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Regional Growth Fund: Impact and
Economic Evaluation Options

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RESEARCH

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Cover note

This report, *Regional Growth Fund: Impact and Economic Evaluation Options*, was completed in 2014 before Rounds 5 and 6 had taken place. It is being published now to coincide with the forthcoming release of the first empirical and case study findings from the full impact and economic evaluation.

The RGF Secretariat has already acted on the recommendations set out in the scoping study, implementing a data collection strategy which has improved the quality of information on RGF programme beneficiaries and compiling a database of metrics on successful and unsuccessful applicants generated through the appraisal process.

We are grateful to Ipsos MORI, Ecorys, Professor Mark Hart, Geoff White and George Barrett for their report and to members of the Independent Academic Panel for their constructive feedback on earlier drafts. We hope this scoping study serves as an informative and useful guide to those embarking on their own evaluation.

Regional Growth Fund Secretariat, Department for Business, Innovation and Skills

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Executive Summary

Ipsos MORI, Ecorys, Professor Mark Hart, Geoff White and George Barrett were commissioned in May 2013 to undertake the study 'Regional Growth Fund: Process Evaluation, Monitoring, and Scoping Impact and Economic Evaluation Options.' This report combines the findings of Phase Two and Three of this study: the development of options for undertaking a robust impact and economic evaluation of the Regional Growth Fund (RGF). This report builds on a previous report (Phase One: Data and Data Monitoring) which provided an examination of the comprehensiveness and quality of monitoring processes underpinning the RGF.

Aims and Objectives

The objectives of the impact and economic evaluation scoping studies are to assess the feasibility of options for implementing:

- **Impact evaluation:** An impact evaluation to robustly establish the causal effects of projects and programmes funded through Regional Growth Fund.
- **Economic evaluation:** An economic evaluation establishing how far the costs of the Regional Growth Fund were justified by the benefits achieved, incorporating both cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA).

The overall objectives of this report, as required by the Department for Business, Innovation and Skills (BIS) and the Department for Communities and Local Government (DCLG), are to set out the issues that will need to be addressed in generating robust, quantitative estimates of the impact of the RGF and its economic outcomes, to review the methods that might be adopted to do so and to identify the methodological options for impact and economic assessment.

The Regional Growth Fund

The Regional Growth Fund was created in 2010 with two key objectives:

- To stimulate enterprise by providing support for projects and programmes with potential for economic growth, leveraging in private sector investment, and creating additional sustainable private sector employment; and,
- To support in particular those areas and communities currently dependent on the public sector to make the transition to sustainable private sector-led growth and prosperity.

The first four rounds of the Regional Growth Fund saw £2.6bn in RGF resources committed to 114 programmes and 286 projects. This portfolio was contracted to create or

safeguard 280,000 person years of employment and leverage further expenditure from private or other public sources of £14.4bn¹.

Rounds 5 and 6 of the RGF were announced in 2013. This saw a slight change in the emphasis of the fund, with eligibility limited to project and programme applications led by the private sector. Applications for Round 5 closed in December 2013, while Round 6 of RGF opened for applications in June 2014. These two rounds will bring the total funding commitment to RGF to £3.2bn up to March 2017².

Segmentation of the RGF portfolio

The RGF project and programme portfolio can be broadly segmented into the following types:

- **Firm level subsidies:** Subsidies of £1m or more for capital investment, research and development, or training projects delivered directly by firms (typically large manufacturers), accounting for £868m of funds committed through the RGF.
- **Grant and loan programmes:** £1.2bn was committed to intermediaries to lead grant and loan programmes on a national, regional or local basis. Programmes are delivered on a State Aid compliant basis, and mainly involve subsidies for capital investment, research and development, or training.
- **Land and property:** £261m was committed to interventions involving the preparation or servicing of land to stimulate the development of commercial or industrial floorspace.
- **Other interventions:** £239m was committed to a diverse mix other area based interventions, such as transport infrastructure, tourist attractions and flood defences.

Recommendation

- Projects and programmes in each group share a number of common features that lend themselves to being treated on a consistent basis, and it is recommended that the evaluation of Regional Growth Fund is structured by this typology. By splitting the RGF portfolio in this way, it is likely that some form of meta-review bringing the results of the strands of analysis together to reach an aggregate judgement on how far the RGF has delivered against its two objectives will be required.

Firm level subsidies (capital investment, innovation, and training)

An impact evaluation of the firm level projects funded through the Regional Growth Fund would need to explore the intermediate and longer term outcomes identified in the table

¹ This (and following figures) are based on monitoring information extracted from the RGF monitoring system in May 2014.

² See <https://www.gov.uk/understanding-the-regional-growth-fund>. Accessed June 2014.

below. These outcomes will have varying relevance to each project depending on type, but given the small numbers of projects involved, observations will need to be pooled to maximise the sample sizes available for econometric analysis.

Table 1 Firm level projects: outcomes of interest

Intermediate outcomes	Final outcomes
Capital investment	Employment
Training expenditure	Output (GVA)
Number of workers trained	Profitability
Research and development expenditure	Productivity
Patents	

Counterfactual groups

The evaluation should seek to build two counterfactual groups: (1) all unsuccessful project applicants, and (2) all non-beneficiaries of the Regional Growth Fund. Differences in the observable characteristics of firms (size, sector, and location) should be minimised through the application of kernel matching.

Recommendation

- To prepare for the main-stage evaluation, BIS should build a database of unsuccessful projects. This dataset should capture the following variables: name and address of applicant firm, Companies House Reference number, round of application, and key metrics generated through the appraisal process (e.g. BCR). For Round 2 of RGF onwards, this is already available in existing BIS databases. However, for Round 1, BIS will need to return to the original application and appraisal forms.
- Additionally, BIS (or a main-stage evaluation contractor) will need to classify all applications by their main type (capital investment, research and development or training). Cleansing of CRN numbers (using the FAME database) would also be beneficial.

Core data collection: data-linking to administrative sources

The scoping study suggests that administrative data may be a superior source of evidence on these outcomes in this instance. A data-linking feasibility exercise suggested that 76 percent of RGF beneficiaries could be matched to the IDBR on the basis of Companies House Registration Numbers, and further improvements could be achieved through manual or fuzzy matching on the basis of name and address. Once linked to the IDBR, at least 90 percent of firms could be linked to key datasets held within the ONS Virtual Microdata Laboratory (BSD, ARD, BRES, BERD). This will offer reasonable longitudinal

coverage of the key outcomes identified in Table 1 (though scope to cover some variables, such as training expenditure may be limited).

Optional supplementary data collection: ex-post primary surveys

An impact evaluation will face a number of challenges in collecting evidence on these outcomes through primary research. Firstly, the volume of projects funded is comparatively small (around 230), and even with response rates in excess of 50 percent, the number of observations that might be available will likely limit the feasibility of econometric analysis. These problems will be compounded by difficulties in establishing baseline (pre-RGF funding) measures on a retrospective basis, and challenges in collecting accurate financial measures through survey research. However, an ex-post survey may have uses in gathering both (less robust) impact evidence based on the perceptions of beneficiaries, as well as some evidence on displacement (as described below).

Recommendation

- Given the small sample sizes, and the difficulties in obtaining robust measures of the of the outcomes of interest, it is recommended that the evaluation adopts a data collection strategy based primarily on linking to the administrative datasets held with the Virtual Microdata Laboratory.

Analysis

The impact evaluation should implement a range of different types of analyses to explore the impacts of the RGF on firm performance depending on the comparison group employed. All analyses should exploit the longitudinal nature of the data through the application of difference-in-differences or fixed effects models. Additionally, the extensions to this basic framework set out in the table below should be applied.

No comparison group	Unsuccessful applicants	Non-RGF beneficiaries
Exploit timing of different rounds of the RGF	Fuzzy RDD using the BCR (from appraisals) as a running variable	Synthetic control methods

Grant and loan programmes

Grant and loan programmes funded through the RGF generally provide subsidies for similar types of projects (capital investment, research and development, training). The evaluation of these programmes should also seek to explore the outcomes identified in Table 1 above. However, there are key differences between projects and programmes in terms of the data available that will necessitate a modified approach to impact evaluation.

Programme Data

An impact evaluation of the grant and loan programmes funded through RGF will require details of the firms benefitting. This information is collected by intermediaries and will need to be gathered by BIS to make an evaluation of grant and loan programmes feasible. Requirements to supply this information were not specified in Final Grant Offer Letters until Round 4, and prior to this scoping study, no central database of programme beneficiaries had been established.

A scoping exercise was undertaken as part of this study to determine how far details of both successful and unsuccessful applicants to these programmes could be collected on a consistent basis across 73 programmes funded through Rounds 1 to 3. Data was provided by the majority of programmes capturing details of over 2,140 beneficiaries and 2,170 unsuccessful applicants. However, there was substantial variation in terms of coverage of key variables of interest. Named contact details were available for around 60 percent of beneficiaries, while ten programmes were unable to provide details of unsuccessful applicants. Though these gaps will not prevent an evaluation of grant and loan programmes, issues of coverage will limit its scope.

Recommendation

- The evaluation of the grant and loan programmes funded by BIS rests on the availability of high quality data on the beneficiaries supported by programmes. The data collected on programme beneficiaries through the scoping study suggested that improvements in the quality of information could be achieved. It is recommended BIS continue to collect programme beneficiary data on an annual basis, and leverage relationships between intermediaries and monitoring officers to achieve improvements in data quality.

Counterfactual

The evaluation contractor should seek to build two counterfactual groups: (1) unsuccessful applicants to grant and loan programmes, and (2) non-beneficiaries of grant and loan programmes. Observed differences between beneficiaries and counterfactual groups should be minimised through the application of kernel matching. Only those programmes supplying details on unsuccessful applicants could be included in analysis driven by comparisons between successful and unsuccessful applicants.

Core data collection: data-linking to administrative sources

A similar data collection strategy as for projects involving firm level subsidies (relying largely on administrative data) would be possible for beneficiaries of grant and loan programmes. However, as these beneficiaries are largely SMEs, the scope of outcomes it would be possible to explore will be narrowed to employment and turnover (with implications for how far it might be possible to undertake a cost-benefit analysis of the schemes involved).

Optional data collection: data-linking to administrative sources

In this case, an ex-post evaluation survey would be beneficial to establish baseline (on a retrospective basis) and current measures of the key outcomes of interest (such as capital or training expenditure), and could also be used to gather views from beneficiaries on the impact the programmes concerned (i.e. self-reporting) as well as evidence on displacement. Such a survey would need to be delivered on a rolling basis (allowing three years to elapse between baseline and follow-up observations to ensure change was being measured over a consistent duration).

Given the comparatively small numbers of firms involved, and possible reductions in effective sample size associated with clustering of outcomes at a programme level, it is advised that such a survey is delivered on a census basis to maximise the number of observations available for detailed analysis. The survey will need to capture detailed financial information, and data quality would be improved if it was (1) targeted at finance directors rather than named contacts, and (2) involved the distribution of advance data sheets (though such steps may not fully ameliorate the risks involved with such a survey).

Recommendation

- BIS will need to reach a decision as to how far the additional costs associated with an ex-post evaluation survey are justified by the added value of exploring wider outcomes relating to capital investment, training expenditure, and productivity.
- Programme intermediaries are pursuing their own programmes of evaluation. If BIS does decide to proceed with a survey of grant and loan beneficiaries then some work with intermediaries will be needed to ensure that there are no conflicts.
- It is suggested that in the event that surveys of successful programme beneficiaries are pursued as part of the evaluation, this should also be extended to unsuccessful applicants. It is not recommended that any survey research is undertaken with non-applicants owing to the substantial potential issues associated with selection bias.

Analysis

The number of beneficiaries at a programme level tends to be small, and observations will need to be pooled for the purposes of analysis. However, grant and loan programmes have not been delivered with homogenous institutional processes and this limits the scope of potential analysis that might be undertaken. As such, the evaluation will need to rely on fixed effects and difference-in-differences models (though there may be opportunities to exploit differences in the timing of application rounds).

Land and Property

An impact evaluation of the land and property projects and programmes funded through the Regional Growth Fund would ideally explore intermediate effects in local property markets (on floorspace and rents), as well as on employment and unemployment. However, given the timescales over which such impacts might be realised, the evaluation of land and property interventions will require a long term view (and employment impacts may not be visible for 10 years in some cases).

Data collection

Partial coverage of the outcomes of interest (including floorspace, employment, and unemployment) could be achieved through the creation of panel datasets bringing together longitudinal observations on these outcomes at an LSOA level from secondary datasets (such as the Business Structure Database). The absence of secondary data on commercial rents will prevent examination of these types of property market effect.

Recommendation

- In order to implement any evaluation of land and property projects, a database of sites receiving RGF intervention should be established by BIS (identifying their geographical location and postal address). This could be achieved through the programme data collection exercise described above.

Analysis

The opportunities for detailed analysis of the impacts of land and property projects are limited by both the small numbers of interventions funded through RGF and the paucity of secondary data on the outcomes involved (at sufficiently detailed spatial scales). Projects and programmes will need to be pooled to offer sufficiently large sample sizes for econometric analysis. The use of area based longitudinal data to examine the employment impacts of land and property interventions may help account for any localised displacement, multiplier, and general equilibrium effects.

Case studies

Quantitative analysis will need to be supplemented by case study research bringing together secondary and documentary evidence and the views of local experts (such as planning officers and local property agents), if these types of intervention are to receive detailed scrutiny through an evaluation of RGF. While these approaches will not offer a quantitative assessment of impact, they will enable a judgement to be reached on the effectiveness of these programmes in securing local economic impacts through addressing failures in local land and property markets.

Case study research would also be usefully supplemented by occupant surveys in the longer term (i.e. after construction of commercial units is complete). This would provide additional insight into the origins of incoming firms and facilitate additional scrutiny of the importance of RGF funded developments in influencing the location decisions of firms (although such results could not be used to make causal inferences). Insufficient information is available on the number of likely volumes of occupants at this stage, and it is suggested that a survey is planned in detail once developments are complete and early indications of occupancy rates are available.

Other interventions

Other intervention types, including those focused on area-level rather than firm-level intervention, should be evaluated on a case study basis. This is due to the fact that these projects and programmes are small in number, account for a small proportion of the overall RGF budget and are diverse in nature.

- Transport and infrastructure schemes make up the bulk of these other interventions, most of which are focused on 'unlocking' property development at sites which are otherwise constrained or unviable. Assessing the impacts of downstream land and property development will be key to evaluating transport and infrastructure schemes although consideration should also be given to direct outcomes (e.g. travel times) and the wider impacts on productivity and agglomeration.
- Tourism schemes are small in number but require a specific set of approaches to estimate the net impact on visitor expenditure and the wider economy.
- Spatial programmes can sometimes involve a wider package of area-based interventions. These should be assessed on a case-by-case basis but are likely to involve a hybrid of approaches depending on the specific nature of the programmes concerned.

Wider issues

Displacement, multiplier effects and general equilibrium effects: Scope for robust investigation of displacement, multiplier effects, and general equilibrium effects will be highly limited. As such, it is likely that an impact evaluation based solely on quasi-experimental methods would fall short of providing estimates of the net additional economic impacts of RGF. Less robust methods, based on ex-post surveys of beneficiaries could be replicated moving forwards (through gathering evidence on the geographical profile of beneficiaries' customers, main competition, and suppliers). Such surveys have been recommended as an option for grant and loan programmes, but not for projects where the majority of evidence required can be gathered through secondary data (and as such, the proposed survey would need to be extended to project beneficiaries if there was interest in pursuing these types of method).

Wider Government intervention: A range of monitoring information relating to other Government programmes is potentially available to help control for their possible influence. While it will not be possible to control for all Government programmes, it will be beneficial to integrate these additional controls for the purposes of robustness checks.

Future proofing: This scoping study is based primarily on the projects and programmes funded through Rounds 1 to 4 of RGF. Rounds 5 and 6 were announced in 2013 and will be open only to private sector bids. It is not anticipated that this change will lead to substantial differences in the nature of the projects funded, though it is likely that fewer grant and loan programmes will be funded (as LEPs were not be eligible to bid). Additionally, there are no anticipated changes in the way that projects and programmes will be selected (and as such, those evaluation strategies based on leveraging the

institutional design of the fund – such as fuzzy Regression Discontinuity Design approaches - will remain viable).

Recommendation

- BIS should seek to establish data-sharing agreements (where necessary) with key Departments and agencies to expedite the availability of monitoring information on wider programme for a main-stage evaluation of RGF.

Economic Evaluation

An economic evaluation would comprise two key components:

- **Cost-effectiveness analysis:** A cost-effectiveness analysis of RGF would seek to undertake a value for money assessment based on the cost per additional job created. Difficulties in assessing displacement and multiplier effects may limit the power of this assessment, and there may be a need to integrate less robust measures of these wider effects in order to support a VFM assessment.
- **Cost-benefit analysis:** A cost-benefit analysis will only be feasible for firm level interventions where it is possible to collect information on capital expenditure, profits and productivity. Again, difficulties in assessing the displacement and multiplier effects will inhibit the extent to which any economic benefits driven by job creation activity can be included (i.e. the focus will need to be on productivity gains, which can be treated as an impact on aggregate supply).

Meta-Review

The suggested main-stage specification will involve a number of different strands of analysis relating to different groups of projects and programmes funded. These different strands of evidence will involve different methodologies and evidence, and different levels of confidence as to how far the projects and programmes have led to causal effects on the main outcomes of interest. In order to bring these, a synthesis exercise will be needed to make an overall judgement as to how far the RGF has met its overall objectives. Such a synthesis will need to assess the available evidence at each stage of the evaluation across a range of dimensions:

- **Job creation and leverage:** The meta-review will need to make a summary judgement as to how far the RGF has led to aggregate impacts in terms of creating (or safeguarding) employment and leveraging private sector investment. This will require synthesis of evidence from quasi-experimental methods (for the firm level subsidies and grant and loan programmes that account for the majority of RGF spending) with evaluation strategies grounded in qualitative evidence (particularly for land and property and other types of investment).
- **Spatial distribution of effects:** The second key objective of the RGF is to grow private sector employment in areas of high dependency on public sector employment. It may be difficult to provide the detailed insight into the spatial pattern of displacement and other

effects required to give definitive answers as to how far any job creation impacts have disproportionately benefited these types of area. However, it will be important that any synthesis examines the geographical distribution of firms and areas benefitting from RGF funding (and any evidence it is possible to gather on displacement effects) alongside evidence of job creation impacts to reach an aggregate judgement on how far the spatial priorities of the fund have been met.

- **Persistence:** The meta-review will also need to consider the importance of uncertainty at various stages of the main-stage evaluation, particularly with regard to how durable the impacts observed are likely to be (and where the expected benefits are long-term in nature – as in the case of land and property projects – an assessment of the likelihood that they will arise in the future will be required).
- **Quality of evidence:** The meta-review will need to temper judgements made on the basis of the strength of the evidence available. Estimates generated through quasi-experimental analysis should carry substantially greater weight in the assessment than those generated either through self-reporting or through case studies. The meta-analysis should also give explicit consideration to how far findings can be generalised across the population of RGF beneficiaries.
- **Benchmarking:** Where it is possible to generate cost-effectiveness metrics or benefit-cost ratios, the meta-analysis should seek to benchmark those values against the results of evaluations of similar policies and initiatives to provide an assessment of the relative effectiveness of RGF overall. Again, it will be important to consider the strength of the methodologies employed in these studies (and academic studies are likely to provide results that are more comparable to those that will be generated by the methodologies suggested in this scoping study).

Main-stage Specification

Phase 1: Early assessment of Impact (August to December 2014)

A main-stage evaluation could begin the short term with an early assessment of impact to feed into the 2015 Comprehensive Spending Review (and would need to complete in December 2014). This early study would focus primarily on data driven approaches to impact, but could also include case studies of land and property and other interventions.

It is important to be clear that such an assessment would only offer early evidence of impacts. Projects and programmes from Round 3 to Round 5 would not be complete, the benefits of innovation projects are unlikely to be visible in the data, and construction activity associated with land and property is unlikely to be complete except in a minority of cases. Some cost-effectiveness assessment analysis may be feasible at this stage (cost per gross additional job created), though cost-benefit analysis may be more problematic.

Task 1: Assembly of Monitoring Information associated with Wider Programmes

The evaluation will ideally supplement RGF monitoring information with monitoring of other programmes (as identified in the Phase 1 report). An immediate priority will be to collect, cleanse and link these datasets. This process could be expedited by BIS if appropriate

data-sharing agreements can be put in place with relevant programmes. This evidence is non-critical for an early assessment of impact, though it would be useful to put in place appropriate protocols and undertake feasibility testing to ensure this data could be used in later waves of the main-stage study.

