and impact evaluations, including development of a preliminary findings paper; and BEIS feedback workshop discussion.

Background to the products within scope

There were two products in scope for this study:

- A standard loan product, which may include a grace period and a repayment term of up to five years. For the purpose of the scoping study, a loan pot of around £60-100m is assumed for the pilot phase, though the actual scale and features of the pilot are to be confirmed. The first loans are expected to be awarded in 2017.
- An equity product based on existing finance schemes (e.g. funds delivered through British Business Bank). The recommended minimum requirement for funding is c. £25-30m for a fund positioned at different stages of firm development. There is potential for variety across investee firms, though there may be targeting of sectors.

The focus of the study was on the above products but the development of an evaluation framework would need to be flexible to continuing development of the policy and refinement of the products through the pilot.

Structure of this report

The structure of this report is as follows:

- Chapter 2 outlines the likely nature, and the associated issues and challenges for evaluating the loan and equity products
- Chapter 3 presents the underlying logic and theory of change for both the loan and the equity products
- Chapter 4 sets out the recommended evaluation approaches to the loan product
- Chapter 5 sets out the recommended evaluation approaches for the equity product

[2] This review covered limited material drawn from BEIS and a brief web search. It was not comprehensive.

- Chapter 6 presents the monitoring and evaluation plan, including the overall timings for monitoring and evaluation, and the implications for monitoring data collection
- An Annex provides a list of core indicators for the loan and equity products.

2. Evaluation issues and challenges

This chapter outlines the nature of the loan and equity products, and in so doing sets out the key issues and challenges for evaluation. This covers the products' target audience, the customer journey, the expected outputs and outcomes, and the key aspects of the wider support landscape. It is important to re-iterate that this scoping study was conducted during product development and certain features of the products discussed here may not reflect the products introduced in the pilot.

Nature of the products and target groups

Loan product

The loan product is intended to be sector-agnostic and targeted at limited companies to incentivise them to undertake new innovation or more innovation activity. The intention is to support companies which would not be able to finance the innovation at the same speed and scale without the loan product. Beneficiaries may include previous Innovate UK beneficiaries (e.g. of grants for developing ideas at earlier stages of development), but it is not limited to this group. Whilst not specifically targeted at particular stages of innovation, it is expected that the loan product may be attractive for later stages of development. Table 2-1 below provides a summary of the key features of the loan product used for the basis of the scoping study. The market research for BEIS (2016)[3] and scoping consultations with stakeholders undertaken for this study point to an expectation that non-price features, for example a two-year grace period, may potentially be more significant drivers of appetite.

The evaluation will need to take account of the complexities of innovation. There are various aspects to this, not least the heterogeneity in the firms the loan product is intended to support. The appetite for the loan product (and for specific features) is likely to vary by e.g. sector, size of firm and stage of development. Whilst the market research for the new innovation finance products (BEIS, 2016)[4] was limited in the number of companies consulted, it did highlight where there may be differences in appetite. For instance, it found that:

[3] BEIS (2016) New Innovation Finance Products: Qualitative Research Interim Report, June 2016, BIS Research Paper (Draft). This research was based on interviews with 40 'innovation active' firms and 10 financiers (lender/investor/investor association).

[4] Ibid, p17.

- large firms tended to have different appetite for the loan product compared to smaller firms[5]
- manufacturing and materials sector (majority large firms) had relatively lower appetite across different features of the products
- firms in the hardware and product innovation sector were positive about having the option of flexible repayment terms, especially if funding operational risk
- firms in health and life sciences (in particular, medtech and biotech), built environment and aerospace had greater appetite when the products included longer grace periods.

These points suggest that certain features will be attractive to different types of firm, and this may need to be reflected in aspects of design and marketing. It also implies that evaluation will need to gather evidence on take-up/demand, attractiveness of the product(s), and experiences of customers not as a homogenous group of firms but segment, as far as possible, by type of firm (this will require greater monitoring and possibly resource to gather details on firms at different stages of their journey). The nature of the firms (and their innovations) that use the loan product will influence the complexity discussed above, with for example timescales to commercial outcomes longer for some companies than for those companies with shorter innovation development cycles. The breadth of the target group has been important in developing the theory of change and evaluation design. The theory of change, set out in chapter 3, has reflected the complexities by, for example, highlighting how timescales and routes to outcomes may vary (recognising that innovation is not necessarily linear).

Another issue for the evaluation is the uncertainty over how many firms will apply and be successful for the loan pot on offer. This is related to the differences in loan sizes that firms may wish to access. As is indicated in Table 2-1, the loan size may vary from £100k to £5m. The scoping discussions have indicated that the average loan sizes for the pilot could be highly skewed; for the purposes of this study we have assumed a central estimate in the range of £300k-£1.5m[6] which has implications for the number of beneficiary firms informing the type of evaluation approaches for the pilot and impact evaluations (see chapter 4). Different scenarios may develop depending on the loan sizes applied for. Whilst chapter 4 sets out the approach based on the assumptions and ranges

[5] For example: some larger firms reported an issue with obtaining permission from shareholders for collateral and security; larger firms may have alternative sources of funding available to them: 'loans from parent companies, good existing relationships with banks, assets in other parts of the business and the ability to cross-subsidise innovation from other parts of the business'; and 'complex' internal governance structures (often international) of larger firms may complicate the processes to access the product. BIS (2016) New Innovation Finance Products.

[6] There is significant uncertainty at this point, and the pilot will provide a more realistic estimate of the expected average. £300k draws on evidence from the market research for new innovation finance products, and €1.5m is drawn on the experience of the Dutch Innovation Credit Facility.

above, these should be revisited by BEIS and partners when there is greater knowledge of the market from the pilot. The development of evaluation options also included some discussions on more specific targeting, e.g. of smaller but more loans, which would facilitate more robust evaluation sooner. However, these were rejected on the basis of the importance of using the pilot to test the market.

Table 2-1: Summary features of the loan product

Feature	Summary	Background
Customer type	Limited companies with or without full credit history Qualify through Innovate UK selection processes (but not limited to this group) No sole traders, universities (or collaborators)	Initial indications are that the market may not be large: c. 23k-25k innovative SMEs p.a. fail to raise all the debt funding they need. About 1 in 10 firms which need support seek it. Not all firms will meet credit requirement. Not all projects will be at a suitable stage of innovation for debt finance
Loan size	Working capital: £100k - £1m Capital expenditure (capex): £250k - £5m	Evidence from the Netherlands also suggests average loan amounts of €1.5m
Pricing	Positive non-zero rate of interest Assume fixed price over term of loan (earning little profit on interest)	Median rate in research for the European Commission (2016) suggests 3%[7] Market research for BEIS (2016) suggests price is less important to customers than other features (e.g. grace periods)[8]
Security	Collateral required Secured against assets purchased using funds from the loan (relevant to only capex) IP taken (although may not be able to value the IP in case of write-off of loan)	Market research for BEIS (2016)[9]: key considerations, esp. for younger, smaller firms in service sectors that lack tangible collateral
Drawdown	Project drawdown period (interest only): 12, 24, 36 months Loans for working capital - smooth drawdown in quarterly instalments Capital equipment purchases – upfront ~50%	Based on typical grant project lengths (possibly different for later stage innovations)

[7] InnoFin Advisory and European Investment Bank Advisory Services (2016) Access-to-finance conditions for KETs companies. Final Report prepared for the European Commission DG Research and Innovation. See report here.
[8] Ibid, p17.
[9] Ibid, p17.

Feature	Summary	Background
	of part of loan followed by quarterly drawdown on remainder	
Grace period/ Payment holiday	Grace period (interest only) c. 24 months No principal repayment during grace period or drawdown period	Research for Innovate UK (SQW et al, 2015)[10] indicates that 90% of Innovate UK's 'Smart' supported development projects expected to introduce new product to market within two years
Repayment window	Repayment of principle and interest is 5 years (straight line amortisation)	Median term loan is 5 years in research for the European Commission (2016)[11].

Source: BEIS and references in table

Equity product

The equity product is designed for wider set of project development stages, and may include a mix of Technology Readiness Levels (TRLs), including lower TRLs compared to the loan product (i.e. innovations that are further from market). There is potential for variety across firms and projects, though there may be some targeting of sectors and certain sectors tend to have a greater appetite for equity finance. The attraction of equity will be dependent on type of firm and the attitudes of company directors etc. (risk appetite; and level of equity aversion). A distinguishing feature of the proposed equity product compared to the loan is that, in some cases, it is considered 'smart money' i.e. the investment is alongside advice and support (e.g. board representation, strategy/business planning support, access to networks etc.). This is in common with other equity available in the private market.

The equity product is likely to involve a different application process and set of appraisal and due diligence considerations than for loan and grant-based schemes e.g. on company growth, exit potential and business valuation. The equity product is also likely to involve monitoring of data over a longer time-period than would generally be the case for loan or grant-based products; a 10-year (or more) time horizon is likely to be required bearing in mind the typical 'J-curve' pattern of expected returns, where positive returns to equity investments are unlikely to be achieved until at least five years after the first investment (depending on sector type), and with time required for a fund to be fully invested. Related to this, the length of time until outcomes are realised can be long, and even longer than for the loan product.

[10] SQW, Cambridge Econometrics and BMG Research. (2015). Evaluation of Smart: Impact and Process Evaluation. Report for Innovate UK.
[11] Ibid, p19.

There may also be a need to incorporate a balance of measures/outcomes for the equity product which reflect both economic development and financial objectives e.g. indicators that are bespoke/relevant to individual companies (especially for project milestones); indicators of economic outcomes, including progress towards attracting private investors, business growth and exit point; and measurement of returns (specifically financial performance). The evaluation may also need to take account of star performers and whether this provides an economic return greater than original investment.

Taking into account the above, the equity product may involve providing capital funding into an existing British Business Bank scheme. It was expected that Innovate UK and British Business Bank expertise would be 'pooled', though specific roles were to be confirmed. Notwithstanding this, the equity product may be positioned at different stages of firm development (i.e. seed, early and late stage), with early and late stage options the most likely at the time of writing. Assuming this is the case, there are likely to be relatively small numbers of companies within a fund. For example, for a fund of c. £30m which attracts further private co-investment for firms at all stages of development, and where initial investment amounts typically range from £100k to £1m, there may be around 60 companies that are supported[12]. For a fund of c. £30m investing at later stages, where individual investment amounts are greater, there will be fewer companies. These small sample sizes have implications for the evaluation approaches recommended, with small numbers for the equity (and loan) product highlighting the likely requirement for mixed evaluation methods.

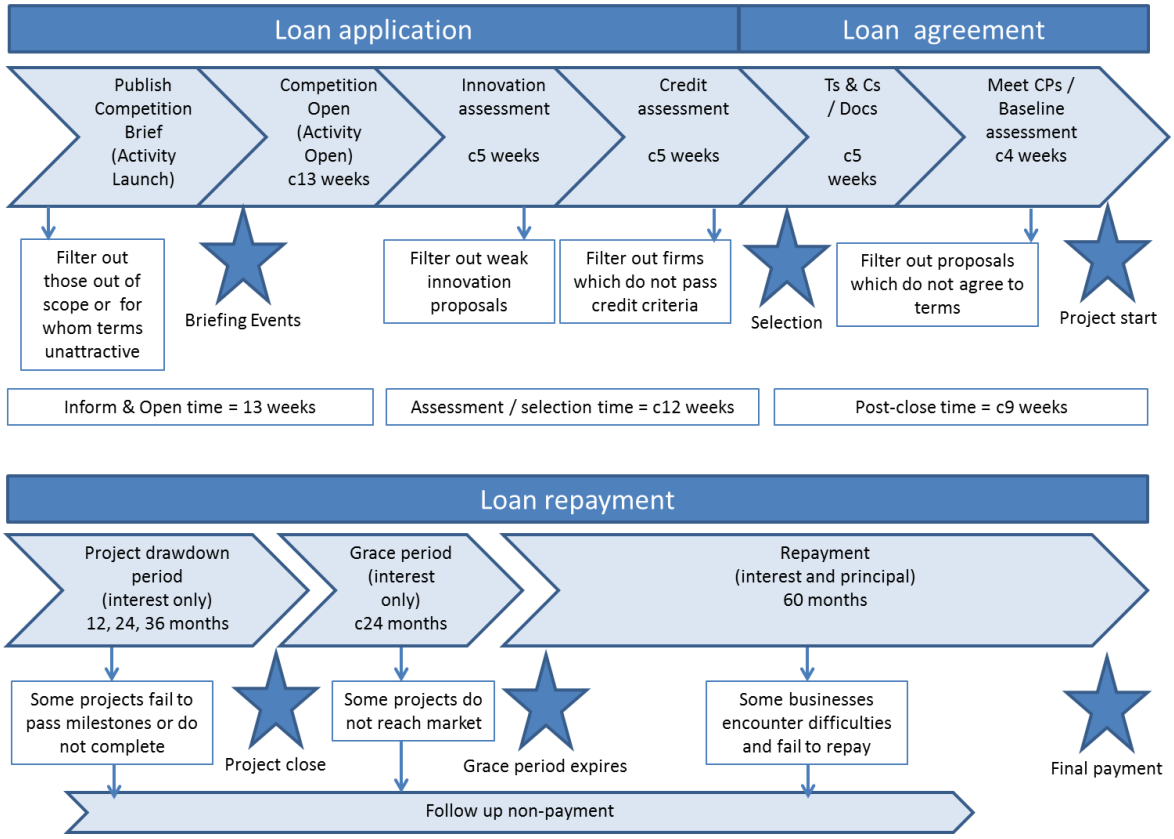
Customer journey

The effectiveness of the processes of implementation and the experiences of the customer journey will be a vital aspect for the evaluation. Figure 2-1 below provides an illustrative process for the customer journey for the loan product. This comprises three main stages (application; agreement; and repayment) as set out below. It is worth mentioning that the length of time available for the pilot means that 'digital delivery' will be central to the loan (and equity) product, facilitating real-time monitoring of certain information. This will contribute to the experience of the customer journey (and associated processes).

It is also worth pointing out that the equity product was at the early stages of development at the time of writing, with the corresponding customer journey for the product to be determined. Therefore, an illustrative example for the customer journey for the equity products is not available.

[12] For instance, with the ACF which does initial investments of between £100k and £1m has invested and committed in excess of £30m, alongside a further £137m from co-investors, providing support to 69 firms. See: http://www.angelcofund.co.uk/

Figure 2-1: Illustrative customer journey



Source: BEIS

Loan application and agreement

The loan application stage comprises of four 'steps': the first relates to publishing of the 'competition brief' (i.e. launch of the activity). This is to filter out firms which are out of scope or which do not find the terms and conditions of the product appropriate for their needs. The second stage is the duration of the competition, which is expected to be c.13 weeks with various marketing channels used (including briefing events) during this time to raise awareness.

Following on from this, the applications that are submitted will be assessed based on 'innovation' and 'credit' assessments (third and fourth steps). The former filters out 'weak' and ineligible innovation proposals using an established innovation scoring approach, and the latter filters out firms which do not meet the credit criteria. It also important to mention that baseline information should be collected from all firms at the application stage (see Annex for details). Firms are 'selected' after they pass through the assessment phase. The time involved for assessment/selection is expected to be c. 12 weeks. An important aspect of the assessment stage will be to understand the nature of 'noes' (including issues relating to encouragement or discouragement).

The desk-based review found different criteria used to screen applicants including e.g. management capacity of the firm; commercial prospects/feasibility of the project; technical

feasibility of the project / failure risk; project strategy, plan and organisation; necessity of the finance. These may need to be borne in mind for the evaluation (perhaps more so in the pilot stage as further refinement may be required/possible). Further, scores could be collected for each of the criteria mentioned rather than only a total score. Notwithstanding any data accuracy issues, this may help in statistical analysis to determine for whom the loan product has worked.

There are examples of practice found in the literature on the application process which are useful to point out: support is provided to enhance quality of propositions/business plans (e.g. part of the process for the Bridges Fund[13]); feedback provided to applicants on initial unsuccessful bids contribute to successful applications in subsequent rounds (e.g. AMSCI[14]); stringent tests of financial constraints applied at the appraisal stage to ensure that only projects that would not otherwise be funded by the private sector are selected; clear guidance for applicants and monitoring required at the start of the application process.

The marketing and approach to selecting applications will have to ensure the 'right' firms are targeted to ensure successful take-up and ultimately successful projects[15]. The market research for BEIS (2016)[16] suggested that marketing and communication of the product will be crucial to its' success and that the communication should be "simple, clear and brief". This information should prioritise the following points: minimum and maximum amounts; security requirement; grace and repayment periods; if repayment is contingent on project success, details of how project success is defined; the application process; implications for any other funding arrangements e.g. R&D tax credits or innovation vouchers; legal structure of the product. The market research also identified a range of channels that would be effective for raising awareness e.g. web portals; email communication; sub-national engagement; communication through existing sector specific channels and networks; through other investor networks; informal news outlets (e.g. blogs); nationwide workshops; and information hotline. The market research highlighted the scale of the communications challenge: identifying a large number of points that firms wanted in material and the broad range of potential communication channels. The implication was that the clarity of the message will be key.

[13] BIS (2015). BIS equity finance programmes qualitative reviews of: a) UKHTF and b) the Bridges Fund
[14] BIS (2015). Advanced Manufacturing Supply Chain Initiative (AMSCI): process evaluation. BIS Research Paper NO. 223
[15] The desk-based review found that debt and equity products were targeted at firms of varying size, age, sector. For example, in the Danish Growth Fund, debt products for both start-ups and established firms, tend not to be sector specific; and equity for seed and/or start-up phases, mainly in ICT and life sciences sectors. See: DAMVAD, Murray, G. and Cowling, M. (2014). Evaluation of the Danish Growth Fund: Evaluation of activities, 2010–2012. Report for the Danish Ministry of Business and Growth. The Dutch Innovation Credit Facility typically for start-ups and early stage companies in the high-tech or life sciences sector; majority of firms are not older than seven years. See: De Jong, P., Gielen, M. and Van Praag, M. (2013). Evaluation of the Dutch Innovation Credit Facility. Study Commissioned by the Dutch Ministry of Economic Affairs.
[16] Ibid, p17.

As discussed above, the routes of marketing are likely to involve both public and private channels (online and offline e.g. publicising through networks, events, business advisors and various publications). This may be tailored for different audiences bearing in mind the heterogeneity of firms e.g. attraction to specific product features varies by sector and size of firm (as highlighted above). It is worth noting here that the desk-review for this study found that applicants for finance became aware of programmes through industry associations and accountants suggesting that publicising through private sector channels can be important (e.g. AMSCI)[17]. The marketing could also involve randomised marketing messages, e.g. using different marketing approaches or emphasising different aspects of the loan product (see chapter 4). In any case marketing will involve online applications to be received by Innovate UK.

The selected firms from the loan application stage undergo the loan agreement process. This comprises of two steps: drawing-up and reviewing the terms and conditions relating to the agreement (c. 5 weeks in duration); and the borrower having to meet the list of conditions precedents (CPs) contained in the loan agreement (c. duration 4 weeks). These are the specific conditions that need to be fulfilled before any money can be drawn down. There will be legal representatives involved (on both the borrower and lender side) until the relevant documents are in agreed form. Fulfilling the CPs will filter out proposing companies which do not agree to the terms and conditions. After agreement has been reached, the borrower can commence the funded project and begin draw down of funds.

The loan application stage is one of the prime areas where digital aspects should be used to monitor and analyse interest and demand for the product. For example, "Google Analytics"[18] can be used to analyse the volume of visitors to the product website, as well as provide data on other aspects such as whether direct visits or referrals, the length of time on the site, and "bounce rates"[19]. The digitalisation will enable real-time tracking of potential and actual customers which should inform delivery as product is being marketed and delivered (e.g. interest after a product 'briefing event' by number of visits to the online application). These data should be used with profiling of customers as part of the evaluation monitoring (see chapters 4 and 5).

Loan repayment

The loan repayment stage involves project drawdown period on a quarterly basis for 12, 24, and 36 months, subject to projects progressing. Some projects may fail to pass milestones, may access other private funds or not be completed, so will not drawdown all of the funds. This is followed by a grace period (c. 24 months) to enable pre-commercialisation activities to be completed, followed by repayment (c. 60 months) (including a 'final' payment). It is worth noting that some firms may encounter difficulties

[17] Ibid, p23.
[18] See Google Analytics: https://www.google.com/analytics/analytics/#?modal_active=none
[19] Bounce rate refers to proportion of hits on a website that leave immediately.

and fail to repay, so following-up non-repayment becomes important. For the evaluation, understanding the reasons for non (or delayed) repayment will be important as these may point to problems with the project/ company itself or other factors. Information on defaults ought to be collected through on-going monitoring and the evaluative research may be able to consider certain issues (recognising that obtaining direct feedback from companies will be challenging).

On-going monitoring will be essential and must ensure the burden of this is proportionate to the support being provided (for both customers and delivery organisations). It may be helpful to draw on the example of practice from the Innovation Credit Facility in the Netherlands (De Jong et al. 2013)[20]. Here, payments and reporting timings were linked to milestones of the project, which were specified in advance; and the repayment schedule was then determined on the completion of the project.

Expected outputs and outcomes

The expected outputs and outcomes are detailed in the logic models and theories of changes for the loan and equity products in chapter 3. In summary, the intended outputs and outcomes will need to cover a mix of innovation (potentially including behavioural, though these may be less core to the underlying logic – see chapter 3), performance and financial aspects, e.g.:

- Innovation outputs/outcomes: achieving project milestones; investment in R&D and innovation; new products/services; accelerating projects to market; new processes; and new IP and licences; innovation capacities & skills in supported firms; increased use of partnerships; more support for innovation in the firm
- Financial outputs: amount drawdown interim and final repayment; early indicators of default rates; values of exits
- Intermediate performance outcomes: subsequent finance raised; employment; new products/services into the market
- Final performance outcomes: turnover/business performance (incl. exports); GVA; and spillovers.

Reviews and evaluations of other relevant UK and international schemes providing finance and/or support for innovation indicates that a mixture of outcomes were assessed. For example, intermediate effects on R&D expenditure (e.g. Innovate UK's Smart scheme)[21], R&D employment and wages (e.g. Dutch Innovation Credit Facility)[22]; intermediate effects

[20] Ibid, p23.
[21] Ibid, p20.
[22] Ibid, p23.

on subsequent investment raised (e.g. Danish Growth Fund)[23]; business performance effects, e.g. sales, exports (e.g. Smart)[24]; as well as other indicators such as productivity. There is also a need to be alert to issues over timescales to outcomes with some international studies focusing entirely on intermediate effects, notably on R&D measures. In addition, wider evaluation practice has looked at indicators of behavioural effects as intermediate outcomes e.g.: increased probability of innovating in the future; increased use of partnerships; more support for innovation in the firm[25] (e.g. Chavez, 2011; and Clarysse et al. 2009)[26]. There is less evidence on the attraction of subsequent finance but there is some positive evidence on the effect of grants (e.g. Meuleman & Maeseneire, 2012)[27].

The desk-based review also found variation in evaluation approaches which covered qualitative and quantitative techniques (e.g. data collection, desk reviews, surveys of customers and non-customers, and stakeholder interviews). Where comparison groups were used, these ranged from simple descriptive comparisons between treatment and control groups, to more advanced econometric techniques which control for selection bias. Some examples are provided in the paragraphs below.

The evaluation of the Danish Growth Fund (2014)[28] made baseline comparisons on selected indicators including employment, sales and labour productivity between a treatment and control group. To identify control groups, those firms were considered that were equal to the treatment group on: equity, start-up year, size of the company and sector. It also identified indicators of 'good practice' in a public-private 'hybrid' venture capital fund based on existing literature and rating and comparing these against control groups.

