DPS FRAMEWORK SCHEDULE 4: LETTER OF APPOINTMENT AND CONTRACT TERMS

Part 1: Letter of Appointment

Frontier Economics Ltd
Mid City Place
71 High Holborn
London
United Kingdom
WC1V 6DA

Dear [redacted],

Letter of Appointment

This letter of Appointment dated Friday, 4th February 2022, is issued in accordance with the provisions of the DPS Agreement (RM6018) between CCS and the Supplier.

Capitalised terms and expressions used in this letter have the same meanings as in the Contract Terms unless the context otherwise requires.

Order Number:	PS21280
From:	**Department of Business Energy and Industrial Strategy**, 1 Victoria St, Westminster, London, SW1H 0ET ("Customer")
To:	**Frontier Economics Ltd**, Mid City Place, 71 High Holborn, London, United Kingdom, WC1V 6DA ("Supplier")

Effective Date:	Monday, 7th February 2022
Expiry Date:	Friday, 29th April 2022

Services required:	Set out in Section 2, Part B (Specification) of the DPS Agreement and refined by: The Customer's Project Specification attached at Appendix A and the Supplier's Proposal attached at Appendix B.

Key Individuals:	Supplier Contact – [redacted]

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	Project Manager - [redacted]

Contract Charges (including any applicable discount(s), but excluding VAT):	As per AW5.2 Price Schedule response highlighted within the RM6018 Contract Terms, section; Annex 1 – Contract Charges. The total value of this contract shall not exceed £85,760.00 Excluding VAT. **Milestone Payments as per below:** [redacted]
Insurance Requirements	Additional public liability insurance to cover all risks in the performance of the Contract, with a minimum limit of £5 million for each individual claim. Additional employers' liability insurance with a minimum limit of £5 million indemnity. Additional professional indemnity insurance adequate to cover all risks in the performance of the Contract with a minimum limit of indemnity of £2 million for each individual claim. Product liability insurance cover all risks in the provision of Deliverables under the Contract, with a minimum limit of £5 million for each individual claim.
Liability Requirements	**Suppliers limitation of Liability** (Clause 18.2 of the Contract Terms);

FORMATION OF CONTRACT

BY SIGNING AND RETURNING THIS LETTER OF APPOINTMENT (which may be done by electronic means) the Supplier agrees to enter a Contract with the Customer to provide the Services in accordance with the terms of this letter and the Contract Terms.

The Parties hereby acknowledge and agree that they have read this letter and the Contract Terms.

The Parties hereby acknowledge and agree that this Contract shall be formed when the Customer acknowledges (which may be done by electronic means) the receipt of the signed copy of this letter from the Supplier within two (2) Working Days from such receipt

For and on behalf of the Supplier:

Name and Title: [redacted], Director

For and on behalf of the Customer:

Name and Title: [redacted], Assistant Economist

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Signature: [redacted]

Date: 09/02/2022

Signature: [redacted]

Date: 09/02/2022

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APPENDIX A

Customer Project Specification

1. Background

Why this project is important:
The project will estimate the rate of return to R&D through a literature review and meta-analysis. A previous study of this kind, Rates of Return to Investment in Science and Innovation, was published in 2014 by Frontier Economics (henceforth Frontier Economics (2014). This project will take our evidence base forward with an update to include the most recent literature while the meta-analysis will provide robust estimates of the rates of return that account for the uncertainty and heterogeneity in the underlying literature.

The government is committed to the 2.4% target and committed to doubling public R&D investment to £22bn per year. This project will gather the evidence to understand the value of our overall R&D portfolio for the next 5 to 10 years – allowing us to support our science superpower ambition and support growth, jobs and prosperity around the UK.

Where this projects results will feed into:
By bringing all the existing literature into a single place with a comprehensive assessment, this project will be essential in allowing BEIS to continue using robust evidence-based analysis to inform the case for R&D investment at budgets, spending reviews and in public forums. It will also provide key evidence for business cases and the Innovation strategy by allowing us to set out the value of the wider R&D portfolio. It may even provide evidence for investments and maximise value to taxpayers, particularly where programmes are new or need to be assessed as a portfolio of programmes.

Brief summary of previous study:
Frontier Economics 2014 was commissioned by the Department for Business, Innovation and Skills to provide evidence on the rates of return to investments in science and innovation. Three approaches were used; a review and synthesis of the existing literature, original econometric work and case studies. Unlike Frontier Economics 2014, this project will not carry out original econometric work but will instead perform a meta-analysis on the existing literature. Further detail on which sections should be replicated is included below (Section 3).

2. Aims and Objectives of the Project

The specific objectives of the project are to answer these key research questions:

1. What is the rate of return to privately funded R&D? To publicly funded R&D?
2. How does the rate of return differ by the characteristics of the research projects?
3. What drives the differences in the rates of returns to R&D?

Answering these research questions will help BEIS have a robust evidence-based view of the value of R&D investments. A discussion of how will this support BEIS is covered in section 1.

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This successful bidder should answer these questions with a:

- Literature review – Which identifies existing rate of return studies, collects them into one table, reviews how these studies compare and analyses what this suggests about the rate of return for science and innovation overall and for research projects of different characteristics
- Meta-analysis – To produce point-estimates and ranges for the direct and social rates of return at firm, industry and national level for publicly and privately-funded R&D.

3. Suggested Methodology

This section provides further detail on what work is expected to address each of the key research questions.

1. What is the rate of return to privately-funded R&D? to publicly funded R&D?

Frontier Economics (2014) assessed the literature to identify the rate of return to privately and publicly funded R&D. It also differentiated between the direct rate of return (rate of return to the funder of the research) and the social rate of return (the rate of return to both the funder of the research plus all benefits that accrue to other parties). This project should replicate this.