Task 2: Data-linking and Econometric Analysis

The main evaluation task would be a data-linking and econometric analysis exercise focusing on RGF funded projects and grant and loan programmes (based on the monitoring information gathered by Ipsos MORI in the first quarter of 2014, covering beneficiaries of programmes from Rounds 1, 2, and 3). This would follow the analytical framework outlined above, and provide early insights into the impacts of the Regional Growth Fund (primarily on firm level employment at this stage).

Task 3: Case Studies

Finally, it may be helpful to include a sample of case studies of land and property projects and programmes, and other interventions funded through the Regional Growth Fund. At this stage, these would primarily focus on providing an assessment of progress, the strength of the market failure rationale for intervention, and an appraisal of the potential future benefits of the projects and programmes. Each case study would involve a detailed review of the documentation associated with the project and programme and depth interviews with project delivery partners. It is suggested that 10 land and property projects are included in the sample (selected at random), alongside 5 other interventions.

Task 4: Analysis and Reporting

A synthesis report setting out the results of the econometric analysis alongside the case study findings will be required, making initial judgements as to the effectiveness of early RGF projects and programmes in meeting their objectives. A cost-effectiveness analysis (looking at the cost per job created or safeguarded) should form part of this analysis drawing on the results of Task 2, though it is likely this will only be feasible for firm level projects and grant and loan programmes at this stage.

Phase 2: Rolling Survey of Grant and Loan Beneficiaries (2015 to 2020)

A rolling survey of grant and loan beneficiaries would begin from March 2015 onwards (once the second wave of beneficiary data collection is complete). This survey would focus on establishing the financial measures of outcomes of interest (baseline and follow-up), self-reported views on the impacts of beneficiaries, and information that may be helpful in reaching an assessment of displacement.

It is assumed that around 6,000 beneficiaries will eventually be available for the survey, of which contact details will be available for 75 percent (4,500). A response rate of 50 percent has been assumed (based on experiences of the process evaluation survey that has taken place as part of Phase 4 of this study), implying around 2,250 observations will be available for the evaluation. Surveys will be targeted at finance directors, and will involve an advance data-sheet to collect information on the metrics of interest. Surveys would be scheduled to take place three years following the agreement of the Final Grant Offer Letter with the beneficiary (which would be 2020 in the case of Round 6 projects).

Medium Term Assessment (2017/18)

A medium term evaluation would take place in 2017/18 and provide a wider assessment of the impacts of the Regional Growth Fund. Impacts on firm performance should be visible for the majority of projects and programmes funded through the scheme (though impacts associated with innovation projects may take longer to emerge, and it is uncertain how far construction of commercial and industrial property developments might be complete at this stage). This medium term assessment would seek to provide a cost-benefit analysis of the programme alongside cost-effectiveness analysis, where data constraints permit.

Task 1: Data-linking and Econometric Analysis

The data-linking programme would need to be refreshed, integrating any additional data collected through the rolling surveys of beneficiaries. This should also include any wider monitoring data it is possible to collect from other programmes.

Task 2: Case Studies

The evaluation should return at this stage to the case studies selected for the early assessment in 2014. Again, the focus will need to be on assessing progress (particularly with regard to land and property projects). These will draw primarily on secondary evidence, though there will be a need to engage with project delivery staff and potentially individuals within planning authorities to provide wider evidence. A further assessment at this stage will be required to examine how far it might be realistic to undertake (1) occupant surveys, and (2) econometric analysis based on spatial data.

Task 3: Occupant Surveys and Econometric Analysis

Contingent on the progress made with land and property projects, surveys of occupants and econometric analysis of spatial data relating to the supply floorspace, employment and unemployment is suggested at this stage to examine the effects of the physical development initiatives funded through the Regional Growth Fund. The cost of occupant surveys should be reviewed at this stage in light of volumes.

Task 4: Analysis and Reporting





A synthesis report combining the results of the three strands of work will be needed at this stage, making longer term judgements as to the effectiveness of early RGF projects and programmes in meeting their objectives. The economic evaluation should at this stage provide a cost-benefit analysis of the schemes involved (as evidence on capital investment and to some extent, research and development expenditure should be available at this stage), though longer term productivity impacts of R&D projects may not be visible in the data. As such, the economic evaluation should also retain a focus on cost-effectiveness analysis (incorporating an assessment of the cost per job created by the programme), and benchmarking these measures against historical evaluation studies where relevant.

Long Term Assessment (2020)

A long term evaluation of RGF would take place in 2020 at which point the impacts of the full portfolio should be visible. This would follow a similar format to the medium term assessment, involving (1) a refresh of the econometric analysis (based primarily on secondary data, (2) revisiting the case studies, and (3) occupant surveys and econometric analysis of spatial data. This long term assessment would seek to provide a cost-benefit analysis of the programme, where data constraints permit.

Summary

A summary of methods are set out in the figure overleaf.

Intervention Type	Counterfactuals	Data Collection	Analysis	Case Studies
Firm level projects: Capital investment, innovation and training 	<ol style="list-style-type: none"> 1. Unsuccessful applicants 2. Non-applicants (matched by size, sector, location) 3. Exploit timing of rounds (R4 vs R1 etc) 	<ol style="list-style-type: none"> 1. Datalinking (BSD, ARD, BERD) for beneficiaries & counterfactuals 2. Controls sourced from monitoring of wider programmes 3. Ex-post census survey of beneficiaries (rolling) 	<ol style="list-style-type: none"> 1. PSM + Fixed Effects 2. Fuzzy RDD 3. Synthetic Control Methods 	<ol style="list-style-type: none"> 1. None
Grant & Loan Programmes 	<ol style="list-style-type: none"> 1. Unsuccessful applicants 2. Non-applicants (matched by size, sector, location) 	<ol style="list-style-type: none"> 1. Datalinking (BSD) for beneficiaries & counterfactuals 2. Controls sourced from monitoring of wider programmes 3. Ex-post census of beneficiaries and unsuccessful applicants (rolling) 	<ol style="list-style-type: none"> 1. PSM + Fixed Effects 2. Difference-in-differences (for survey data) 3. Synthetic Control Methods 	<ol style="list-style-type: none"> 1. None
Land and Property 	<ol style="list-style-type: none"> 1. Area based counterfactual (all LSOAs) 	<ol style="list-style-type: none"> 1. Spatial aggregation of BSD data 2. Occupant surveys 	<ol style="list-style-type: none"> 1. Fixed Effects 	<ol style="list-style-type: none"> 1. Local property market case studies
Other (Transport, Tourism, Spatial Programmes, and Infrastructure) 	<ol style="list-style-type: none"> 1. None 	<ol style="list-style-type: none"> 1. None 	<ol style="list-style-type: none"> 1. None 	<ol style="list-style-type: none"> 1. Project and programme level case studies (bespoke to intervention)

1. Introduction

Ipsos MORI, Ecorys, Professor Mark Hart, Geoff White and George Barrett were commissioned in May 2013 to undertake the study 'Regional Growth Fund: Process Evaluation, Monitoring, and Scoping Impact and Economic Evaluation Options.' This report combines the findings of Phase Two and Three of this study: the development of options for undertaking a robust impact and economic evaluation of the Regional Growth Fund (RGF). This report builds on a previous report (Phase One: Data and Data Monitoring) which provided an examination of the comprehensiveness and quality of monitoring processes underpinning the RGF.

1.1 Objectives

The objectives of the impact and economic evaluation scoping studies³ are to assess the feasibility of options for implementing an:

- **Impact evaluation:** An impact evaluation to robustly establish the causal effects of projects and programmes funded through Regional Growth Fund on beneficiary firms, alongside any externalities involved at a variety of spatial scales (such as displacement, multiplier effects, and agglomeration effects).
- **Economic evaluation:** An economic evaluation to establish how far the costs of the Regional Growth Fund were justified by the benefits achieved, incorporating both cost-effectiveness analysis (CEA) and a cost-benefit analysis aligning with the principles of the HM Treasury Green Book.

The overall objectives of this report, as required by BIS and CLG, are to set out the issues that will need to be addressed in generating robust, quantitative estimates of the impact of the RGF and its economic outcomes, to review the methods that might be adopted to do so and to identify the methodological options for impact and economic assessment. Given the diversity of RGF supported activities, it is acknowledged that it is unlikely to be possible to adopt a single evaluation method for all RGF programmes and projects. Different methods (some more quantitatively robust than others) will be needed for different types of RGF interventions and for different categories and segments of direct and indirect RGF beneficiaries. This is likely to require a meta-review of the different strands of evidence in order to reach an overall assessment of RGF costs and benefits.

A central objective of the evaluation is to provide an assessment of the impact of the RGF on business and other beneficiaries, its wider economic effects and the balance of its overall resource costs and benefits. The evaluation is to be carried out according to the principles set out in the HM Treasury Green Book and Magenta Book and will also draw upon guidance from BIS where it is possible to do so.

³ This represents a departure from the original terms of reference set out in the ITT, that defined the impact evaluation as an assessment of the firm-level impacts of the Regional Growth Fund, and the economic evaluation as an assessment of its spatial impacts.

1.2 Phase One Report

This report was preceded by a critical review of the monitoring systems underpinning the Regional Growth Fund (with a particular focus on enhancing evaluation options). Although the findings of the review were generally positive, the following key points emerged:

- **Direct, Indirect, and Construction Jobs:** The monitoring of the programme combines direct, indirect and construction jobs, making it challenging to meaningfully aggregate the volumes of expected and actual jobs created or safeguarded by the programme. Responses to recommendations to separate these three types of job outcome suggest that the RGF Secretariat will work towards separating direct and indirect jobs (though construction jobs will continue to be combined under the headings of direct and indirect jobs as appropriate).
- **Narrow range of key performance indicators:** The key performance indicators collected to monitor the programme are limited to jobs created and jobs safeguarded. Where additional measures have been integrated into monitoring, it has been undertaken on a case by case basis, leading to inconsistency of measurement (and are not been included for all cases for which they might be relevant). This will make it challenging to describe the intermediate outputs of many of the longer term innovation and land and property projects and programmes funded through the programme. In response to the recommendations of the report, the RGF Secretariat has indicated it will apply greater consistency both to future and past projects (with guidance under development to aid case officers in specifying more consistent and comprehensive KPIs in Grant Offer Letters).
- **Level of spatial detail:** The projects funded through the RGF are mainly limited to a single site. Monitoring systems capture the postcode of that site, enabling some spatial disaggregation of the outputs and outcomes achieved. However, there is limited detail collected on the spatial distribution of the job outcomes associated with the programmes funded: programme intermediaries report aggregate information on the achievements of outcomes to the RGF Secretariat. The latter has suggested that it is unlikely that additional spatial detail on the location of outputs and outcomes secured by programmes will be collected in the future.
- **Beneficiary details:** The RGF Secretariat keeps substantial information on the details of project beneficiaries (including addresses, contact details, and Companies House registration numbers), which will be beneficial for the purposes of both primary data collection through surveys and linking to administrative data sources. However, no central record of the beneficiaries supported by programme intermediaries was available at the beginning of this scoping report. Consultations with programme intermediaries suggest that the required information is being collected at a local level and in principle available for an evaluation of RGF. This was confirmed through this wave of research, in which a sample of beneficiary records was collected from 18 individual programmes to test the feasibility of a data-linking exercise. The RGF Secretariat has now put in place processes to support the annual collection of details of beneficiaries from programme intermediaries (which will be held on the central monitoring system).

1.3 Academic Panel

The draft impact and economic evaluation scoping studies were subject to a peer review process involving an academic panel of economists and evaluation specialists with particular expertise in spatial economics, industrial policy, and impact evaluation methodologies. This process led to a number of recommended enhancements to the structure of the impact and economic evaluation options, which have been explored in the process of finalising this report.

1.4 Programme Data Collection

A key issue identified by the academic panel related to the uncertainties over the scope and availability of data relating to the beneficiaries of programmes funded through the Regional Growth Fund. A data collection exercise was undertaken as part of the scoping study to establish how far systematic evidence on the nature of successful and unsuccessful applicants to programmes is routinely collected by programme intermediaries. The results of this exercise have fed into the refinement of the methods suggested for examining the impacts of projects and programmes.

1.5 Structure of this Report

The remainder of the report is structured as follows:

- **Section 2:** Overview of RGF – this section sets out an overview of RGF, the market and other failures it was set up to address, and provides an analysis of the projects and programmes that have received funding.
- **Section 3:** Capital Investment, Innovation and Training Projects – this section sets out methodological options for assessing the impacts of capital investment, innovation, and training projects.
- **Section 4:** Grant and Loan Programmes – this section sets out potential evaluation options for assessing impacts of the Grant and Loan programmes funded through RGF.
- **Section 5:** Land and Property – this section assesses the available options for assessing the land and property projects and programmes funded through RGF.
- **Section 6:** Other Interventions – this section explores the possible evaluation options for other types of initiative that have been funded through RGF.
- **Section 7:** Economic Evaluation Issues – this section outlines the range of issues that might need to be addressed in an economic evaluation of the Regional Growth Fund.
- **Section 8:** Costs – this section describes the range of options for assessing the costs of the Regional Growth Fund.
- **Section 9:** Benefits – this section sets out the range of issues and options for assessing the monetary and non-monetary benefits of the Regional Growth Fund.

- **Section 10:** Value for Money – this final section sets out the range of issues that might be encountered in bringing together the estimated costs and benefits of RGF in an assessment of value for money.

2. Overview of RGF

This section considers the objectives of the Regional Growth Fund and related policy frameworks, and the market failures it was designed to address.

2.1 Regional Growth Fund

The Regional Growth Fund was created in 2010 with two key objectives:

- To stimulate enterprise by providing support for projects and programmes with significant potential for economic growth, leveraging in significant private sector investment, and creating additional sustainable private sector employment; and,
- To support in particular those areas and communities that are currently dependent on the public sector to make the transition to sustainable private sector-led growth and prosperity⁴.

The case for RGF is set out in the 2010 White Paper⁵ on local growth and the associated underpinning economic analysis set out in the accompanying evidence paper⁶. These policy documents make the following arguments for the Regional Growth Fund:

- **Regional disparities in economic performance:** A range of evidence suggests that regional variation in economic performance increased substantially during the 2000s. This evidence suggests that in many cases these disparities will be the optimal outcome of well-functioning markets (driven by agglomeration economies), though in some cases there will be locally specific market failures inhibiting growth in private sector employment.
- **Market failure:** Where such market failures are present, there may be a case for focused Government intervention in schemes with the potential for sustainable private sector job creation that would not go ahead without public subsidy. There may also be a case for targeting this subsidy at the areas that 'need it most' – those areas with a weak private sector likely to be most exposed to a retrenchment in public sector expenditure. However, as these market failures are likely to be locally specific, solutions might be best found locally with resources allocated through a fund that is not ring fenced for specific thematic priorities.

⁴ RGF funding is available for both discrete projects involving subsidies of £1m or more, as well as programmes in which responsibility for allocating funds to smaller projects is given to an intermediary (which may be an organisation in the public or private sector).

⁵ Local Growth: Realising Every Place's Potential, HM Government, October 2010, <http://www.bis.gov.uk/assets/biscore/economic-development/docs/l/cm7961-local-growth-white-paper.pdf>. Accessed May 2014.

⁶ Understanding Local Growth, BIS Economics Paper Number 7, October 2010, <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/u/10-1226-understanding-local-growth.pdf>. Accessed May 2014.

2.2 Rationale for Rebalancing Activity

The policy framework for RGF stresses resources should be targeted only at schemes tackling market (and other) failures inhibiting growth. However, a range of general market failure issues (manifesting themselves in different ways at local levels) may also provide a justification for the RGF (and in particular, the emphasis on rebalancing areas highly dependent on public sector employment through encouraging sustainable growth in private sector employment) .

2.2.1 Geographical concentration of economic growth

The clustering of economic activity in urban centres creates benefits for firms (such as productivity gains associated with geographical proximity to suppliers and customers, and resultant reductions in journey times, or wider knowledge spill-over effects derived through social networks and the ability to observe advances made by competitors). These types of 'agglomeration economy' encourage firms and workers to locate in such urban centres areas to take advantage of these benefits.

However, the process of urban growth also involves negative externalities: each additional firm or worker locating within a particular cluster will impose costs on incumbents by placing pressure on the price of scarce resources (such as land) and cause wider dis-benefits (such as increased congestion). As these costs are not fully internalised by incoming workers and firms, this process may cause economic agglomerations to become inefficiently large. Displacement of economic activity from larger to smaller economic geographical clusters (that might normally be treated as welfare neutral in a cost-benefit analysis) could contribute to an increase in overall social welfare by reducing these negative externalities.

2.2.2 Drivers of regional disparities

Agglomeration economies are often thought to play a contributory role in driving regional disparities. While the process of agglomeration may be an optimal market outcome in some cases, there may be failures in factor markets that prevent the effective readjustment of areas exposed to economic shocks or decline. Some factors are fixed in space, preventing their redeployment in areas of high demand. This most clearly applies to physical assets (such as buildings) and social overhead capital (roads or schools), but also may apply in the labour market if housing market or other constraints (such as skills mismatches, credit market failures, or transport constraints) inhibit the mobility of workers. In the event of an economic shock (or gradual decline of locally significant industries), these market failures may lead to unemployment or underemployment of these inputs (e.g. unemployed workers, redundant buildings or derelict land). Subsidies to bring these resources back into use may contribute to an increase in aggregate supply and in social welfare (where the benefits of doing so exceed the costs).

2.3 Project specific market failures

In addition to the general market failures driving dependency on public sector employment in deprived areas and underpinning the rationale for RGF overall, a wide array of specific market failures (and other failures caused by regulation or constraints on public sector intervention) will support the rationale for the individual projects and programmes that have been successful in securing funding through the scheme.

2.3.1 Constraints on capital investment

There is a range of sources of finance that firms might access to fund capital investment projects (such as debt finance, venture capital or equity investment). If capital markets operate imperfectly then there may be an economic rationale for public intervention in easing these funding constraints. There is empirical evidence to suggest small firms struggle to obtain debt finance on comparable terms to larger firms for projects of similar levels of risk. These issues are typically explained by information asymmetries: the borrower will typically have greater knowledge of the likely risks and anticipated benefits associated with the project (and the probability of default) than the lender. Smaller firms often have a weaker track record of repayments on debt, less scope in revenue streams, and less in the way of assets against which lending can be secured. Additionally, the fixed scale of transaction costs may also reduce incentives for lenders to offer credit for small scale projects.

Moral hazard issues may act as a further constraint: once a firm obtains venture capital funding, there is a risk they may divert from plans originally agreed with the investor to pursue more or less risky projects. As a consequence, venture capitalists typically impose a range of monitoring obligations on the firms concerned (taking seats on the board for example, to observe and influence the decisions taken by senior management). This monitoring is typically costly, and as a result there is evidence that suggests that venture capital tends to be available only for larger projects.

These market failures will lead to an inefficient allocation of resources with firms employing too little capital in production, and acting to restrain productivity and profitability below socially optimal levels. Provision of grant or loan funding through RGF projects and programmes may help ease these constraints, enabling capital investment projects to go ahead that would not have otherwise been viable. In turn, easing of these constraints will lead to profitable investments (and potentially to increases in employment).

2.3.2 Foreign Direct Investment

If capital subsidies help to attract internationally mobile capital investment projects (for example, where failures are driven by FDI subsidies offered by Governments overseas), there may be further positive externalities through spill-over effects on incumbent firms. A range of research has shown that in-flows of FDI investment can lead to productivity spill-overs, through exchange of knowledge between incoming and incumbent firms and the adoption of more efficient working practices in their supply chains.

2.3.3 Innovation

A range of positive externalities could be put forward in a case for public investment in innovation initiatives. The main output of innovation is knowledge which is, to a degree, a public good and firms investing in innovation produce knowledge that it is difficult to prevent rival firms from exploiting. While in practice knowledge can be protected through secrecy and confidentiality and the application of commercially valuable knowledge can be restricted through use of patents, the risk of competitors free-riding on a firm's expenditure on R&D can lead to a socially sub-optimal investment in innovation. This is particularly the case for innovation that has a variety of commercial applications rather than a very specialist innovation that only has value for the firm making the investment. As the business cannot appropriate all of the gains from the innovation but still bears all of the costs, the firms' incentive to engage in innovation activities is weakened and this may result in a level of innovation below the socially optimal level. Public subsidies for innovation activity can potentially lever additional R&D expenditure, accelerating the commercialisation of new products and processes and helping to support productivity growth in the long term.

2.3.4 Development of brownfield land

A private owner of a piece of land or property may only invest in development if the expected returns exceed the anticipated costs (in terms of rental income or the sale of the asset for a profit). However, as land can be used in a range of different ways and development decisions can be irreversible (owing to the high costs involved), the uncertainties involved may encourage owners to postpone development decisions to the future (as more profitable ways of utilizing land may emerge). Development may also be held back as a consequence of regulatory risk: planning regulations on land use can be relatively rigid, while the costs of any public infrastructure works may be transferred to developers through Section 106 agreements or other instruments (such as the Community Infrastructure Levy), and any uncertainty associated with the size of these costs may increase incentives to postpone investment decisions. This imperfect functioning of the land market can lead to underutilization of sites.