The evaluation of the Dutch Innovation Credit Facility (2013)[29] used econometric techniques to analyse the effects of schemes on R&D, and used rejected firms to construct a control group by using Propensity Score Matching techniques. The evaluation of Innovate UK's Smart instrument (2015)[30] used Difference-in-Difference analysis, and both the evaluations of Smart and the Advanced Manufacturing Supply Chain Initiative (2015)[31] used unsuccessful applicants when considering control groups. Another example is the

[23] Ibid, p23.
[24] Ibid, p20.
[25] Chavez, S. (2011). Behavioural additionality in the context of regional innovation policy in Spain. Innovation: Management Policy and Practice 13 (1), 95.
[26] Clarysse, B., Wright, M., & Mustar, P. (2009). Behavioural additionality of R&D subsidies: A learning perspective. Research Policy, 38(10), 1517–1533.
[27] Meuleman, M., and Maeseneire, W. (2012). Do R&D subsidies affect SMEs' access to external financing? Research Policy, 41, 580-591.
[28] Ibid, p23.
[29] Ibid, p23.
[30] Ibid, p20.
[31] Ibid, p23.

evaluation of Tekes (2012)[32] in Finland where organisations that applied for funding support without success, and organisations that had not received any Tekes funding were used (it is worth noting here that the appropriate financial instrument is determined after assessment). In evaluation studies on equity products e.g. the Bridges Fund[33], UK High Technology Fund[34] and JEREMIE[35], it is often the case that evidence on beneficiary firms[36] only has been used (in some cases explained by small number of firms as in the Bridges Fund). The options for control groups are considered for their feasibility in chapters 4 and 5 on the proposed approaches, including unsuccessful applications, Innovate UK grantees, and the wider business population. For the equity product in particular, the fund size is considered as well as the potential delivery model and how companies may come to enquire and apply.

In some cases, the sample sizes for control groups were larger than the beneficiary groups. For example, in the Enterprise Finance Guarantee (2013)[37] Scheme there were 899 unassisted versus 500 assisted firms; in the Small Firms Loan Guarantee (2010)[38] Scheme: 1,047 unassisted versus 441 assisted firms; and in the AMSCI[39]: 102 unsuccessful applicants and 79 were successful applicants. Further, matching of control groups tended to be based on different firm characteristics including: sector, age, size of business and patent stocks[40].

As already highlighted, the long timescales to outcomes will be an important and challenging factor for evaluation. For example, in the new loans supported projects it may take two-to-five years for new products/services to come into the market and up to nine years from loan approval to final repayment. There is likely to be a need to produce evidence on emerging impact around 2020 (i.e. after 2½ years) to inform policy so evaluation needs to bear in mind that by 2020 the effects will be intermediate. For a new equity product, the timescales are likely to be even longer. The above issues are further discussed in subsequent chapters.

Wider landscape

The new innovation finance products do not operate in a vacuum and need to fit within the wider landscape for innovation support, business support and access to finance; not least

[32] Technopolis and VVT. (2012). Evaluation of Tekes. Publications of the Ministry of Employment and the Economy; Innovation (22/2012)
[33] Ibid, p23.
[34] Ibid, p23.
[35] Regeneris. (2013). Mid-Term Review of the English JEREMIE Funds.
[36] Evidence from fund managers and private investors has also been used.
[37] BIS (2013). Economic Evaluation of the Enterprise Finance Guarantee (EFG) Scheme.
[38] BIS (2010). Economic Evaluation of the Small Firms Loan Guarantee (SFLG) Scheme.
[39] Ibid, p23.
[40] Ibid, p23.

as an important objective of the products is to deliver value for money to the tax payer and the products should not compete with existing finance providers. The scoping discussions with stakeholders noted an awareness that the new finance products will need to align with products, both public and private, which are already available in the wider finance landscape (i.e. other public and private provision). This includes, for example: the British Business Banks's Help to Grow scheme; private venture debt funds provided through bank and non-bank sources; private crowdfunding and peer-to-peer lending providers; and other public and private sources. In this regard, the scoping consultations emphasised the need to examine what other options applicants have considered before, and may go on to use or consider in the future. In addition, standard issues around deadweight and crowding-out effects were also important. As mentioned, the finance will need to align with other government supported finance measures. Innovate UK and the British Business Bank are working together to deliver the new finance products, and this should assist in provide greater co-ordination and coherence in the financing landscape.

Notwithstanding the above, the loan and equity products are expected to fit and add to the finance options available for innovation, so it becomes important to consider how they are likely to affect and address the gaps in provision. In this regard, specific gaps in the innovation finance landscape which the new products will need to address relate to: the Valley of Death[41] – firms unable to raise subsequent finance for high risk projects and nascent/ uncertain technologies (need to show the Valley of Death is being bridged); thin markets in later stage/venture deals (i.e. £2m-£5m); and other gaps which are more sectoral and geographic.

[41] According to the House of Commons Science and Technology Committee Report (2013) 'Bridging the valley of death: improving the commercialisation of research': "The valley of death describes the point where a business, often a technology based business, has a working prototype for a product or service that has not yet been developed enough to earn money through commercial sales. The company needs to find sufficient
money to develop the prototype until it can generate sufficient cash, through sales to customers, that would allow it to be self sufficient and grow".

3. Logic models and theories of change

This chapter sets out the underlying logic and theory of change for both the standard loan product and an equity product. In doing so, a brief narrative on the key components of these is also included.

Standard loan product

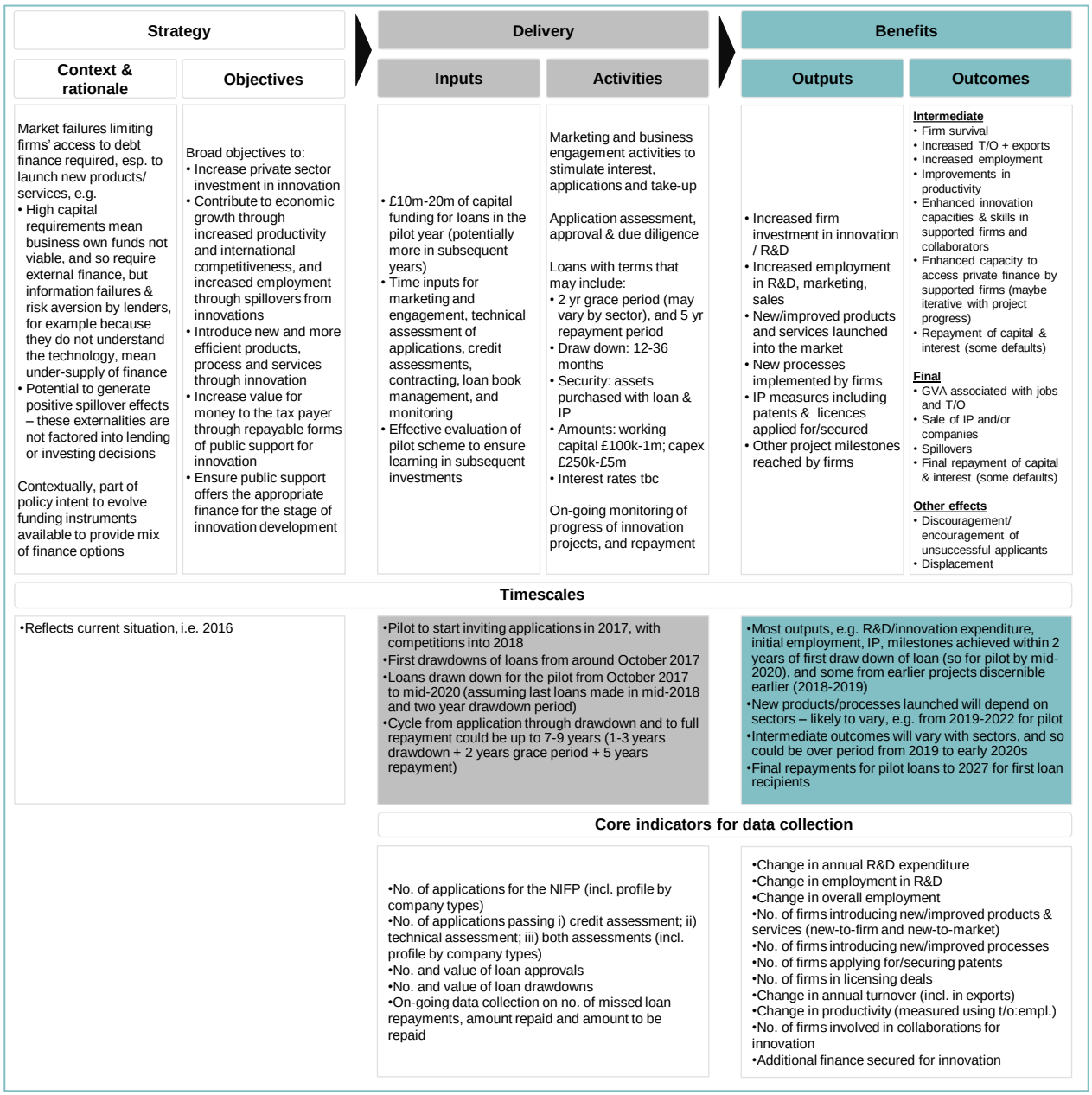
On the following page the logic model is set out for the standard loan product. The key components of this are as follows:

- The logic model covers the strategic background (i.e. rationale and objectives), delivery (i.e. inputs and activities) and expected benefits (i.e. outputs and outcomes). Given that the finance products are still in development, certain features may be subject to change, notably on the specifics of the inputs and activities. The benefits cover the initial outputs, such as R&D investment, and new products and services that are delivered by projects financed by loans. The benefits also include: the subsequent changes in behaviour and performance of the companies including intermediate and final effects such as turnover, exporting, innovation capacities, GVA and loan repayments; and potential third party effects of the products, e.g. relating to discouragement issues, displacement and spillovers.

- Indicative timescales for the delivery and benefits aspects of the logic model are included within the logic model to provide an indication as to when effects may occur. This uses the pilot as an illustration, showing how benefits may start to occur from 2018/19, though also that later effects may only become apparent into the 2020s and that timescales may generally vary across the companies supported. At the time of writing, the pilot is expected to begin in 2017 and continue with applications into 2018/19, and a scaled up programme may start delivery from 2019. Therefore, for timescales for a scaled up product, 2 years can be added to those set out in the logic model overleaf. These timescales are an important factor to consider in the evaluation and its timing.

- For the delivery and benefits stages, key indicators are set out. These have fed directly into the design of the evaluation, which is described in chapter 4 of this report. The indicators are also listed in Annex A, along with the proposed sources and data collection requirements.

Figure 3-1: Logic model for the loan product



Source: SQW, drawing on feedback from scoping consultations; objectives as specified by BEIS

In chapter 4, the key sets of evaluation questions are specified for the loan product, and these are split into the following issues: process elements, covering interest and demand for the product, and implementation processes and the customer journey; and impact elements covering the early effects (as part of the pilot evaluation) and outcomes/impacts (as part of a later impact evaluation). For these different aspects of the evaluation, the underlying assumptions and theory of change are described here.

Process elements

There are number of assumptions that underpin the delivery process for the loan product, and it will be important for the evaluation to test these. These include the following:

- The motivations for companies wanting to use the loan product should be tested, to inform assumptions relating to the rationale. This should include whether companies had considered alternative sources of finance beforehand, and whether these had been applied for. It should also consider the reasons for applying for the government-supported loan product. There is a link here to the attractiveness of key features (see bullet point below). Chapter 4 proposes how and when these data should be collected.

- There will need to be sufficient appetite for this kind of product amongst relevant companies. This can be measured in terms of initial interest, for instance if there is a need to register interest in order to begin/download application documentation.

- Companies will need to view the terms of the product as appropriate and be able to meet the requirements such as the security and repayment terms. At the most basic level, this can be measured in terms of the numbers of applications, and the data on company characteristics for those applying can inform on the types of companies for which the product was viewed as appropriate. In addition, data should be collected on the attractiveness of different features of the product – in chapter 4 we set out how this should be done.

- The quality of applications needs to be sufficient in order for the loan pot to be distributed. This will require sufficient numbers of companies to apply and meet the levels required in technical and credit assessments. This can be measured through the technical and credit scores achieved as part of the application process.

- In terms of drawing down the loan pot, there is an assumption that successful companies draw down the product as their projects are pursued. This can be measured in terms of the number and value of drawdowns versus approvals. Any withdrawals at this stage can be followed up with as part of the evaluation – as set out in chapter 4.

- On the implementation of the application and approval process, feedback should be collected from both successful and unsuccessful applicants, e.g. to understand the appropriateness of the information required, clarity of understanding in what was required, satisfaction with feedback on applications, and satisfaction with timeliness of the provision of funding. Thereafter, feedback on the project and repayment periods ought to be collected to check satisfaction, proportionality of monitoring and clarity of requirements. Again, chapter 4 sets out how the data should be captured.

Impact elements

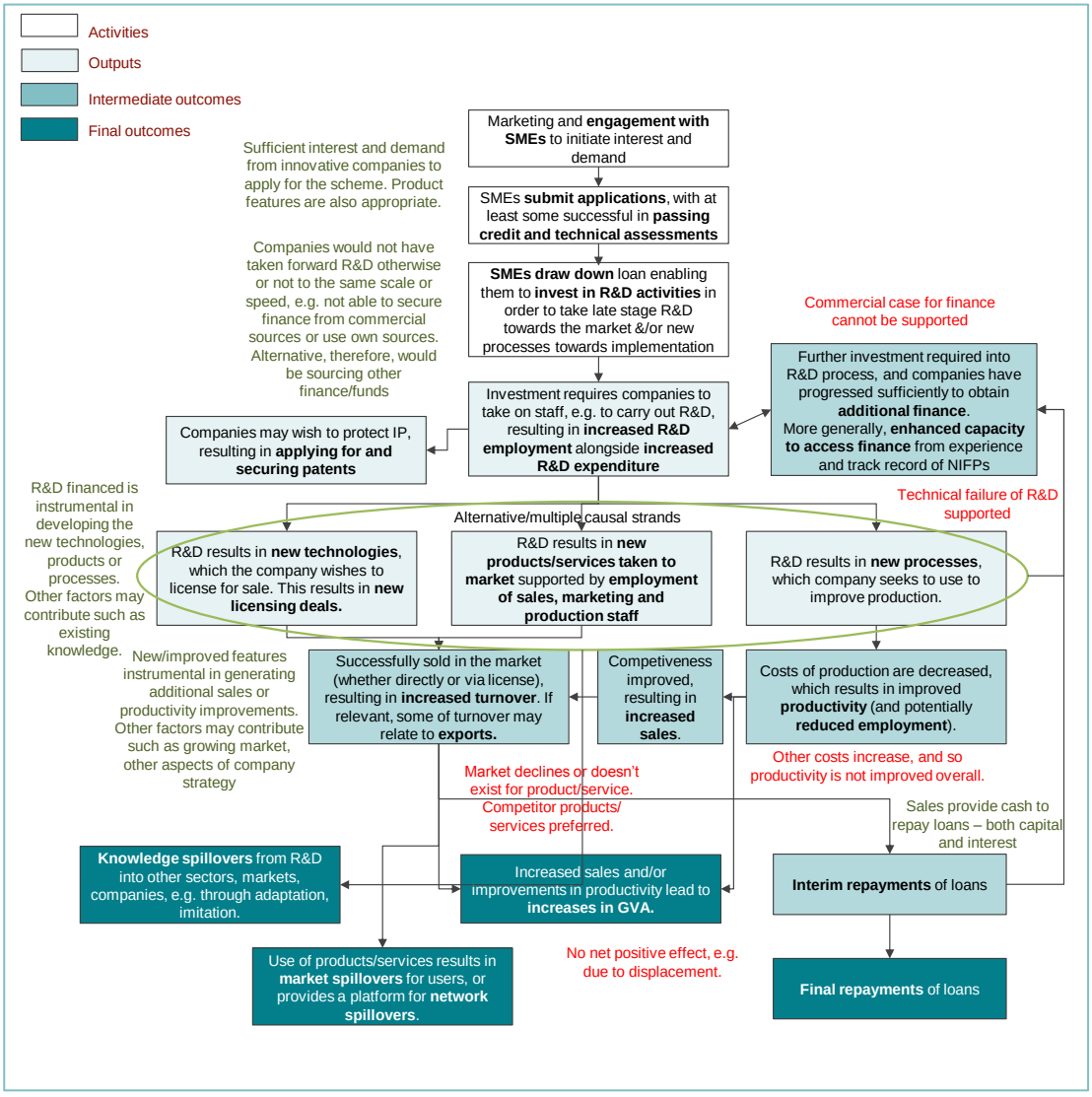
In Figure 3-2, an illustrative theory of change is provided for the key routes from activities to outcomes. This sets out the different routes from the activities to stimulate interest and engagement in the product, through the provision of loan finance to the intended outputs and outcomes. The core activities, outputs, and intermediate and final outcomes from the logic model in Figure 3-1 are reproduced within the colour-coded boxes. The boxes and arrows set out the different potential routes to outcomes. The routes are accompanied by further narrative, with the green text setting out key assumptions and other potential

explanatory factors for effects, and the red text providing reasons as to why the theory of change may not occur. These assumptions, alternative causal factors, and potential reasons for failure will need to be borne in mind as part of the evaluation of early effects and outcomes/impacts. It is worth noting that, as would be expected in the case of innovation, it is likely that some projects/companies will succeed and others will fail (though even failures may generate benefits, such as improved knowledge). Indeed, previous work has shown that the commercial benefits of interventions in business and innovation support are likely to be concentrated amongst a minority of beneficiaries[42].

The underlying theory of change in terms of the routes to outcomes is complicated, in particular as there may be multiple and/or alternative causal routes. Different routes are illustrated in the links set out in Figure 3-2, and then described below the diagram.

[42] Cook J., Macdonald B. and Pates R. (2013) "The Pareto Principle: the importance of the vital few in business support programmes", SQW Insight Paper.

Figure 3-2: Routes to outcomes/causal links to illustrate theory of change



Source: SQW

The implementation activities, such as marketing and SME engagement, will be important in stimulating interest and demand from companies to apply for the loan product. This, along with wider demand from SMEs, is expected to result in applications for loan finance. These are likely to be from SMEs with R&D and innovation projects that are relatively close to market (in order to be able to generate a revenue stream within a sufficient timescale in order to repay the loan). The assessment activities of the delivery phase will consider credit and technical aspects of applications, with at least some passing both of these in order to be awarded the loan finance, which is then drawn down by the companies.

The loan finance is postulated to support projects that take forward R&D and innovation activities which may not have happened otherwise, or at a greater speed, scale and quality than would have been the case without support. In some cases, the loan will be used by

companies to develop new or improved products or services. This could be as part of late stage R&D whereby companies develop a prototype, a beta version, or could be through an initial pilot launch for final testing and customer feedback, or indeed through investment in new production facilities. This may constitute R&D expenditure and may require taking on/retaining R&D staff or other staff as part of sales or marketing. Subsequently, products or services may be launched into the market or launched more widely, and this again may require further employment creation if this cannot be met by internal capacity (e.g. on sales/marketing or production in-house or through suppliers). Product/service launches themselves may require additional finance to be secured. If the product or services are successful, then this will result in additional turnover, some of which may be exports (if sales are overseas). The additional output reflects a contribution to GVA for the economy, thereby meeting growth objectives of the new innovation finance product.

- As set out in Figure 3-2, there are other potential contributory factors to these effects, such as the execution of other parts of the company's strategy such as marketing and branding, the role play by previous or complementary R&D activities, and external factors such as a growing market.

- There are also reasons why the effects may not occur or would have occurred at a lower scale, speed or quality. In addition to issues such as technical failure of the project (which is to be expected for some projects given the innovative nature, and which may still expand the knowledge base), and absence of market take-up (whether through poor marketing or market decline), even where the postulated routes occur through to sales there may be other issues in play that have a bearing on specific effects. For example, R&D expenditure may not increase if, say, later stage R&D is taking the place of previous earlier stage R&D; and employment effects may not be seen if R&D employment is replaced by employment in sales functions. However, compared to unsuccessful applicant, R&D expenditure or employment may still be higher. Growth may also not be additional if the effects result in displacement from other businesses.

In other cases, the loan will be used by companies to develop new or improved processes. As with product and service innovation, this may constitute R&D expenditure and may require taking on/retaining R&D staff. If successful, the process innovation may improve the productivity of the company, which may mean cost reductions and/or employment reductions, or may involve improvements to the 'quality' of products in some way. Through these effects, the competitiveness of the companies offer may improve, resulting in being able to sell more of the product or services than would be the case otherwise.

- Again, other contributory factors may be important. For example, whilst competitiveness may improve for companies, in order to translate this into additional sales will require execution of other aspects of business strategy such as marketing.

- The failure of other aspects of business strategy may also mean that intended effects do not occur as postulated. In addition, there may be other issues such as technical failure (which, as above, can still expand the knowledge base by

demonstrating what does not work) and external market factors that prevent the expected effects from occurring.

It is worth noting that innovation for both products/services and processes may be undertaken by companies (as has been found in other innovation support schemes such as Smart[43]), and so both of the routes set out above in terms of product/service and process innovation may apply.

While the loan is expected to support innovation activities closer to market than projects which would require grant finance, the activities supported by the loan product may not in and of themselves lead to the adoption of new/improved processes or the launch of new products/services. Before this stage is reached, it may be that further stages of R&D are required. As set out in Figure 3-2, this may result in the attraction of additional finance, and further increases in R&D expenditure. The attraction of additional finance from commercial sources may provide an indication that the finance is helping companies to bridge the 'Valley of Death.'

The routes described above focus on the direct effects. As shown in Figure 3-2, there may also be spillover effects. Different routes to these are set out, reflecting knowledge, market and network spillovers (drawing on Jaffe, 1996[44]). The process of innovation may generate new knowledge within direct beneficiaries, though this may diffuse to other organisations through various routes (e.g. movements of people, through the supply chain as beneficiaries engage suppliers in the development/production of new products/components, as part of collaborations, through articles on the innovation or due to imitation). Other organisations may then be able to draw on this knowledge themselves. The take-up of products/ services, or the adoption of new processes may have market effects as users derive some of the benefits, e.g. the consumer surplus as direct beneficiaries do not take the full surplus value. Network spillovers may occur in some instances if the products/services that are developed and launched provide a platform for other innovations.

The routes to outcomes set out in Figure 3-2 are similar to those of existing or previous Innovate UK grant schemes (e.g. Smart). A systematic, or even formal rapid, review of literature has not been undertaken as part of this scoping study, and so the strength of the existing evidence base on the links set out in Figure 3-2 cannot be described with a high degree of confidence. The review that has been undertaken has shown that there is evidence from international schemes that there is a positive effect of loan schemes on R&D expenditure (Tekes, 2012[45]; De Jong et al. 2013[46]). Some evidence also points to an

[43] Ibid, p20.
[44] Jaffe, A.B. (1996) Economic Analysis of Research Spillovers Implications for the Advanced Technology Program, prepared for the Advanced Technology Program, Brandeis University and National Bureau of Economic Research
[45] Ibid, p26

effect on new products and services being taken to market and sales performance of companies, though there is less strong evidence of the effects on productivity and spillover effects (Tekes, 2012). In the UK, evidence from R&D grant schemes suggest positive effects on R&D expenditure, employment and turnover, though this depends on sample segments selected – with these findings particularly sensitive to project level additionality, which varies (SQW et al. 2015[47]). The same report found evidence of spillovers from a selection of case studies. With loan finance a new instrument in the UK for funding innovation, it will be important to test the links throughout the theory of change. For example, these existing findings indicate the importance of establishing project-level additionality and the effect on R&D expenditure in the first instance.

Equity product

On the following page, Figure 3-3 sets out the logic model for an equity product. The components are set out as follows, though we note that specific features of an equity fund for innovation may be subject to modification depending on a final fund model:

- The logic model covers the strategic background (i.e. rationale and objectives), delivery (i.e. inputs and activities) and expected benefits (i.e. outputs and outcomes).