This project's literature review should replicate Frontier Economics (2014)'s literature review, including sections 2.1 through 2.5 but excluding section 2.2.3 on wider intangible assests, 2.3.2 on returns to product and process innovation and 2.4.4 on linkages between business and research sectors. Section 4 will discuss what the replication should look like in further detail.

The meta-analysis is expected to produce point-estimates and ranges for the direct and social rates of return (at firm, industry and national level for publicly and privately-funded R&D). This meta-analysis should employ the standard techniques across the field including accounting for heterogeneity in the results, weighting by the quality of evidence etc. It should also attempt to assess whether there is a systematic bias in the results found in the literature.

2. How do the rates of return differ by the characteristics of the research projects?

There are many characteristics of R&D projects that may affect their rate of return. To understand how these differences impact the rate of return, the literature review should capture all R&D rate of return studies and identify key characteristics of each of the studies in line with the list of questions below (a comprehensive list is in Section 4):

- Was the project funded by the private or public sector?
- What was the stage of research? (basic vs applied vs experimental development)
- What sort of funding mechanism was used? (infrastructure vs talent vs competitive grants)?
- What country was the study based in?
- If conducted by a firm, what is their size?

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- What was the field of technology/economic sector?
- What industry did the study focus on (if different to the technology/economic sector)?

Having identified each of the key characteristics, the literature review should then identify how the average returns vary by characteristic (for example, what is the average rate of return across studies examining basic research? What is the average rate of return across studies examining applied research?). The literature review should summarise these average rates of return (i.e. mean, median and ranges) and any overall conclusions in the main body of the final report.

If there are sufficient studies on a characteristic to make it possible, it would be valuable to use meta-analysis techniques to identify if the differences in rates of return for projects with different characteristics are statistically significant. In addition to estimates we expect the literature review to distil mechanisms that deliver the rate of return (touched on below).

3. What drives the differences in the rates of returns to R&D?

Question 1 and 2 will identify differences in rates of return to R&D projects (public vs privately funded, basic vs applied vs experimental development). The literature review should then explore why the differences in the rates of returns exist. The literature review should also unpack some technical questions (below) that explore how the rates of return are formulated.

- What are the different methodological approaches to estimating the rate of return? (e.g. the production function method) And how do they compare?
    - What benefit streams are measured? (e.g. increases to business revenues)
    - What is the relative importance of these benefit streams?
    - How do these different methods of measurement impact the RoR estimates?
- What does the evidence suggest about how long the rate of return lasts? What does it suggest about the length of time between the investment and the realisation of those benefits (commonly referred to as a time 'lag')? What assumptions are typically made for these in various studies?
- How predictable are the returns to R&D? (e.g. what is the risk for R&D within categories, such as industry or technology stage?)
- In many rate of return studies, an implicit discount rate is used to account for the depreciating economic value generated by a new innovation over time. What discount rates are commonly used in the literature? Which of these might be most appropriate when trying to assess the value of the overall R&D portfolio?
- What influence does additionality/crowding-out have on the studies' estimates of returns?

4. Deliverables

The project must finish by the 31st of March 2022.

The project will be managed through regular weekly meetings between BEIS and the project team who will track progress against defined milestones. All outputs will be checked and quality assured by the BEIS managers and be signed off by a member of BEIS prior to the project team receiving final payment. The final product will be a published report. The report

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should be published on the successful bidder's website or where they usually publish their research.

Contractors will be responsible for ensuring the report clearly communicates the analysis to technical and non-technical audience through good use of data visualisations, tables, graphs and clear and concise narrative.

Intermediate outputs are also required to track the projects' progress. This includes:

1. A table of all the rate of return studies with detailed characteristics identified for each study
2. Summary tables and charts summarising the average rates of returns and how these compare between studies of different characteristics (with a supporting summary chapter which sets out these results)
3. Literature review draft
4. Meta-analysis
5. Draft full report

These will be followed by the delivery of the full final report.
Section 3 covered what was required in the project by key research question. Much of the material below covers similar content but by project output.

Intermediate Output 1: A table of the rate of return studies

The first key output in this study is an evidence table with all the underlying R&D rate of return studies. This table should include each studies' estimates, an assessment of the quality of evidence, a brief summary of the methodology underpinning the study and identify other key characteristics of the study to help address the key research questions above (e.g. study was on UK-based firms, 1990s-2000s, in field of life sciences, grant competition funding etc. – a full list of characteristics is provided below). The table should be provided in excel as well as in an annex to the report. If calculations were required to deduce the rate of return from a study, the details of any methods used to calculate the estimate should also be included in the excel table. At the completion of the project, the contractor will also be expected to provide copies of the studies they review as part of literature.

An example table produced for Frontier Economics 2014 can be found in Appendix B of its report and is copied below. The scope should be expanded to include the following columns:

- Authors/date of study
- Country
- Time period
- Public returns
- Private returns
- Unit of analysis (firm, industry and country)
    - If conducted by a firm(s), their size
- Summary of study findings
- Brief assessment of study quality
- Brief summary of data source used for the study and its quality
- The field of technology
- Economic sector
- Research Project funder (private or public)
- Research Project funded domestically or from abroad

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- The stage of research (basic vs applied vs experimental development)
- Funding mechanism (infrastructure vs talent scheme vs competitive grants etc.)
- Type of Organisation performing the research (private sector, charity, public research institute, university etc.)
- Domestic or Internationally collaborative research

Study Methodology

- Type of analysis (production function etc.)
- Lifetime of returns – how long were returns measured for?
- Time lag between investment and realisation of returns
- Discount rate

Frontier Economics 2014 Table of Evidence Summaries from Annex B is copied below.

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Part 2: Contract Terms

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