The redevelopment of sites left derelict or vacant as a consequence of economic change typically involves additional costs (such as land clearance or remediation costs). This can both exacerbate the uncertainties involved (introducing substantial unknowns relating to the cost of bringing land back into use) as well as introduce information asymmetries that may depress land values below those that would obtain in the case of full information (as the owner of the site will have greater knowledge of the level of contamination than other parties, such as developers). Intervention by the public sector to either fund the costs of site remediation or provide gap funding might be justified by these forms of market failure.

Brownfield land may also lead to wider negative externalities. Contamination of land may lead to a range of environmental costs for the occupants of neighbouring plots (and potentially more widely), and this may be reflected in their value. Visual disamenities may also be a significant factor in leading to depressed commercial and residential property values in neighbouring sites. As these costs are not borne by the land owners involved, public intervention to bring these sites back into use may have wider positive benefits through the removal of these externalities.

2.3.5 Training

The potential loss of trained staff to competitors may prevent employers from fully internalizing the benefits of training, encouraging suboptimal levels of training investment (particularly where skills are transferable to other firms). Public subsidies for training will help lever additional investment in training, supporting on-going productivity growth.

2.3.6 Transport

Investments in transport infrastructure can remove negative externalities associated with congestion, improve connectivity between areas (making it less costly for firms to serve markets and access labour markets in other locations), as well as increase supply of labour.

2.3.7 Tourism

Although all relevant firms in the tourism sector stand to benefit from investment in tourist attractions and destination marketing, they cannot fully internalise the benefits of these expenditures (as the spending of tourists will be spread across many firms). A business in the sector will not be able to appropriate all of the benefits associated with the investment due to the dispersed nature of tourism expenditure, with some firms gaining rents associated with another firms' investment (e.g. hotels and restaurants benefiting from a new golf course). As such, public investment in both destination marketing and tourist attractions may be justified by these free-rider problems.

2.4 RGF projects and Programmes⁷

This section sets out an analysis of allocation of RGF resources to projects and programmes, covering an assessment of the types of initiative that have been funded and their distribution across space and sectors. Additionally, this section highlights the issues raised for the impact and economic evaluation studies, and considers how an evaluation might be optimally structured.

2.4.1 Allocation of RGF resources

The first four rounds of the Regional Growth Fund have seen £2.6bn in RGF resources committed to 114 programmes and 286 projects⁸. This portfolio has collectively been contracted to create or safeguard 280,000 jobs and leverage further expenditure from private or other public sources of £14.4bn. The relative share of RGF resources allocated

⁷ The analysis of management information set out in the following section is based on extract of monitoring information taken from RGF systems in May 2014.

⁸ Note: this excludes 71 projects and programmes awarded a Conditional Offer Letter but subsequently withdrew during or after the due diligence process.

to programmes has increased over successive rounds (rising from 47 percent to 83 percent of RGF resources between Rounds 1 and 4)⁹.

Rounds 5 and 6 of the RGF were announced in 2013. This saw a slight change in the emphasis of the fund, with eligibility limited to project and programme applications led by the private sector. Applications for Round 5 closed in December 2013, while Round 6 of RGF opened for applications in June 2014. These two rounds will bring the total funding commitment to RGF to £3.2bn up to March 2017¹⁰.

Table 2.1 – Overview of RGF Resources Allocated (£m) and outputs committed (job years created or safeguarded), Rounds 1 to 4

	Round 1	Round 2	Round 3	Round 4	Total
RGF Committed (£m)					
Programmes	179	436	520	330	1,465
Projects	216	343	399	176	1,134
Total	395	779	919	506	2,599
Jobs Created or Safeguarded¹¹					
Programmes	14,969	60,744	55,899	46,253	177,864
Projects	17,147	41,515	33,651	9,827	102,139
Total	32,116	102,258	89,549	56,080	280,003
Leverage (£m)					
Programmes	453	2,404	2,342	1,879	7,077
Projects	1,842	1,781	2,729	968	7,320
Total	2,295	4,185	5,070	2,847	14,397

Source: RGF Monitoring System, Accessed July 2013

2.4.2 Types of project and programme

The nature of projects and programmes funded through the RGF is diverse. A classification exercise, mapping the projects and programmes receiving funding to the market failures identified in the preceding section, was undertaken as part of the scoping phase to identify options for structuring an overall evaluation of RGF. The following broad typology of projects and programmes emerged from this exercise (which is explored further in later sections):

⁹ Although the emphasis of RGF spending shifted from projects to programmes over round 1 to 4, RGF resources for LEP programmes were added to the Local Growth Fund in Round 5. Remaining resources were focused largely on private sector led capital investment projects. The focus of Round 6 is to be confirmed.

¹⁰ See <https://www.gov.uk/understanding-the-regional-growth-fund>. Accessed June 2014.

¹¹ These figures are based on the 'Jobs Target' captured in the RGF monitoring system. These figures do not include indirect jobs.

- **Firm subsidies:** The bulk of RGF projects and programmes take the form of direct subsidies to firms¹²:
 - **Capital investment projects:** Subsidies for large scale investments in new plant equipment or land and buildings, either involving a single firm or consortia of smaller firms.
 - **Innovation projects:** Subsidies for research and development activities, involving capital expenditure (such as purchase of instruments) and revenue expenditure (salaries of R&D staff).
 - **Training projects:** Subsidies for training and workforce development activity (either through capital investment in new training facilities or direct subsidies for training programmes).
- **Grant and loan programmes:** Programmes led by intermediaries involving grants or loans for capital, innovation or training projects.
- **Area based interventions:** Projects and programmes focused on enhancing the competitiveness of businesses in general and opportunities for people within a given geographical area:
 - **Land and property:** Projects and programmes to unlock employment land for development, including land reclamation, site servicing as well as investment in the construction of buildings to house commercial and industrial activity.
 - **Transport:** Investment in new or enhanced transport infrastructure to improve connectivity between areas and reduce congestion.
 - **Tourism:** Destination marketing and development of new tourist attractions to attract visitor expenditure.
 - **Spatial programmes:** Complex spatial programmes involving combinations of the interventions outlined above, often forming part of broader regeneration programmes.
 - **Other:** A small number of projects and programmes did not fit straightforwardly within the framework, including a start-up advice programme and a flood defence project.

The table below illustrates the distribution of RGF resources across these different types of intervention. It should be noted that this analysis is approximate: for example, projects that have been classified as 'capital investment' may often involve small amount of spending on training or other expenditures eligible under the State Aid rules.

¹² Over 80 percent of RGF resources have been allocated in the form of direct subsidies to firms, with 53 percent being allocated through smaller grant and loan programmes under the management of intermediaries.

Table 2.2 – Overview of RGF Resources Allocated (£m) and outputs committed (job years created or safeguarded)

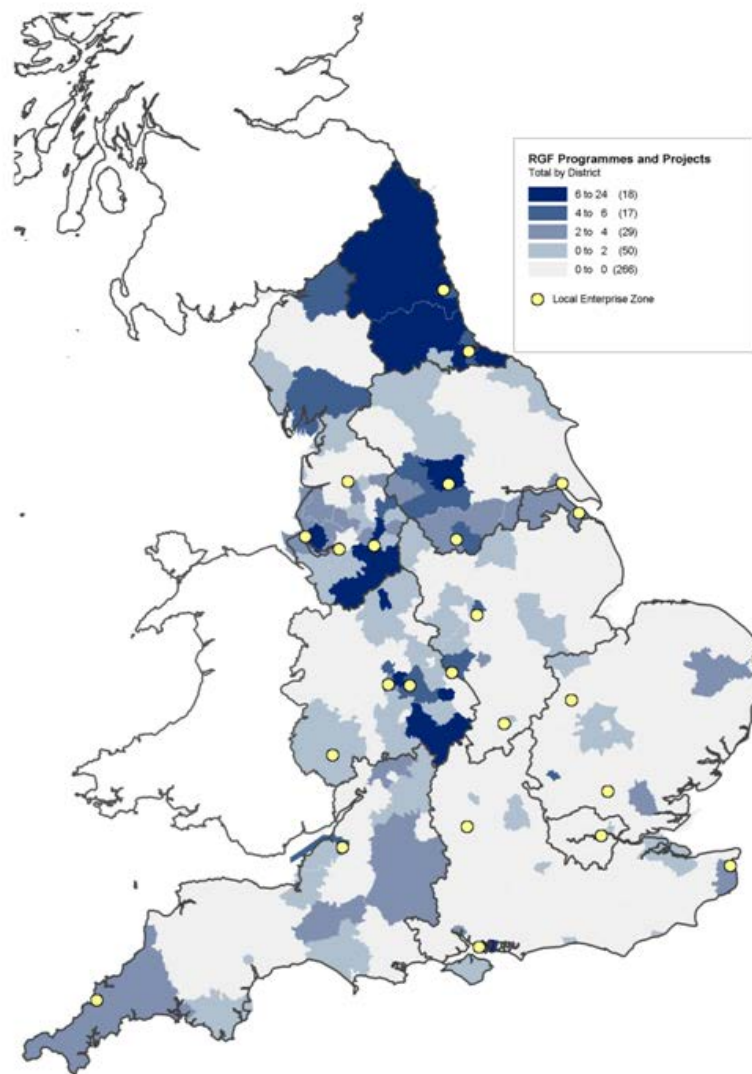
	Number of projects or programmes	£ms committed	% of total
Firm Level Subsidies			
Capital	142	448	17
Innovation	78	335	13
Training	9	85	3
Grant and loan progs	95	1,229	47
Area Based Interventions			
Land	27	261	10
Transport	9	71	3
Tourism	2	21	1
Spatial	3	53	2
Other*	35	57	4
Total	400	2,599	100.0

Source: RGF Monitoring System July 2013, and analysis of application forms (* includes interventions that were not possible to classify owing to lack of information)

2.4.3 Spatial Distribution

The spatial distribution of projects and programmes (by Local Authority) is set out in the figure overleaf (which excludes a number of national programmes largely led by major financial institutions, involving subsidies for asset, mezzanine or other types of credit for capital or other investment purposes). While there is no defined target area for the Regional Growth Fund, projects and programmes are clustered around the metropolitan areas of the West Midlands, North West and North East. This spatial distribution is closely aligned with the 2007 to 2013 Assisted Areas map¹³ as well as the target zones for other past regeneration and economic development programmes (such as the National Coalfields Programme).

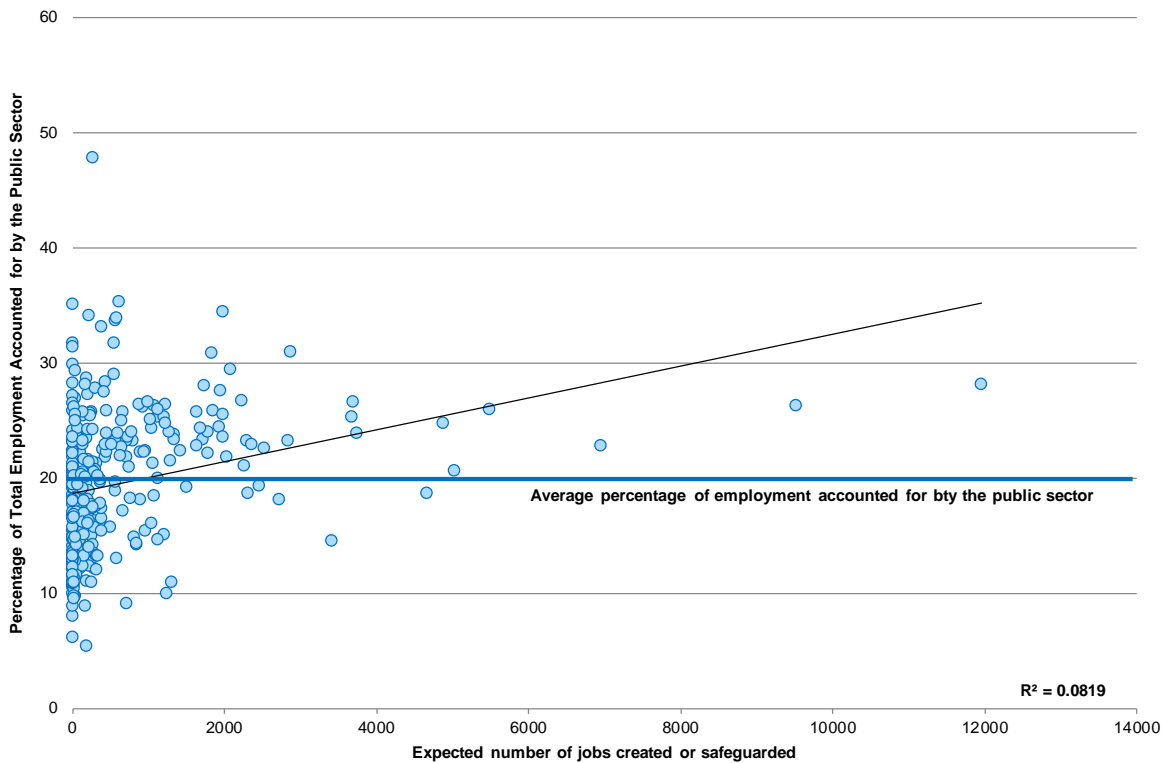
¹³ The 2014 to 2020 Assisted Areas Map was approved by the European Commission in May 2014 but is broadly comparable in terms of coverage of key conurbations to the 2007 to 2013 map. Details of the 2014-2020 Assisted Areas Map and associated consultation can be found here: <https://www.gov.uk/government/consultations/assisted-areas-map-2014-to-2020-stage-2> (accessed June 2014)

Figure 2.1 – Spatial Distribution of RGF Projects and Programmes

Source: RGF Monitoring System and Ecorys analysis.

The White Paper on local growth emphasised that RGF resources would be allocated to areas highly dependent on public sector employment. The figure below sets out the spatial distribution of expected jobs created or safeguarded impacts at a local authority level by level of dependency on public sector employment. While the expected job impacts are mainly concentrated within areas with above average dependency on public sector employment, there is not a significant positive relationship between dependency on public sector employment and the scale of expected job impacts.

Figure 2.2 – RGF projects and programmes, by committed number of jobs created or safeguarded and dependency on public sector employment



Source: RGF Monitoring System and Ecorys analysis. Each point on the chart represents a single RGF project or programme.

2.4.4 Implications for the evaluation framework

The assessment above suggested the following typology for the development of distinct frameworks for the evaluation of the RGF:

- **Firm level subsidies (capital investment, innovation and training projects):** These RGF projects share important characteristics: they involve direct subsidies to businesses, and were selected using the same application and appraisal process. As such, their impacts can be understood within a similar framework, though differences in the underlying market failures they aim to address will mean an impact evaluation would ideally establish different intermediate outcomes in each case (e.g. capital investment for some and increased R&D for others).
- **Grant and loan programmes:** Although covering similar types of intervention as above, grant and loan programmes will require separate treatment in an impact evaluation. Each programme employs its own process for selecting projects. This creates additional complexities in identifying an appropriate counterfactual and implies they cannot be straightforwardly grouped with project interventions.
- **Land and Property Projects and Programmes:** Interventions in land and property markets share a range of common characteristics. However, the number of sites

concerned is comparatively limited, and it is suggested that projects and programmes are grouped to maximise sample sizes and opportunities for econometric analysis.

- **Other Interventions:** Other types of intervention are typically small in number, are likely to generate more diffuse impacts, and will merit separate scrutiny in an evaluation of RGF.

The absence of a defined target zone for RGF introduces particular complexities in terms of understanding and evaluating the nature and scale of displacement and other spatial effects of interest:

- With a clearly defined target area, it is straightforward to define concepts such as displacement within the framework set out in the HCA Additionality Guide. If economic activity is displaced from within the target area, then it should be subtracted from estimates of the net impact of projects and programmes.
- In the absence of target zones (particularly in the case of a national programme like RGF), these concepts are difficult to operationalise for the purposes of sub-national analysis (see Annex C and Annex D for a detailed discussion of the spatial issues involved). For example, an attempt to understand the impacts of RGF on a selection of towns in the West Midlands would not only need to account for any displacement occurring within those towns, but also for any negative effects within those towns caused by projects and programmes funded in other regions. This suggests the impact evaluation will need to understand the spatial distribution of these types of effect in substantially greater detail than might be required for a straightforward area based initiative.

Finally, this scoping study is based primarily on the projects and programmes funded through Rounds 1 to 4 of RGF. Rounds 5 and 6 were announced in 2013 and will be open only to private sector bids. It is not anticipated that this*change will lead to substantial differences in the nature of the projects funded, though it is likely that fewer grant and loan programmes will be funded (as LEPs were not be eligible to bid). Additionally, there are no anticipated changes in the way that projects and programmes will be selected.

3. Capital Investment, Innovation and Training Projects

This section sets out the evaluation framework and impact evaluation options for RGF support for capital investment, innovation, and training projects.

3.1 Characteristics of projects and beneficiaries¹⁴

The table below provides a more detailed breakdown of the typology of projects set out in the preceding section (again, this typology captures the primary focus of expenditure involved and individual projects will include expenditure on multiple items):

- **Capital investment:** There was an approximately even split between investment in land and building (including acquisitions and construction activity - £211m), and investment in plant machinery (£236m).
- **Innovation projects:** Around £200m has been allocated to subsidies for the delivery of research and development projects (involving the development or testing of new products and processes), with a further £135m directed to the construction of R&D facilities.
- **Training:** The majority of RGF funding for training projects was in the form of subsidies for workforce development activities (£58m) with a smaller share directed at the construction of training facilities (£27m).

¹⁴ The analysis of management information set out in the following section is based on extract of monitoring information taken from RGF systems in July 2013.

Table 3.1 – Breakdown of firm level projects

	Number of projects or programmes	£ms committed
Capital investment		
Land and Buildings	78	211
Plant machinery	63	236
Unknown	1	1
Innovation		
Construction of R&D facilities	36	135
R&D projects	35	197
Unknown	7	3
Training		
Construction of training facility	4	27
Training subsidies	5	58

Source: RGF Monitoring System and Ipsos MORI analysis, Accessed May 2014. Note that totals do match Table 2.1 as the classification of projects was based on a list of R1-4 programmes made available in July 2013.

3.1.2 Size of firms

The beneficiaries of RGF funded projects have in the main been large firms (with 250 employees or more) as illustrated in the table below. This may be a reflection of the minimum size of RGF projects (minimum of £1m RGF investment). The SMEs benefitting from projects have largely accessed funding through consortia bids (SMEs could bid into the RGF as a part of consortia of firms in Round 1 and 2, though not from Round 3 onwards).

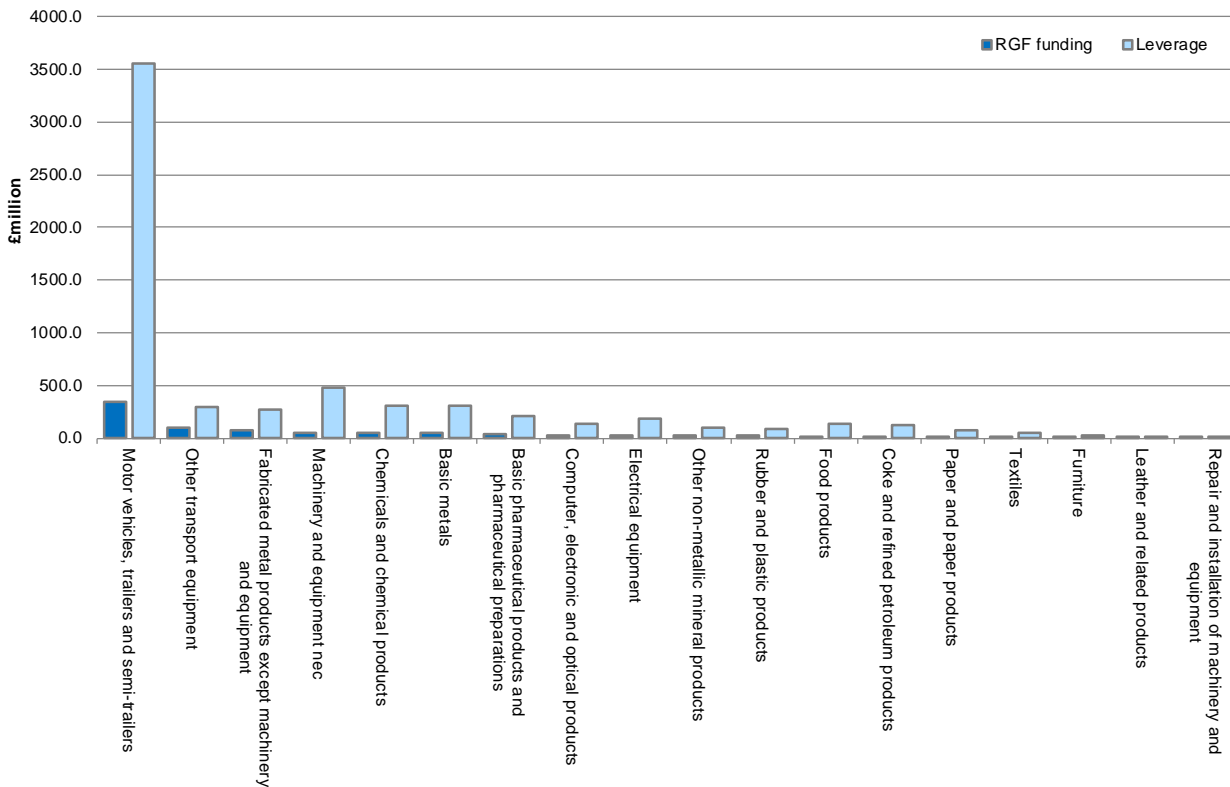
Table 3.2 – Overview of RGF Resources Allocated (£m) and outputs committed (job years created or safeguarded)

	Capital investment		Innovation		Training	
	Projects	£m RGF	Projects	£m RGF	Projects	£m RGF
Large firms	108	339	56	306	5	26
SMEs	29	52	14	25	3	58
Unknown	5	56	8	4	1	1
Total	142	448	78	335	9	85

Source: RGF Monitoring System and Ipsos MORI analysis, Accessed May 2014. Note that totals do match Table 2.1 as the classification of projects was based on a list of R1-4 programmes made available in July 2013.