- Contextually, the rationale highlights that venture capital firms have been moving to later stage investments. The traditional "2 and 20" model prevalent in the venture capital industry - typically where a VC fund requires a management fee of 2% per year, plus 20% of the profits - incentivises funds to do fewer and larger deals, and this is further exacerbated by the costs of due diligence and transacting, which are disproportionately high for smaller investments. The transaction costs are not helped by 'thin markets' with small numbers of investors and firms having difficulty in finding each other and contracting at reasonable cost[48]. The 'thinness' of the market is particularly acute for technologies and projects in life sciences, physics and cleantech, where the capital intensity of development and the development timescales are harder to align with investors' expectations[49].

- The activities include reference to different fund models that may be adopted for the equity product – though this is subject to ongoing product development. There are similarities in the benefits as to the loan product, though there are two points to note. For the equity product, innovation activity may be at an earlier stage and so

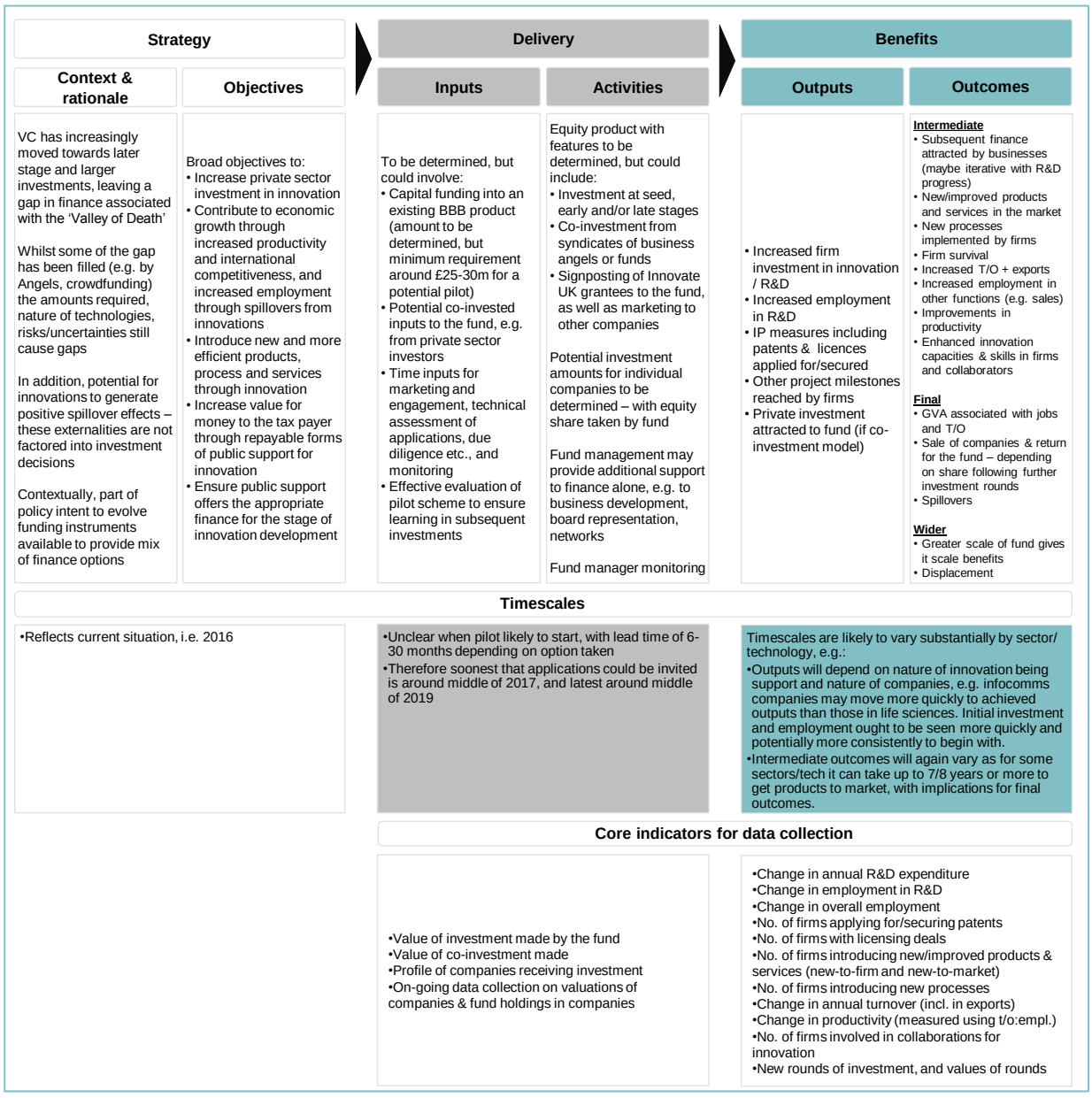
[46] Ibid, p23
[47] Ibid, p20
[48] Nightingale et al (2009) From funding gaps to thin markets: UK Government support for early-stage venture capital. NESTA & BVCA Research Report.
[49] SQW (2010) "Improving the coherence, co-ordination and consistency of publicly-backed venture capital provision", Report for BIS; and SQW (2013) "Assessing the economic and wider benefits of the Rainbow Seed Fund," Final Report to Midven Ltd on behalf of the Rainbow Seed Fund partners.

there may be greater importance attached to businesses' progress in developing technology and the associated intellectual property. Second, there may be greater emphasis on attracting further funding to continue to develop technologies, including through subsequent equity finance rounds. As with the loan product, potential third party effects are captured, e.g. relating to displacement and spillovers.

- The timescales for the equity product are unclear at this stage, as time needs to be allowed for the setting up of the fund which will take at least six months and potentially longer. Thereafter, the timescales for the equity product will be longer for two key reasons. First, it will take longer for the investment to be made as fund managers will want to ensure the right companies are invested in. Second, given the nature of the companies and innovations, the timescales to final effects and exits (potentially to make a return) may be long.

- For the delivery and benefits stages, key indicators are set out. These have fed directly into the design of the evaluation, which is described in chapter 5 of this report. The indicators are also listed in Annex A, along with the proposed sources and data collection requirements.

Figure 3-3: Logic model for the equity product



Source: SQW, drawing on feedback from scoping consultations; objectives as specified by BEIS

In chapter 5, the evaluation questions for the equity product are split into three stages, an early assessment, interim assessment and final assessment. The early assessment focusses on process aspects, with some consideration of early effects (which may lead to intended outcomes/impacts), and the interim and final assessment focus on impacts. For these different aspects of the evaluation, the underlying assumptions and theory of change are described here.

Process elements

There are number of assumptions that underpin the delivery process for the equity product, and it will be important for the evaluation to test these. These include the following:

- There will need to be sufficient appetite for equity finance amongst relevant innovative companies, and these should have been unable to secure the investment that they require from other sources. These aspects can be measured in terms of the numbers of serious enquiries received by the fund managers, and through data on previous approaches to finance elsewhere. There are no 'hard and fast' rules on what constitutes a 'serious enquiry', as there may be a wide funnel of interest, which is narrowed down to a much smaller number of propositions for genuine consideration. The fund manager(s) may be able to collect data on those they deem to be serious, for example those companies with whom they have second meetings with.

- The conversion of appetite into interest can be considered in terms of the numbers of companies who formally put forward a proposition or pitch for investment, and again there will need to be sufficient genuine interest which reaches this point for the fund to work.

- The quality of applications needs to be high enough for the equity fund to be invested. The quality of applications can be considered qualitatively from feedback received from fund manager(s) and other relevant investors (e.g. those that may invest alongside the equity fund).

- In terms of investing the fund, there is an assumption that successful companies pass through due diligence processes, and potentially secure other investment as part of their funding round. For example, for a particular investment by the NIFP, it may be that the equity fund is investing alongside others, and there may be a need to secure sufficient interest from investors. There may be a role for the fund manager(s) here through helping the company to hone its proposition and business plan.

- Thereafter, as well as the investment itself the implementation of the equity fund will also involve the role that the fund manager(s) may play in supporting the business, with equity seen as 'smart money'. For example, the fund manager(s) may provide support through representation on the board, through access to networks and connections, and through other advice.

- In evaluating implementation, feedback should be collected from companies and unsuccessful applicants (where possible, e.g. those that were close to receiving investment) to understand the application processes and, for those companies receiving investment, the role/value played by the fund manager(s). Feedback from the fund manager(s) themselves, and others (such as other experts) may also be valuable in providing evidence on the above assumptions. Chapter 5 discusses how this evidence should be collected.

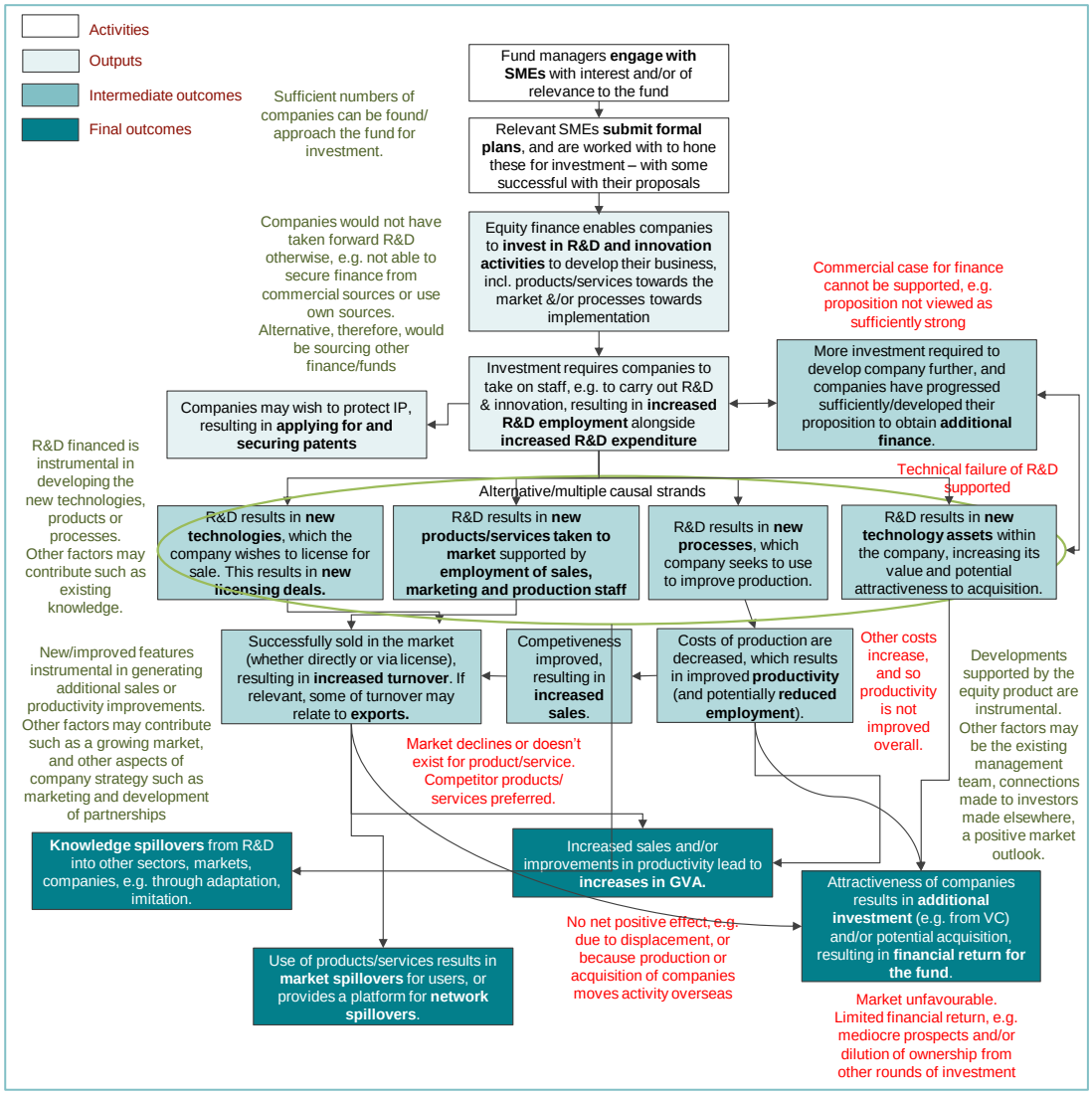
Impact elements

In Figure 3-4, an illustrative theory of change is provided for the key routes to outcomes. This sets out the different routes from the activities to engage with SMEs (including the work of fund managers to help hone investment plans), through the investment and business development activities support to the intended outputs and outcomes. The core

activities, outputs, and intermediate and final outcomes from the logic model in Figure 3-3 are reproduced within the colour-coded boxes. The boxes and arrows set out the different potential routes to outcomes. These routes are accompanied by further narrative, with the green text setting out the key assumptions and other potential explanatory factors (aside from the NIFP), and the red text providing reasons as to why the theory of change may not occur. These assumptions, alternative causal factors, and potential reasons for failure will need to be borne in mind as part of the evaluation of early effects and outcomes/impacts. It is worth noting that, as would be expected in the case of innovation and equity investment, it is likely that some projects/companies will succeed and others will fail. Indeed, a minority of those in which investments are made would be expected to be star performers, generating the returns for the fund.

The underlying theory of change in terms of the routes to outcomes is complicated, and there may be multiple and/or alternative causal routes, as shown in Figure 3-4. Below the diagram a description of certain possible routes

Figure 3-4: Routes to outcomes/causal links to illustrate theory of change



Source: SQW

The activities of the delivery phase are likely to involve the fund manager(s) dealing with enquiries for the equity fund as well as fund managers using networks and intermediaries to engage with potential SMEs that may be appropriate for investment. As a result of these varying routes to connect SMEs to the fund, there may be a large number of initial enquiries. The appointed fund manager(s) will identify the most relevant SMEs through a sifting process and work with this smaller group to understand their propositions with feedback to strengthen these. Some of the SMEs will then be expected to submit formal applications for the fund, with some of these successful in obtaining equity investment following further iteration and due diligence.

Following the investment from the equity product, there is an expectation that this will lead to additional expenditure on R&D and innovation activities, and this may include the need to recruit additional staff, e.g. to deliver R&D activities. For some companies, where protection of intellectual property is important, there may be applications and securing of patents. Perhaps more so than with the loan product, there may be a subsequent round(s) of finance required to progress innovation and company development further, and this would be indicated by additional finance being attracted, e.g. from investors. The extent to which there are requirements for this, and the timescales over which this might occur may well vary across sectors and technologies. For instance, a company involved in the development of therapeutics may require significant investment following equity funding from an innovation equity fund to take them forward; on the other hand, a company developing digital health products may not require any further investment beyond the innovation equity funding.

As with the loan product (see above), there are then various routes postulated in terms of the nature of the R&D and how these flows through into company development. These are set out in terms of the following, whether individually or in combination:

- the development of technologies for licensing, which may result in new licensing deals and the generation of royalties/revenues from these licences and the sales of the associated innovative products/services

- the development of products and services for sale by the company itself, which may require growing company employment in sales/marketing and production (or perhaps engaging a supply chain that benefits from growth), and, subject to market take-up, resulting in increases in turnover for the company

- the development of new/improved processes that help solve particular problems (e.g. in manufacturing) that allow production to be implemented, and so then lead to sales of this product (subject to market take-up) and/or bring about competitiveness improvements that can help with company growth; these may mean productivity is increased and actually result in falls in employment

- the development of the company's technology assets/IP, which make it attractive for further investment and/or acquisition before the company reaches a sales stage – e.g. the aforementioned therapeutics company may take development to such an advanced stage that it becomes attractive for a pharma buyout.

With all of these routes, if companies progress and/or grow, the attractiveness to other investors may increase, and the values may increase. At some stage, this may result in an exit for the equity fund, potentially resulting in a financial return.

As with the loan product, there are also potential spillover benefits, which may again occur through knowledge, market and network spillovers (Jaffe,1996)[50].

As is set out in Figure 3-4, in addition to the equity fund itself there are likely to be other factors that contribute to the outcomes. For example, there may be other development activities that play an important role in the innovation and R&D process, there may be other aspects of the business strategy, e.g. marketing, company partnerships, that contribute to performance outcomes, and there may be external factors such as the growing nature of the market that also play a key role in performance outcomes.

Similarly, as set out in Figure 3-4, there may be several points at which the postulated theory of change breaks down. These may include technical failure of the R&D/innovation, an insufficient commercial case for companies in securing further investment (e.g. due to other market players, and the perceived absence of demand for a product/service or lack of demand at the price), the market may not receive any new product/service as well as expected, and the outcomes may occur but may leak overseas (e.g. if acquisition takes companies overseas).

A comprehensive review of literature has not been undertaken as part of this scoping study, and so the strength of the existing evidence base on the links set out in Figure 3-4 cannot be described with a high degree of confidence. That said, the brief review undertaken does provide some positive indications to justify the theory of change. For example, there is evidence that suggests positive effects on securing additional finance (DAMVAD et al., 2014[51]), and on R&D expenditure, employment and turnover growth (e.g. SQW, 2010[52]; BIS, 2015[53]). SQW (2010) also described the potential spillover effects in terms of the market and knowledge spillovers drawing on individual company case examples. However, it is important to note that the evidence on equity schemes in these studies was based primarily on self-reported judgements as to the attribution of effects to the funds concerned; and the benefits are very highly skewed towards a small number of companies benefiting. The approach proposed to evaluating the equity fund under NIFPs

[50] Ibid, p34.
[51] Ibid, p23
[52] Ibid, p35
[53] Ibid, p23

set out in chapter 5 highlights how the contribution of the fund relative to other factors should be assessed to strengthen the evidence base on the theory of change.

Summarising the core questions

In this final sub-section of this chapter, the core evaluation questions are summarised for the evaluations of both the loan and equity products. These are set out in Table 3-1 for the pilot and impact components of the evaluations. For each evaluation question, a set of testable hypotheses are provided.

Table 3-1: Summary of key evaluation questions

Evaluation question	Loan product	Equity product
Pilot evaluation/early assessment		
What is the interest in, and demand for, the pilot products? What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?	Interest and demand is predominantly from SMEs that were previously/currently active in innovation and which had ideas that were relatively close to commercialisation but where the investment was considered to be too high risk than would be debt funded by the private sector. In some cases, companies may have alternatively (or previously) applied for later stage grants from Innovate UK, e.g. prototype grants. Demand is from a range of sectors and company stages, and for varying amounts.	Interest and demand is from a mix of start-ups/early stage companies and more established SMEs that are active in innovation and want funding to secure rapid growth. The projects for which funding is required are at seed or scale-up stages and at higher risk (or lower investment size) than would be funded by the private sector otherwise. Demand may be more focussed on particular sectors where appetite for equity is greater, but still across a range of sectors.
How effective are the processes of implementation and what are the experiences of the customer journey?	Marketing through Innovate UK and its networks results in attracting eligible businesses and projects, with interest above that which can be funded. The process of application entails more information than is the case for the private sector, but the process overall is as fast in terms of time until decisions are provided. Feedback is provided for those that are not successful – with those achieving high scores encouraged (rather than discouraged) to continue to try to take their project forward.	Marketing through Innovate UK, British Business Bank and their networks is effective in attracting eligible businesses and projects. Fund managers also use their networks to identify relevant companies. There is a process of sifting, which is undertaken efficiently by the fund managers. They are then able to spend time with the most relevant SMEs to understand projects and effectively assess propositions. Appraisal is similar in terms of time taken as the private sector. And support to hone plans is as good if not better than the private sector, given the time that can be provided for investments at this level and value. This support continues as part of

Evaluation question	Loan product	Equity product
		portfolio management.
What evidence is there of progress towards the achievement of intended outputs and outcomes?	Supported businesses are able to take on risks and innovate successfully in a way and/or at a scale and/or on a timeframe that would not otherwise have been possible. There is evidence amongst a significant proportion of the pilot cohort of progress in achieving outputs such as additional R&D expenditure and employment that would not have occurred otherwise. Amongst a smaller group, there is evidence of progress towards achieving intermediate outcomes through different routes such as the launch of new products or licensing.	Supported businesses are able to develop the business and/or project in a way and/or at a scale and/or on a timeframe that would not otherwise have been possible. Whilst limited numbers may have been invested in by the time of the early assessment, many of those that have received investment are able to show that R&D expenditure and employment have grown in ways/ at a scale/in a timeframe that would not have happened otherwise.
Impact evaluation/interim or final assessment		
What has been the 'additional' effect on intermediate and final outcomes, in particular the effects on innovation behaviour and performance, and business performance?	Supported SMEs have, on average, spent more on R&D, and grown more in terms of their turnover and employment than would have occurred otherwise. The effects on bottom-line business performance are concentrated in a proportion of businesses, because some projects have not worked technically or commercially as planned. Supported SMEs have greater capacity to innovate and attract finance than would otherwise be the case.	At the level of the portfolio there has been an increase in the R&D investment and employment of the companies supported than would otherwise have been the case. This has been facilitated by the equity investment itself, and also the fact that further private investment has been attracted that is unlikely to have happened otherwise. A small group of 'star' performers from the portfolio have grown their turnover to a scale and/or in a timeframe that would not have been possible otherwise.
To what extent can spillover effects be identified from the innovation projects that have been supported?	The potential for spillover effects are confirmed by beneficiaries, in particular through customers, collaborators and suppliers. In case examples, these are reaffirmed through subsequent benefits achieved by these third parties.	The potential for spillover effects are confirmed by beneficiaries, in particular through customers, collaborators and suppliers. In case examples, these are reaffirmed through subsequent benefits achieved by these third parties.
Has there been any crowding out of private R&D investment amongst firms supported? Has there been any crowding in/out of lending or other investment by finance providers? Have there been	Through the support of the loan product, and the ability to leverage other finance subsequently, supported SMEs have been able to increase their levels of R&D investment than would have been the case otherwise. This indicates a degree of crowding in of private investment – due to the use of public funding to de-risk investments in innovation. For some SMEs supported, there is evidence of displacement from other	The initial equity investment and the support of the fund managers results in leverage of private sector finance into the supported companies. As such, SMEs have been able to increase their levels of R&D investment than would have otherwise been the case. This indicates a degree of crowding in of private investment – due to the use of public funding to de-risk investments in innovation.

Evaluation question	Loan product	Equity product
any other third party effects, such as displacement (e.g. of the business/market share of other firms)?	SMEs – as a result of competing with other UK-based companies. The level of displacement is limited, however, by the innovative nature of companies.	There is limited evidence of displacement, because of the highly innovative (and sometimes unique) nature of the technologies developed by the companies, and the high degree of exporting, both limiting the degree of competition with UK-based firms.

Source: SQW

4. Evaluation of the loan product

This chapter sets out the recommended approaches to the pilot and impact evaluations of the loan product.

Pilot evaluation

Key evaluation questions

Chapter 3 outlined a number of assumptions underpinning the delivery process for the loan product. These relate to: motivations for firms wanting to use the loan product; appetite amongst relevant firms; terms of the product; the extent to which there are quality applications; and the successful firms drawing down the loan as their project progress.

The pilot evaluation will need to test these issues and assumptions using a formative (i.e. process) approach to evaluation, as well as making an early assessment of progress towards outcomes by the loan product, identifying what does and does not work well, and why. In doing so, it offers the opportunity to evolve and refine the policy and its implementation for scaling up/wider roll out. To achieve this, it is helpful to prioritise evaluation questions for the pilot in order to ensure usefulness of evaluation findings in informing future delivery. The key pilot evaluation questions are set out below with further detail provided in Table 4-1. It is worth pointing out that the loan (and equity) product would be new and the scoping study has been conducted at a relatively early stage in product development; this gives an opportunity to design evaluation in rather than consider this after product development/ implementation.