3.1.3 Sector Distribution

In order to give an understanding of the distribution of RGF spending by sector, each project was assigned to a three digit SIC code corresponding to the industry in which grant beneficiaries operate. The bulk of RGF resources has been allocated to the manufacturing sector (85 percent), with the remaining spending spread across a range of other sectors (including power generation, transport, and telecommunications). At sub-sector level, the major beneficiary of RGF spending has been the automotive industry, as illustrated in the chart below.

Figure 3.1 – Allocation of RGF resources by manufacturing sub-sector

Source: RGF Monitoring System and Ipsos MORI analysis, Accessed May 2014.

3.2 Logic Models

The three types of intervention covered in this section will typically have varying rationales for intervention, with differences in the causal processes by which they might be expected to lead onto job and GVA impacts. The following sub-sections set out logic models for each of the intervention types in turn.

3.2.1 Capital Investment

The anticipated chain of causality by which capital investments may lead to economic and other impacts is as follows;

- **Inputs:** RGF will typically represent a small share of the overall cost of capital investment projects, with the rest made up largely of finance provided by the applicant (from reserves, debt or equity) and to a lesser degree other public sector contributions.
- **Activities:** Projects and programmes will largely involve the construction, acquisition of production facilities, or installation of new plant machinery.
- **Gross jobs created or safeguarded:** Firms benefitting from RGF subsidies will either need to recruit new workers to staff new production facilities (jobs created) or redeploy existing workers that may be at risk of redundancy (jobs safeguarded).

- **Deadweight:** If Government subsidies are targeted at marginal schemes that would not have gone ahead in their absence, RGF would be expected to lead to increases in capital expenditure (though expected impacts on employment and output are ambiguous). If subsidies ease constraints in credit markets, firms would also be expected to see increases in profitability. A key issue for the impact evaluation will be to determine how any such outcomes can be observed, and how far they would have occurred in the absence of RGF.
- **Displacement effects:** The expansion in the productive capacity of the firm will potentially lead to short term displacement effects. If beneficiaries expand their sales at the expense of local or other competitors in the UK, then there may be offsetting losses of output and employment within those firms. A key challenge for the evaluation will be to determine the spatial distribution of these competitors. If they are largely based outside the UK (as might be expected if firms are producing largely for export markets), then such offsetting effects may be small at the national level. Where firms compete primarily in national markets, such effects may be stronger. There are also internal substitution effects to consider, in other words what the company would have done in the absence of the project (i.e. would it have proceeded with an alternative project, perhaps in a different location).
- **Multiplier effects:** In order to increase production, beneficiary firms will also need to increase their consumption of intermediate goods and services. This may require supplier firms to increase their output and employment (and so forth through the supply chain). Again, the economic evaluation will need to consider the spatial distribution of these effects (for example, if this demand is satisfied largely through imports then such effects will be negligible).
- **Net short run jobs and GVA created or safeguarded:** Accounting for these displacement and multiplier effects (which will require consideration at a variety of spatial configurations in order to address the evaluation questions) will provide estimates of the net (short run) impact on jobs and output.
- **Factor market effects:** In the medium term, factor prices will tend to adjust to the initial stimulus. If the net effect on demand leads to pressure on wages, rents or the price of other factor inputs, then this will encourage firms to reduce their output (and employment) to maintain profitability. These offsetting effects will be limited by the extent to which the increase in output was achieved by use of unutilised or under-utilised factor inputs (largely unemployed workers), or through greater efficiency (allowing resources to be redeployed for other productive uses elsewhere in the economy).
- **Net medium run jobs and GVA created:** The net medium run economic impact can therefore be represented as the sum of aggregate supply gains: the additional GVA created through improvements in efficiency, any output produced by any unemployed or underemployed workers, and any wider efficiency gains driven by agglomeration effects.

3.2.2 Innovation

The discussion provides an outline of the anticipated process by which innovation projects will lead to outputs, outcomes and impacts:

- **Inputs:** As with capital investment projects, a large share of the cost of innovation projects is being funded by beneficiaries. However, if innovation projects lead to the later production of new products, then the evaluation may need to consider any further costs associated with later refitting of production lines or construction of production facilities (and it is not possible to rule out the possibility that further public subsidy would be provided in these cases).
- **Activities:** Activities under this intervention type largely involve funding for the construction of new research facilities or staffing and capitalising specific R&D projects at various stages of the research cycle.
- **Gross jobs created or safeguarded:** Firms taking forward subsidised R&D projects will need to recruit new or redeploy existing R&D personnel and other workers.
- **Deadweight:** The issues associated with deadweight are similar to those associated with capital investment projects in the short term: with expectations that subsidies will lead to increases in R&D expenditure and employment amongst beneficiary firms. However, these increases might be first expected to lead on to increases in research output (such as patents and the development of new products and processes), before finally leading to increases in total factor productivity as innovations are commercialised (for example through increases in product quality or the efficiency of production processes). The impact evaluation will need to establish how far any such outcomes would have been achieved in the absence of RGF.
- **Displacement:** As innovation projects do not (at least initially) lead to any goods or services being produced for the market, it is likely any short run displacement in product markets is negligible.
- **Multiplier effects:** Innovation projects will absorb intermediate goods and services and have the potential to lead to short run indirect effects of the nature described above.
- **Net (short run) jobs created or safeguarded:** The net short run impact of innovation projects will be captured by any additional jobs associated with the project (largely R&D projects), net of displacement (assumed to be negligible) and multiplier effects.
- **Factor market effects:** Projects may create demand for research and development staff, and may put upward pressure on wages. As many of these types of job roles tend to be highly specialized, required high levels of skill and experience, it may be difficult for firms to recruit staff from the ranks of the unemployed and impacts on wages might be expected to be stronger (than for capital investment projects, for example). This will potentially lead to reduced levels of research and development amongst other firms operating in similar fields.
- **Production of goods and services:** If innovation activity leads on to the production of new goods and services, then in the longer term, beneficiaries may expand their

production capacity to produce these goods and services. These will lead to further net short and medium run economic impacts of the nature described under capital investment (although this production will not necessarily take place in the site in which the research was developed, or even in the UK).

- **Spill-over effects:** Alongside any benefits accruing to the firms developing new processes and products, there may be a number of positive externalities associated with innovation. Firstly, the adoption of innovative products and processes more widely in the market may lead to wider benefits for those adopting the technology. To the extent that these benefits are captured by the innovator through profits then these effects will be reflected in estimates of GVA impacts. However, some firms may be able to repurpose technologies (or undertake incremental innovation), allowing them to achieve productivity gains beyond those embodied in profits accruing to beneficiaries. Spill-over effects may also occur through the exchange of knowledge between workers (either through social networks or poaching effects).

Innovation projects are expected to lead to results over longer timescales, involve greater risk, though improvements in efficiency may represent a greater share of the overall effects of projects and programmes. Spill-over effects may also be less significant in the case of RGF: the projects and programmes funded do not often involve a collaborative dimension and emphasise the development of knowledge that will likely be protected by the firms through patenting.

3.2.4 Training

A small number of RGF funded projects and programmes (nine over Rounds 1 to 4) are focused on training with the primary objective of raising workforce productivity. Training schemes involve either grants to firms to fund workforce development activity or to construct training centres. The economic impacts of these types of scheme are likely to be reflected in higher rates of productivity amongst the firms concerned, rather than in an expansion of employment. Although there may be displacement effects in the short run as a result of higher labour productivity, this process potentially will release workers and other factor inputs that can be redeployed elsewhere in the economy in the medium run (notwithstanding any issues relating to the mobility of workers).

3.3 Key Outcomes

The table below sets out the key intermediate and economic outcomes that would need to be captured by an impact evaluation of RGF projects. The interventions are expected to lever changes in capital, R&D or training expenditure, leading to intermediate outcomes in the form of increased research output or numbers of workers training in the cases of innovation and training interventions respectively.

These interventions are also expected to deliver a range of economic impacts, including increased jobs, output and profitability (GVA) amongst the firms concerned, alongside growth in productivity. Capital investment subsidies may lead to an increase in average labour productivity (GVA per worker). However, these increases will be driven by an expansion of the capital stock, rather than in improvements in the overall efficiency with

which factor inputs are used, and unlike innovation and training projects, an increase in TFP might not necessarily be expected.

Table 3.3 – Key outcomes by type of intervention (shaded cells show outcomes of relevance to each type of project)

	Capital investment	Innovation	Training
Firm expenditure			
Capital expenditure			
R&D expenditure			
Training expenditure			
Intermediate outcomes			
Patents registered			
New products and processes			
Number of workers			
Economic outcomes			
Employment			
Output (GVA)			
Average Labour Productivity (GVA per worker)			
Total Factor Productivity			
Profitability			

3.4 Impact Evaluation Options

This section sets out a range of potential options that might be applied in assessing the impacts of Regional Growth Fund projects at a firm level.

3.4.1 Self-reporting

The most commonly applied approach (at least historically) to evaluating the impacts of economic development projects/programmes has been to use primary surveys to collect the views of beneficiaries on the importance of public funding in their implementation. Such surveys commonly offer respondents a range of possibilities as to how a particular project may have been taken forward if public funding was not available. Assumptions on what those responses imply for the probability that a particular project would have gone ahead without public sector funding are then carried forward into estimates of the causal effects of programme funding.

The table below provides an illustrative example of how such an approach was taken forward in a past evaluation of the Regional Selective Assistance programme. The table

shows the range of responses offered to respondents and the probabilities carried forward into final results. Similar questions have been employed to establish beneficiaries' views on the employment impacts of public intervention.

Such approaches, while straightforward to implement, suffer from major difficulties. There is a presupposition that the respondent can answer with a meaningful level of confidence as to what might have happened in the absence of funding. Additionally, the relevant probabilities assumed in relation to different responses may not be shared by respondents (for example, while the evaluator may assume that a response indicates that a project had 75 percent chance of going ahead in the absence of public support, individual respondents may have different views). Finally, there are incentives for respondents to overstate the impact of public funding, particularly if they anticipate benefitting from similar support in the future (though equally, there may be countervailing tendency for beneficiaries to assert that they could have achieved any relevant outcomes alone).

Surveys of this kind can provide evidence on the perceptions of beneficiaries and useful information and insights that help to improve the design of public support and the delivery of its intended outputs and outcomes. However, there is no way of assessing how far and in what way self-reporting might bias the estimates of net outcomes and impacts and, as a consequence, it is difficult to attach statistical significance to quantified estimates of impact based on such self-reported evidence.

Table 3.4 – Example additionality assumptions: RSA 1991 to 1995 DTI 2000

Respondents view on how investment project would have been taken forward without RSA assistance	Number of projects or programmes
Gone ahead unchanged	0% additional
Gone ahead elsewhere in the UK	100% additional if non Assisted Area, 0% additional if Assisted Area
Proceed elsewhere in EU	100% additional
Proceed elsewhere outside EU	100% additional
Gone ahead more slowly	Based on the present value of actual jobs compared with likely timing of project without RSA funding
Proceed at a smaller scale	Based on comparison of actual jobs against scale of job outcomes reported in event of non-assistance
Abandoned	100% additional

Source: Evaluation of Regional Selective Assistance 1991 to 1995, DTI, September 2000.

While this is the weakest form of evaluation strategy, it is potentially viable (as contact details for all project beneficiaries are held by the RGF Secretariat), and may offer useful comparisons against more robust methodologies (for example, to help understand biases in more detail and calibrate the results of future surveys). However, evidence based on

self-reporting would need to be carefully reported alongside the inherent weaknesses of the methods involved.

3.4.2 Before and After

A 'before and after' approach to evaluation would focus on establishing robust measures of the outcomes set out in Table 3.4 for beneficiary firms both prior to RGF intervention and a suitable period afterwards (to gauge change over time). This would potentially offer an improvement on self-reporting, though the opportunities for causal inference would be substantially weakened by the absence of a counterfactual. This approach will be feasible if it is possible to gather evidence on the metrics of interest.

Primary Surveys

Primary surveys of beneficiaries are a potential strategy for gathering the evidence on outcomes required. Given the need for accurate information on detailed financial variables, telephone surveys may not be the optimal mode of data collection (though use of advance datasheets can substantially enhance the quality results). Face to face surveys, involving discussions with finance directors of the firms concerned may be needed to establish accurate measures of some of the variables concerned.

However, a key challenge that would be faced is that it would not be straightforward to collect information on the pre-treatment characteristics of firms through surveys. Surveys would either need to take a retrospective view (which may lead to issues associated with recall bias), or it might be assumed that the characteristics of interest are time invariant.

Secondly, overall sample sizes are likely to prove problematic. Just 250 projects were funded through Rounds 1 to 4, and though this number will rise through Rounds 5 and 6, response rates of perhaps 50 to 60 percent through a census survey will limit the number of observations that might be required to collect the evidence of interest. Additionally, the need to maintain engagement with firms on a longitudinal basis will also reduce the numbers of observations available for survey. Though strategies are available to minimise attrition between survey waves, an attrition rate of around 50 percent might be achievable. As such, primary surveys of beneficiaries are unlikely to be a suitable method of obtaining evidence on outcomes.

Data-linking

An alternative strategy would be to place greater emphasis on secondary information collected through administrative data and other public surveys of firms. If it is possible to identify RGF project beneficiaries within these datasets, then it may be possible to obtain longitudinal data on the outcomes involved without recourse to a large scale primary survey exercise.

The table overleaf maps the key outcomes of interest to the available secondary datasets. As suggested, the majority of outcomes of interest are captured across these datasets, though it may be more difficult to obtain longitudinal data on R&D and training expenditure and outcomes. In order to use this data for the purposes of evaluation, it is necessary to identify the firms of interest within these datasets. This process is made substantially more straightforward where it is possible to collect Companies House Registration Numbers or

VAT Registration numbers, as ONS and BIS maintain a lookup table matching these registration numbers to their corresponding identifier within the Inter-Departmental Business Register.

A data-linking exercise was undertaken as part of this scoping study to determine the feasibility of integrating such a strategy into an evaluation of RGF. This exercise covered all project beneficiaries from Rounds 1 to 3 and programme beneficiaries from a sample of 18 programmes (a total of 593 beneficiaries in total), and involved matching CRN numbers to IDBR identifiers (an exercise completed by BIS). This information was then uploaded to the Virtual Microdata Laboratory to explore how far these records could be linked to the key firm level datasets held within the VML.

The results of this exercise were as follows:

- **CRN to IDBR matching:** 452 of 593 beneficiaries could be matched to the IDBR (76 percent). These 452 corresponded to 433 unique enterprises as multiple CRNs belonged to the same enterprise in some cases. It should be noted that this matching exercise was undertaken using a lookup table dating from 2010, and no fuzzy matching using name and address data was employed to improve the matching rate. As the number of projects involved is a manageable number, it is anticipated that substantially higher rates of matching could be achieved through manually identifying the firms concerned within the IDBR (an exercise that could be completed by BIS internally). As CRNs can no longer be directly imported into the VML (for reasons of anonymity), it has not been possible to identify the specific beneficiaries that were not matched into these datasets.
- **Matching to BSD:** Of those successfully identified in the IDBR, 94 percent could be matched into the Business Structure Database. This suggests it will be feasible to assemble longitudinal panel data (annual data) on employment and turnover for RGF project beneficiaries.
- **Matching to ARD/ABS/BRES:** 91 percent, 97 percent, and 99 percent of firms could be matched to at least one wave of the ARD, ABS, BRES respectively. As the majority of projects involve large firms with 250 or more employees, this will imply that longitudinal data could be available on the more detailed financial measures required to measure capital investment, capital stocks, productivity and GVA directly. However, there are lags associated with the availability of the ARD, though results from the ARD and Annual Business Survey are available through the UK Data Service up to 2012.
- **Matching to BERD:** 34 percent could be matched to the Business Expenditure on Research and Development survey. This will substantially limit sample sizes for the exploration of impacts on research and development expenditure, and it may not be feasible to use a datalinking strategy to provide sufficient evidence on this outcome measure (though the number of project beneficiaries will increase through Rounds 5 and 6 of the programme).
- **Matching to Community Innovation Survey:** A 27 percent matching rate was achieved to the CIS waves 2 to 7. Again, this suggests that exploring changes in innovation outcomes for RGF project beneficiaries will be challenging.

Overall, the data-linking results suggest that use of secondary data may be a more practical method of obtaining information on key outcomes (capital investment, productivity, employment, output and profitability) for projects. However, opportunities to collect longitudinal data on innovation and training outcomes are more limited, and there is less confidence that this would be an appropriate strategy in these areas. This may be of smaller concern for training projects (as they account for a small share of RGF spending and projects), though may be more problematic in the case of innovation given the scale of investment involved.

The above datasets are not all supplied at enterprise level (i.e. at the level of the firm overall, rather than at the level of individual plants or offices); they are mainly at Reporting Unit or Local Unit level. This means that, before any analysis can be undertaken, the units would have to be aggregated up to a common level, such as enterprise level. This is fairly straightforward for numerical variables such as turnover or employment, whereby the units can be summed together to provide the enterprise total but would be more difficult for any variable in which the responses are ranked e.g. on the CIS. In these instances, and where different units within the same enterprise had responded differently, a choice would have to be made as to whether to take an average or to choose a representative unit.

Finally, there are datasets that it may be feasible to access to provide additional evidence on outcomes. This includes the PATSTAT dataset providing firm level information on patenting activity, though it is a subscription service and access to this data will come at a cost. Secondly, a range of datasets (including international trade information and PAYE records) can be accessed through the HMRC Datalab: at present, access to this data can only be granted where the research is of demonstrable value to the HMRC and evidence from other datasets could not be imported into the Datalab (though this may change in the future).

Table 3.5 – Secondary Datasets Capturing Key Outcomes

Dataset	Outcomes captured
Business Structure Database	An annual snapshot of the Inter-Departmental Business Register providing observations of turnover and employment for all UK firms registered for either VAT or PAYE. Data is provided from a combination of the Annual Business Survey and PAYE records. The Annual Business Survey covers all large firms (250 employees or more), around 30 percent of medium firms and negligible proportion of small firms (SMEs provide returns every three years. For firms outside the ABS, employment and turnover observations are taken from VAT and PAYE records (with employment or turnover imputed from available data in the event that the firm is not registered for VAT or PAYE). Data can be accessed through the ONS Virtual Microdata Laboratory.
Annual Respondents Database	An annual inquiry into the financial performance of businesses, capturing evidence on capital expenditure, consumption of goods and services, and profitability. This is a mandatory census survey of large firms (providing a longitudinal panel dataset), and a sample survey of SMEs (with firms in the ARD panel surveyed every five years). Again, firm level data can be accessed via the VML.
Community Innovation Survey	The UK Innovation Survey is a sample survey of 28,500 businesses undertaken every two years by the Office for National Statistics (as part of the Community Innovation Survey across the EU). The survey focuses on R&D activity by UK firms, and would provide evidence on introduction of new processes and products alongside a range of other innovation outcomes. The survey is voluntary, but may

Dataset	Outcomes captured
	offer longitudinal data for some firms.
PATSTAT	PATSTAT data from the European Patent Office (EPO) captures firm level patenting activity. Records for RGF beneficiaries could potentially be extracted to describe overall firm level patenting activity both before and after receipt of RGF subsidies, and can be accessed publicly.
BERD	BERD is an annual survey of 5,000 businesses known to be involved in research and development activity with the primary aim of establishing Research and Development Expenditure amongst businesses (using the Annual Business Survey, the UK Innovation Survey and other sources as a sampling frame). The survey is a census of the 400 firms investing the largest amounts of resource in R&D activities over the previous two years (and as such will offer longitudinal data), with those investing smaller amounts sampled on a random probability basis. Access to BERD is through the VML.
Employer Skills Survey	Evidence on training expenditure and numbers of workers trained is gathered through the Employer Skills Survey, a random probability survey of 55,000 firms undertaken every two years by UKCES (using Experian telenummering data as a sampling frame). Although a sample survey of SMEs, it is delivered as a census of large firms. As such, it may be possible to create a longitudinal panel dataset from different waves of the ESS, though this has not been attempted to date. Access to the ESS would need to be brokered through UKCES.

Recommendation

- A data-collection strategy based primarily on administrative data-linking should be employed in the evaluation of RGF projects owing to the small sample sizes involved and difficulties in capturing high quality measures of the effects of interest.

3.5 Quasi-experimental Approaches

The key weakness of a ‘before and after’ approach is the absence of a counterfactual against which to estimate the outcomes that would not have happened without RGF. Comparing changes in the outcomes secured by RGF beneficiaries against those achieved by a comparison group of non-beneficiaries would potentially enhance confidence that a causal effect has been observed (a quasi-experimental approach to evaluation).

The design of the RGF poses several challenges to the design of an appropriate counterfactual to aid identification of the short and long term impacts of RGF on firm performance. Firstly, non-applicants to RGF may differ in ways that will be correlated with their employment, output and productivity. For example, non-applicants may have no appetite for capital investment (or the associated commitment to recruitment that comes with RGF grants). As such, RGF grant beneficiaries may be expected to grow more rapidly than non-applicants anyway.

The appraisal process introduces a second layer of possible selection bias. Successful applicants are selected following a detailed economic appraisal. This involves judgments with respect to the probability that a project or programme would go ahead without RGF

support as well as consideration of displacement, number of jobs created or safeguarded, cost per job created, implementation risk, and the location of projects. The results of the appraisal are then shared with an Independent Advisory Panel (who make recommendations on the projects to be selected), and a final Ministerial Group makes final decisions on the projects and programmes to take forward.

As a consequence, there may be differences between successful and unsuccessful applicants that may also be correlated with performance. If the appraisal process is effective in identifying those bids that would have gone ahead anyway, then a comparison between the two groups might understate the impact of the programme. Alternatively, if relatively financially unconstrained firms are most effective in preparing successful bids (through use of consultants for example) then comparisons may overstate the impact of the programme.

3.5.1 Regression Discontinuity Design (RDD)

One strategy for evaluating programmes involving a competitive application process is to exploit situations where demand for public funding exceeds its availability, creating a threshold point at which bids are rejected. A possible design would be to compare successful applications just above the threshold to those just below the threshold (i.e. those that just 'made it' against those that just 'missed out'). Assuming that any unobserved characteristics of firms that might jointly influence both probability of success and their performance are independent of the threshold, then comparisons of relative performance could yield estimates of the causal effect of RGF (though only at threshold: results could not be generalised across beneficiary firms unless the impact of RGF on firm performance is homogenous across beneficiaries).

This type of Regression Discontinuity Design strategy is not viable in the case of RGF owing to the design of the appraisal process. Although the appraisal did lead to a formal score (in the form of the Benefit to Cost Ratio), other information was also taken into account in the selection process (such as location and implementation risks). The Independent Advisory Panel and Ministerial Group used this information to make a judgement on which projects and programmes to take forward (and this may have included projects with a lower BCR). As such, a formal discontinuity in the selection process does not exist. Additionally, anecdotal evidence gathered through the inception phase suggested a large group of projects and programmes 'just missing out' did not exist: successful and unsuccessful applicants tended to form two distinct groups of high and low quality bids. Both of these factors rule out the possibility of this type of methodology based on a sharp discontinuity design.

3.5.2 Fuzzy Regression Discontinuity Design

Although a sharp RDD approach may not be feasible, other types of approach might be available that exploit the appraisal process as a means of identifying the causal effects of RGF. An examination of the benefit to cost ratio associated with successful and unsuccessful applications to the Regional Growth Fund over Rounds 2 to 4 suggested the presence of a minimum scoring threshold at which the probability of success rose substantially (consultations with the RGF Secretariat confirmed that this discontinuity relates to a specific aspect of the architecture of the project selection process).

This discontinuity in the probability of success could potentially be exploited through the use of fuzzy RDD methods that use the BCR as an instrumental variable for treatment status. The strength of these approaches depends on how far the BCR can be treated as unconnected to firm performance (at the discontinuity). If certain types of firms have an understanding of the mechanics of the appraisal process (and are therefore able to influence their treatment status) then this may weaken results, particularly if these characteristics are linked to project performance. As an example, firms with a history of accessing public subsidies through programmes such as RSA have been shown to be less productive than average, and this experience may aid them in the RGF application process, creating a risk that these methods understate the impacts of funding. However, these issues can be assessed formally as part of an evaluation (i.e. once evidence on outcomes is available), and the approach strengthened in combination with longitudinal panel data methods described below.

The viability of such an option will be contingent on how far it is possible to observe similar outcomes for unsuccessful applicants. This should prove relatively unproblematic as BIS has collected Companies House Reference numbers through the application process, and a similar data-linking strategy will also likely to be viable. Assembly of this data may be time intensive, particularly for Round 1 applicants where information has been held less systematically (with an additional challenge that bids were not classified in terms of project and programmes in the first round, so an evaluator would need to provide this classification to remove programme bids).

Recommendation

- It is recommended that a fuzzy RDD approach is explored as part of an evaluation of the impact of RGF firm level projects. However, any analysis should be clear on the limits of how far such results are generalizable. These types of approach will only provide evidence on the average impact of RGF amongst successful applicants submitting a bid with a BCR close to the threshold at which the probability of success rises substantially. Such results could not be assumed to apply to those submitting bids with much higher BCRs (and therefore could not be extrapolated to provide an estimate of the total impact of RGF projects funded on the firms concerned).
- It is recommended that BIS take action to assemble details of unsuccessful applicants to the programme on a systematic basis (including details of appraisal metrics). This will require returning to the original applications and appraisals in the case of Round 1.

3.5.3 Propensity Score Matching

A common strategy adopted in programme evaluation is to create a comparison group that is as closely related as possible to the treatment group in terms of the factors known to influence the probability of receiving treatment. If all influential characteristics can be accounted for in this process, then selection bias will no longer be an issue: comparisons between a treatment and the comparison group will give consistent estimates of the impact of RGF on the outcomes of interest. Given the risk that the treatment itself may alter these factors, any matching should ideally be made on the basis of pre-treatment characteristics.

There are two potential groups from which a sample could be drawn for such an exercise:

- **Unsuccessful applicants:** As suggested above, the use of unsuccessful applicants as a counterfactual group is attractive as they can be assumed to share similar characteristics motivating application to the programme.
- **Non-applicants:** Non-applicants might also be used a counterfactual group, though the issues with selection bias are substantially more pronounced (as such a group can no longer be assumed to share those characteristics motivating application to the programme).

The effectiveness of such matching methodologies depend on two key factors: how far it is possible to observe all relevant factors influencing selection into the programme, and how far it is possible to identify sufficiently similar comparison units within comparison samples (the issue of 'common support' for matches).

Unsuccessful applicants

The RGF Secretariat keeps relatively rich data on the details of the results of the appraisal process (and describes the full range of information available to the Independent Advisory Panel and Ministerial Group in supporting their decision making). The availability of such a dataset is highly advantageous: it may be possible to account for all known factors influencing the probability of selection (to the extent that any unobserved preferences of the Independent Advisory Panel and Ministerial Group are not substantially influential) in the matching process.

Initial analysis of appraisal data from selected rounds held by the RGF Secretariat suggests that there are substantial differences between successful and unsuccessful applicants in terms of key characteristics of the appraisal process. The most obvious difference between the two groups is the vfm assessment: successful bids offered substantially lower cost per net person year of employment and high estimated benefit to cost ratios while estimated deadweight and displacement was relatively lower on average than for unsuccessful applicants.

This data was used to test the viability of matching successful to unsuccessful applications. This involved the development of a statistical model to predict the probability that a particular bid would be successful in the application process (on the basis of the characteristics observed through the appraisal process, such as location and value for money metrics). Successful and unsuccessful bids were 'matched' where they shared similar predicted probabilities of success in the appraisal process. These statistical models suggested that the main factor influencing the probability of success was the benefit to cost ratio.

The results of this exercise suggested that it would be challenging to use a matching approach using only information on the characteristics of bids. As the BCR is highly influential in determining success, it is difficult to find a sufficiently large number of bids sharing similar BCRs to create a sufficiently large matched sample. Using a relatively simple matching algorithm, it was possible to match 214 successful project bids to 74 unsuccessful project bids. The characteristics of the two groups were not well balanced: the 74 unsuccessful bids were characterised by a substantially higher cost per net job

created than successful applicants. As such, the lack of 'common support' may be problematic.

This analysis should be treated as indicative: it may be possible to develop a richer set of control variables through additional classification and analysis of individual applications (this analysis is restricted only to those variables captured consistently in appraisal databases across rounds). Such an exercise will be resource intensive, but could improve the performance of a matching exercise. Additionally, more complex matching algorithms could be applied (such as kernel matching) that use propensity scores to weight unsuccessful applications according to their similarity to successful bids. However, lack of common support for matches is likely to remain a problem.

Non-applicants

An alternative (or supplementary) approach would be to draw a general comparison sample of firms from business databases (e.g. the IDBR). In this case, the outcomes involved can be viably measured for both treatment and comparison units, and is a potentially viable strategy. In order to minimise selection issues, a comparison sample would need to be as closely matched to the characteristics of the participants firms as possible.

The scope for creating a matched comparison based on characteristics observed at the ex-ante stage will be limited by the range of variables available. These datasets will provide information on size, turnover, sector, location, and single/multi plant status. This will allow a comparison sample to be drawn from the IDBR that reflects these characteristics of the treatment sample:

- **Pairing treatment units with comparison units:** The closest match might be achieved through selecting one or multiple comparison firms for each individual RGF beneficiary that operate in the same sector (at the four or five digit SIC level), and share similar employment, turnover, and location.
- **Large firms:** There is a risk that for relatively unique large firms, it may be difficult to secure a large number of viable comparisons. In order to secure additional matches, it may be necessary to relax the sector constraint outlined above (moving to three and two digit SIC codes until a viable set of comparisons are found).

Matching on a relatively small number of variables - size, sector and location - to create a comparison sample would carry a risk that there are unobserved characteristics of firms that simultaneously influence their motivations to apply for funding and their underlying performance. Ideally, these variables would need to be supplemented by a range of other characteristics known to influence firm performance, as well as how far the firms involved had considered making similar expansionary capital investments, R&D capacities, or training investments since 2010 (to help ensure that the comparison group shared similar ambitions to RGF beneficiaries).

A key likely challenge is that a lot of this additional information could only be collected through surveys of firms. As substantial time has passed since RGF funding has been allocated (at least for Rounds 1, 2, 3 and 4), it will not be straightforward to collect information on the pre-treatment characteristics of both beneficiary and non-beneficiary

firms required to implement such matching strategies. This would be less of an issue for Rounds 5 and 6, though still problematic: while Round 5 and 6 projects have not started yet, the information would ideally be gathered either at the point of application to the programme (and would require a substantially longer application form), as success in the application process may cause changes in managerial attitudes for example (limiting the quality of matches).

Surveys would either need to take a retrospective view (which may lead to issues associated with recall bias), or it might be assumed that the characteristics of interest are time invariant (risking the possibility that these characteristics are influenced by receipt of subsidies through RGF). As suggested above in relation to 'before and after' methods, such a survey exercise is likely impractical and would place substantial pressure on sample sizes.

Limitations of matching approaches

More generally, matching methods are only effective in eliminating selection bias to the extent that all relevant characteristics driving selection into the programme can be observed. This assumption is untestable, and if there are significant unobserved factors driving the process then it is likely that approaches based on matching alone might fail to resolve the possible issues with selection bias. While it is possible to explore the implications of these types of issue through sensitivity analysis (postulating the presence of unobserved variables correlated with the outcomes involved), matching strategies can also be combined with supplementary approaches (such as longitudinal panel methods) to address the issues associated with unobserved differences between the treatment and comparison groups.

Recommendation

- It is recommended that Propensity Score Matching is used as part of an overall impact evaluation, though given the difficulties involved in accounted for unobserved drivers of selection into treatment, it is suggested that it is combined with other methods (difference-in-differences or fixed effects) to optimise robustness.

3.5.4 Longitudinal Panel Methods

The issues associated with bias driven by the unobserved characteristics can potentially be addressed (to some extent) if longitudinal panel data can be obtained on the outcomes and control variables of interest.

Longitudinal Panel Dataset

A longitudinal panel dataset would provide annual information on the key outcomes of interest for a treatment group of RGF project and programme beneficiaries and a comparison group of non-beneficiaries. The dataset would also indicate the year in which each of the RGF beneficiaries received support from the programme. The dataset would be supplemented by further annual observations on a set of appropriate control variables.

Ideally, the panel would need to have been set up three to five years prior to the receipt of treatment (from say 2005 to 2007 onwards).

There are two options for building such a panel dataset:

- **Survey based methods:** Surveys could be utilised to establish a longitudinal record of the information needed. They would need to be repeated regularly in order to update the information required, and would be resource intensive. There would be substantial risk of sample attrition (a long term study is likely to struggle to maintain the engagement of businesses over a period of say 7 to 10 years).
- **Administrative datalinking:** Alternatively (and less resource intensively), records of RGF beneficiaries and a matched comparison group could be used to create a panel dataset using the datalinking strategy as described under section 3.5.2.

The latter approach is likely to have substantial advantages over the former, in terms of accuracy and cost. A datalinking approach could be combined with a survey driven matching approach as described before (survey results could be used to achieve a closer match between the treatment and control group). Survey methods are likely to prove highly problematic in the assembly of a panel dataset, as there will be substantial challenges in obtaining the financial information of interest (surveys taking place in 2014 would need to collect information on turnover, employment, capital investment stretching back to at least 2010), as well as facing substantial challenges in maintaining the panel over time.

Recommendation

- It is recommended that the evaluation of firm level subsidies focuses on establishing a longitudinal panel dataset based on secondary data (rather than using primary research methods).

Difference-in-differences and fixed effects

Through building a longitudinal panel of the nature described above, it will be possible to design a quasi-experimental approach that accounts for some of the unobserved factors that might drive selection bias. These longitudinal panel techniques extend the basic regression model frameworks to allow for unobserved factors that are invariant across time or invariant across observation units (or groups of observation units) - and are described as fixed effects.

In practice, this involves adding a series of discrete variables to regression models to model the (hypothesised) unobserved factors of interest. For example, if there is a concern that there are unobserved firm level characteristics that influence both participation and the outcome involved (that do not vary over time), these can be controlled for by adding a dummy variable to describe each firm in the panel. An evaluation of RGF may need to allow for a variety of these fixed effects (though there are limits to the number of additional dummy variables that can be added to any regression model without running out of observations):

- **Firm level characteristics:** If there are time specific unobserved characteristics of firms driving both participation in RGF and their underlying performance, these can be accommodated by integrating firm specific fixed effects into regression models. If no survey data was to be collected in the manner described above, these fixed effects would capture the influence of the characteristics identified in Annex A to the extent that they did not vary over time (or at least over the window of interest).
- **Time, sector or location specific effects:** There may also be unobserved shocks at a sector or location level (or within a particular time period) that may influence the outcomes of interest (as well as the probability of participation). These can also be controlled for with longitudinal data (though the extent to which it is feasible to do so will depend on the number of observations available).
- **Evolution of the programme:** Adjustments were made to the appraisal and selection process over time and the unobserved characteristics of firms benefitting from the programme may vary over successive rounds. However, this could be potentially controlled for by incorporating round specific fixed effects.

Application of this basic framework could be applied in combination with propensity score matching approaches to help deal with some of the issues associated with the presence of unobserved factors driving selection bias. It may also be possible to exploit features of the design of the programme in order to refine estimates of impact, as detailed in the following sections.

Recommendation

- It is recommended that the evaluation of firm level subsidies involves a core analysis involving difference-in-differences and fixed effects models, using counterfactuals of both non-applicants and unsuccessful applicants.

Timing

The Regional Growth Fund has been allocated over a sequence of successive rounds as shown below. It may be possible to exploit this variation in the timing of projects and programmes to identify the causal effects of RGF. This strategy would focus largely on the businesses that have received financial assistance from RGF in the early stages with those receiving grants at a later stage being used as a counterfactual. Application rounds closed on the following dates:

- **Round 1:** 12 April 2011 (2011/12)
- **Round 2:** 31 October 2011 (2011/12)
- **Round 3:** 19 October 2012 (2012/13)
- **Round 4:** 11 July 2013 (2013/14)
- **Round 5:** 9 December 2013 (2013/14)
- **Round 6:** 30 September 2014 (2014/15)

Evaluation strategies based on the timing of intervention have been exploited in a number of studies¹⁵. By focusing only on those that were successful in the application process, such a strategy will (in principle) control for any unobserved factors that influence the probability that firms apply for financial assistance, and are successful in this bid. However, underlying this approach is an implicit assumption that there is no correlation between the period in which a particular firm was successful in their application for RGF and their business performance. There are some scenarios in which this might not hold: for example, if different types of firms faced financial constraints in different periods as a consequence of unobserved variation in management practices.

Recommendation

- A supplementary assessment of impact, based on comparisons between applicants successful in different rounds should be undertaken as a robustness check on the main results.

Synthetic Control Approaches

Matching can potentially be enhanced with the availability of extensive pre-treatment data. Firstly, evidence on past performance can be used as cross check to confirm that treatment and comparison groups were closely matched. This is particularly appealing in the case of large firms, where confidence that a viable comparison group has been constructed may be lower.

Secondly, evidence on past performance can be used to weight comparison observations to achieve a closer match through the development of a synthetic control. These approaches are similar to propensity score matching methods in that they seek to choose those members of the comparison group that most closely resemble the treatment group. However, with a synthetic control approach, the counterfactual is constructed from a weighted average of the comparison units (on the grounds that the observed pre-treatment characteristics of the treatment group can be better approximated by a weighted average of the untreated units than individual members of the control group). Estimates of the causal effects can then be derived from a post-treatment comparison of the outcomes observed for the treatment and (weighted) comparison group.

Such an approach does not address any issues associated with unobserved differences between the treatment and comparison group. Therefore, it is not recommended as a sole strategy for isolating the impacts of the RGF. However, it has substantial appeal as a cross check on results derived from other methods. In particular, given the prominence of large firms in the dataset (and the difficulties involved in identifying a reliable counterfactual), application of such an approach would offer potential confirmation (or denial) of findings obtained using other techniques.

¹⁵ For example: 'Impact of Urban Enterprise Zones on Establishments' Location Decisions: Evidence from French ZFUs', Mayer, Mayneris, and Py, 2012. Available at <http://www.parisschoolofeconomics.eu/IMG/pdf/mayermaynerispy-seeidd-nov2012.pdf> (accessed June 2014)

Recommendation

- Synthetic control methods would be beneficial, particularly in addressing some of the issues associated with the uniqueness of the larger firms supported through the RGF.

3.5.5 Instrumental Variables

One option for dealing with the issues associated with unobserved characteristics driving selection bias is to identify a variable that is correlated with probability of participation in RGF, but not with the underlying outcomes of interest (i.e. an instrument). If a valid instrument can be identified, the causal effects of the policy can be identified through its influence on the likelihood a particular firm receives funding. These approaches are generally implemented using a two stage procedure (such as Two Stage Least Squares), and can be used in combination with the matching and longitudinal data strategies to maximise robustness.

Identifying an appropriate instrument can be challenging: in many cases an instrument may only have a weak influence over participation (or there may be substantial concerns that that variable may in some way be correlated with outcome of interest). Additionally, it is difficult to provide a detailed ex-ante assessment of the likely effectiveness of these instruments in most cases as this will only become apparent in the implementation of the evaluation. The following sections set out the range of possibilities that were considered as part of the scoping study but were rejected.

Appraisal Metrics

In comparisons between successful and unsuccessful applicants, it may be possible to identify variables that influence the probability a particular applicant was selected, but would not influence either the probability they took forward the project or programme of interest or the underlying performance of the enterprise in question (in the case of projects). Two possible instruments were identified for further investigation:

- **Location:** The RGF is targeted at areas dependent on public sector employment and is an explicit criteria of the appraisal process. However, the decisions of private sector investors and creditors may be uninfluenced by such concerns. Clearly, this may only be valid in the case of projects: in the case of programmes, funding often will be matched by funding from other public sources, the availability of which will also largely depend on location.
- **Displacement:** While the assessment of displacement is an important factor in the appraisal process, private investors will be concerned primarily by private rather than social returns. Unless the assessment of displacement reflects other preferences of the private sector (such as the characteristics of the markets in which particular firms operate), this could be an effective instrument.