- What is the interest in, and demand for, the pilot products? What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?
- How effective are the processes of implementation and what are the experiences of the customer journey?
- What evidence is there of progress towards the achievement of intended outputs and outcomes?

Table 4-1: Key questions

Key questions	Priorities
What is the interest in, and demand for, the pilot products?	Proportion of eligible businesses that: i) are interested, ii) submit quality applications, and iii) take-up the product? What are the characteristics of businesses (applicants and non-applicants)?

Key questions	Priorities
What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?	What types of projects are being funded (e.g. which sectors, TRLs, technological or wider)? What factors contribute to awareness and interest (e.g. marketing, product features)? Reasons for applying for the loan product? What alternative sources of finance were considered (and/or applied for) prior to applying for the loan product?
How effective are the processes of implementation and what are the experiences of the customer journey?	What have businesses done before, during and after receiving the loan product (e.g. other funding)? How effective/timely/burdensome are the application, decision-making and monitoring processes (including for unsuccessful applicants)? How does the process compare with private providers? How effective is the joint working between Innovate UK and the British Business Bank?
What evidence is there of progress towards the achievement of intended outputs and outcomes?	What are the project outputs and are there any early indicators of changes in behaviour/outcomes? Do these suggest progress towards bridging the 'Valley of Death'? Do the products speed up the innovation/commercialisation process? Are there any 'early warning' indicators for defaults?

Source: SQW

Overall approach to the pilot evaluation

In view of the issues, challenges and questions outlined previously, a mix of methods approach where results are triangulated is required for the pilot evaluation. The recommended approaches for the pilot evaluation are: a 'formative' assessment, which focuses on exploring the process issues associated with the loan product; together with a theory-based impact assessment to test the extent to which early outcomes/changes in behaviour are being brought about by the loan product (in line with the theory of change); complemented by analysis of data collected during the application and monitoring. A specific type of theory-based approach, 'contribution analysis', should be used to build up the evidence to demonstrate the contribution made by the loan product to bringing about the early outcomes in question, while also identifying the other (external) factors (see details below). The pilot evaluation will require reconciliation of different data collection sources/'tools': monitoring, surveys, interviews and case studies (covering a mix of qualitative and quantitative data). These are summarised as follows:

- Analysis of monitoring data on implementation of the loan product. This would be to understand the profile of applicant firms, with an additional option to compare the profile to other relevant group(s) of companies (e.g. Innovate UK single company grantees).

- Interviews/feedback from those involved in implementation from Innovate UK and British Business Bank. This would be to gather feedback on how implementation is working, covering steps of the customer journey and the joint working between the two organisations.

- Surveys/interviews of applicant firms that were successful and unsuccessful, as well as those that withdrew (i.e. not completed). This would be to gather data on motivations for applying to the scheme, attractive features etc. These interviews would also be used to capture feedback on the customer journey, and, for unsuccessful firms, to test re-applications/ discouragement issues.

- Longitudinal case studies of small number of participants to gather more in-depth information, focusing on testing the logic model (set out in chapter 3); decision and process effects; and exploring issues raised by survey or process assessment.

- Table 4-2 outlines how each of the above data sources/ tools link back to the approach and questions e.g. which inform the process issues, and which inform the theory-based assessment (some will be both).

Table 4-2: Data source and link to approach

Data source	How links to process evaluation?	How links to theory-based impact evaluation?
Monitoring data (including from digitalisation) on implementation of the loan product	Profiling the businesses (applicants and non-applicants) and identifying the types of projects being funded will assist in understanding which types of firms/projects find the process effective (or otherwise) and any differences in experiences in the customer journey. The additional option of comparing the profile of applicant firms to other relevant group(s) of companies adds to the existing evidence on the theory of change by showing how the applicants compare with the wider business-base.	The monitoring data provide the basis for establishing the interest in, and demand for, the pilot product – covering both a process issue and an important assumption in assessing the extent to which the theory of change is being followed as predicted.
Interviews/feedback from those involved in implementation	Gathers views from stakeholders (Innovate UK, BBB) on processes of implementation and the experiences of the	N/A

Data source	How links to process evaluation?	How links to theory-based impact evaluation?
	customer journey. Evaluates how the loan product executed and delivered from the perspective of stakeholders.	
Surveys/interviews of applicant firms: successful, unsuccessful, and those that withdrew (i.e. not completed)	Captures data on the customer journey. These surveys and interviews should help to identify factors that have helped or hindered the effectiveness; provide a description of the activities undertaken, who provides them, the forms they take, how they are delivered and how they are experienced by businesses.	Gather data on motivations for applying, attractive features of the loan product etc.
Follow-up surveys/interviews of successful firms (loan awardees) and unsuccessful firms	Any further process issues should be captured bearing in mind that specific aspects of implementation of the product may change over time (e.g. informed by on-going learning).	Provides evidence on early progress towards the achievement of intended outputs and outcomes, and the role of loan in contributing to these. Follow-up surveys/ interviews with unsuccessful firms to test re-applications/ discouragement and to provide triangulation on assessing early progress of beneficiaries (by using non-beneficiaries as an alternative perspective).
Longitudinal case studies of small number of participants	Further explores issues raised by survey by earlier process assessment.	Seeks out additional evidence (more in-depth information), focusing on testing the logic model and the contribution of the loan product relative to other factors.

Source: SQW

At the time of writing, the pilot for the loan product was expected to run from 2017/18 to 2018/19 (with findings from pilot expected to inform the full roll-out in 2019/20). It is also worth pointing out that the expected numbers of firms involved informs the feasibility of

evaluation approaches. There is uncertainty over how many firms will apply but it is assumed that the average loan sizes are likely to be in the range of £300k-£1.5m. This will need to be tested in the pilot but based on this average loan size and assuming the pilot runs for one-to-two years, a £100m loan pilot could mean 100-250 beneficiaries. This suggests relatively small sample sizes (statistically), and this has informed the evaluation approaches for the pilot. The detail and justification of the above approaches are set-out below.

Evidencing interest and demand

An important first step for the pilot evaluation will be to analyse monitoring data from application forms to profile the applicant firms. This profiling can be broken down by e.g. amount of loan finance sought, sector, geography, stage of firm development, technology assessment score, credit score. This will help to evidence which (and how many) firms were interested, submit quality applications, and are taking-up the product. An additional option would be to compare the profile of applicant firms to other relevant group(s) of companies (e.g. Innovate UK single company grantees or beneficiaries of British Business Bank schemes). In doing so, it is worth noting that there should be sufficient quality data available on the types of companies receiving Innovate UK grants. Innovate UK collects company data on its award recipients, which are disaggregated by, for example, sector, location, age, amount of grant received etc. A request should be put to Innovate UK to allow access to these data (without requiring identification of companies) for the purposes of comparative analysis. Similarly, the BBB should be able to make available data on the characteristics of company beneficiaries of its relevant schemes without having to identify the company themselves. The process for acquiring the data will need to be agreed at the outset of the pilot evaluation.

This comparative profiling will help to better understand the types of applicant firms, reflecting the potential heterogeneity in the firms that may be interested, and also informing an understanding of how the loan product was being considered by Innovate UK's wider business audience. This heterogeneity in businesses' requirements may have implications for development pathways, and routes and timescales to outcomes which need to be considered at later stages of the pilot evaluation (and in the impact evaluation). For instance, there will be a need to build into the evaluation design this heterogeneity as a 'complicating' characteristic of the intervention, e.g. through analysis to understand what works for which types of business and in which context. Profiling firms and comparing with other relevant groups assists in this exercise. In terms of timing, we expect the monitoring data to be collected on an on-going basis (e.g. for project milestones achieved, project drawdown, repayment)[54], and analysis can be completed when, for each competition round, initial drawdown by firms is confirmed. In addition to the analysis of monitoring data, it is proposed that a survey is undertaken of successful and unsuccessful applicants as

[54] Monitoring collected once will be for profiling firms (successful and unsuccessful applicants) which can be done at the start of the 'customer journey'.

well as those that withdrew their applications. The purpose of the survey would be to gather data on the motivations for applying to the scheme, identifying the attractive features of the loan product (e.g. grace period, specific terms and conditions), potential discouragement issues (e.g. not applying for all the loan amount required; reasons for withdrawing applications) etc. The survey would also be used to capture other data to inform 'evaluating implementation and the customer journey' (discussed below). The method for collecting these data would be through a telephone or online survey questionnaire. This should provide a relatively high response rate from recipients but some encouragement will be required to ensure response from unsuccessful applicants. To encourage participation by unsuccessful applicants a combination of good practice techniques should be used including: framing this as an opportunity to inform policy which may lead to improved chances of success next time round; making contact on multiple occasions with non-respondents or until a 'refusal' is secured; arranging appointments for times that are convenient for the would-be respondent; and requesting this as part of application forms and reminding would-be respondents that they had agreed to take part in such research. In addition, a small number of in-depth interviews could be used to capture more detailed feedback on particular issues (e.g. factors contributing to awareness of the product). In terms of timing, the survey could be undertaken at or soon after completion of the award process (with the analysis available shortly after that) as this will secure a higher response rate.

As part of the analysis of monitoring and survey data (including profiling) it may be useful to consider the findings on interest and demand reported in the market research (BEIS, 2016)[55] for the new innovation finance products. For example, this research found that financiers anticipated high demand by firms varying by type of firm[56]; firms were interested in accessing a broad range of loan sizes; security and collateral were considered more attractive compared to interest rate subsidies; and the need for clear communication on the product (especially the most suitable type of company and projects).

Evaluating implementation and the customer journey

The second priority pilot evaluation questions relate to implementation of the loan product and the customer journey/experience (see also Figure 2-1). This should explore the following issues:

- the effectiveness, timeliness and burden of the application, decision-making and monitoring processes (including for unsuccessful applicants)
- the lessons from joint working between Innovate UK and the British Business Bank

[55] Ibid, p17.
[56] According to Qualitative Research Interim Report (Draft) for BEIS, a 'two-year grace period might vary significantly between a firm pursuing a software innovation and a medtech business'. Also, large firms appeared to have a very different appetite to smaller firms.

- activities of firms prior, during and after receiving the loan product (especially in terms of accessing other funding)
- a comparison of the process with private providers.

Analysis of monitoring data on implementation can be undertaken to provide data on the timeliness of the scheme, e.g. time taken between applications and decisions. This would rely on the collection of reliable data on the different stages of the process.

In parallel, it is suggested that interviews are conducted with those involved in implementation (Innovate UK and British Business Bank representatives and appointed contractors, including those involved in assessing applications and monitoring projects, and other relevant stakeholders). This would be to gather feedback from those involved on how implementation is working, covering steps of the customer journey and the joint working between the two key organisations (and associated delivery partners). There will be a need to ensure reliability of data, e.g. responses being anonymous to gather honest feedback. Data can be collected through interviews with those involved which could be undertaken following initial competition rounds.

Informed by the feedback from those involved in implementation, it is proposed that survey/interviews are undertaken of applicant firms that were successful and unsuccessful, as well as those that withdrew their applications, soon after awards are made (as noted above). The purpose here will be to elicit customer feedback on the customer journey – how did they find out about the scheme, other options considered (trying to get a sense of additionality), the application process, assessment process and the communication involved in the assessment process. There will be a need to collect information on the impact of both 'yes' and 'no' decisions due to potential discouragement issues. It will be important to explore discouragement issues (e.g. bad rejections) including 'drop-outs' - at what stage did they exit the process, and why? It may also be useful to gather views on how this process compares with that used by private commercial providers of debt venture funds (bank and non-bank sources) for those who may have gone through (or have knowledge of) both processes.

This primary data collection should be undertaken through a telephone/online survey questionnaire. It is anticipated that beneficiary response rates will be relatively high, and some encouragement will be required to ensure response from non-beneficiaries (see chapter 6 for resourcing). The unsuccessful firms will be important due to potential discouragement issues; and in-depth interviews could be used to capture more detailed feedback. In terms of timing, the survey should be undertaken approximately three months after completion of award processes (drawdown will be for 12, 24, 36 months and firms can drawdown on quarterly basis within these periods) with the analysis available soon after that. It may be the case that phasing of the survey needs to considered if there are likely to be multiple competition rounds.

Evaluating early progress and achievements

The scale of the pilot is likely to be modest (see below), and so a quantitative assessment of the cause and effect of the product will be challenging. In addition, there are 'complicated' features to the product, such as the highly innovative and risky nature of the projects that the loan product will target, the uncertain and long timeframes to achieving outcomes, the variety of companies involved, and the varied treatment through different loan values. There are a number of evaluation approaches which could be considered if a large enough group of companies were to be achieved (e.g. in year 2 of delivery of the loan product). However, in spending evaluation resource, consideration needs to be given to what is feasible, practical and cost-effective. Given the likelihood of a 'small n' of beneficiaries in the pilot period, the complicated characteristics of the product, and the uncertainty over the size of the effect it is recommended that theory-based techniques to assess the cause and effect (White and Phillips, 2012)[57] are adopted to assess early effects. As is discussed later in this chapter, once the product is scaled-up, and larger numbers of beneficiaries are supported, counterfactual approaches to evaluation ought to become feasible.

Drawing on evaluation literature and practice, theory-based approaches such as Contribution Analysis and Process Tracing can be used to increase confidence that the intervention has had an impact (Befani and Mayne, 2014)[58]. Instead of examining *"what would have happened in the absence of the intervention?"* such approaches ask "*is there strong evidence that the intervention – rather than other factors – was critical in causing the outcomes observed/reported?"*

The aim of Contribution Analysis is to build up evidence to demonstrate the contribution made by the loan product to bringing about the outcomes in question, while also identifying the other (external) factors (e.g. economic environment, market opportunities, business strategy and its execution, regulations). It uses an iterative six step process (set-out below) of evidence gathering and analysis to compare an intervention's postulated theory of change to the evidence of what happened in practice. In doing so, it comes to conclusions about the contribution that the intervention itself (instead of other factors) has made to observed outcomes. Mayne (2008) sets out six steps to contribution analysis[59]:

- 'Step 1: Set out the attribution problem to be addressed' (i.e. has the loan product led to business growth)

[57] White, H., & Phillips, D. (2012) Addressing attribution of cause and effect in small n impact evaluations: towards an integrated framework, International Initiative for Impact Evaluation Working Paper 15.
[58] Befani, B. and Mayne, J. (2014) Process Tracing and Contribution Analysis: A Combined Approach to Generative Causal inference for Impact Evaluation, IDS Bulletin, Vol. 45 No. 6.
[59] Mayne, J. (2008) Contribution Analysis: An Approach to Exploring Cause and Effect, ILAC Brief 16.

- 'Step 2: Develop a theory of change and risks to it' (e.g. steps in process to reaching growth, why growth might not be achieved, what other factors may contribute) – see Chapter 3 for the ex-ante theories of change
- 'Step 3: Gather the existing evidence on the theory of change' (e.g. evidence on steps to growth, evidence on presence of other factors)
- 'Step 4: Assemble and assess the contribution story, and challenges to it'
- 'Step 5: Seek out additional evidence' (e.g. further consultations and/or secondary data)
- 'Step 6: Revise and strengthen the contribution story' (i.e. arrive at a plausible explanation based on the evidence which can be qualitative and quantitative).

A plausible association can be made if the following are satisfied (White & Phillips, 2012)[60]:

- A reasoned theory of change is set out
- The activities of an intervention have been implemented as set out in the theory of change
- The chain of expected results can be shown to have occurred
- Other influencing factors have shown not to have made a difference.

Given the nature of the loan product, it is recommended that a theory-based approach forms the main part of the evaluation of the early effects. This is particularly so for the pilot phase, though it is also recommended that a theory-based approach is adopted in the later impact evaluation (see later sections of this chapter). Contribution Analysis should draw on the data collection techniques described above to gather the evidence required (e.g. survey of beneficiaries, consultations, case studies, and use of secondary sources). Together these should provide the material for the contribution analysis.

The assessment of early progress and achievements should consider project outputs, initial indicators of changes in behaviour and intermediate outcomes, signs that the product is helping firms to bridge the 'Valley of Death' and to accelerate the innovation/commercialisation process, and any 'early warning' indicators for defaults (these should draw on the logic model and theory of change set out in chapter 3, and a full set of indicators is set out in the Annex to this report). It is important to note that tracking and assessing these aspects links/overlaps with the impact evaluation (see later in this chapter), though it is important to draw on the pilot phase as far as possible to assess

[60] Ibid, p47.

early progress to inform decisions relating to scale-up/rollout. Although the proposed length of time for the pilot is not going to be sufficient for a full assessment of outcomes, it may be the case that some evidence can be gathered on intermediate changes that have occurred which provide indication of a 'direction of travel' to eventual outcomes and impacts.

The evaluation should undertake a follow-up survey and/or set of interviews with successful firms (loan awardees) at 12 and/or 24 months after award. It is recommended that completion of these surveys be made a requirement of the award (notify firms as part of the application stage). It would also be informative to undertake a follow-up survey or interviews with unsuccessful firms, e.g. to test re-applications/discouragement, and as a comparison group. Follow-up surveys should consider the areas mentioned above including: progress with innovation project (e.g. milestones, further investment, additionality issues); behavioural effects on firm; any links to other private/public support; and any early warning of default rates (but this should primarily be from monitoring). The data collection should include questions on the extent to which the loan product has facilitated outcomes relative to other influencing factors. As indicated in the theory of change in chapter 3, there are other factors that should be tested, including those relating to the wider strategy of companies and their markets.

Primary data collection should adopt telephone or online survey questionnaires (see chapter 6 for resourcing). A survey at 12 and/or 24 months after award would enable results at around 16 and/or 28 months after award (see chapter 6 for indicators). The timing of 12 months after award was driven by the need to cover the attractiveness of the loan product and on the customer journey, while the 24 months draws on the logic model for the loan product (see section 3) where most outputs would be expected to be achieved during this time, but recognising it could take longer. As with 'implementation and customer journey' above, there will be a need to consider phasing if multiple competition rounds are introduced.

In addition, it is suggested that longitudinal case studies of a small number of participants could be undertaken to gather more in-depth information to test in detail the extent to which the loan product has been instrumental in leading to outcomes versus other factors. These will need to cover key trigger points to project and company development and so require in-depth interviews with around 10-15 loan recipients at key points, perhaps coinciding with the surveys. As before, consideration will need to be given to phasing if multiple competition rounds are part of the process.

As illustrated in chapter 3, the underlying assumptions and theory of change in terms of routes to outcomes are complicated with multiple and/or alternative causal routes. The table below sets out some of these assumptions to test and the other factors to consider in evaluating the early effects of the loan product. In a subsequent section of this chapter, covering the impact evaluation, assumptions and factors are set out for later effects of the loan product. These issues can be covered in overview through surveys, but require the

in-depth interviews to cover them in more depth and detail – as mentioned above in relation to the trigger points of project and company development.

Table 4-2: Assumptions and factors to test (early effects)

Assumptions	Examples of potential factors contributing
There is sufficient appetite for this loan product amongst firms – measured in terms of initial interest… …Companies find the terms of product as appropriate and can meet requirements (e.g. security and repayment terms) - measured in terms of applications… …Sufficient numbers of companies apply and are accepted – measured in terms of applications reaching quality threshold and passing technical and credit assessments	Loan product was well marketed as an alternative source of funding; or Firm eligibility criteria too broad indicating requirements met relatively easily; or The application and approval process was in line with commercial funding in terms of timeliness and simplicity; or Firms already experienced in applying for public sector funding and therefore more likely to be accepted for loan; or The assessment process does not filter out inadequate applications being accepted; or Loan product features (in particular non-price aspects) attractive to firms compared to the private market.
Sufficient numbers of companies draw down the product as their projects are pursued – measured in terms of draw downs…	Loan offer made in timely way, with appropriate terms and conditions Firms able to utilise their own internal funds which were not available previously Firms accessed other private sources (not as a result of the loan product), and these sources may have been more timely/appropriate
Loan product leads to project milestones being reached…contributing to specific outputs and intermediate outcomes. Initial effects may include firm investment in innovation / R&D, employment in R&D, and IP measures including patents applied for/secured. R&D/innovation activities may lead to a requirement for further finance, which may be attracted if commercial potential can be demonstrated. The R&D/innovation activities then lead to alternative/multiple causal strands, which will depend on the company, e.g.: - Development of new/improved products and services that are subsequently launched - Development of new technologies to be licensed. - Development of new processes to be implemented. …There may also be enhanced innovation capacities & skills capabilities; enhanced	Loan was instrumental in providing finance to support R&D and innovation (or to do so more quickly) Role of alternative finance/funding Previously-developed intellectual property Other elements feeding into product/service development (rather than those elements financed by the loan product) Other contributing factors to process improvement Role of element supported by loan finance in improving productivity vs role of elements supported by other means Firms invest in/develop their own skills and training strategy (not related to the loan finance) Firms more willing to access private finance as a result of advice of their business advisors/accountants (not related to the loan finance)

Assumptions	Examples of potential factors contributing
capacity & willingness to access private finance; and interim repayment of capital and interest.	
NB: for later effects, e.g. from the development of new products/services and the entry to market for these products and services, and the development and adoption of new processes, see the section on the impact evaluation. These effects could be tested in the pilot evaluation if applicable.	

Source: SQW

Options for using Randomised Controlled Trials in the pilot evaluation

Randomised Controlled Trials (RCTs) based on the random allocation of subjects to treatment and control groups are often regarded as providing the gold standard evidence of causal impact. In terms of innovation support RCTs remain uncommon with the two notable UK examples being the Creative Credits project and the UK Growth Vouchers RCT. In the Creative Credits project an RCT methodology was applied to a voucher type initiative with a relatively large recipient and control group[61]. In the much larger Growth Voucher scheme, randomisation was used to explore two elements of the treatment: the initial communication to firms to encourage them to take advantage of the scheme and then in evaluating the effectiveness of the Growth Voucher treatment itself[62]. Both studies included in the RCTs short-term behavioural outcomes and longer-term assessment of business performance outcomes.

Both previous RCTs highlight the potential value of the approach where sample sizes are adequate to allow randomisation to be effective and where the treatment involved is similar across members of the treatment group. In terms of the pilot loan product there are perhaps two areas in which it might be useful to consider the potential for RCTs: the marketing of the loan product; and then the award of the loan product itself.

Testing the marketing of the loan product

The loan product will be new to firms, demand is uncertain and the appeal of different aspects of the loan product to firms of different types and in different sectors should be tested. In marketing the loan product, it ought to be possible to experiment with randomised marketing messages to test different aspects of the loan product. This could help inform approaches to stimulating interest in innovation funding more generally, and help to test which aspects of the product proved most persuasive in encouraging firms to seek further information about the loan product and subsequently to apply. One group of firms might, for example, be provided with marketing messages relating to the levels of security required while another might be targeted with a central message relating to

[61] Bakhshi, H., et al. (2015). Assessing an experimental approach to industrial policy evaluation: Applying RCT plus to the case of Creative Credits. Research Policy 44(8): 1462-1472.
[62] BIS (2015) Growth Vouchers Programme: Phase One Qualitative Assessment, BIS Research Paper No 220

holiday grace period (BIS, 2016)[63]. Comparison of different group outcomes measured by click-through rates to the loan product web site or application form would then provide information on the differential attractiveness of the elements of the loan product and enable persuasive marketing to be conducted in future.

Therefore, to take an RCT of the marketing forward, two or more different sets of marketing messages should be developed, with these randomised across target companies. This would need to draw on the marketing routes used – for example if electronic marketing was used, one group of companies could receive one set of emailed marketing messages, and a second group another. This would need to be implemented consistently through the marketing process to limit contamination. Sample sizes are likely to be sufficient to ensure that randomisation between different groups is effective because the samples would reflect the potential target audience for the product (rather than the number of companies applying). The previous implementation of an essentially similar trial of marketing messages in the Growth Voucher project will provide key learning points for effective implementation. The costs of implementing this approach may be modest, and would include:

- additional costs of developing separate marketing messages
- additional costs of incorporating randomisation into how the marketing is disseminated
- costs of digital data collection, e.g. on click-through rates and applications
- analysis and reporting of the findings.