The analysis of RGF appraisal data completed as part of the scoping study suggests that neither is likely to be a valid instrument for selection into the programme: location was only shown to be a weak predictor of selection in the case of programmes, while displacement

was not shown to be an effective predictor of programme selection for either projects or programmes.

Awareness

Awareness of the Regional Growth Fund (or grant programmes led by intermediaries) is likely to be a key factor influencing the likelihood a particular firm or programme intermediary makes an application for funding. If awareness of the programme is unrelated to performance, then this might form an effective instrumental variable (and such approaches have been exploited in past programme evaluation studies). However, scope to implement such an approach is limited in this case as awareness needs to be established on an ex-ante basis (i.e. pre-application).

However, it may be viable to exploit the publicity associated with the RGF: a series of regional events have taken place offering potential applicants an opportunity to understand RGF in more detail (as well as offering face to face meetings to discuss expressions of interest). Distance from these events may influence potential applicants' willingness to attend, and if the events are helpful to applicants in drafting their bid, attendance of these bids may also influence the probability that they are successful in their bid. While this may in practice prove a useful instrumental variable, on an ex-ante basis the assumption is that distance from regional events is likely to prove a weak predictor of programme participation: substantial information about the programme is disseminated on-line, and given the potential scale of subsidies on offer through the RGF, it is not anticipated that distance will present a meaningful disincentive for potential applicants to attend these events.

Staff dedicated to securing public subsidies

Many of the larger firms that have received funding have members of staff dedicated to securing public subsidies. If employing such staff increases the probability of applying to the RGF and being successful, then this could provide a potential instrument that could be utilized (particularly in the case of large firms). However, this is unlikely to be an appropriate strategy for assessing the impact of RGF on programmes (as the presence of such staff will clearly be influential in their ability to secure funding from other sources).

There is no dataset that provides this type of information and it would need to be collected through surveys. However, there may be concerns that the employment of staff dedicated to securing public sector subsidies may reflect other aspects relating to the organisation of the firms' concerned (that will also be influential with respect to firm level performance).

Changes to State Aid Rules

The RGF overall does not have any rigid eligibility criteria that might be exploited for the purposes of assessing the impact of the programme. However, the scale of subsidy that can be offered (at least to those projects and programmes involving direct subsidies for firms) are limited by EU State Aid rules. These regulations place limits on the subsidies that can be offered with respect to defined set of project costs to firms located in different areas under General Block Exemption Rules). These areas are set out in the Assisted Areas map (with varying levels of subsidy permissible in different locations, though subsidies can be granted under De Minimis guidelines in any area).

The Assisted Areas are defined by the EU in consultation with Member States over six year cycles and the current set of areas defined for the period 2007 to 2013. A recent study examining the long term impacts of the Regional Selective Assistance programme exploited this institutional feature to develop estimates of the causal impact of RSA on employment and productivity at firm (and area) level. As the Assisted Areas guidelines were set independently of the firms benefitting from funding through the programme (by the EU), a change in these guidelines may have an influence on the probability particular firm would receive funding through RSA without influencing the underlying performance of the firm. The change in the maximum intervention rate was used as an instrument for receipt of RSA (taking the value of zero for firms based in areas ineligible for subsidies under GBER, otherwise taking the value of the maximum grant intervention rate for both treated and untreated firms).

Replicating this approach within an RGF may not be a viable strategy for assessing the impacts of the programme. A change in the Assisted Areas map is expected in summer 2014. Round 5 projects and programmes may be accelerated for approval in advance of this deadline if they have particular State Aid issues. However, unlike the RSA programme, the RGF is not solely focused on the Assisted Areas, which may weaken the strength of this instrument (and it may function more effectively in application solely to projects). The effectiveness of the approach may also improve if there are further rounds of RGF beyond Round 6 (as if RGF does have an effect on firms' performance, the effects of Round 6 subsidies may only be felt amongst a small number of firms).

3.6 Controlling for Other Government Interventions

Given the propensity of some firms to secure subsidies and assistance from multiple public sector sources, applying these above strategies may leave residual concerns that any impacts observed may be the consequence of other interventions funded by the public sector (rather than the RGF). In order to address this concern, the Phase One report examined how far it might be viable to append or match the monitoring associated with other public sector programmes to that collected by the RGF Secretariat to account for the potential influence of other programmes on performance. Details of the programmes examined are set out in the Annex B and the results of the assessment are summarised here.

There may be significant overlap between the beneficiaries of RGF and those businesses targeted by other programmes. In the Assisted Areas, large firms may have benefitted from public subsidies through a number of past programmes (and in particular RSA, SFIE, and GBI), and the effects of these subsidies may still be working their way through in these businesses. There is also possible overlap with other programmes (for example, some UK Export Finance beneficiaries have also been successful in obtaining RGF funding). There is also substantial overlap between RGF programmes and Enterprise Zones.

Obtaining monitoring information for key BIS programmes (e.g. Employer Ownership Pilot, Growth Accelerators, RSA/SFIE/GBI, Enterprise Finance Guarantee etc) will be relatively straightforward. In some cases, this monitoring will include details of Companies House Registration numbers which will facilitate the matching (for example, the Blue Sheep database kept by the Skills Funding Agency enables Companies House references to be gathered for EOP beneficiaries). However, in the case of access to finance interventions,

efforts to match this data to the IDBR as part of evaluation activity has proven challenging (for example, difficulties were encountered in the Enterprise Venture Capital programme beneficiaries, possibly due to changes in ownership).

Other Government departments also showed a general willingness to share details (with UK Export Finance publish details in annual reports). However, there was some variability in the level of detail kept by different agencies (Companies House details for example, are not captured by UKTI). Additionally, evidence gathered suggested that there have been substantial difficulties in implementing data-linking exercises as part of other evaluations (in particular the ERDF programme).

Given the variability in data available across different programmes it is likely in some cases that a substantial amount of manual work may be needed to match across programmes (using other sources of information - such as the FAME database to validate and improve the quality of results). Such an exercise would also need to be completed for both the treatment and comparison groups. With this work, there is no guarantee that a complete match can be achieved (though a matching rate of between 60 to 80 percent might be possible).

As suggested above, such a data matching exercise would need to take place for both the treatment and comparison group. This data would be appended to data gathered through both data-linking and surveys in order to provide an additional set of controls. It is suggested that analysis is performed with and without this additional set of controls to test the overall robustness of findings (given the potential drawbacks associated with the data). It is also recommended that BIS accelerate the creation of a 'central data spine' that will substantially increase the scope to control for wider firm level interventions across all programmes of evaluation.

Recommendation

- Attempting to control for other Government will not be perfect but if firm level monitoring records can be assembled for some other the larger nationwide initiatives then this will offer a useful set of controls to test the robustness of results.
- BIS should work towards putting in place appropriate data-sharing agreements and accelerate the creation of the 'central data spine' to expedite the process of integrating and linking wider monitoring information to panel datasets built through the evaluation.
- Further feasibility work as part of an early additionality assessment should be undertaken to establish how far implementing this in practice might prove problematic.

3.7 Displacement, Multiplier Effects and Crowding Out

An evaluation of RGF would ideally need to establish the scale of any displacement, multiplier effects and crowding out. These issues would ideally need to be understood at a national level to facilitate any cost-benefit analysis taking place as part of an economic evaluation. However, the spatial distribution of these effects would also be required to make a comprehensive assessment of how far the RGF has met its objective to create sustainable private sector jobs in areas highly dependent on public sector employment.

A review of the potential options for capturing displacement, multiplier effects and crowding out has been undertaken. A detailed discussion is provided in Annex C. However, the conclusion of this study is that it will not be possible to robustly demonstrate these effects for firm level projects, owing to the substantial difficulties in identifying the specific firms subject to these wider effects and the absence of rigidly defined spatial boundaries for the programme:

- Methods adopted in past evaluations have largely been driven by collecting evidence from beneficiaries on the spatial distribution of their competitors and suppliers, and applying a range of assumptions to draw inferences on the potential scale of displacement and other effects. These methods are replicable to a degree in an evaluation of RGF, though the absence of a defined target area is problematic. Survey questions could only be designed to capture displacement and related effects across relatively well defined geographies (so at national and local levels). It would not be possible to repurpose these questions to explore displacement effects across geographies that would be challenging for respondents to survey to operationalise (such as 'areas highly dependent on public sector employment').
- These methods have also been criticised for failing to empirically demonstrate that any such effects have occurred (being derived from views of beneficiaries, rather than direct observations of the performance of the firms affected). Evaluations that have been able to show spill-over effects on a causal basis have generally been able to identify the firms or areas likely to be subject to hypothesised spill-overs. However, in the case of RGF, where many of the firms benefitting from the fund are manufacturers operating in national or international markets (and the absence of a defined target zone for the programme), identifying such areas or firms is substantially more challenging.
- These issues also extend to understanding the medium run effects of RGF projects. If RGF projects are successful in achieving rebalancing objectives through encouraging the reabsorption of the unemployed into the workforce (rather than generating offsetting effects through placing pressure on wages), then this might be observed in reductions in unemployment locally. However, the absence of spatial discontinuities in the design of the programme will again make it challenging to identify suitable comparison areas to facilitate an assessment of the causal effects of RGF in reducing unemployment.

Recommendation

- This finding has significant implications: it will be challenging to provide robust causal estimates of the net economic impacts of the RGF at national or regional levels (and therefore assess how far the fund has met its core objectives). As such, there will be merit in replicating past methods (despite their substantial weaknesses) in any ex-post evaluation surveys undertaken, to at least offer some speculative insight into the possible spatial patterns of net job creation impacts. The use of such results would need to be treated with a substantial degree of caution, with a clear acknowledgement of the weaknesses involved.

3.8 Spill-over effects

A detailed review of potential options for capturing the spill-over effects of projects has been undertaken as part of this scoping study. Detailed discussion is set out in Annex D, but it has been concluded that it will not be viable to robustly assess the following possible spill-overs:

- Agglomeration effects are likely to be too small to capture through an evaluation of RGF;
- It will be difficult to capture innovation spill-overs owing to complexities in establishing the firms likely to benefit;
- It may be viable to examine the value of productivity gains associated with training that are captured by non-beneficiary firms (i.e. via the loss of workers to competitors). This could be achieved through the analysis of PAYE data (through tracking the earnings of workers once they leave the employment of RGF beneficiaries). However, it is highly uncertain that access to this data would be possible over the timescale for an evaluation.

3.9 Firm level projects: suggested approach

The recommended principles of an evaluation strategy for firm level projects are set out below. The range of options is somewhat constrained by small sample sizes and difficulties in using primary research to establish a baseline retrospectively:

- **Assembly of a panel dataset:** The evaluation of firm level projects should be based on the creation of a longitudinal panel dataset of businesses receiving RGF support and non-assisted businesses. This panel dataset should be created through the adoption of a data-linking strategy for collection of key variables rather than one based on primary research with the firms concerns (i.e. drawing on administrative data and other sample surveys rather than ex-post evaluation research with the firms concerned). As project beneficiaries are primarily large firms, it will be viable to collect evidence on a range of key outcomes including capital expenditure, employment, GVA and productivity (a more limited set of outcomes will be available for the small number of SMEs delivering RGF projects).
- **Counterfactual:** The assembly of panel data should incorporate two counterfactual groups alongside successful applicants: unsuccessful applicants to the programme, and a sample of non-applicants selected so as to match beneficiaries as closely as possible in terms of size, sector, and location (using a propensity score matching strategy or similar).
- **Core analytical approach:** The creation of such a panel dataset will enable the application of longitudinal panel methods (difference-in-differences and fixed effects) to control as far as possible for unobserved factors driving selection into treatment.
- **Other analyses:** Alongside this core approach, a range of supplementary analyses should be undertaken to exploit the design and implementation of RGF to enhance

confidence in results. This should include application of fuzzy RDD approaches (using BCRs as an instrument for RGF treatment), exploitation of the timing of different rounds of the RGF, and synthetic control group approaches (capitalising on the availability of pre-treatment data).

- **Controlling for other interventions:** An additional set of control variables should be incorporated into the analysis to capture the extent to which members of the treatment and comparison groups have benefitted from other Government programmes. This should be used in sensitivity analysis to establish how far the results are robust to the inclusion of these controls. BIS should act to accelerate the creation of the 'central data spine' which would substantially simplify this process for this and subsequent evaluations.
- **Role of a primary survey:** An ex-post evaluation survey will provide useful additional information in an impact evaluation by collecting evidence that might help explain the results of econometric analysis. This could be extended to include self-reported measures of impact and to provide some evidence on the possible scale of displacement (though substantial care should be taken in reporting on results given the inherent weaknesses in such strategies).
- **Limitations:** This strategy will be weakened by the comparatively narrow range of control variables it will be possible to assemble (raising concerns that there will be significant unobserved factors influencing results) However, as it is not possible to undertake primary research to robustly collect evidence on additional firm level characteristics prior to the receipt of RGF, there is no way of meaningfully addressing these weaknesses.
- **Scope:** Relatedly, it will also be challenging to measure the innovation and training impacts of RGF projects and programmes owing to difficulties in assembling the longitudinal data on these outcomes.
- **Wider effects and spill-overs:** This scoping study suggests that there will be no way of robustly assessing the causal effects of RGF in terms of displacement, multiplier effects and wider spill-over effects. As such, an evaluation of RGF will not be able to provide robust measures of net impacts at a national or regional level. In order to overcome this weakness, some evidence would need to be gathered through surveys (as suggested above), though such approaches are far from robust.

4. Programmes

A substantial share of RGF funding has been directed towards grant and loan programmes, in which funding has been given to a programme intermediary to distribute subsidies to firms in the form of grants and loans. This has enabled RGF funding to reach smaller projects and businesses, but introduces a range of additional evaluation issues that would need to be addressed. This section identifies a range of impact evaluation options for the grant and loan programmes that have been funded through Regional Growth Fund, and assesses their potential viability.

4.1 Programme Data Collection

Programme intermediaries are required to report aggregate information on the jobs that have been created or safeguarded by their programme portfolios to BIS. However, while monitoring officers collected details of programme beneficiaries, at the outset of this scoping exercise (May 2013), there were no standardised templates for the collation of this data or requirements to assemble this data on a central basis. A systematic data collection exercise was undertaken as part of this scoping exercise, covering the 73 programmes funded through Rounds 1 to 3 of the Regional Growth Fund, to establish the scope of information that was potentially available at a firm level in terms of:

- Details of successful and unsuccessful applicants to programmes;
- Characteristics of applicants (e.g. size and location);
- RGF funding sought through the application process;
- Types of project funded (e.g. capital investment, innovation, etc);
- Number of jobs created/safeguarded.

Beneficiary level data was provided by 52 grant and loan programmes (alongside 10 programmes of other types) by May 2014. Four programmes were excluded from the process (either due to data protection reasons or because the programme had not engaged sufficient volumes of beneficiaries).

4.2 Characteristics of Programmes

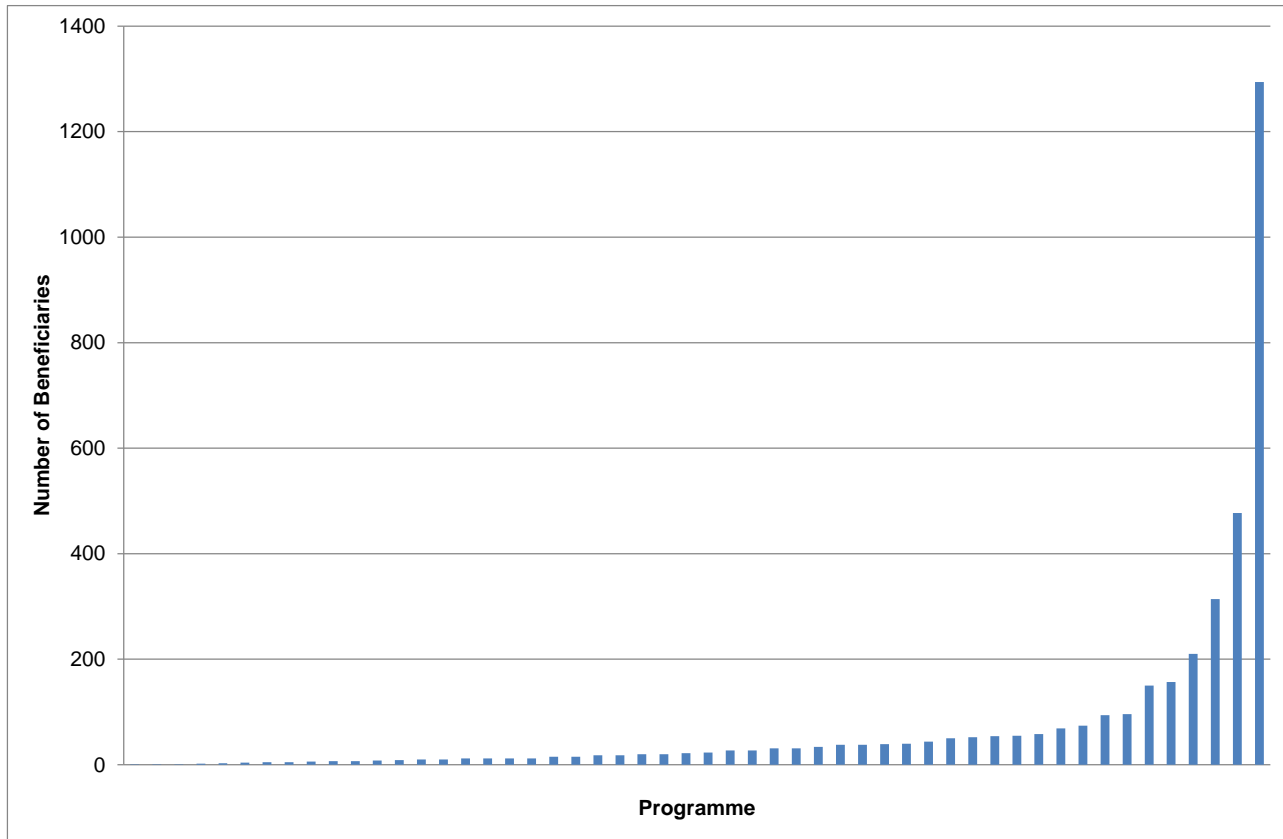
This section provides an analysis of the data received from the 52 grant and loan programmes supplying information by May 2014. Programmes largely involve allocated of funding to capital investment, innovation, and training projects, and will largely involve a similar causal process by which they might be expected to lead on to economic impacts (so a separate discussion of these outcomes is not provided here).

4.2.1 Beneficiary volumes

In total, details of 3,831 firm level beneficiaries were supplied by grant and loan programmes as part of this process (accounting for £298m of committed RGF funding and around 39,138 jobs created or safeguarded). The volume of beneficiaries at a programme level was highly variable: with the smallest programme supplying details of a single

beneficiary and the largest provided details for 1,294. The distribution of projects by beneficiary volumes is shown in the figure below.

Figure 4.1 – Programmes Ranked by Beneficiary Volumes



Source: Programme Data Collection May 2014, RGF Secretariat

This chart suggests that in the main, the volume of beneficiaries at a programme level is small. All but six of the programmes had committed funding to fewer than 100 beneficiaries, and 37 programmes had fewer than 50 beneficiaries. The sample was dominated by the larger national programmes (with one programme accounting for close to 33 percent of the overall records). This suggests that opportunities to examine the causal effects of grant and loan programmes on a case-by-case basis will be limited owing to the small sample sizes involved (observations will need to be pooled to maximise opportunities for econometric analysis).

These 52 programmes accounted for a small share of the overall RGF funding committed to grant and loan programmes and it is anticipated that beneficiary volumes will grow substantially in future data collection rounds (this assumption is contingent on programme intermediaries committing their funding). As such, this conclusion is tentative, and will require re-appraisal at a later date.

4.2.2 Size of firms

Programme intermediaries were asked to describe the characteristics of the beneficiaries receiving funding through the RGF in terms of their turnover and employment at a site and enterprise level. Evidence on employment (either at site or enterprise level) was provided

in relation to 2,440 beneficiaries, and suggested that funding has primarily been targeted at micro and small businesses:

- 35 percent had 0 to 9 employees at the point of application;
- 47 percent had 10 to 49 employees;
- 16 percent were medium sized firms with 50 to 249 employees;
- Just 2 percent were large firms with 250 employees or more.

Given the size of firms benefitting from programme support, this may limit the scope of the potential evidence on outcomes that can be gathered through data-linking strategies (as outlined below).

4.2.3 Unsuccessful applicants

Programme intermediaries were also asked to provide details of unsuccessful applicants to their programmes (largely mirroring the information requested in connection to successful applicants). 34 of the 53 intermediaries were able to provide details of unsuccessful applicants. There was substantial variation across programmes in the nature of the selection process. Some programmes employed a single stage application process while others employed two stage application processes involving an initial EOI before submission of full bids. Other programmes involved no formal application process.