Testing the effectiveness of the loan product

The logic models discussed earlier suggest that receipt of the loan product should encourage firms to expand and potentially accelerate their innovation activity. Market outcomes from innovation activity may take some time however (e.g. 3-5 years) depending on the time it takes to bring an innovation to market. Shorter-term behavioural effects may provide more timely evidence on initial effects. These are potentially measurable in an RCT although within the scope of the pilot project a number of implementation difficulties arise:

- Sample sizes, particularly the number of loan recipients, are likely to be inadequate to ensure the effectiveness of any randomisation. Some simulation evidence suggests that a minimum requirement of around 300 observations in each of the treatment and control group is required for randomisation to be effective[64]. In this

[63] Ibid, p17.
[64] Bruhn, M. and D. McKenzie (2009). In Pursuit of Balance: Randomization in Practice in Development Field Experiments, in American Economic Journal-Applied Economics 1(4): 200-232.

case, high variance is expected and the effect size is currently uncertain though the benefits are likely to be skewed, which would suggest relatively high sample sizes are required.

- Random allocation – to implement an RCT, loans would need to be randomly allocated among applicant firms meeting the set of eligibility criteria. This could mean that some poorer projects and firms are supported with the potential for an increased default rate in the short term. Random allocation of loans may also generate deterrent and distortionary effects on applications to the pilot. Weaker firms may feel that randomised allocation gives them a greater chance of obtaining support than, say, a peer review process, encouraging applications from this group. Stronger firms, on the other hand, may be discouraged from applying if they know that their application is not going to be judged on its merits[65]. Some of these issues could be overcome by randomly allocating loans to firms meeting a quality threshold (this is discussed later in this chapter).

- Uniformity of treatment – the size of loans available through the pilot project may vary significantly. This translates into some variation in the treatment which firms are receiving. In statistical terms this is not a fundamental problem where sample sizes are large enough to allow comparisons between groups with homogenous treatments as in the Growth Voucher Pilot. In the pilot loan product, however, this issue is compounded by what are likely to be relatively small recipient numbers. Whilst loan sizes could be fixed to address this problem, this would risk having policy design that was not set up to address the issues that had given risk to it in the first place.

The combination of a relatively small recipient group and a lack of uniformity of the treatment (loan size) being provided means an RCT design is not well suited to the initial evaluation of the behavioural or impact of the pilot loan product. However, this could be revisited at the end of the pilot phase, in particular when it is clearer as to any variation in treatment and loan sizes, and on likely sample sizes.

Timings of the pilot evaluation

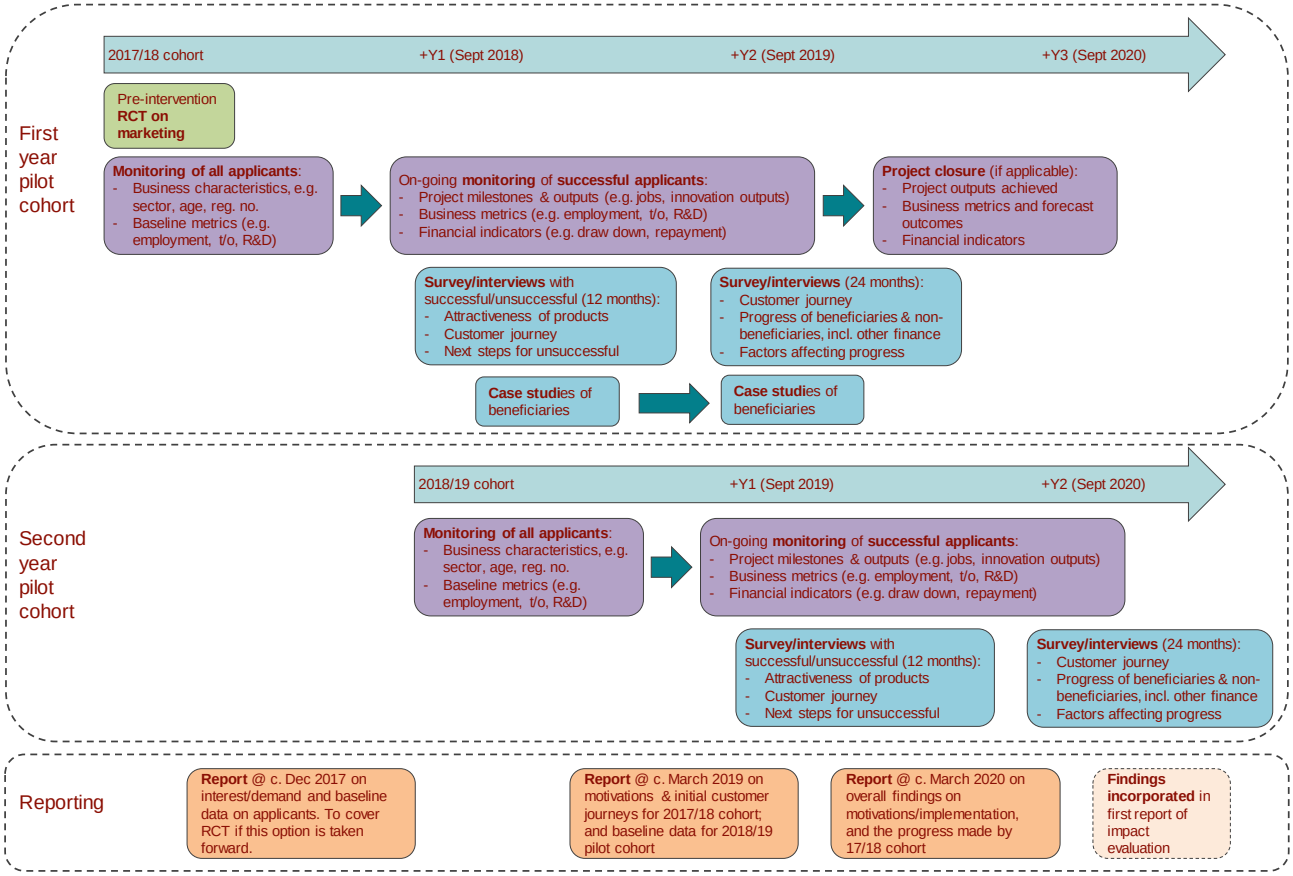
Figure 4-1 sets out the timetable for the pilot evaluation of the loan product. The expectation is that for the pilot evaluation, the cohorts of interest may be drawn from multiple years. The graphic presents the timetables as though this is the case.

In addition, further complicating the timings of the evaluation, there may be multiple competition rounds in each year. The proposed timetables have set out single survey rounds for each year's cohort, and the timings here are 'stylised' in terms of the lengths of time following awards. These surveys could be undertaken in multiple phases and potentially for the initial survey for the pilot evaluation (at c. +3 months following award).

[65] Heckman, J. J. and J. A. Smith (1995). Assessing the case for social experiments, in Journal of economic perspectives 9(2): 85-110.

For the pilot evaluation of the loan product, the RCT option (if taken up) is completed once for the first cohort, and completed as part of the first competition rounds. Monitoring data is collected for all applicants, and then collected on an on-going basis for beneficiaries. These data are to be complemented by interviews with beneficiaries and some non-beneficiaries at 12 and 24 months, and a small number of case studies. Early, interim and later stage reports are completed in late 2017/early 2018, early 2019 and early 2020.

Figure 4-1: Timetable for the pilot evaluation of the loan product



Impact evaluation

Key evaluation questions

The impact evaluation of the loan product will need to build on the initial assessment of the effects of the pilot, described earlier in this chapter. As set out above, the evaluation of the benefits of the pilot will focus on the adoption of theory-based impact evaluation techniques to test the early effects of the theory of change from evidence collected from cohorts of beneficiaries and non-beneficiaries. The impact evaluation will focus more on the later effects and, as discussed later, should involve a mix of counterfactual and theory-based impact evaluation approaches. The impact evaluation questions are as follows:

- What has been the 'additional' effect of the loan product on intermediate and final outcomes, covering in particular the effects on innovation behaviour and performance, and business performance? These effects are those that were

specified in the logic model in chapter 3, with detail provided on the postulated theory as to how they may be brought about.

- To what extent can spillover effects be identified from the innovation projects that have been supported by the loan product? Again, these were identified in the logic model and postulated theory of change in chapter 3.

- Has there been any crowding out of private R&D investment amongst firms supported? Has there been any crowding in/out of lending or other investment by finance providers? Have there been any other third party effects, such as displacement (e.g. of the business/market share of other firms)? These are important third party effects to help understand whether the product has brought about a net gain.

In addition to these evaluation questions, the impact evaluation stage will need to consider the evidence on the financial performance of the portfolio. A key question here is: what have been the levels of repayment and default on the loans?

Overall approach to the impact evaluation

The overall approach to the impact evaluation is summarised below, with subsequent sub-sections providing further detail and justification on the particular methods that have been recommended. It is worth highlighting that the early assessment (described above) may inform refinement of the theory of change and logic model, which may need to be reflected in the approach to the impact evaluation. In addition, the nature and scale of take-up to the early competition rounds of the pilot will need to inform final decisions on the approach to the impact evaluation. In particular, as discussed later, there is uncertainty as to the number and variation in loans that will be supported by the product, which have implications for the feasibility of an econometric approach. In summary, the core evaluation design that is recommended incorporates a triangulation of results derived using the following approaches:

- A counterfactual impact evaluation is suggested to compare the intermediate and final effects of a beneficiary group with a non-beneficiary group drawn from high quality unsuccessful applicants (presuming that there are sufficient numbers). The data should be collected using monitoring and multiple rounds of surveys, based on cohorts of applicant companies in 2019/20 and 2020/21 (though timings can be flexible). Analytical approaches employing difference-in-difference and panel methods should be used to compare the two groups – with multiple approaches enabling results to be corroborated.

- Theory-based impact evaluation, drawing on the surveys identified in the previous bullet point, and also in-depth case-based research, which continues to track pilot cohorts from earlier years. This will draw on contribution analysis to assess the effect of the loan product on intermediate and final effects.

- Consideration of third party and indirect effects through the use of the aforementioned methods (e.g. using surveys to estimate displacement and any

discouragement/encouragement effects; and using case-based research to assess spillover effects) as well as qualitative research with financiers to consider crowding in/out effects.

The detail and justification of these core approaches is discussed below. In addition, alternative and complementary options are set out where applicable.

Effect on innovation and business performance

The early assessment, as described earlier in chapter 4, will provide initial evidence on the effect on innovation and business performance by establishing the extent to which the expected theory of change is occurring as expected and the extent to which this has been brought about by the loan product (rather than other factors). This will draw on theory-based techniques and an analytical approach that draws on contribution analysis. Given the early stage of the assessment, it is recommended that this is continued (through further rounds of qualitative research with the cohorts of beneficiaries and non-beneficiaries with high quality applications – two further rounds are recommended and set out in the timetable in Figure 4-2) to consider the underlying logic, assumptions and contribution of the loan product to later effects. The impact evaluation, however, should seek to strengthen the evidence on cause and effect by also incorporating counterfactual impact evaluation techniques, and the options for this are discussed below.

Identifying a suitable 'control' group is a fundamental challenge to policy evaluation, because the treated and untreated effects for individual companies can never be observed. Imbens and Wooldridge (2009) outline situations which describe the allocation of subjects to a control and treatment group[66]. The first is the classical experimental situation of randomised allocation in which allocation is unrelated to outcomes. The second allocation mechanism – 'un-confounded allocation' – occurs where assignment is independent of outcomes but may be related to subject characteristics. Here, where the assignment mechanism is either observable or discoverable, sampling and/or statistical approaches can be used to minimise any systematic differences between the characteristics of the treatment and control groups and provide a valid estimate of treatment effects. This has led to the development of econometric approaches which can 'control' ex post for potential selection biases by either implicitly or explicitly modelling the probability that a firm will be in the treatment rather than the control group, and then estimating the impact of the treatment 'controlling' for any selection biases.

In practice the control groups used in experimental and quasi-experimental evaluation approaches are of three main types: random, matched and self-selected. As discussed earlier in the chapter under the pilot evaluation, random control groups comprise a random drawing from the pool of eligible businesses for a particular scheme. Differences between

[66] Imbens, G.W. and Wooldridge, J.M. (2009) Recent Developments in the Econometrics of Program Evaluation, in Journal of Economic Literature 47:5-86.

the treatment group and a random control group comprise the treatment effect as well as selection effects related to the propensity to apply for support and its award. Matched control groups may be matched ex post with scheme applicants on some observable characteristics such as age, size, sector etc. This is likely to reduce the 'distance' between a random control group and treatment group but selection issues remain important. Finally, a self-selected control group may be constructed from unsuccessful scheme applicants. This reduces self-selection effects related to the propensity to apply for support but other selection effects remain an issue (e.g. related to how applications are judged and assessed) meaning that econometric methods need to be used to allow for potential selection effects.

To inform the decision across these three main types, there are a range of issues to consider, such as deliverability, data availability and timeliness. In addition, within the three main types there are different options for how the counterfactual is defined and identified:

- Random selection was considered, but was deemed to be unfeasible and inappropriate. An RCT would ideally be implemented at the pilot stage to ascertain the effectiveness of the product on behavioural and performance outcomes. However, the size of the pilot is likely to be such that the sample sizes would be too small for quantitative analysis (as discussed in chapter 2, depending on the average loan size, there may be between 70 and 250 successful applicants, leading to 40-150 observations following attrition rates). In addition, whilst in theory loans could be randomly assigned to those companies that meet certain selection criteria and pass quality and credit assessments, loan amounts requested will vary, complicating random selection with the result that treatment and control groups would be unlikely to be similar. Loan amounts could of course be fixed, but this defeats the purpose of the scheme. Moreover, by the time decisions need to be made on the roll-out of the product (circa 2019 or 2020), there will have been insufficient time for an RCT to be able to provide robust evidence, in particular on the fundamental innovation and business performance effects. This is due to the relatively long timescales to outcomes, which were described in chapter 3 on the logic models. An RCT could be implemented with later larger cohorts, but this could be unethical if the early evidence from the pilot shows that the product is likely to benefit companies. This could be revisited at the end of the pilot period.

- Matched control groups from the wider business population (e.g. as used as one comparison group in the evaluation of Tekes[67]) could incorporate use of external sources of company data, such as the Inter-Departmental Business Register (IDBR) and commercial sources (e.g. Fame and Dun and Bradstreet). Using these sources, however, would limit matching to characteristics such as sector, size and age. This ignores fundamental characteristics such as innovative potential, and so this kind of matching is unlikely to sufficiently close the distance between the control

[67] Ibid, p26.

and beneficiary groups. The IDBR could be supplemented by the use of Community Innovation Survey (CIS) and Business Enterprise R&D survey (BERD) data, using indicators such as R&D spend and innovation activity. Such matching would narrow the distance between control and beneficiary groups, though the anonymity of the CIS and BERD data means that the kind of analysis would be restricted to admin-based data. The option of implementing an evaluation using admin data is considered in more detail below. An alternative matching approach would be to use Innovate UK grantees that have just completed single company grant projects on the basis that, having completed these arguably earlier stage R&D projects, they may be at a similar stage of innovation as those applying for the loan product[68]. Innovate UK has data on the size, age and sector of these companies, which could be used to match with the beneficiary group. There are potential weaknesses here, though, in particular if those self-selecting into loans are different from those just completing grant-funded projects. This option is considered in more detail below.

- A self-selected group could be identified from unsuccessful high quality applicants, as has been used in other evaluations of innovation schemes (e.g. Smart in the UK[69], the Dutch Innovation Credit Facility[70], and as one comparison group in the evaluation of Tekes[71]). The selection process is likely to incorporate a technical assessment of applications and a credit assessment. Therefore, the comparison group of non-beneficiaries could be chosen from those with the highest technical and credit scores – indeed depending on the quality of applications, it may be feasible to identify fundable applicants, which would limit any difference between beneficiary and comparison groups. The feasibility of this option will depend on the level of interest and applications, with over-subscription by high quality applications ideal in generating as robust a comparison group as possible. Other Innovate UK competitions are over-subscribed, and the evaluation of Smart in the UK was able to utilise a comparison group of companies that were above or just below the quality threshold required for funding. Given that the market for the loan product is unknown at this point, the extent to which this assumption holds would need to be tested in the first competition rounds. This option is considered in more detail below.

With this long-list considered, the short-list of feasible options is assessed in the following table. In all cases, different analytical techniques can be used to evaluate the difference that the loan product has made over and above what would have happened anyway, for instance drawing on difference-in-difference, regression (including panel models) and selection models (e.g. Heckman two-stage selection model if an appropriate instrument can be found). The results should be triangulated with the qualitative analysis to corroborate the findings. Given the relatively small size of the pilot cohort, and the

[68] Innovate UK grantees are likely to have completed projects such as Proof of Concepts or Development of Prototypes, and so be at later TRL stages that are similar to loan applicants.
[69] Ibid, p20.
[70] Ibid. p23.
[71] Ibid. p26.

potential attrition rates for survey data collection and matching-rates for admin data collection, the impact evaluation should draw on later larger cohorts of companies. At the time of writing, it was likely that a pilot would run from 2017/18 to 2018/19, and so the beneficiary cohort for the impact evaluation ought to be drawn from a series of competitions across 2019/20 and 2020/21 (if and when the core loan product is rolled out/scaled up) to ensure an appropriately-sized sample is identified. This is discussed in more detail later in this sub-section.

In parallel to the counterfactual impact evaluation itself, monitoring data should be collected on an on-going basis, and used as part of the evidence base on the repayment of the loans (the financial evaluation is covered later in this chapter). As well as providing core data on repayment and defaults, there may be further analysis that can be undertaken as part of the time-series dataset to identify any early warning signs of defaults. Ex post it may be possible to examine whether there were any indicators that were associated with subsequent default relating, for example, to: project characteristics (such as baseline TRL, size of loan requested), sector characteristics, slower project progress, lower tendency to expect future effects such as product/service launch, and a greater tendency for a requirement for further R&D/innovation.

Table 4-3: Options for counterfactual impact evaluation

Option summary	Data and evidence	Challenges/issues	Timeliness
Successful & high quality unsuccessful applicants tracked over time	Use of monitoring and survey data to track outcomes, i.e. intermediate effects (R&D expenditure, patents, employment, new products, processes and licences, additional finance, and behavioural effects) and final effects (turnover and productivity). Survey data can also be used to see whether /how projects would have gone ahead anyway (for beneficiaries) and whether/how they have gone ahead (for non-beneficiaries). Repayment to be covered through monitoring.	Appropriateness of unsuccessful applicants needs to be considered – based on quality of applications. Varying timescales to outcomes between companies (which may depend on sectors, markets, technologies). Attrition of sample through longitudinal surveys, and minimising burden on companies.	The timeliness challenge is an issue that reflects the nature of the intervention (and its timescales to outcomes) and the policy design which requires the impact evaluation to draw on a later cohort. This option will provide timely evidence as far as possible, as earlier effects can be assessed from survey and monitoring data.
Successful applicants and	Use of monitoring and survey data to track	Distinguishing between the effect of previous	As above.

Option summary	Data and evidence	Challenges/issues	Timeliness
Innovate UK grantees that have recently-completed grant projects tracked over time	outcomes, i.e. intermediate effects (R&D expenditure, patents, employment, new products, processes and licences, additional finance, and behavioural effects) and final effects (turnover and productivity). Repayment to be covered through monitoring.	grants (for comparison group) and loans (for beneficiary group). As above on timescales to outcomes and attrition and burden for companies.	
Successful applicants matched to a group of companies using administrative datasets	Baseline BERD and CIS questions replicated exactly to gather data on beneficiary group as part of, or soon after, application. Data also collected on sector, age and size. These characteristics are used to identify a matched group drawing on BERD, CIS and IDBR datasets. The two groups are tracked over time using admin data such as the time-series provided by the Business Structures Database (BSD).	BERD and CIS are survey-based data, and CIS only covers companies with 10+ employees. Therefore, matching may have certain limitations. For the purpose of tracking outcomes, the BSD will provide data on only later stage effects such as turnover and employment, and not on the range of other intermediate effects. There are also some question marks on the reliability of the BSD data, as this draws on IDBR data, which can vary in the date of collection (e.g. from 2 months to 2 years old), and is sometimes based on imputed data (rather than actual data). Further, admin data do not currently contain details of other finance that may have been secured by the comparison group.	The evidence from this option will be less timely, as it is dependent on admin data on final effects, which by their nature will be further into the future. In addition, there are time lags on the data from the IDBR, and so the BSD.

Source: SQW

Drawing on the points raised in the table above, the first option would be the preferred option on the presumption that:

- There are sufficient numbers of unsuccessful applicants.
- These unsuccessful applicants submitted relatively high quality proposals, e.g. technical assessments that surpassed or were close to the required quality threshold and with credit scores that met or were close to requirements.
- Most of the unsuccessful applicants that form part of the comparison group do not go on to successfully apply in future rounds. Indeed, use of future rounds of the new innovation finance scheme or other innovation funding schemes will need to be tracked for both groups.

This would mean that a comparison group of unsuccessful applicants would be a good match to beneficiaries in terms of awareness and motivations to use loan finance to support innovation, and have similarly high quality project proposals. In addition, the tracking surveys can collect evidence on whether projects would have gone ahead (for beneficiaries) and whether they have indeed gone ahead (for non-beneficiaries) – such issues are best addressed through surveys rather than monitoring in order to obtain unbiased responses. With the good match and the various ways of approaching the additionality issue, the evidence would provide a high degree of internal validity for the evaluation findings and the ability to triangulate varying sources. If there are insufficient numbers of good quality unsuccessful applicants, then the alternative of recent Innovate UK grantees could be used alongside or instead. The third option does remain a possibility for the future, as this could be implemented at a later date – though it does require some modest additional data collection from applicants in order to set this up (e.g. baseline data on R&D spend and attitudes towards innovation, and company identifiers such as company registration numbers).

The analytical approaches for comparing the outcomes of the beneficiary group with a group of unsuccessful applicants should use multiple techniques in order to provide corroboration on the findings. Difference-in-difference and regression techniques using panel methods are recommended to compare the outcomes, in particular as the match ought to be good if unsuccessful applicants are high quality. Such an approach for the counterfactual also helps to address issues relating to self-selection into the programme.

As noted above, the recommended approach is likely to use applications from 2019/20 and 2020/21. This could be earlier if the product scale is increased sooner. The intention to wait until beyond the first year (or two) of the product (i.e. beyond the pilot period) is to allow a sufficient sample of applicants to be available for the evaluation. There are no hard and fast rules to required sample sizes, as this is dependent on factors such as the variance and effect sizes, and also on the extent to which sub-group analysis is required (e.g. for different loan amounts or sectors). However, conventionally econometric studies are only useful where there are samples of 400-500 or more. This does not need to be evenly spread between the beneficiary and comparison groups. For example, this could be split between 150 in one group and 250 in another to achieve 400 in total. The sample sizes are required at the end point of the evaluation, and with attrition rates it means that

starting sample sizes need to be larger. The following assumptions have been considered:

- For beneficiaries, there will be a greater propensity to participate, and so it may be reasonable to expect that 65% would participate in surveys in the three years following support. However, for those that default there will be challenges in tracing contacts and in encouraging participation, and so a response rate may be expected at around 30-35% for this group[72]. Taking this into account results in an overall response rate for the beneficiary group of just over 50%. It is recommended that participation in monitoring and evaluation is made clear as an expectation as part of application/contracting in order to help to maximise response rates.

- For the comparison group, there will be lower propensity to participate given that they will have been unsuccessful or otherwise have less interest in the evaluation. For this group it may be reasonable to expect that 40-50% would participate in surveys over the course of three years. If participation in evaluation is made clear as part of application processes, then this should help to maximise response rates.

Taking conservative response rates of 50% (for beneficiaries) and 40% (for non-beneficiaries), the following table sets out potential scenarios for the starting sample sizes. Other assumptions used are:

- Amounts of finance are expected to be highly skewed, but for the purposes of calculating potential sample sizes we assume an average loan sizes to be £300k-£1.5m. This is a broad range, which is indicative of the current uncertainty of the amount of finance that companies will be looking for[73]. This can be tested in pilot rounds to improve upon the assumption, though at this stage a wide range highlights the loan size as a potential risk in robust impact evaluation. The product (or indeed individual competition rounds) could be targeted at lower loan amounts, which would improve the rigour of the evaluation. However, this may be at the expense of leaving a gap for certain levels of innovation finance provision, and may reduce the generalisability of the evaluation findings to the type of businesses that are relevant for this kind of scheme.

- The ratio of unsuccessful (i.e. non-beneficiaries) to successful (i.e. beneficiaries) applications is assumed to be 2:1. This draws on Innovate UK experience of application rates for other schemes. For example, the application success rate for

[72] It is difficult to estimate response rates for this group and the effect on the overall response rate, because it is unknown how many companies may default. Defaulting does not necessarily mean that the business becomes insolvent, and so in these cases responses may be easier to obtain. For companies that do go insolvent, representatives may still be contactable if alternative contact details have been collected – though of course these representatives are likely to be less willing to take part in the evaluation.

[73] There is significant uncertainty at this point, and the pilot will provide a more realistic estimate of the expected average. £300k draws on evidence that BEIS has collated from the market research for new innovation finance products, and £1.5m is drawn on the experience of the Dutch Innovation Credit Facility.

Smart is in the order of around 25% (meaning a 3:1 ratio of unsuccessful to successful), though this includes all applicants. In order to focus a comparison group on the higher quality unsuccessful applications, a lower ratio of 2:1 is used. This assumption can also be tested following early competition rounds, though it is important to note that the success rate may take some time to settle as companies will potentially weigh up the chances of success in deciding whether or not to apply[74].

Based on the assumptions, and loan pots of £150m and £250m (potentially over two years), it is evident that obtaining sufficient sample sizes may be an issue for the impact evaluation, in particular if loan sizes are at the higher end of the range. For a loan pot of £150m, based on the assumptions used, an average loan size of under £500k would be required to obtain a total sample size of at least 400. For a pot of £250m, the average loan size would need to be £800k or under in order to achieve a total sample of at least 400. Both of these averages are towards the lower end of the range of £300k-£1.5m for the expected loan average that has been identified in the scoping work. It is also worth noting, though, that a total sample size of 400 is the lowest that we would recommend (in particular as there may be issues such as missing data to address, as well as potentially a high degree of variance in the data). Ideally, therefore, the evaluation should aim for higher sample sizes.

Table 4-4: Scenarios for sample sizes

Loan pot	Assumptions	Potential sample sizes
Loan pot of £150m (e.g. over one-to-two years)	£300k-£1.5m average loan means 100-500 beneficiaries 2:1 unsuccessful yet quality applications: successful applications means 200-1000 non-beneficiaries	With 50% and 40% response rates for beneficiaries and non-beneficiaries, results in: 50-250 beneficiaries; 80-400 non-beneficiaries; 130-650 total
Loan pot of £250m (e.g. over two years)	£300k-£1.5m average loan means 167-833 beneficiaries 2:1 unsuccessful yet quality applications: successful applications means 333-1,666 non-beneficiaries	With 50% and 40% response rates for beneficiaries and non-beneficiaries, results in: 83-416 beneficiaries; 133-666 non-beneficiaries; 216-1,083 total

Source: SQW

The scenarios set out in the table above suggest a loan pot over the course of one-to-two years. Indeed, the samples could be built up over more competition rounds and years. The extent to which this is required for the impact evaluation will depend on the annual

[74] For example, the data on Smart suggested a fluctuation in the probability of success in the first rounds, and this gradually settled to around 25% over time.

commitment of loans, loan sizes and desired sample sizes. Based on the 2015 autumn statement of £165m per annum being available through new innovation finance products, clearly a pot of £250m may require multiple years of competition rounds. A note of caution here is that this will mean that different groups of companies are at different stages of drawdown, repayment, project development, business development and so on (given the likely variation between companies applying this is likely to be the case anyway). This will add some complexity to the analysis to be carried out.

In order to accommodate this complexity and to corroborate the findings of the counterfactual impact evaluation, it is recommended that theory-based impact evaluation techniques are also undertaken, building on those undertaken as part of the pilot evaluation. There should be two aspects to this:

- It would make sense to continue to follow, as part of a longitudinal exercise, those companies supported/not supported by the pilot through qualitative research. If there is significant attrition, or a change in the product scope, then new companies should be recruited from the roll-out cohorts for rounds of in-depth research. The purpose of tracking these companies is to focus on the latter stages of the theory of change, in particular on assumptions and the role of the product vis-à-vis external factors as set out in the table below.

Table 4-5: Assumptions and factors to test (later effects)

Assumptions	Examples of potential factors contributing
A proportion of projects are successful in developing (or contributing to) new products or services that are taken to market… And/or a proportion of projects are successful in developing (or contributing to) new technologies that are licensed to companies… …New products/services or licences lead to turnover and employment growth – with employment dependent on requirements to recruit to deliver growth (within direct beneficiaries and/or licensees)…	Loan product was instrumental in providing finance to support innovation and the development of the product/service of technology for licensing (or to do so more quickly) Alternative finance/funding Previously-developed intellectual property Other elements feeding into product/service or technology development (rather than those elements financed by the loan product) Execution of other aspects of the strategy of the company in securing market growth The market for the kind of products/services that the company was developing/offering anyway was growing
…Within this turnover, a proportion is due to exports	Role of the product/service that the loan product facilitated the development of (including potential confidence that company had in developing new markets overseas due to the quality of the product/service) Company already had a strategy/plan in place to export and actions within this were instrumental
A proportion of projects develop new (or improved) processes, which enable higher quality/more competitively-produced/less waste … and potentially improvements in	Loan product was instrumental in providing finance to support innovation and the process improvement (or to do so more quickly)

Assumptions	Examples of potential factors contributing
productivity as well as sales/employment etc.	Alternative finance/funding Previously-developed intellectual property Other contributing factors to process improvement Role of element supported by loan finance in improving productivity vs role of elements supported by other means
Companies that successfully innovate and improve performance are more attractive to other lenders/investors, leading to further finance (and potentially growth)	Performance improvement driven by what was supported by the finance of the loan vs other elements Extent to which networks/quality of management team/coincidental timing was instrumental in securing subsequent finance

Source: SQW

- Second, the tracking survey established for the impact evaluation (i.e. from the cohorts from roll-out of the product) should incorporate questions relating to the various components of the theory of change and the role of varying contributing factors (using closed questions drawing on the issues set out in the table above).

Addressing 3rd party, wider and unintended effects

There are several wider effects that will need to be considered as part of the evaluation, which are discussed in this sub-section.

Displacement effects

The development of new products and services may generate economic value for those involved in supplying and selling these. However, the finance landscape is complex and there is the possibility that some of this economic value may be gained at the expense of third parties involved in supplying and selling similar products and services. This potential displacement effect should be taken into consideration. It must be noted here that the new products and services supported through the loan product may be of superior quality and value compared to those that they are displacing, which may become obsolete (i.e. possibly through a process of creative destruction).

There are standard survey questions that can be used to estimate the potential size of the displacement effect, e.g. through consideration of the location of customers, competitors and the extent of market competition. These can be utilised here to assess displacement effects. In addition, there should be further evidence collected on the extent to which innovations are completely 'new-to-market' and/or significantly improving on previous product/service offerings in order to provide an assessment of the extent to which displacement is occurring due to moving up the value chain.

Crowding in/out effects

There are two key issues for consideration under crowding in/out, which relate to:

- Whether the loan product crowds out R&D expenditure that beneficiaries may have made anyway, e.g. they divert R&D resources to the project supported by the

product and/or use loan finance to support the project rather than other sources? The evidence on this should be captured as part of the core approach to the counterfactual impact evaluation described above, which should consider R&D expenditure as an early outcome. If the change in R&D expenditure is greater amongst beneficiaries compared to non-beneficiaries, then this would suggest that there has not been crowding out.

- Whether the loan product crowds in/out investment or lending by other financiers? Again, the core approach to the counterfactual impact evaluation should consider the attraction of private sector finance for both beneficiaries and non-beneficiaries to ascertain the extent to which the loan product is affecting this as an intermediate outcome. The interpretation of this will need to be tested through qualitative research (with both companies and lenders/investors) to understand the extent to which different explanations are in play:
    - initial finance for beneficiaries may reflect some co-investment
    - higher subsequent finance for beneficiaries may reflect increased attractiveness of companies due to, for example, an improved commercial case facilitated by the innovation project supported by the loan
    - finance for non-beneficiaries may reflect some demonstration effects, or encouragement issues (see point below).

Spillovers

An important aspect of the rationale for government funding for innovation is that the innovation outcomes may lead to spillover benefits to other parties (i.e. outside of the direct beneficiaries involved), which would be positive externalities. There are three main types of spillover (Jaffe,1996)[75]:

- Market spillovers accrue to non-innovating firms and the customers of innovative goods, services and processes. These reflect the benefits derived from their use, including through the reducing in the cost of producing an existing product.
- Knowledge spillovers occur when the knowledge generated in the development of an innovation is diffused, e.g. through movement of people involved, as a result of collaboration/partnering, or through imitation such as by competitors.
- Network spillovers relate to the interdependencies between certain technologies. They can occur when innovation creates a platform or critical mass for other innovative goods and services to be developed.

Tracing and quantifying spillover effects is challenging, as by their nature they are unpredictable and can be dispersed widely. Econometric approaches have been used to

[75] Ibid, p34.

estimate social returns to innovation (including from spillovers), for example at industry level by considering a range of public investments[76]. In the specific case of this loan product, however, such approaches are not appropriate given the scale and specificity of the intervention. Two key options for considering spillovers effects of the loan product are set out in the table below. This provides a recommended option, which is a case-based assessment drawing on the identification of potential spillovers through beneficiary survey and interview data, and a lower cost option, which seeks simply to identify possible sources of spillovers. A key question for BEIS and Innovate UK to consider in particular is whether the spillovers that are expected through the loan product (and the new finance products more generally) are expected to be any different in nature and scale from other public innovation funding schemes. If not, a core set of questions to identify the potential sources of spillovers should be developed across evaluation work, and this would inform a more substantive study focussing purely on spillovers across multiple schemes.

Table 4-6: Options for assessing spillover effects

Option summary	Data and evidence	Challenges/issues	Timeliness
Case-based assessment of market, knowledge and/or network spillovers – seeking to track through spillovers from individual beneficiaries of the product to wider sets of customers, collaborators etc.	Need to identify where there may be evidence of one or more of the different types of spillover effect. This could be through survey or beneficiary interview questions on collaborators, product benefits for customers, competition etc. Subsequent data collection required to trace through spillovers to customers, collaborators, &/or competitors – e.g. through in-depth interviews.	Identifying potential spillovers is a key challenge – suggested topics in previous column draw on beneficiary knowledge, but also scope to understand nature of innovation. Causality tested through qualitative assessment rather than empirically – can be challenging due to uncertain ways in which knowledge /benefits are transferred between economic entities. Purposive sampling to evidence spillovers, rather than representative samples that can be aggregated to the population.	Timescales for spillovers to be evidenced likely to be beyond the lifetimes of projects, and variable dependent on how knowledge or benefits 'spill over'. Market spillovers evident at point of product/service take-up; knowledge spillovers vary depending on whether through collaboration (sooner) or imitation (later); network spillovers will be in longer-term.
Light touch review to identify potential	Essentially covers the first part of option 1,	Provides only headline overview of potential,	As above.

[76] For a summary of literature, see, for example: Frontier (2014) Rates of return to investment in science and innovation, A Report for BIS.

Option summary	Data and evidence	Challenges/issues	Timeliness
sources of spillover effects, primarily limiting to beneficiary surveys and interviews.	and so low cost option that is built into existing evaluation options: identify where there may be evidence of one or more of the different types of spillover effect through survey or beneficiary interview questions on collaborators, product benefits for customers, competition etc.	rather than evidenced spillovers. Reliability of beneficiary feedback is a key challenge – suggested topics in previous column draw on beneficiary knowledge, but also scope to understand nature of innovation.	

Source: SQW

Encouragement/discouragement effects on unsuccessful applicants

Access to the loan product will involve some form of application, potentially through a competition process. As with forms of market provision, a key issue to consider is the potential discouragement effect (resulting from rejection) or encouragement effect (as companies see the potential for external finance and/or receive feedback or advice on their proposition, which they build on for future applications).

This issue should be covered in the survey with non-beneficiaries that apply unsuccessfully for the loan product – as part of data collection for the counterfactual impact evaluation. Whilst this will also be covered in the pilot evaluation, it is recommended that this issue is also covered in the impact evaluation for two key reasons: the larger cohort should provide greater confidence in the findings than under the pilot and a longer timescale for considering the effects of encouragement/discouragement; and second it may be important in interpreting other findings.

Financial assessment

In addition to the core impact evaluation, a financial assessment of the loan product should be undertaken. This will largely draw on monitoring data on repayments, assessing the financial performance based on:

- the value of loans in the pilot and impact evaluation cohorts
- the opportunity costs of these loans
- repayment data – covering principals and interest
- defaulted loans.

The financial assessment could be undertaken internally by BEIS (or its representatives). It will require access to data from the loan book at individual company level, and such

repayment data will also need to be accessible to evaluators. Therefore, if applicable, a contractual clause should be included in any back or middle office functions that are contracted to provide financial services for the loan product.

It is important to note that for the first loan recipients, final repayments may not be due until 2027, taking into account drawdown, grace and repayment periods. As noted below, the final evaluation is proposed for around 2025, and so at this stage it will be subject to a small degree of uncertainty (though at this point there ought to be assumptions that can be used).

As well as providing the data for the financial assessment, financial monitoring data can be used to undertake analysis to identify any potential early warning signs of defaults. Ex post it may be possible to examine whether there were any indicators that were associated with subsequent default relating, for example, to: project characteristics (such as baseline TRL, size of loan requested), sector characteristics, slower project progress, lower tendency to expect future effects such as product/service launch, and a greater tendency for a requirement for further R&D/innovation.

Value for money

The impact evaluation will need to consider the economic value for money (VfM) of the loan product. This should use cost-benefit analysis (CBA) which assigns monetary values on the changes in relevant outcomes (e.g. the value of turnover benefits). It examines the overall justification for a policy (i.e. do the benefits outweigh the costs?), and enables comparison across similar (and different) interventions. The proposed surveys of beneficiaries (and non-beneficiaries) for the impact evaluation should provide information on the benefits associated with the funding received at firm level (to date and expected in the future). Most of the key economic benefits are quantifiable, especially the direct effects on the beneficiary firm (e.g. change in turnover, jobs created/safeguarded).

The net impacts over the evaluation period will be based on the responses of businesses surveyed, in terms of: net GVA impacts (based on turnover to GVA ratios); and net employment impacts. In order to calculate these impacts, adjustments will need to be made for the various additionality factors (deadweight, leakage and displacement) over the evaluation period, using responses from the survey of businesses who attributed an impact to the support received.

The cost side (of the CBA equation) will need to draw on the financial assessment specified above. This will need to include lending and non-lending costs, expressed in terms of (i) the costs to government of the loan product (i.e. Exchequer Costs) and (ii) opportunity costs of funding, accounting for finance additionality (i.e. Economic Costs). All the costs will need to be adjusted for inflation and discounted. More specifically, the costs include:

- lending costs, which refer to the value of the loans provided to businesses, and takes into account expected percentages of interest repayments, defaulted loans, arrears) at the start of each year for Exchequer Costs

- non-lending costs, which relate to the costs associated with the delivery of the loan products

- an allowance for a rate for public sector opportunity cost on the balance outstanding at the end of each year based .

Following from the above, a benefit-cost ratio can be calculated when the net discounted benefits (i.e. net GVA) are divided by discounted public costs. In business support programmes, a positive BCR of at least two is considered to be minimum for providing at least reasonable value for money[77].

Timing of the impact evaluation

Drawing these different strands together, the impact evaluation of the loan product will need to be undertaken over a period of time, building on the pilot evaluation.

Figure 4-2 below sets out the timetable for the impact evaluation for the loan product. As discussed above, for the impact evaluation, the cohorts of interest may be drawn from multiple years, and so this may complicate the timings somewhat. Figure 4-2 therefore presents the timetable using a cohort based on two years of competitions for the counterfactual impact evaluation, with the theory-based approach continuing to use cohorts from the pilot evaluation.

In addition, further complicating the timings of the evaluations, there may be multiple competition rounds in each year. The proposed timetables have set out single survey rounds for each year's cohort, and the timings here are 'stylised' in terms of the lengths of time following awards. These surveys could be undertaken in multiple phases, though it must be borne in mind that multiple rounds of surveys will add substantively to complexity and also add to the costs of the fieldwork. A compromise is suggested, which is to take a mid-point for surveys. For example, where surveys are due to be completed at +24 and +48 months from award based on mid-points, this would actually mean that awardees were between 18 and 30 months following the time of award (for the +24 month survey), and between 42 and 54 months following the time of award (for the +48 month survey).

Key points on the timings are as follows:

- There is no baseline survey for the impact evaluation cohorts, and this means that baseline data will need to be collected as part of the application process.

[77] BEIS (2017) Sector Analysis - Assessing the value for money of government support to business: an appraisal framework.

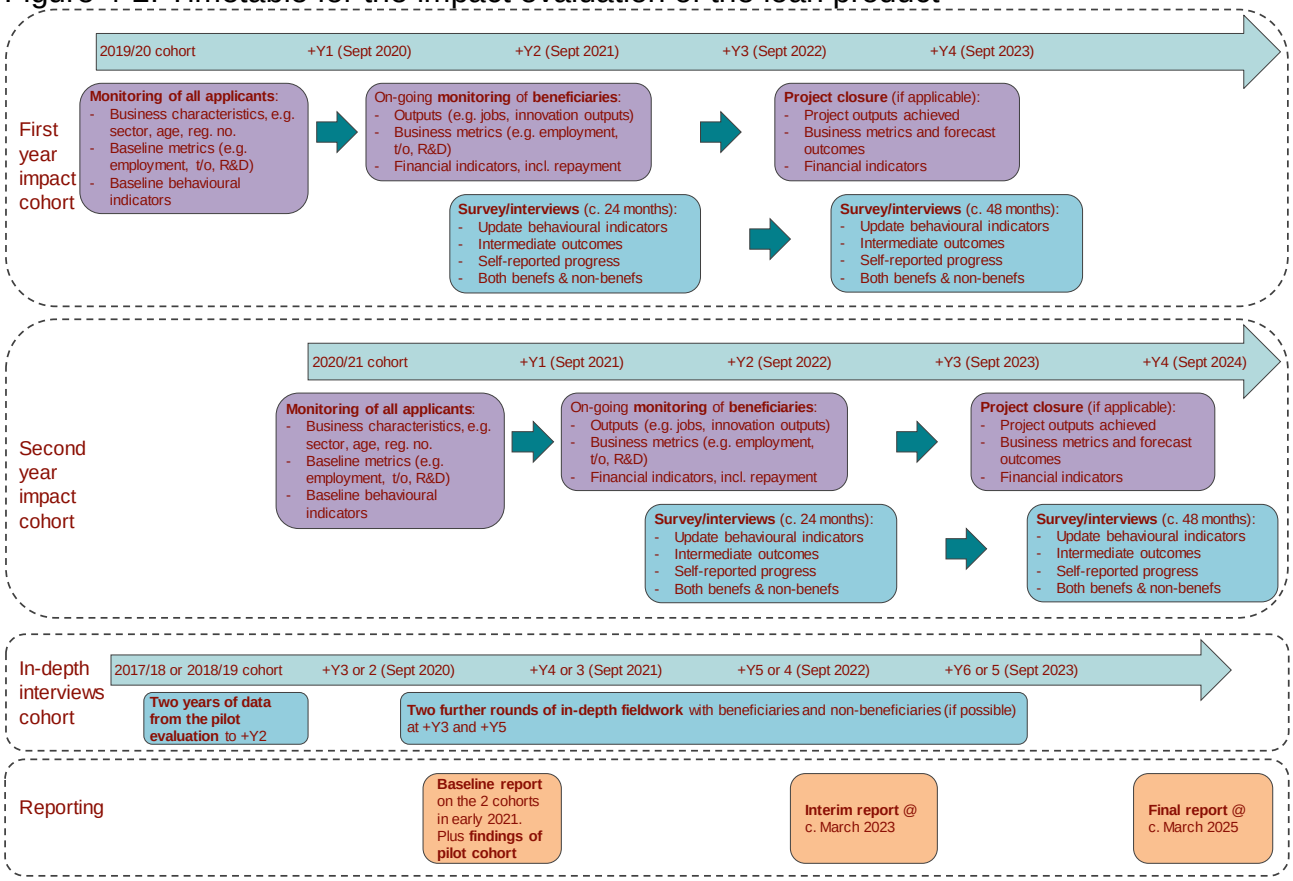
- Groups of beneficiaries and non-beneficiaries will need to be tracked through both monitoring and survey data for at least four years, with two rounds of surveys. Monitoring can be used to track business performance metrics for the beneficiary group; surveys will be required to track business performance metrics for the non-beneficiary group, and to track behavioural indicators and self-reported aspects of additionality for both groups.

- These surveys will be complemented by continuation of tracking of smaller numbers of the pilot cohort beneficiaries and non-beneficiaries through qualitative interviews.

- Baseline, interim and final evaluations are to be completed in 2021, 2023 and 2025.

- The use of administrative data for the impact evaluation, as discussed earlier in this chapter, is not included in the timetable. Nonetheless, if this option is taken forward, it is recommended that it is undertaken around 2024/25 to feed into the final assessment.

Figure 4-2: Timetable for the impact evaluation of the loan product



Source: SQW

5. Evaluation of the equity fund

This chapter sets out the recommended approaches to the evaluation of the equity product. There is less specificity and detail provided (compared to the loan product), given that the product was at the early stages of development at the time of writing. The recommended approaches are relevant for the range of options that are being considered, though the specifics may need to be refined.

Rather than drawing a distinction between 'pilot' and 'impact' evaluations, given the longer investment timescales the evaluation approaches are set out for a single fund running over a long period of time. There are two parts to the evaluation that are described. First, an 'early assessment' is discussed, which should focus on the processes of implementation. Second, 'interim' and 'final' assessments are discussed, which will gradually shift from processes towards assessing the impact of the fund. These stages of assessment are broadly consistent with current approaches used by the British Business Bank in evaluating its equity products (CEEDR, 2010)[78]. They have been deliberately selected to reflect the timescales of funds of this nature, the need to be realistic in gathering evidence, and given the likely benefit in aligning the evaluation with British Business Bank's approaches (see later in the chapter).

As noted, the equity product may be positioned at different stages of firm development (i.e. seed, early and late stage). The early and late stage options were considered the most likely at the time of writing. As such, this means that there are a range of evaluation options which may be feasible, but require refinement as the policy develops. That said, as discussed in chapters 2 and 3, there are some pertinent challenges to the evaluation and these are likely to be apparent whichever model is selected:

- There are likely to be relatively small numbers of companies within a fund. For example, for a fund of c. £30m which attracts further private co-investment for firms at all stages of development, with investment amounts from £100k to £1m, there may be around 60 supported companies[79]. For a fund of c. £30m investing at later stages, where individual investment amounts are greater, there will be fewer companies.