In total, details of 2,172 unsuccessful applicants were provided by programme intermediaries. Again, there was substantial variation in volumes of unsuccessful applicants across programmes.

4.2.4 Project types

Programme intermediaries were asked to class projects in terms of their type (capital investment, innovation, training or other). This information was provided in connection with 3,261 projects:

- 81 percent of projects were described as capital investment projects;
- 10 percent were described as training projects;
- 2 percent were described as research and development projects; and,
- 6 percent were classified as other projects.

As such, the majority of projects could be classified in the same way as projects funded directly through RGF. Individual programmes have generally a range of different types of project (rather than being focused exclusively focused on funding projects of a single type, such as capital investment or training).

4.2.5 Availability of contact details

Programme intermediaries were also asked to provide contact details for beneficiaries. Postal address data was provided for virtually all beneficiaries (3,772), though availability of named contact details was much lower (with named contacts provided for 1,604 beneficiaries, and telephone numbers for 1,539). Companies House Reference numbers were also provided for 1,121 beneficiaries.

Recommendation

- An evaluation of grant and loan programmes will only be feasible to the extent that details of programme beneficiaries are available. It is strongly recommended that BIS encourage monitoring officers to work with programme intermediaries to improve the coverage of named contacts in future iterations of data collection.

4.2.6 Timings

Finally, programme intermediaries were asked to provide evidence on the timing of applications to the programme and project start dates. Application dates were provided for 3,135 beneficiaries, and date of agreement of the final offer letter was provided for 1,550 beneficiaries. This suggests that in some cases, information on key dates will not be available, which will potentially be critical for any evaluation strategy reliant on the construction of longitudinal panel datasets.

Recommendation

- Information on timing of programme intervention will be vital for the evaluation, and it is strongly recommended that BIS encourage monitoring officers to work with programme intermediaries to improve data quality in this area.

4.3 Key Outcomes

As grant and loan programmes have largely been directed at funding similar types of projects, the key outcomes of interest for an impact evaluation will largely align with those set out in the preceding section for firm level projects (namely):

- Capital investment;
- R&D expenditure;
- Patents;
- Introduction of new processes and products;
- Training expenditure;
- Number of workers trained;
- Employment;
- Productivity (Average Labour Productivity & Total Factor Productivity)
- Output; and,
- Profitability

4.4 Impact Evaluation Options

This section identifies the range of potential impact evaluation options for grant and loan programmes, building on the discussion in the preceding chapter for firm level projects.

4.4.1 Self-reporting

Self-reporting (as described in Section 3) is a potentially viable option for the evaluation of programmes. However, alongside the weaknesses with self-reporting, there will be further problems in applying these methods to programmes as they require ex-post evaluation surveys. As contact details (telephone or email) are only available for around 50 percent of programme beneficiaries (amongst those providing beneficiary level data), such a survey could only achieve partial coverage of programmes funded through the RGF (though there is no reason to believe that this may bias results, unless there is a connection between how far programme intermediaries have been able to supply such information and the strength of other processes such as project selection mechanisms).

4.4.2 Before and After

Similar strategies will also be available to implement before and after approaches to evaluation as for firm level projects. However, again, there will be additional challenges associated with the implementation of these approaches as described below.

Primary research

Again, primary surveys of beneficiaries would need to take a retrospective view on the outcomes of interest in order to establish pre-treatment measures of the outcomes of interest. It will be highly challenging to collect reliable measures of the financial outcomes of interest through primary surveys, and research to establish post-intervention outcomes will again be subject to the highly problematic nature of attrition in longitudinal business surveys (though with larger volumes, such attrition may be less problematic).

Datalinking

Use of secondary datasets may again be a preferable strategy to obtaining information on the key metrics of interest. As suggested in Section 3, it was possible to match 76 percent of project and programme beneficiaries to the key datasets within the ONS Virtual Microdata Laboratory (based on a sample of 18 programmes).

CRNs were provided for around 50 percent of programme beneficiaries, and it has been possible to manually obtain CRN numbers for a further 35 percent. As such, it is likely that such a datalinking strategy is likely to prove viable for a large share of programme intermediaries (a comparison of the beneficiaries of the 18 programmes sampled as part of the datalinking feasibility exercise and the 43 supplying details through a more systematic exercise suggested the groups were broadly similar).

However, problems arise because of the size of the firms concerned: as close to all programme beneficiaries are SMEs (97 percent), longitudinal data on more detailed financial measures contained within the ARD and other datasets will not be available. As such, a datalinking strategy is only likely to yield longitudinal evidence on the following measures through linking to the Business Structure Database:

- Employment;
- Turnover.

As such, this is likely to limit substantially the range of outcomes it is possible to explore robustly through a datalinking strategy. However, given the problems associated with gathering evidence on these outcomes through surveys, it is suggested that datalinking remains a key component of the strategy for establishing evidence outcomes as it offers greater coverage of beneficiaries and scope to create longitudinal panels.

Potential role of primary research

In order to expand the range of outcomes it is possible to explore, supplementary survey research is suggested as an option (establishing pre- and post-treatment measures of the outcomes of interest). Given the volume of contact details available, such a survey would need to be delivered as a census to offer a sufficient number of observations for detailed analysis (it is anticipated that even with advance datasheets, survey approaches would yield a comparatively high level of non-response to detailed financial questions).

A rolling survey of grant and loan beneficiaries would begin from March 2015 onwards (once the second wave of beneficiary data collection is complete). This survey would focus on establishing the financial measures of outcomes of interest (baseline and follow-up), self-reported views on the impacts of beneficiaries, and information that may be helpful in reaching an assessment of displacement.

It is assumed that around 6,000 beneficiaries will eventually be available for the survey, of which contact details will be available for 75 percent (4,500). A response rate of 50 percent has been assumed (based on experiences of the process evaluation survey that has taken place as part of Phase 4 of this study), implying around 2,250 observations will be available for the evaluation. Surveys will be targeted at finance directors, and will involve an advance data-sheet to collect information on the metrics of interest. Surveys would be scheduled to take place three years following the agreement of the Final Grant Offer Letter with the beneficiary.

Recommendation

- Datalinking strategies will provide robust evidence, but only for a very narrow set out the outcomes of interest (as beneficiaries tend to be SMEs).
- BIS may wish to consider using primary surveys of beneficiaries to retrospectively gather baseline information and outcome measurements. Such a survey would take place three years following signature of the Grant Offer Letter, and would be a census survey of beneficiaries (with an expectation of 2,250 observations). While targeting the survey at finance directors and using advance data sheets would likely enhance the quality of information collected, the risks and challenges involved with such a survey should not be understated.

4.5 Quasi-experimental approaches

Programme intermediaries adopt similar selection processes to the RGF overall (with many implementing their programmes by duplicating arrangements at a national level). As such, similar issues with selection bias will need to be addressed in the design of an

evaluation of programmes. However, this is made complex by the variety of arrangements being employed by programmes, with no two programmes using identical appraisal and selection mechanisms.

On the one hand, this would suggest that a programme-by-programme approach to evaluation might be preferable. However, the issues with sample sizes at a programme level suggest that such an approach is unlikely to be viable. As such, it is recommended that observations on programme beneficiaries are pooled for the purposes of an impact evaluation, with strategies designed to accommodate variance across programmes (such as allowing for unobserved differences between programmes).

4.5.1 Regression Discontinuity Design

Information is not systematically available on the governance arrangements associated with every programme funded through the RGF. However, qualitative work undertaken with programme intermediaries suggests that few, if any, programmes have adopted a model in which selection decisions are made purely on the basis of scores in appraisals (programmes routinely incorporate a selection panel or investment board). As was concluded with respect to RGF projects in the previous section, a sharp RDD design is not a viable option for the evaluation of grant and loan programmes.

4.5.2 Fuzzy Regression Discontinuity Design

The application of fuzzy RDD approaches will also be problematic in the case of programmes. As programme intermediaries do not apply identical appraisal measures in their project selection decisions, there is no single metric that can be used as a running variable (like the BCR in the case of projects). Additionally, even if such a variable was available, the relevant discontinuity would vary from programme to programme, making it challenging to apply such an approach. Finally, its application would be limited only to those programmes that could provide information on unsuccessful applicants (33 of the 43).

As part of the programme data collection exercise, information was obtained on total jobs created or safeguarded and RGF funding sought for both successful and unsuccessful applicants (though this information was not provided by all programme intermediaries). It is much less clear that there is an obvious discontinuity in the probability of success on the basis of this VFM metric that might be thought to be influential in project selection decisions. As such, fuzzy RDD approaches are unlikely to be effective in the case of programmes (at least on the basis of using cost per job as a running variable).

4.5.3 Matching

The strength of results will be substantially enhanced if it is possible to develop a comparison group that is as closely matched to programme beneficiaries in terms of the key characteristics influencing their performance. The amount of data available on the appraisal of successful and unsuccessful bids to programmes is substantially less rich than for direct bids into the RGF, and in the absence of such information it will not be viable to adopt a strategy based on matching successful and unsuccessful applicants on the basis of the characteristics of their application to the programme.

As such, an evaluation strategy will need to focus on matching programme beneficiaries to comparison groups on the basis of their observable characteristics. The data-linking approach outlined above will supply information on the size, location, sector and past performance of beneficiaries and unsuccessful applicants. Application of Propensity Score Matching approaches will help control for observed differences between the two groups (as well as addressing issues associated with the unobserved factors motivation application to programmes). However, there would be residual issues associated with unobserved differences between successful and unsuccessful applicants driving both probability of success and performance more widely. Additionally, such a strategy could not be extended to programmes that have not supplied information on unsuccessful applicants.

It may be advisable to create a second comparison group drawn from non-applicants to RGF programmes to facilitate the inclusion of a broader range of programmes. Again, this could be achieved through creating a sample of non-applicants sharing size, sector, locations and past performance from key public datasets (such as the IDBR), using a Propensity Score Matching approach. However, the set of controls available to support such a matching exercise will be substantially limited (and cannot realistically be expanded through additional survey research). As with project level interventions, matching will need to be combined with other strategies as outlined below to help minimise possible selection bias issues driven by influential unobserved variables.

Recommendation

- The impact evaluation of grant and loan programmes should be based on two counterfactual groups: unsuccessful applicants and non-beneficiaries (drawn from key public datasets). Propensity Score Matching should be employed to minimise observed differences between beneficiaries and the two sets of counterfactuals.

4.5.4 Longitudinal Panel Data

The extent to which influential unobserved factors might bias estimates of the causal effects of programmes might again be minimised through the assembly of longitudinal panel data for treatment and comparison groups, following a similar strategy to that recommended for projects (as outlined in Section 3). However, application of such approaches would need to allow for unobserved variation in how projects and programmes are administered and implemented (and models will need to allow for programme specific fixed effects, alongside unobserved firm level and time specific shocks).

However, it should be noted that the application of these methods will be limited to some extent by the extent to which programme intermediaries have been able to supply information on the timing of applications and the agreement of Grant Offer Letters. It is recommended that BIS act to strengthen the availability of this data to enhance the potential coverage of an impact evaluation of RGF.

Additionally, primary research (as described above) would be required with both the treatment group and comparison groups to provide supplementary evidence on the outcomes involved (owing to the limited number of outcomes it is possible to explore

through datalinking). Collection of baseline and follow-up observations could be undertaken through a single ex-post evaluation survey (and would enable the application of difference-in-differences approach, though the smaller number of longitudinal observations would limit the range of fixed effects it is possible to include in models).

Delivery of such a survey would need to be undertaken on a rolling (annual) basis to ensure a consistent period of time has elapsed between signature of offer letters and the collection of follow-up observations. The earliest programme beneficiaries (as based on the beneficiary data collected) applied for support in 2012, and a survey of this first cohort undertaken in 2015 would capture short term outcomes over three years. Advance datasheets would facilitate the collection of financial metrics, though it should be anticipated that execution of these methods are likely to lead to issues with recall bias and missing values. A similar sampling strategy should be adopted for unsuccessful and non-applicants for RGF support.

Recommendation

- The impact evaluation of grant and loan programmes should integrate panel data techniques (fixed effects and difference-in-differences) in combination with Propensity Score Matching to address issues associated with unobserved group differences (as far as is feasible through such approaches).

4.5.5 Timing

It will also be viable to exploit differences in the timing of programme rounds in a similar manner to that outlined in Section 3 (again, only to the extent to which programme intermediaries can provide information on the timing of applications).

Recommendation

- The impact evaluation should seek to exploit differences in the timing of programme rounds as a cross check on more general longitudinal panel methods.

4.5.6 Spatial discontinuities

While a relatively large number of grant and loan programmes have been funded through RGF, coverage of the country is not universal. Unlike land and property programmes, the boundaries of these programmes are almost always defined along administrative lines (usually the boundaries of an LEP or local authority). Again, if these boundaries can be treated as relatively arbitrary, then eligibility for support under RGF programmes might be treated as an instrumental variable to help identify the causal effects of these programmes (using control rings around the boundaries of those programmes to help control for any unobserved area trends that might be influential).

Adoption of such an approach would introduce additional criteria in the selection of a comparison group of non-applicants. Non-applicants would need to be explicitly sampled from areas adjacent to programme boundaries (to ensure that they were not eligible for

support through the programme). However, there may be concerns that the delivery of other similar programmes in the future (such as Growth Deals or the Single Local Growth Fund) may limit confidence in such an approach. As such, development of these wider policies will need to be closely monitored if this approach is to be adopted as part of an evaluation strategy for programmes.

Recommendation

- Scope for exploiting spatial discontinuities should be revisited once policy developments for economic development at a local level are known.

4.6 Displacement, Multiplier Effects and Spill-over Effects

As with projects, the conclusion of this scoping study is that it will not be possible to robustly assess displacement and other spill-over effects as part of an evaluation of RGF (as discussed in Annex C and D). This has similar implications (i.e. that it will not be possible to provide a robust assessment of the net impacts of programmes at national or regional levels). However, as with RGF projects some indicative evidence on the possible scale and spatial distribution of these effects could be integrated into an ex-post evaluation survey.

4.7 Grant and Loan Programmes: Recommended Approach

The following principles underpinning an evaluation strategy for Grant and Loan Programmes are recommended:

- **Assembly of a panel dataset:** The assembly of a panel dataset capturing longitudinal observations on key outcomes for programme beneficiaries is likely to offer the most effective strategy available for assessing the causal effects of programmes. However, while this should include datalinking in a similar manner to RGF funded projects, such an exercise will only offer scope to explore employment and turnover effects owing to the size of firms involved. It is recommended that a census survey of programme beneficiaries is undertaken in parallel to attempt to gather further observations on the outcomes involved (for both programme beneficiaries and comparison groups).
- **Counterfactual:** As with projects, assembly of longitudinal data should extend to comparison groups of unsuccessful applicants and a sample of non-applicants selected to closely resemble programme beneficiaries in terms of their size, sector and locations. Unsuccessful applicants will only be a feasible counterfactual group for those programmes that have supplied relevant details (and any programmes that cannot supply this information would need to be excluded from this particular analysis)
- **Core analytical approach:** A similar core strategy should be applied, exploiting the availability of longitudinal data to account for unobserved differences between programme beneficiaries and the comparison groups. This should also include fixed effects at a programme level to allow for unobserved variation in the ways that

programmes have been administered. Where results are based on survey data, a difference-in-differences analysis could be combined with matching techniques.

- **Limitations:** The evaluation options for programmes are restricted by volumes of beneficiaries at a programme level (inhibiting the extent to which an evaluation might deal with each programme separately), size of firms (limiting the range of outcomes it will be possible to explore), and availability of data from programme intermediaries (meaning coverage can only be partial). This will limit the robustness of any evaluation strategy, with particular issues associated with accommodating unobserved differences in the ways in which individual programmes are implemented and governed.

5. Land and Property

This section sets out a framework for understanding the economic and wider impacts of the portfolio of land and property projects funded through the Regional Growth Fund, and identifies and assesses the viability of options for evaluating those effects.

5.1 Project and Programmes¹⁶

£261m has been allocated to 15 land and property projects (largely focused on a single site) and 12 land and property programmes (focused on multiple sites). The majority of this resource has been allocated to the preparation of brownfield development sites (covering land reclamation activities and provision of site infrastructure in advance of downstream development). A further £30m has been allocated to nine projects and programmes involving subsidies for the construction of commercial or industrial units. Finally, £23m (under Rounds 1 and 2) was allocated to land clearance and site assembly schemes associated with housing developments that were stalled due to the withdrawal of the Housing Market Renewal Programme.

While the majority of funding was issued in the form of grants, there were two examples of Revolving Infrastructure Funds in which the RGF grant was being used to forward fund site infrastructure works on the expectation that these capital resources would be recovered (at least in part) through subsequent Section 106 agreements with developers¹⁷.

5.2 Logic Model

In broad terms, an impact evaluation would ideally examine direct effects in land and property markets, as well as economic impacts:

- **Inputs:** Around £261m of RGF funding over Rounds 1 to 4 has been directed at land and property projects and programmes. There is some variation in how far additional resources from the private or public sectors are involved in supporting the direct costs of these projects and programmes. However, where development has come forward on sites serviced, the cost of any subsequent development activity (including contributions secured through Section 106 agreements) will need to be considered as an input.
- **Activities:** Activity is mainly focused on land remediation and providing site infrastructure to accelerate development on brownfield sites intended for commercial and industrial development, though there are some examples of schemes potentially involving housing.

¹⁶ The analysis of management information set out in the following section is based on extract of monitoring information taken from RGF systems in May 2014.

¹⁷ Site level information has been captured from land and property programmes funded through Rounds 1 to 3 of RGF. This provided evidence on the progress made across 37 employment land sites. Physical works were complete on one site, and the development of commercial and industrial units were in progress on a further two sites. For all other sites, land reclamation and site servicing was underway or no progress had been made.

- **Deadweight associated with development activity:** Consideration needs to be given to how far the development activity would have occurred in the absence of RGF funding.
- **Construction impacts:** Development activity may be expected to lead to short term effects through the creation of temporary construction jobs (and any multiplier effects). These short term impacts would ideally be assessed, alongside consideration of how far construction activity placed additional pressure on factor markets (potentially crowding out other construction locally or more widely).
- **Impacts on rents and land values:** Development activity will lead to an increase in the local supply of commercial and industrial floorspace or housing (potentially placing downward pressure on rents). However, if there were substantial environmental externalities associated with the sites involved, their removal may place upward pressure on adjacent and local land and property values (and potentially rents).
- **Relocation effects:** On the assumption that floorspace coming forward proves attractive, employment and GVA impacts will be driven by firms locating in the units built. Some may be using the premises to establish a new production facility, while others may be relocating existing operations. If units have attracted international firms, then the economic activity housed may lead to a (gross) increase in employment both locally and at the level of the UK. However, if units have mainly attracted local firms then impacts on employment may be limited. Relocations will leave original units vacant with corresponding effects on local employment and rents. The evaluation will need to consider the significance and spatial distribution of these negative effects (including how quickly any units left vacant were re-occupied).
- **Expansion and efficiency effects:** Relocations may facilitate the expansion of firms, which would be observed in an increase in their employment and output associated with the plant or firm in question. New premises may also help firms operate more productively.
- **Deadweight (2):** The extent to which these effects might be considered additional will also be dependent on how far the availability of the floorspace influenced the location decisions of the firms concerned. There may also be related displacement effects: if firms would have otherwise located elsewhere then it will be important to establish what other locations were under consideration (if any).
- **Displacement and multiplier effects:** Where developments have led to growth in economic activity (at any spatial scale) there may be short run displacement and multiplier effects.
- **Net (short run) additional jobs and GVA created or safeguarded:** The net short run impacts of land and property programmes will be represented by any additional employment brought to the area of interest, net of any displacement and multiplier effects.
- **Factor market effects:** If incoming firms create additional local demand for labour, then this may place pressure on wages (and the price of other factor inputs) which might be expected to lead to offsetting reductions in output and employment amongst other firms.

- **Net medium run jobs and GVA created:** The net medium run economic impact can again be represented as the sum of aggregate supply gains. In this case, interventions will have a direct impact on aggregate supply by increasing the availability of commercial and industrial floorspace (reducing the price of this input, and potentially encouraging firms to expand their overall levels of output). However, these types of interventions may also lead to rebalancing effects if they have impacts on the location decisions of firms.

5.3 Timing of Effects

Land and development projects are likely to deliver net economic impacts over the longer term. Development activity may take time to emerge on any sites remediated or serviced. The construction of commercial and industrial floorspace on sites remediated will also absorb time, and will also need to be marketed. It may not be unreasonable in some cases to expect the full employment and output impacts to emerge over timescales as long as ten years (with clear implications for the optimal length of an evaluation study), particularly if sites have been remediated in areas with weak property demand (though premises can be occupied quickly in cases whether there are shortages of commercial and industrial floorspace).