- The length of time taken to invest can be several years, and finding the right companies to invest in is a key aspect of the fund management approach. This means that the early assessment may be particularly constrained by the number of

[78] Centre for Enterprise and Economic Development Research (CEEDR), (2010). Early Assessment of the Impact of BIS Equity Fund Initiatives. Report commissioned by BIS.
[79] Ibid, p21.

companies in which investments have been made. In addition, the length of time until outcomes are observable can be long.

- Whilst there are potentially large numbers of companies that may express interest in the fund, many of these will not be serious contenders for investment, and so there are difficulties in establishing appropriate comparison groups of non-beneficiaries.

- The outcomes can vary significantly for companies that are relevant for equity investment, and funds frequently have only a small number of star performers.

Early assessment (focus on processes of implementation)

Key evaluation questions

The key evaluation questions for the early assessment of the equity product are as follows:

- What is the interest in, and demand for, the equity product?

- How effective are the processes of implementation and what are the experiences of the customer journey?

- What early evidence is there of progress towards the achievement of intended outputs and outcomes (including amount of private investment attracted)?

Proposed approaches

The recommended approaches to the early assessment reflect the challenges highlighted at the start of this chapter. Given the expected small numbers of companies and the early stage nature of the evaluation, the recommended approaches for the early assessment are: a 'formative' assessment to capture evidence on process issues associated with the equity product; together with an initial theory-based impact assessment to test progress towards early outcomes/changes in behaviour brought about by the equity product (in line with the logic model and theory of change), which will be developed further in later stages of the assessment. 'Contribution analysis' should be used to evidence the contribution made by the equity product to any early outcomes, while also identifying the other (external) factors. The early assessment will require different data collection sources/'tools': monitoring and interviews including case-based analysis (covering mainly qualitative data). These are summarised as follows:

- Analysis of monitoring data on implementation of the equity product, e.g. sources of enquiries, applications.

- Interviews with those involved in implementation, i.e. the appointed fund manager(s).

- A set of in-depth qualitative interviews with applicant firms: successful (equity recipients) and unsuccessful applicants or withdrawals ('near misses' for investment).

- Interviews with a broader set of informed individuals and experts, such as representatives from other investors, Innovate UK, the British Business Bank.

Table 5-1: Approaches to the early assessment of the equity product

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
Analysis of monitoring data on implementation, to understand the profile applicant firms. Potential to examine other datasets as 'benchmarks' though in descriptive terms only given the small scale.	Profiling of applicant firms (e.g. amount of equity finance sought, sector, geography, stage of firm development). Useful to collect data on other internal and external funding of the business (possible implications for equity co-investors).	Firms seeking equity more likely to be associated with high levels of technological risk and uncertainty. Sectoral analyses perhaps more important (e.g. life science, software firms tend to apply/receive equity). Opportunity to do more in-depth monitoring due to small 'n' (around 60 firms if £30m fund with investment amounts from £100k to £1m), i.e. detailed descriptions of initial project milestones. Profiling against other relevant groups may require purchasing/ accessing private databases (e.g. Dow Jones, PitchBook, Preqin, Beauhurst).	Gathering these data at application stage provides the basis for further analyses and targeting of the equity product.
Interviews with those involved in implementation, i.e. appointed fund manager(s).	Collect feedback on how various aspects of implementation are working, e.g. pipeline, applications (quality), role of fund manager in supporting company development. Discuss any gaps in monitoring data and how monitoring is being implemented to inform later stages of the evaluation.	Active management of the portfolio is an important feature for success – are the processes in line with other private practice? Important to triangulate the perspective of fund managers with different stakeholders and companies (see rows below). The delivery may evolve over time, so the questioning to consultees has to reflect this.	Interviews within the first two years of implementation to capture early impressions, will require follow-up interviews at specified times over the duration of the fund. In particular, issues on implementation may be revisited in the next interim assessment.

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
In-depth interviews/ case-based analysis with individual firms on interest and demand; implementation and customer journey; and possibly on early signs of progress towards outputs and intermediate outcomes. Should also include interviews with a small number of companies that were 'near misses' in receiving investment from the equity product if these can be engaged – as a comparison on a qualitative basis.	Collect evidence (face-to-face and telephone) on motivations for applying, attractive features, experience of the customer journey, and any baseline data on behavioural metrics and innovation objectives (in particular what happens when new investors join the business). Important to capture evidence on what firms before, during and after investment. As equity is considered 'smart money', should gather data on other related support as a result of the equity investment (e.g. active involvement in management and strategy). Interviews with unsuccessful firms to establish reasons for not being accepted, any discouragement issues, and what firms did after missing out.	The focus is on process issues but capturing any early progress towards outputs and intermediate outcomes will need to be weighed up against other possible factors which could contribute to the same intermediate outcomes (e.g. leadership, strategy, regulations, economic environment). Also need to consider the long timescales to outcomes – so progress may be limited at the time of the early assessment. Gathering evidence from 'near misses' may be challenging, especially over a long period of time, i.e. from early to interim to final assessments.	Interviews with portfolio companies and near misses after c. two years, follow-up interviews at appropriate times over duration of the fund (see later on 'interim' and 'final' assessments).
Interviews with other stakeholders, such as Innovate UK technology leads, British Business Bank, other investors	Collect feedback (via face-to-face and telephone) on how implementation is working. Role of the fund managers, and the support provided, including how these perceived to contribute to company development and attracting other investors. Explore any issues relating to	Active management of the portfolio is an important feature for success – are the processes in line with other private practice? Important to triangulate the perspectives of the different stakeholders. The delivery may evolve over time, so the questioning to consultees has to reflect this.	Interviews within the first two years of implementation to capture early impressions, will require follow-up interviews at specified times over the duration of the fund (see later under 'interim' and 'final' assessments).

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
	discouragement.		

Source: SQW

Interim and final assessment (focus on impact)

Key evaluation questions

The key questions for the impact evaluation of the equity product are similar to those of the loan product, with a particular focus on:

- The effects of the product on innovation and business performance of those companies that are invested in.
- The financial performance of the fund in terms of returns on investment.
- Wider innovation effects, such as through spillovers.

Proposed approaches

The recommended approaches to the 'interim' and 'final' assessments for the equity product reflect the key challenges noted at the outset of the chapter. A counterfactual impact evaluation is deemed to be unfeasible given the small numbers of beneficiaries, difficulties in identifying a counterfactual, and long and varying nature and timescales to outcomes. Therefore, it is recommended that a theory-based impact evaluation approach is adopted, using contribution analysis or qualitative comparative analysis to assess the extent to which the equity fund has contributed to intended outcomes. The approach will require:

- Collection and analysis of a range of innovation, business and financial data on the portfolio of companies supported by the equity product.
- A series of in-depth qualitative interviews with companies supported (and potentially a small number of those not supported), fund managers, other investors and relevant experts/informed individuals.

The detail of this is discussed in below. The potential to incorporate the evaluation within a wider evaluation of British Business Bank funds (within which the NIFP equity fund may sit) is also discussed. It is noted that the approach essentially draws on self-reported perceptions of how the product has brought about outcomes. As a result, in order to ensure that the assessment is as robust as possible, multiple perspectives are critical to the approach along with a thorough consideration of the 'contribution' of the product to the achievement of outcomes that takes account of the role of other factors.

Effect on innovation, business and financial performance

Reflecting the specific characteristics of the product, the evaluation of the effects on innovation and business performance will require mixed methods and the use of a range of data sources. There are also complementarities here with assessing the financial performance of the fund. In Table 5-2 below, the proposed methods are set out. These focus on the collection of quantitative data on key outcomes and financial performance, alongside a series of interviews to gather a range of perspectives on the development of companies, and the role of the equity fund within this. The analysis of the 'additionality' of the equity product in terms of its contribution to the outcomes is expected to be qualitative. We have proposed that the role of the equity fund vis-à-vis other factors is considered, using techniques similar to a 'contribution analysis'. The extent to which there can be a systematic assessment across the fund will depend on the comprehensiveness of the evidence collated from the interviews, and also the scale of the fund. For example, 30 interviews with companies sampled from an Angel Co-Fund that supported 40 companies in total ought to be analysed using a case-based analysis (potentially drawing on qualitative comparative analysis). However, for 10 interviews from a sample of 15, for example, there may be challenges in drawing out the key messages (and this would be insufficient for a qualitative comparative analysis).

It is proposed that the approaches set out in the table below are undertaken at different stages of the fund's operation. There are no specific times for when assessments should be undertaken, which is due to the time that may be required to make investments, the iterative and uncertain nature of company development, and the likely variation between different sectors/technologies. Put simply, progress for one company through the postulated theory of change set out in chapter 3 may occur at a different pace to the progress of another. Therefore, taking on board approaches used by the British Business Bank for its equity funds, it is suggested that an 'interim' assessment is undertaken at around five years into the fund's operation. This ought to allow sufficient time for investment into a number of companies, and for some of these there ought to be progress in their development. For a 'final' assessment, this should take place at around 8-10 years into the fund's operation, which ought to allow sufficient time for some of the first investee companies to be reaching exits.

Table 5-2: Approaches to the impact evaluation of the equity product

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
Collation and analysis on portfolio of investments, covering business metrics for individual companies (data on employment, R&D expenditure, any sales, other	Fund manager's monitoring and financial data, including on business metrics and financial performance of the portfolio.	Potentially will be gaps in data, which should be filled through interviews (see subsequent rows). Some weaknesses in expected values, as can present overly-	Potentially provides real time or up-to-date data on portfolio performance. However, lags to outcomes mean that need to wait for a sufficient amount of

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
investments), current and expected valuations, and returns from exits.		optimistic assessment of company's chances of success.	lapsed time. Expected valuations and business forecasts can be used to help address this, though there are weaknesses in using these data.
Interviews with individual companies on innovation outcomes, business performance and the contribution of the equity investment to business development. Should also include interviews with a small number of companies that were 'near misses' in receiving investment from the equity product if they can be identified and engaged – as a comparison on a qualitative basis.	In particular, to collect data on innovation outputs and outcomes (i.e. patents, technologies developed, products/ services developed, processes developed), and the role of the equity product to contributing to these and to subsequent business development (i.e. generation of sales, new markets, exports). This should take account of the finance provided, but also any other support from the fund manager (e.g. board representation, networks, business planning support etc.).	Contribution of equity fund is based on perceptions and so potential weaknesses. As far as possible, contribution of the product to the outcomes should be weighted up relative to other factors such as company leadership, strategy, marketing, external environment etc. This assessment should be strengthened with interviews with companies that were 'close' to obtaining investment from the product but did not (if they can be identified and engaged), to consider their progress and the role that other factors have played.	Can provide evidence at different stages of development and so would make sense to undertake in multiple waves as the portfolio develops and as the companies develop. This should cover: i) evidence on earlier effects such as innovation outcomes and role of the product; ii) subsequent wave on further progress towards markets, including role of the product; iii) final wave on business's development etc.
Fund manager perspectives on individual companies, including development before (and/or without funding).	As above to consider role of the equity product to contributing to business development, taking account of the finance provided and other support from the fund manager (e.g. board representation, networks, business planning support etc.)	Potential weaknesses in that based on perceptions, so need to ensure these are justified. Also important to weigh up relative to other factors such as company leadership, strategy, marketing, external environment etc.	As above, should be done in different waves as the portfolio develops.
Perspectives from other investors or market experts (e.g. co-investors in relevant funding rounds or in	As above to consider role of the equity product to contributing to business development, taking account of the finance	Provides a more 'independent' perspective than companies themselves and fund manager, and so an important	As above, though may be dependent on when other investors are involved with companies from the portfolio.

Approach	Data and evidence	Challenges/issues	Timeliness of evidence
subsequent rounds, or experts in particular technology areas) on individual companies and the role of the equity product.	provided and other support from the fund manager (e.g. board representation, networks, business planning support etc.). As an external perspective, can test the extent to which their own investments were influenced (positively or otherwise) by the involvement of the equity product under evaluation.	corroboratory source of evidence. As with other interviews, important to weigh up the role of the equity product relative to other factors such as company leadership, strategy, marketing, external environment etc.	

Source: SQW

Spillovers

As with the loan product, it is recommended that spillovers are considered using a case-based assessment. The assessment should be incorporated within the in-depth interviews with individual companies in particular, but also with fund managers and other investors. Two key issues are particularly prevalent:

- The nature of the products/services/processes being developed and the extent to which these might generate benefits for customers/users or society more widely. For example, previous studies of equity products have found that companies have developed technologies that generate wider benefits in areas such as healthcare, security and the environment[80]. There are clearly time lags for these effects to be demonstrated, dependent on the timescales to reaching markets – though the 'promising' nature of wider effects may be evident sooner.

- Knowledge development within people working at the companies supported, which may be transferred to other organisations as individuals move roles and organisations. These may be more difficult to trace, though key past employees could be tracked using relevant web sources.

Value for money

The financial returns estimate the expected returns from the investee firms and when these are likely to occur. Due to the nature of the equity product, there is a greater degree of uncertainty associated with returns and their timing compared to the loan product. In theory, the non-financial benefits for the equity product include the turnover and

[80] See for example SQW (2013) Assessing the economic and wider benefits of the Rainbow Seed Fund, Final Report to Midven Ltd on behalf of the Rainbow Seed Fund partners.

employment benefits up to the point of trade sale (or Initial Public Offering) of the investee firm (i.e. exit by the Government and private investors). These would inform the CBA for the equity product, after adjusting for the additionality factors, discounting etc. Going beyond this point may lead to double counting (i.e. turnover benefits reflected in the financial returns after sale). The VfM assessment should, therefore, only cover the non-financial benefits period up to trade sale, along with the achieved (or expected) financial return from the equity stake.

To address the greater uncertainty associate with the equity products, it is proposed that sensitivity testing is used for the assessment, in order to illustrate the uncertainties around key variables (e.g. by varying any assumptions used). This would provide upper and lower bounds for estimates, or probability distributions for estimates, of the value for money along with a 'best case'.

Incorporating within British Business Bank evaluation

As noted above, some of the options for the equity product may involve incorporating an equity product for innovation with an existing British Business Bank products (such as the Angel Co-Fund or the Enterprise Capital Funds). If this is the case, there will be merit in incorporating impact evaluation of the innovation equity element within a wider evaluation. The wider scope of such a study may provide greater scale to undertake an assessment, and may mean that larger samples of companies could be considered as part of a more systematic assessment, including of quantitative data on business metrics as well as of qualitative evidence on the role of funds in contributing to outcomes. The above methods would still be relevant as part of such evaluations.

If this approach was to be taken, there would be a need to consider the innovation equity element as a distinct part, in order to inform policy and to consider specifically the innovation outcomes that have been brought about. In theory, the innovation equity element will have a greater focus on supporting innovation and the achievement of such outcomes. Indeed, one particular area that would be worthy of testing would be the extent to which an innovation equity element had supported companies with more innovative products, services or processes, and whether it had led to more innovation outcomes than other elements within the wider suite of equity funds considered. This should be tested by focussing in particular on outcomes such as:

- The numbers of companies delivering innovation outputs such as patents and licences.
- The numbers of companies that have launched new products or services (and the number of products and services launched) and whether these are 'new to market' as well as 'new to firm'.
- The R&D intensity of the companies supported, e.g. the proportion of employment in R&D, or the R&D expenditure relative to turnover.

- The extent to which spillovers have been generated.

Timing of the early, interim and final assessments

In the graphic below (Figure 5-1), the timetables for the early, interim and final assessments of the equity product are set out. As noted previously, the timescales of the equity product are likely to be long, both in terms of the length of time it takes to invest, but also in terms of the timescales to outcomes. These timescales are also likely to vary and be changeable and so the timetable ought to be revisited once the fund is set up and after the initial period of delivery. With this caveat in mind, the timetable sets out three main phases of evaluation activity, to be complemented by monitoring that is undertaken by the Fund Manager. These three phases are:

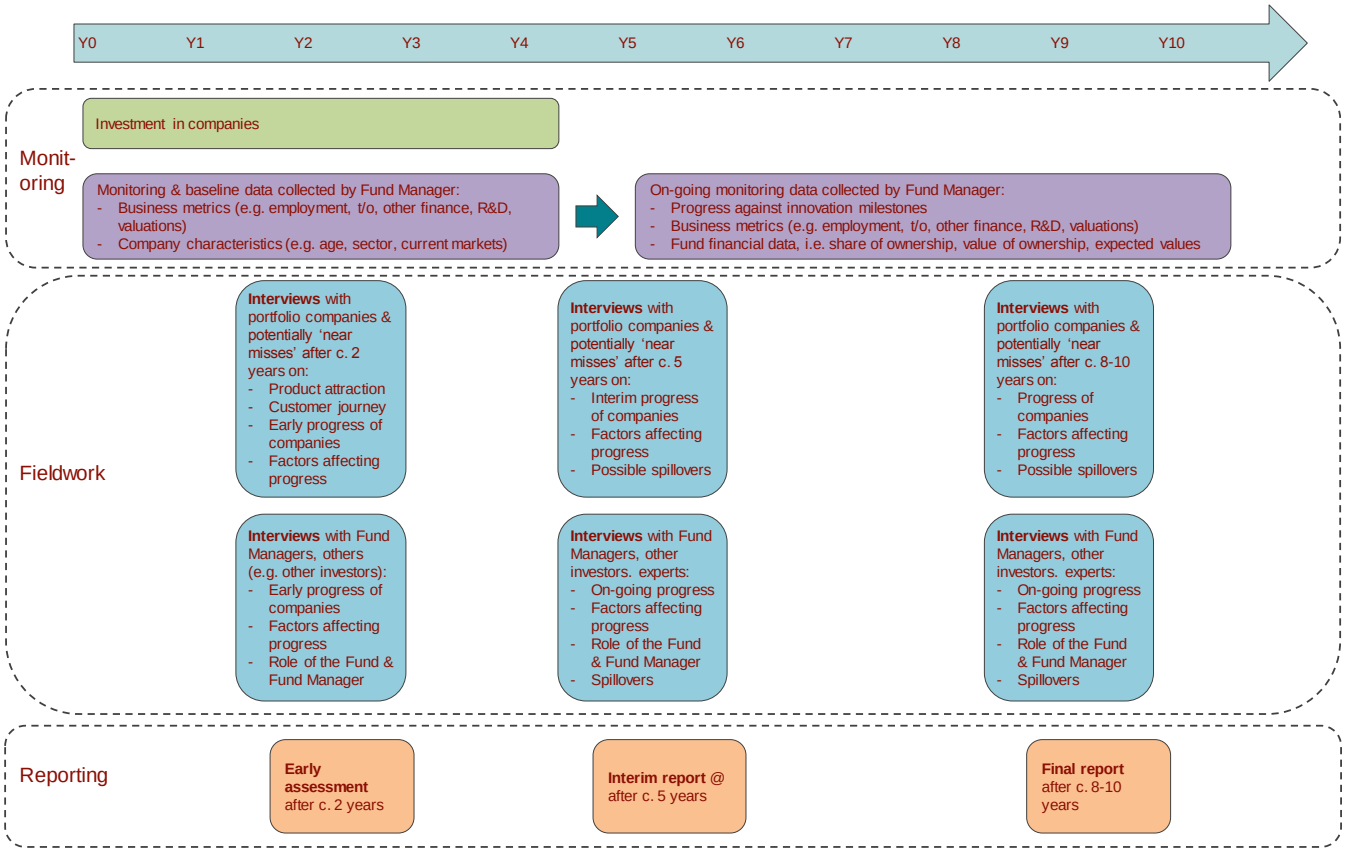
- An early assessment after around two years (though potentially later if the first investments take some time to be made) should focus on the early implementation of the fund, the progress it is making with developing a pipeline and the role of the Fund Manager in this, the customer journey of companies, and the support and role of the Fund Manager within this.

- An interim assessment after around five years should revisit issues of implementation, but also focus more on the interim progress of the companies.

- A final evaluation after 8-10 years should focus on the outcomes of the fund, in terms of the role of the fund and the Fund Manager in supporting innovative companies to succeed and grow, and the financial repayment (e.g. in terms of any exits).

It is noted that interviews with ‘near misses’ are suggested within the timetable. The purpose of these is to strengthen the evidence on the contribution of the equity fund to the outcomes achieved – as evidence on the progress of those not receiving funding should be triangulated with the hypothetical perspectives of beneficiaries and the fund manager(s). It may be more realistic to engage such ‘near misses’ in the earlier rounds of the assessment rather than later ones.

Figure 5-1: Timetable for the early, interim and final assessments of the equity product



Source: SQW

6. Monitoring and evaluation planning

This chapter sets out the operational aspects of the evaluations, including the overall timings for monitoring and evaluation, and the implications for monitoring data collection.

Overall plan and timings

Evaluation of the loan product

Timetable graphics for the pilot and impact evaluations of the loan product were provided in chapter 4. In the table below, the timings of individual tasks are set out, covering the different elements, i.e. monitoring, the RCT on marketing approaches, the pilot evaluation, and the impact evaluation. The timings assume that the loan product will start at the outset of the 2017/18 financial year.

Table 6-1: Timings of tasks for the loan product

Component of M&E	Tasks	Indicative timings
Monitoring	Final development of application form, on-going monitoring forms and project closure form	Early 2017
	First rounds of monitoring data collected on profiles of applicants	From 2017
	On-going monitoring of projects of successful companies	From 2017 onwards
	Project closure monitoring	Start in 2019
	Monitoring of financial repayments	From 2019
RCT	Develop different marketing messages	Early 2017
	Develop RCT protocol	Early 2017
	Implement randomisation of companies to receive marketing messages	2017
	Collate and analyse data on 'click through' rates and application rates	2017
Pilot evaluation	1st survey of first year cohort at between 6 and 18 months	Sept 2018
	First round of case studies at between 6 and 18 months	Sept 2018
	Interviews with those involved in implementation (i.e. from	Sept 2018

Component of M&E	Tasks	Indicative timings
	Innovate UK, BBB, relevant contractors)	
	2nd survey of first year cohort at between 18 and 30 months; and 1st survey of second year cohort at between 6 and 18 months	Sept 2019
	Second round of case studies at between 18 and 30 months	Sept 2019
	Interviews with those involved in implementation (i.e. from Innovate UK, BBB, relevant contractors)	Sept 2019
	2nd survey of second year cohort at between 18 and 30 months	Sept 2020
Impact evaluation	Baseline data collection as part of application process	From 2019
	1st survey of 1st year cohort for impact evaluation at between 18 and 30 months	Sept 2021
	1st survey of 2nd year cohort for impact evaluation at between 18 and 30 months	Sept 2022
	2nd survey of 1st year cohort for impact evaluation at between 42 and 54 months	Sept 2023
	2nd survey of 2nd year cohort for impact evaluation at between 42 and 54 months	Sept 2024
	Further rounds of in-depth interviews with pilot cohort to inform impact evaluation at c. three years and five years	2022/23 and 2023/24

Source: SQW

In Table 6-2, the indicative timings of the tasks for the evaluation of the equity product are set out. The timings are given in terms of year 0, 1, 2 etc. as there is no clear start date for the product's implementation at the time of writing.

Table 6-2: Timings of tasks for the equity product

Component of M&E	Tasks	Indicative timings
Monitoring	Final development of application form and on-going monitoring requirements in conjunction with fund manager	Year 0
	First rounds of monitoring data collected on profiles of 'serious' applicants	From Year 0
	On-going monitoring of investee companies	From Year 0

Component of M&E	Tasks	Indicative timings
	Monitoring of financial performance of the portfolio	From Year 0
Early assessment	Interviews with companies	Year 2
	Interviews with Fund Manager, other investors, finance experts	Year 2
Interim assessment	Interviews with companies	Year 5
	Interviews with Fund Manager, other investors, experts	Year 5
Final assessment	Interviews with companies	Year 8-10
	Interviews with Fund Manager, other investors, finance experts, and other relevant personnel or collaborators	Year 8-10

Source: SQW

Implications for monitoring

In this sub-section the key implications for monitoring are set out. In the case of the loan product, this builds on existing processes that Innovate UK has developed. In the case of the equity product, this will require liaison with the chosen Fund Manager(s) for the product.

Loan product

Innovate UK has developed an application template for all of its competitions, and the expectation is that this will be used for the innovation finance products – in particular for the loan product. The review of this found that this will collect most of the key information that is required for monitoring and evaluation, namely on company characteristics (e.g. sector, size), baseline data on outcomes contained within the logic model and to be subsequently tracked over time (e.g. turnover, R&D spend, employment – and projections for these indicators) and further information to facilitate data linking (e.g. company registration number, in addition to company's registered name and address). There are four further elements of data that should be included, which would: facilitate matching to a comparison group drawn from administrative data (points one and two below); provide baseline data on innovation behaviours (points two and three below); and provide further historic observations on key metrics to facilitate a more robust difference-in-difference analysis (point four below). These four elements are:

- age, i.e. when the company was incorporated

- innovation behaviours, replicating core questions contained within the Community Innovation Survey (CIS) on whether the company has undertaken product/service, or process innovation in the last three years[81]

- further data on innovation behaviours to act as a baseline – again, drawing on the CIS on whether the company has used partnerships for innovation[82]

- actual data on turnover, employment and R&D expenditure for two complete years (the current form only asks for one year's data).

It is recommended that these four areas be added to the application form. If the first two are not added, then this will weaken the ability to identify a well-matched comparison group for an admin data-based approach. If points two and three are not included, then either a baseline survey should be undertaken shortly after the application process, or otherwise the evaluation will not be able to assess changes in behaviours[83]. The absence of point four will limit the difference-in-difference analysis.

As part of the application process, it should be clear that data can be shared with third parties for the purpose of monitoring and evaluation – in order to facilitate evaluation. In addition, as part of the application and/or contracting process it should be communicated to companies that there is an expectation to take part in evaluation – in order to help maximise response rates to surveys and interviews.

Following the application and contracting stages, there will need to be a process of on-going monitoring, which will be undertaken for the innovation project, and for financial repayment. The responsibilities for these may be split between different organisations. It is understood that Innovate UK will have responsibility for monitoring the projects, including their progress and outputs. Based on current processes, Innovate UK's monitoring is likely to involve a quarterly monitoring visit by a monitoring officer to collect information on the progress of the project funded by the loan on six criteria: scope, time, cost, exploitation planning, risk management, and project management. The focus is

[81] Question wordings should be taken from the latest/next CIS, but indicatively these are: "During the 3 year period [X to Y], did your business introduce (i) new or significantly improved goods; (ii) new or significantly improved services?" "During the 3 year period [X to Y], did your business introduce any new or significantly improved processes for producing or supplying goods or services?" It would also be useful to ask relevant follow-up questions on whether the new goods/services were new-to-the-firm or new-to-the-market, and on whether the new processes were new-to-the-industry – though this will need to be considered in light of the existing length of the application form.

[82] Question wording should be taken from the latest/next CIS, but indicatively these are: "During the 3 year period [X to Y], did your business co-operate on any innovation activities with any of the following: other businesses within your enterprise group; suppliers of equipment, materials, services or software; clients or customers from the private sector; clients or customers from the public sector; competitors or other businesses in your industry; consultants, commercial labs or private R&D institutes; universities or other higher education institutions; government or public research institutes."

[83] Though it still may be possible to evaluate differences in behaviours between a beneficiary and comparison group – though obviously the baseline position will be unknown.

clearly on project progress and any issues relating to progress. The current monitoring process does not collect data on 'outputs' or 'intermediate outcomes' such as employment, turnover, patents, finance secured etc. during delivery.

For the on-going monitoring of innovation projects, therefore, it is recommended that core aspects of outputs and company metrics are incorporated into the monitoring processes. This should cover those 'outputs' identified in the logic model in chapter 3. In addition, on an annual basis core metrics for company performance should also be collected (i.e. turnover, R&D expenditure and employment). At project closure (and thereafter, e.g. if there is a post-project round of data collection[84]), data should again be collected on these indicators.

On the financial side, monitoring should be collected on the following aspects at a minimum to inform evaluation, in particular for a financial assessment of the loan product:

- agreed value of loan at contracting
- amount drawn down, including start and end of draw down period
- agreed repayment period and rate of interest
- amount of interest repaid (and outstanding)
- amount of principal repaid (and outstanding)
- missed repayments and reasons
- status of loan, i.e. on-track, re-profiled (but with full repayment expected), re-profiled (but with lower level of repayment expected), default.

A list of core indicators for monitoring and evaluating the performance of the loan product can be found in the Annex to this report.

Equity product

The collection of monitoring data for the equity product will need to be agreed with the appointed Fund Manager(s). There are number of stages when monitoring will need to be undertaken, and key issues relating to these are set out below:

- Enquiries and applications: there may be large numbers of enquiries in the product, and recording information on all of these may be too great a burden. Therefore, data (e.g. contact information, business metrics and company characteristics)

[84] Following the completion of the closure report and finance close, there is normally no on-going contact with the beneficiary. However, Innovate UK's contracts include a stipulation that the beneficiary can be contacted for up to five years following completion, which could include a post-project review.

should be collected only for those going some way through the process (i.e. 'near misses' or late withdrawals) as well as successful applicants.

- Milestones associated with the investment: for each company, the key milestones should be documented and progress considered against them. The outputs within the logic model provide areas for consideration, though these are likely to vary by company and could be bespoke to individual investees.

- Company progress: there should be on-going monitoring of core business metrics for all investees, e.g. covering employment, R&D expenditure, turnover, exports and new investment/finance raised.

- Financial metrics: for the portfolio's financial performance, metrics should be tracked for each company on current valuation, share of ownership, and expected valuations. At the point of exits, then sales and returns should be recorded.

The core indicators for the equity product are presented in the Annex to this report.

Resourcing

In this final sub-section, indicative resources for evaluation are set out. It must be noted that these are ball-park estimates, rather than fully-specified costs. Table 6-3 sets these out for the pilot and impact evaluation of the loan product; and Table 6-4 sets these out for the different stages of the evaluation of the equity product.

Key inputs to the evaluation of the loan product will be the surveys of beneficiaries and non-beneficiaries. What can be achieved with respect to these surveys will be dependent on the numbers of applicants and the average size of loans (as discussed in detail in chapter 4). However, to inform the resourcing, certain assumptions have been used to provide ball-park estimates. These are as follows:

- For the pilot evaluation, there will be two rounds of survey data collection for each competition cohort. For the first round of survey data, it is assumed that high response rates can be achieved for the beneficiary group with 100 respondents from a total group of 130 beneficiaries (based on a loan pot of £120m in total for the pilot and a mid-point of £0.95m per loan there may be 130 loan beneficiaries). The non-beneficiary group is expected to be larger due to over-subscription, but the response rate lower, and so 150 responses are assumed. The second round of surveys is based on the following assumptions: 25% attrition for the beneficiary group, resulting in 75 survey completions; 33% attrition for the non-beneficiary group, resulting in 100 survey completions. This results in a total of 425 survey

completions across the pilot evaluation (175 beneficiary survey completions and 250 non-beneficiary survey completions)[85].

- For the impact evaluation, there will be two rounds of survey data collection for each competition cohort included within the study (assuming that the detailed baseline data can be collected through applications). The assumptions for the numbers in each survey round draw on the discussion in chapter 4 on sample size scenarios. The objective is to ensure that there are at least 500 survey completions in the third round of data (i.e. the second round of the survey, with the first round of data covered by monitoring), covering both beneficiaries and non-beneficiaries. It is assumed that there will be attrition to this final round, and with 35% attrition in total, this will mean 770 survey completions in the second round of data collection. This means 1,270 survey completions are required in total.

Table 6-3: Resource requirements for evaluation of loan product

Component of M&E	Tasks and assumptions	Indicative costs
RCT option	Develop RCT protocol Time to collate and analyse data Time for reporting and management	£25k
Pilot evaluation	Fixed costs of designing and setting up surveys 2 rounds of surveys (approx. total of 425 interviews) – undertaken by phone Two rounds of 10 case studies Interviews with those involved in implementation Analysis and reporting – x3 reports Project management	£150k
Impact evaluation	Fixed costs of designing and setting up surveys 2 rounds of surveys (approx. total of 1,270 interviews) – undertaken by phone Two subsequent rounds of in-depth interviews from pilot cohorts (x40) Analysis and reporting – x3 reports Project management	£210k
Data linking option	Match data into virtual microdata laboratory Undertake analysis Reporting Project management	£35k

Source: SQW

[85] It is noted that tracking the same companies is less important for the pilot evaluation (than for the impact evaluation), and so the sample could be drawn from all applicants for subsequent rounds to increase sample sizes – though with implications for resources required.

Table 6-4: Resource requirements for evaluation of equity product

Component of M&E	Tasks and assumptions	Indicative costs
Early assessment	15 company interviews 10 other interviews Analysis and reporting Project management	£35k
Interim assessment	30 company interviews 15 other interviews Analysis and reporting Project management	£40k
Final assessment	50 company interviews 20 other interviews Analysis and reporting Project management	£55k
Complementary to assessments for benchmarking purposes	Purchase of private database	Allow £5k per round of evaluation (specifics to be quoted in detail)

Source: SQW

Annex

Table A-1 presents a list of core indicators important for monitoring and evaluating the performance of the loan product. The list of indicators corresponds with the inputs, activities, outputs and outcomes contained in the logic model, as well as the key evaluation questions for the loan product (see chapter 3).

Table A-1: Core indicators for the loan product

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	PROFILE OF APPLICANT COMPANY:				
1	Company name (as per Companies House) Main contact person details (name, title, position, email, phone) Age of company, i.e. when company incorporated (months or years) and when the company started Address (incl. postcode): trading address and registered address in case they are different. Main company activities Organisation type Sector/SIC code	Application form *For turnover, employment and R&D expenditure data*: baseline in application form; subsequent updates through monitoring (for beneficiaries) and surveys (for non-beneficiaries)	Application stage *For turnover, employment, R&D expenditure data*: updates on yearly basis or as per frequency of surveys	Innovate UK/ BEIS	Depends on the final application form developed; should be relatively straightforward to collect but will require consistency of reporting for specific data e.g. turnover of company as distinct from holding/parent organisation

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	Company registration number VAT number / PAYE number Unique Tax Reference (companies that are unregistered with CH) Company financial year end Turnover of company in the UK (£) for the last two years No. of staff employed by company in the UK (FTE) for the last two years Salaries of staff in the UK (overall and R&D) (£) for the last two years R&D expenditure of company in the UK (£) for the last two years Holding/parent organisation details (if applicable): name, organisation type, registration no., address, SIC, turnover, staff (excl. applicant company)				
	INPUTS AND ACTIVITIES:				
2	**Time input (in days or weeks) of government/public sector staff at each stage of the 'customer**	Monitoring[86]	On-going	Innovate UK, BEIS	Expect this to be easily available; based on internal time recording systems to

[86] These data should be obtained from online application system which can capture timing. The application page can be linked with Google Analytics to measure these data.

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	journey': loan application (incl. launch and assessment; loan agreement; and loan repayment				NIFP project but will require separation to stages of customer journey; possibility of some overlap between stages
3	**Real-time data on interest and demand: (i) No. of unique visitors to the website; (ii) No. of unique visitors sourced from direct marketing (e.g. emails); (iii) bounce rate (proportion of 'hits' on website that leave immediately) and duration (in minutes) of visit on website**	Monitoring[87]	On-going	Innovate UK, BEIS	Potentially comprehensive data depending on the quality of digital sources used for collection e.g. Google Analytics
4	Attractive (and non-attractive) features of product for firms	Survey of successful and unsuccessful firms	12 month pilot evaluation survey	BEIS/ external contractor	Expect this to be relatively comprehensive/good quality as respondent firms should be able to specify this
5	Reasons for applying for the product	Survey of successful and unsuccessful firms	12 month pilot evaluation survey	BEIS/ external contractor	Expect this to be relatively comprehensive and good quality as respondent firms should be able to specify this; and can be checked against details provided during the application

[87] Through Google Analytics.

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
					process
6	No. of applications for the loan product (incl. profile by company type)	Monitoring	Each competition round	Innovate UK, BEIS	Expect this to be comprehensive as easily available from application
7	No. of applications passing innovation assessment	Monitoring	Each competition round	Innovate UK	Expect this to be comprehensive as available from the 'filtering' of the application process
8	No. of applications passing credit assessment	Monitoring	Each competition round	BBB (tbc)	Expect this to be comprehensive as available from the 'filtering' of the application process
9	No. of applications passing both innovation and credit assessments	Monitoring	Each competition round	Innovate UK, BBB (tbc)	Expect this to be comprehensive as available from the 'filtering' of the application process
10	Record innovation and credit scores for unsuccessful applicants	Monitoring	Each competition round	Innovate UK (tbc)	Expect this to be comprehensive as available from the 'filtering' of the application process
11	No. of loan approvals	Monitoring	Each competition round	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed
12	Value of loan approvals (£)	Monitoring	Each competition	Innovate UK	Expect this to be

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
			round		comprehensive based on the internal monitoring system developed
13	No. of loan drawdowns	Monitoring	Each competition round	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed
14	Agreed repayment period (months)	Monitoring	On signed loan agreement	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed
15	Value of loan drawdowns (£)	Monitoring	Quarterly for project drawdown period for 12, 24, 36 months	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed
16	Record of missed loan repayments	Monitoring	Quarterly for project drawdown period for 12, 24, 36 months	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed
17	Late repayment (days or months)	Monitoring	Quarterly for project drawdown period for 12, 24, 36 months	Innovate UK	Expect this to be comprehensive based on the internal monitoring system developed

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
18	Amount of interest repaid (£)	Monitoring	Bi-annual	Innovate UK	This should be easily calculated based on the internal monitoring system developed
19	Amount of interest outstanding (£)	Monitoring	Bi-annual	Innovate UK	This should be easily calculated based on the internal monitoring system developed
20	Amount of principal repaid (£)	Monitoring	Bi-annual	Innovate UK	This should be easily calculated based on the internal monitoring system developed
21	Amount of principal outstanding (£)	Monitoring	Bi-annual	Innovate UK	This should be easily calculated based on the internal monitoring system developed
22	Satisfaction with different stages of the customer journey	Surveys of beneficiary firms	Survey at 12 and 24 months (pilot)	BEIS/ external contractor	Dependent on the quality of the subjective responses
23	Suggestions for improvement of the customer journey	Surveys of beneficiary firms	Survey at 12 and 24 months (pilot)	BEIS/ external contractor	Dependent on the quality of the subjective responses
	OUTPUTS:				
24	Record of key project milestones achieved	Monitoring Surveys with successful and unsuccessful	Monitoring – quarterly Surveys – 12 and 24 months (pilot);	Innovate UK	Quality of data likely to vary across different projects as they are different stages of development; dependent on

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
		firms	24 and 48 months (impact)		the quality of responses; requires careful consideration if comparing between projects (and across different years)
25	Whether project went ahead anyway without support	Surveys of unsuccessful firms	12 and 24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
26	Reasons for encouragement/discouragement (nature of 'noes')	Surveys of unsuccessful firms	12 and 24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
27	No. of firms of applying for/securing patents	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses but could be checked against secondary sources (e.g. Intellectual Patent Office)
28	No. of firms with licensing deals	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
29	Change in employment in R&D (no. of FTEs)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	OUTCOMES:				
30	No. of firms introducing new/improved products and services (new-to-the-firm)	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
31	No. of firms introducing new/improved products and services (new-to-the-market)	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
32	No. of firms introducing new/improved processes	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
33	Value of change in annual turnover (incl. in exports) (£)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
34	Change in overall employment (no. of FTEs)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
35	Value of change in salaries of staff (overall and R&D) (£)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
36	Value of change in annual R&D expenditure (£)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
37	Change in productivity (proxy measure calculated using turnover per FTE employee)	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
38	No. of firms involved in collaborations for innovation	Survey/ interviews with successful and unsuccessful firms	Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
39	Additional public finance secured for innovation (£)	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
40	Additional private finance secured for innovation (£)	Survey/ interviews with	24 months (pilot); 24 and 48	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
		successful and unsuccessful firms	months (impact)		
41	Other factors (internal and external) which contribute to outcomes	Survey/ interviews with successful and unsuccessful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses
42	During the 3-year period [X to Y], businesses introducing new or significantly improved goods	Application form Surveys of successful and unsuccessful firms	Application stage Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
43	During the 3-year period [X to Y], businesses introducing new or significantly improved services	Application form Surveys of successful and unsuccessful firms	Application stage Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
44	During the 3-year period [X to Y], businesses introducing any new or significantly improved processes for producing or supplying goods or services	Application form Surveys of successful and unsuccessful firms	Application stage Impact evaluation surveys (24 and 48 months)	BEIS/ external contractor	Dependent on the quality of responses
45	During the 3-year period [X to Y], businesses co-operate on any innovation activities with other	Application form Surveys of successful and	Application stage Impact evaluation	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	public and private organisations	unsuccessful firms	surveys (24 and 48 months)		
46	Type of spillovers generated	Case studies with successful firms	24 months (pilot); 24 and 48 months (impact)	BEIS/ external contractor	Dependent on the quality of responses.

Source: SQW

Table A-2 presents the core indicators for the equity product reflecting the logic model (see chapter 3) and the key evaluation questions.

Table A-2: Core indicators for the equity product

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	PROFILE OF COMPANIES:				
1	Contact information, firm metrics and characteristics for those going some way through the process (i.e. to end of loan application stage as in Figure 2-1) (Same as in Table 6-3 above but also collect data on internal and external funding of firm i.e. other types and amounts of finance already accessed)	Monitoring of successful applicants, 'near misses' and late withdrawals	Application stage	BBB/ Fund manager	Expect this to easily available from internal monitoring systems of fund managers
	INPUTS AND ACTIVITIES:				
2	**Time input of public sector staff delivering the equity product (days/weeks)**	Monitoring	Quarterly	BBB/ Innovate UK	Expect this to be easily available; based on internal time recording systems to equity product
3	**Real-time data on interest and demand: (i) No. of unique visitors to the website; (ii) No. of unique visitors sourced from direct marketing (e.g. emails); (iii) bounce rate (proportion of 'hits' on website that leave immediately) and**	Monitoring	On-going		Potentially comprehensive data depending on the quality of digital sources used for collection e.g. Google Analytics

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	duration (in minutes) of visit on website				
4	Attractive (and non-attractive) features of product for firms	Interviews with successful and unsuccessful firms	Application stage	BEIS/ external contractor	Expect this to be relatively comprehensive/good quality as respondent firms should be able to specify this
5	Reasons for applying for the equity product	Interviews with successful and unsuccessful firms	Year 2 (early assessment)	BEIS/ external contractor	Dependent on the quality of responses
6	No. of applications for the equity product (incl. profile by company type)	Monitoring	Quarterly	Fund manager	Expect this to be comprehensive as easily available from application
7	No. of applications passing assessment	Monitoring	Quarterly	Fund manager	Expect this to be comprehensive as straightforward to collect based on the fund manager's monitoring systems
8	Value of investment made by the fund (£)	Monitoring	Quarterly	Fund manager	Expect this to be comprehensive as straightforward to collect based on the fund manager's monitoring systems

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
9	Value of co-investment made (£)	Monitoring	Quarterly	Fund manager	This should be easily available from the fund manager's monitoring systems but might not be comprehensive as could be affected by confidentiality/ disclosure issues relating to private co-investors (at specific times in the year)
10	Characteristics of co-investor (e.g. type, location, investment criteria)	Monitoring	Quarterly	Fund manager	This should be easily available from the fund manager's monitoring systems but might not be comprehensive as could be affected by confidentiality/ disclosure issues relating to private co-investors (at specific times in the year)
11	On-going valuations of companies	Monitoring	Quarterly	Fund manager	Dependent on (i) the financial information provided by investee firms (ii) market conditions affecting valuations. The valuations may vary significantly on an annual or even quarterly basis; requires consistent and agreed method of value of firms by fund manager

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
12	On-going valuations of fund holdings in companies (£)	Monitoring	Quarterly	Fund manager	This should be easily available from the fund manager's monitoring systems
13	Type of additional support given by fund manager (directly or indirectly) to companies (e.g. management, strategy)	Interviews with fund managers/ in-depth interviews with successful firms	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager	Dependent on the quality of responses but expect this to be easily available and comprehensive
14	Satisfaction with different stages of the customer journey	Interviews with successful firms	Year 2 (early); Year 5 (interim)	BEIS/ external contractor	Dependent on the quality of responses
15	Suggestions for improvement of the customer journey	Interviews with firms	Year 2 (early); Year 5 (interim)	BEIS/ external contractor	Dependent on the quality of responses
	OUTPUTS:				
16	Record of key project milestones achieved	Monitoring Interviews with successful and unsuccessful firms; and fund managers	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager	Quality of data likely to vary across different projects as they are different stages of development; dependent on the quality of responses; requires careful consideration if comparing between projects (and across different years)
17	Factors affecting company progress	Interviews with: successful and unsuccessful	Year 2 (early); Year 5 (interim); Year	BEIS/ external contractor	Dependent on the quality of responses; possibly use pre-defined factors to

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
		firms; fund managers; other investors/ market experts	8-10 (final)		ensure consistency and comparability across time and firms; possibly rank factors in terms of importance to the firm
18	Whether project went ahead anyway without support	Interviews with unsuccessful firms	Year 2 (early); Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
19	No. of firms introducing new/improved processes	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
20	No. of firms of applying for/securing patents	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
21	Change in employment in R&D (no. of FTEs)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
	OUTCOMES:				
22	Additional public finance secured for innovation (£)	Interviews with: successful and unsuccessful firms; fund	Year 2 (early); Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
		managers			
23	Additional private finance secured for innovation (£)	Interviews with: successful and unsuccessful firms; fund managers	Year 2 (early); Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
24	No. of new rounds of investment (firm level)	Monitoring/ interviews with fund managers	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager, BEIS/ external contractor	Dependent on the quality of responses
25	No. of investments exited (fund and firm level)	Monitoring/ interviews with fund managers	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager, BEIS/ external contractor	Dependent on the quality of responses
26	Value of exits (fund and firm level) (£)	Monitoring/ interviews with fund managers	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager, BEIS/ external contractor	Dependent on the quality of responses
27	Role of fund managers (and the support provided) in contributing to company development and attracting other investors	Interviews with: successful firms; fund managers; other investors/ market experts	Year 2 (early); Year 5 (interim); Year 8-10 (final)	Fund manager, BEIS/ external contractor	Dependent on the quality of responses
28	Reasons for not being accepted for equity product: discouragement	Interviews with unsuccessful	Year 2 (early); Year 5 (interim)	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
	issues (nature of 'noes')	firms			
29	No. of firms introducing new/improved products and services (new-to-the-firm)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
30	No. of firms introducing new/improved products and services (new-to-the-market)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
31	No. of firms in licensing deals	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
32	Value of change in annual turnover (incl. in exports) (£)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
33	Change in overall employment (no. of FTEs)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
34	Value of change in salaries of staff (overall and R&D) (£)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses

#	Indicator	How to collect?	When to collect?	Who is responsible?	Data quality/issues?
35	Value of change in annual R&D expenditure (£)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
36	Change in productivity (proxy measure calculated using turnover per FTE employee)	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
37	No. of firms involved in collaborations for innovation	Interviews with successful and unsuccessful firms	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
38	Other factors (internal and external) which contribute to outcomes	Interviews with: successful and unsuccessful firms; fund managers; other investors/ market experts	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses
39	Type of spillovers generated	Interviews with: successful; fund managers; other investors/ market experts	Year 5 (interim); Year 8-10 (final)	BEIS/ external contractor	Dependent on the quality of responses

Source: SQW

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