5.4 Gross Outcomes

As suggested above, an impact evaluation of the land and property projects and programmes funded through RGF would ideally capture their causal effects in both property markets and on local employment:

- Construction jobs and GVA created;
- Brownfield land reclaimed or serviced;
- Supply of additional commercial and industrial floorspace;
- Rents; and,
- On-going jobs and GVA accommodated.

As highlighted in the Phase One report, RGF monitoring focuses largely on the employment outcomes and leverage achieved by projects and programmes (with monitoring of short term construction jobs combined with the on-going employment associated with the developments). This introduces a range of issues associated with monitoring the gross outcomes of land and property project and programmes.

5.4.1 Construction jobs and GVA

An impact evaluation would ideally separate temporary construction effects from on-going effects on employment in assessing the performance of RGF. A number of options could be pursued to reach an estimate of the gross construction jobs and GVA created by RGF projects and programmes:

- **Project documentation:** Project applications provide substantial detail on both the expenditure associated with the project and jobs expected to be created or safeguarded. These describe the nature of any construction costs associated with the

project (and construction jobs where applicants are willing to be contracted to monitor those jobs). Job roles are also clearly specified in quarterly claim forms and application forms. A systematic analysis on a project by project basis may facilitate an approximation of construction impacts.

- **Surveys:** Surveys of beneficiaries could be used to allow them to self-report the proportion of project costs that represented construction expenditure. Results could then be used to approximate the number of construction years of employment and GVA created for the sample by applying estimates of turnover per worker (or the ratio of turnover to GVA) in the construction industry to estimates of construction costs. These estimates could then be extrapolated to the RGF overall on the basis of a suitable measure of aggregation (such as gross construction years of employment per £1 of project or programme expenditure).
- **Downstream development:** An assessment of the cost of any downstream development that might take place as a consequence of land remediation activity will be needed. In some cases, estimates might be available directly from programme intermediaries or developers. However, where this information is unavailable, estimates of the likely costs involved will need to be derived on the basis of the overall scale and type of development. For example, Turner and Townsend publish the International Construction Cost Survey, which provides estimates of build cost per square metre for a range of different accommodation types. These estimates could be applied to estimates of the total size of developments (see below) in order to reach an estimate of cost. Similar methods to those outlined above could then be applied to reach estimates of gross construction GVA and employment impacts¹⁸.

The strategies outlined above will only lead to an approximation of the short term gross construction impacts of RGF. Establishing these measures of the costs associated with downstream development will be particularly important for understanding the resource costs associated with the land and property projects funded (and hence the economic evaluation).

Recommendation

- Estimates of the construction jobs associated with land and property projects will need to be carefully assembled through a combination of application and monitoring data and research with beneficiaries.

¹⁸ See for example best practice guidance produced by the Homes and Communities Agency: <http://www.homesandcommunities.co.uk/employment-densities-guide-2nd-ed>.

5.4.2 Land Reclaimed, Floorspace and Rents

The impact evaluation will need to demonstrate the progress made by schemes in delivering land outputs. Monitoring of intermediate land and property outputs has not been built into the monitoring of RGF, but plans are in place to establish these measures more systematically. However, in the event that this information is not integrated into on-going monitoring, it is suggested that information is compiled from the following sources:

- **Grant beneficiaries:** Beneficiaries will hold substantial information on the schemes funded. A repeated census of these beneficiaries and intermediaries (as part of annual monitoring) can be used to collect the following items of information:
 - Geographical location of sites (postal address);
 - Size of sites (hectares);
 - Progress of remediation and preparation works;
 - Progress of construction of commercial and industrial units;
 - Floorspace associated with commercial and industrial units;
 - Postal addresses of commercial units;
 - Costs associated with any development activity (if available);
- **Planning applications:** If the information above cannot be obtained, searches of planning applications made to the local authority may help fill gaps in information. Consultations with local planning officers may be required to verify the status of development activity.
- **Rents:** There will be no monitoring information available to capture the rental value of developments constructed. Estimates could be derived using Valuation Office Agency's list of non-domestic properties for the purposes of assessing business rates. This data is a property level dataset incorporating the VOAs assessment of rateable value (the VOAs estimate of the annual rents that might accrue to the owner). However, these ratings are only updated on an infrequent basis (every 10 years), and would be of little use for an impact evaluation.

Recommendation

- Examination of gross effects of land and property projects will be challenging owing to an absence of detailed monitoring information or secondary data. An evaluation will need to assemble this information using a combination of secondary sources.
- BIS should work to establish a database of land and property projects and programmes (at a site level), to facilitate a later analysis of their impacts.

5.4.3 On-going Employment Impacts

Finally, an impact evaluation will need to capture the gross employment accommodated by developments that have come forward on targeted sites. As RGF monitoring does not separate construction jobs created from jobs housed by developments, an evaluation will need to use secondary data to establish these outcomes. However, provided postal addresses of all units constructed can be gathered through monitoring, it will be possible to

establish the employment associated with firms through analysis of the Inter-Department Business Register (an analysis that can be undertaken internally by BIS)¹⁹.

5.5 Impact evaluation options

The impact evaluation would ideally establish estimates of the causal effects of the site development activity of the Regional Growth Fund on land markets. There are three key issues requiring detailed consideration: (1) how far development would have taken place on the site involved in the absence of RGF funding, (2) how far that development crowded out any other development activity, and (3) how far employment accommodated by developments would not have come forward in the absence of the developments concerned. This section examines the viability of different options for assessing these effects.

5.5.1 Self-reporting

A 'self-reporting' approach for land and property programme would need to comprise both mixed methods case studies alongside surveys of occupants of developments.

Occupant surveys

Evaluation of land remediation programmes schemes have in the past tended to rely on the views of occupants to establish estimates of additionality of the employment that have come forward on those sites. Surveys of occupants were generally used to establish the following:

- Their motivation for moving to the new site (i.e. whether their occupation was a relocation of existing operations, the establishment of a new location, or the opening of a new enterprise)
- If the firm was a relocation, surveys would also seek to identify their prior locations;
- If the firm was a new firm, surveys would seek to establish the importance of the premises in supporting their formation;
- Any other locations under consideration, and how far they had experienced any shortages in the availability of suitable premises;
- Views on where the firms involved would have otherwise located in the absence of the premises;

As such, estimates of the impacts of land and property programmes have largely been based on the self-reported assessment of occupants. The application of these methods may allow a degree of spatial precision (since it will be possible to determine the specific origin and counterfactual destinations of firms). The incentives to overstate the impacts

¹⁹ Surveys of occupants will only be viable to the extent that it is possible to obtain contact details for occupants of developments. As the majority of land programmes were not complete, it has not been possible to determine with confidence whether this data will be straightforward to collect through monitoring (contact details were supplied in connection with just one site as a part of the exercise). In the event that such details cannot be obtained, contact details can potentially be assembled through proprietary business tele-numbering databases.

involved will also be smaller in these cases (as the occupants will not have received a direct subsidy from the Government), though the use of self-reported evidence will mean that any confidence that a causal relationship has been observed will be low.

Case studies

An assessment of property market impacts is potentially possible in the form of a case study approach involving the triangulation of secondary data and the views of local experts. Addressing the issue of the impact of RGF on site redevelopment will require an assessment of the local property market, in particular the extent to which development on the site would be attractive to a private sector developer given the likely cost (including any remediation or abnormal site preparation costs) and resulting end values.

If a viability assessment for the proposed development on a site has been commissioned by the local authority or landowner this will provide an indication of the extent to which the developer can be expected to pay any infrastructure or site preparation costs and still have a viable development. This assessment can then be compared to the actual contribution made by the developer (versus the cost met by RGF/the public sector). If such an assessment is not available, the development can be compared to benchmark costs and end values achieved by similar schemes in the area, supplemented by discussions with local agents and/or planning officers, to illustrate the extent to which public sector intervention was required to bring the site back into use.

If end values are shown to be insufficient, given the total costs involved, to encourage the private sector to take forward the development then some consideration should also be given to the likelihood that other public sector funds would have been used in the absence of RGF (e.g. ERDF or the Growing Places Fund). This will require desk research to establish the availability of relevant alternative funding sources in the area, and the stated priorities/objectives of such funds.

Review of desk research would ideally be supplemented with consultations with local experts: planning officers, property market agents, and potentially developers that have come forward to redevelop the sites in questions. These consultations should seek to establish a comprehensive view on the abnormal costs associated with the site, evidence of demand for similar brownfield sites in the locality, and ultimately further views on how far public subsidies were necessary to bring the vacant or derelict land back into use.

This process will not yield a quantitative assessment of the impacts associated with the RGF. However, the triangulation of secondary evidence and expert judgement should not be dismissed as a mechanism for understanding the causal contribution of RGF funding through a narrative assessment of the issues involved.

Recommendation

- A combination of occupant surveys and case studies are recommended to examine the impacts of land and property projects and programmes, given the risks associated with quasi-experimental approaches to evaluation (as set out below).

5.5.2 Before and After

A 'before and after' approach would focus on providing measures of the supply of commercial floorspace, associated rents, and employment before and after RGF intervention at the locations concerned. In principle, longitudinal data on these measures could potentially be constructed at fine geographical scale as follows:

- **Floorspace and rents:** The Valuation Office Agency (VOA) compiles a list of non-domestic properties for the purposes of assessing business rates. This data is a property level dataset comprising the address of the property, its land use class, its gross internal area, and its rateable value. The dataset also describes when a particular property entered the rating list, allowing the construction of a time series dataset at (for example) a Lower Super Output Area level through an aggregation of this information. However, although the dataset includes measures of rateable value, they are updated infrequently and would not be appropriate for assessing changes in rental prices at a local level.
- **Employment and GVA effects:** Longitudinal data at a site level (or small area level) could be assembled using the IDBR or Business Structure Database. However, there is a limit to how far such information could be utilised to establish GVA impacts directly (in most cases this would need to be estimated on the basis of ratios of GVA to turnover or GVA per worker derived from aggregated results of the Annual Business Survey).

While such an approach would give measurements of changes in the key outcomes of interest at key locations targeted, the absence of a counterfactual would substantially limit the extent to which any changes observed could be confidently attributed to the programme.

Recommendation

- Before and after approaches will be feasible using secondary data (exploring intermediate impacts on floorspace supply, and employment and unemployment). However, substantial work will be required to extract the relevant data from the VOA website (BIS could potentially expedite this process by facilitating access to the raw figures held by the VOA).

5.5.3 Site Level Approach

More robust strategies for assessing the causal effects may be possible if a sample brownfield sites sharing similar characteristics (acting as a counterfactual) can be identified. Such an analysis would focus largely on establishing the causal effects of RGF in bringing forward employment land for development, and would offer little insight into effects relating to on-going employment impacts.

There is currently no administrative dataset that holds details of such a set of brownfield sites: the National Land Use Database (fed by local authority returns on previously developed derelict or vacant sites) would in theory provide a potential sampling frame, but has not been updated since 2010. However, there may be alternative strategies:

- **Revolving Infrastructure Funds:** Two Revolving Infrastructure Funds have been created through RGF funding. These schemes will involve a competitive application process, and it may be viable to use rejected applications as means of identifying a control sample. However, this would only be suitable for two of the twelve programmes funded.
- **Planning officers:** Planning officers in the areas benefitting from RGF funding may be able to identify comparable brownfield sites that could be offered as a counterfactual.
- **Planning officers in non-RGF areas:** Planning officers in non-RGF areas may also be able to offer a set of comparable brownfield sites.
- **Unsuccessful applicants:** Finally, it may be possible to use the sites identified by unsuccessful applicants to the programme (though not all applicants identified specific site: for example, where applicants aimed to set up competitive funds).

Each of these strategies for identifying a counterfactual would suffer from substantial weaknesses. Selection bias issues might be anticipated: those sites involving RGF intervention are likely to be put forward on the basis that there is a reasonable expectation that a developer would come forward (and as such would be expected to differ substantially from those not put forward by RGF applicants). The range of unobserved characteristics of these sites is likely to be substantial (as unknown contamination and remediation costs will be driving the uncertainties that are preventing redevelopment of the land). Finally, there are also likely to be a range of highly localised and unobserved characteristics of local land and property markets that will be influential in the likelihood a developer being prepared to take forward development (there is very limited data on commercial property markets at a small spatial scale).

Recommendation

- A quasi-experimental approach based on the selection of counterfactual sites will not be viable.

5.5.4 Firm Level Approach

An alternative approach would be to focus on the location decisions made by occupants of the developments concerned. Such an analysis would focus primarily on establishing how far the employment accommodated by RGF funded developments was additional to the areas concerned. A more robust assessment would allow for a counterfactual scenario that accounted for firm's relocation or location decisions in the event that the site development did not take place.

This is not straightforward: the counterfactual might include firms that would have otherwise located in the same area, firms that would have otherwise located elsewhere, and firms that would have otherwise remained in their original location. These complexities have been reduced in a number of studies by focusing only on those firms that have made a relocation or location decision (i.e. focusing on the impact of the intervention in influencing firms' location decision, conditional on the firm having made a relocation). With

longitudinal data on location decisions made by firms it may be viable to assess the causal effects of these initiatives on the location decisions made by firms.

Such a framework could potentially be adopted for the purposes of assessing the effects of the sites developed through the Regional Growth Fund on firm location decisions. As the IDBR and Business Structure Database contains information on the postcode associated with individual plants and trading addresses on annual basis, it will be viable to select a sample of all businesses in England that have either relocated production facilities or established a new location both prior and subsequent to completion of site development works.

The impact of site developments could then potentially be understood using a choice model designed to capture the influence of the construction of new commercial and industrial premises on the probability that a particular firm decides to locate within the areas targeted by RGF funded land and property programmes. If completion of site works increases the attractiveness of the areas concerned (or eases constraints in commercial property markets driven by shortages of suitable floorspace), then one might expect to observe an increase in the probability of relocation to the area after the completion of site works. If no such increase is observed, then it might be concluded that employment accommodated by the sites concerned represents displacement from within the areas concerned.

In order to establish a counterfactual, it may be viable to exploit the timing of completion of site development works (i.e. those areas in which site development works are completed at a later stage might be used as a counterfactual for those areas in which works were completed at an earlier stage). However, this may be problematic as it requires an assumption that the selection of sites for remediation was made on a homogenous basis (and can therefore be assumed to have similar unobserved characteristics). In reality, RGF applicants will have selected sites for intervention on very different bases: in some cases sites will have been defined through the process of agreeing City Deals, in others, an applicant may have come forward with a scheme in the knowledge that large firms had shown interest in developing the site in question.

Additionally, there are likely to be unobserved area characteristics influencing both the probability that developers construct new commercial and industrial units and the location of decisions of firms. For example, if a large firm adopts a new location within the areas of interest, this may create incentives for suppliers to locate in proximity to the firm concerned (placing pressure on rents and increasing incentives for developers to bring forward employment land). In these scenarios, such a strategy is likely to overstate the impact of site completion works on location decisions. These could be in theory accommodated by allowing for time and area specific fixed effects within the analysis. However, such issues will undermine any strategy based on using the timing of site completion works as a means of identifying a counterfactual: sites developed most rapidly are also likely to be in those areas with the highest levels of demand for commercial and industrial units.

A final issue relates to the likely magnitude of the effects of the impacts of the site developments concerned. There is uncertainty as to the number of units that might eventually be constructed, which will act as a notional limit on the number of location decisions that may have been influenced by the availability of additional commercial and industrial floorspace. As noted previously, the number of schemes funded through the

RGF is relatively small (27 projects and programmes) and it may be difficult to robustly identify impacts with such a small sample size.

Given the issues outlined above, it may not be viable to establish a credible counterfactual to establish the causal effect of site development programmes of firm location decisions (owing to both the ways in which sites were selected and the likely small number of occupants involved).

Recommendation

- A quasi-experimental approach based on firm location decisions will not be viable.

5.5.5 Spatial Aggregation

An alternative approach would be to use area (LSOA) rather than site or firm level data to assess the impact of site development programmes. This would involve looking at changes in the supply of commercial and industrial floorspace and employment over time within the target area for programmes and a suitable counterfactual area. This approach would have the advantage of controlling for any displacement and crowding out effects at the local level (since any such effects would be accounted for by making an assessment at the area rather than a site level).

The selection of a comparison area is likely to be highly challenging owing to unobserved differences in the economic and physical characteristics of those areas receiving RGF treatment and those that do not. These problems might potentially be minimised using the following:

- **Analytical framework:** It will be possible to exploit an analytical framework developed to assess the long term impacts of land reclamation projects funded through the Single Regeneration Budget. This approach is set out in detail in Annex C, but involves defining a series of ‘treatment’ rings of increasing diameter around the centre of each LSOA in England. An LSOA is defined as having received a ‘treatment’ if there is an RGF funded site development within those rings (with treatment effects allowed to vary by distance). A counterfactual is created both by the inclusion of LSOAs that are not sufficiently proximate to the site developments concerned, and through variations in timing of completion of development work (with LSOAs benefitting from developments completing at later dates acting as a control for those benefitting from developments completed at an earlier stage).
- **Fixed effects:** With a longitudinal panel dataset at the area level, it will be possible to account for any time invariant characteristics of each LSOA in the panel that might influence the probability that developers add to the supply of commercial and industrial floorspace, as well as any unobserved time specific effects.
- **Land use designation:** In order to implement this approach it will be critical that proper account is made of land use designations over time. Planning constraints will place limits on the scope for commercial and industrial development within each LSOA. Close engagement with the local authorities concerned will be needed to establish a full record

of areas marked suitable for development for different uses (over time) so they can be accounted for appropriately (alongside reviews of Local and Unitary Development Plans). Any special designations (SSSIs, AONBs, etc) will also need to be captured (though this information can be straightforwardly obtained from ONS Geography).

- **Other spatial interventions:** RGF intervention is likely to be correlated with the intensity of other interventions (including the Growing Places Fund, City Deals, Enterprise Zones, and Growth Deals). As such, there is a risk that any approach that fails to account for these programmes will overestimate the impact of RGF. Each of these programmes has a defined treatment area that could be incorporated into a spatial analysis of the nature described above (at postcode, ward, or local authority area) and can be assembled from publicly available sources. As such it should not prove problematic to assemble the data to examine how far results are robust to the addition of these controls.

Recommendation

- Econometric analysis of area level data will potentially be feasible. However, such analysis should be considered optional until such a time that physical progress with the delivery of land and property projects is known more fully.

5.5.6 Sample size issues

The number of sites involved is likely to be small: just 15 projects and 12 programmes were identified through the review of Round 1, 2, 3 and 4 applications. The location and volume of sites involved at this stage is unknown: many programme bids have not identified specific sites for development (and consultations from Phase One suggest that in the case of some programmes, no schemes have come forward). Perhaps 50 to 100 sites might come forward, which would imply that the potential effect sizes would need to be substantial to be observed through statistical methods.

5.6 Displacement, Multiplier Effects and Crowding Out

For land and property projects, the methods outlined above would offer a framework for understanding displacement and multiplier effects at local levels (as outlined in detail in Annex C). Additionally, by extending the range of outcomes of interest to unemployment (the DWP publishes information on numbers on out of work benefits at finely grained geographical scales) it will be possible to establish how far any stimulus has translated into long-run improvements in aggregate supply through reabsorbing workers into the labour market (subject to the caveats associated with sample sizes highlighted in the preceding sub-section).

5.7 Land and Property: Recommended Approach

The following principles are recommended to support an impact evaluation of land and property projects and programmes:

- **Opportunities for detailed analysis:** The opportunities for detailed analysis of the impacts of land and property projects are limited by both the small numbers of interventions funded through RGF and the paucity of secondary data on the outcomes involved (at sufficiently detailed spatial scales).
- **Area level data:** Some assessment of the impacts of land and property projects on the supply of floorspace, employment, and unemployment through the creation of panel datasets bringing together longitudinal observations on these outcomes at an LSOA level from secondary datasets. Projects and programmes will need to be pooled to offer sufficiently large sample sizes for econometric analysis. However, given the timescales over which such impacts might be realised, the evaluation of land and property interventions will require a long term view (and employment impacts may not be visible for 10 years in some cases).
- **Displacement and multiplier effects:** The use of area based longitudinal data to examine the employment impacts of land and property interventions may help account for any localised displacement, multiplier, and general equilibrium effects.
- **Case studies:** However, it is likely that any quantitative analysis will need to be supplemented by case study research bringing together secondary and documentary evidence and the views of local experts (such as planning officers and local property agents), if these types of intervention are to receive detailed scrutiny through an evaluation of RGF. While these approaches will not offer a quantitative assessment of impact, they will enable a judgement to be reached on the effectiveness of these programmes in securing local economic impacts through addressing failures in local land and property markets.
- **Occupant surveys:** Case study research would also be usefully supplemented by occupant surveys in the longer term (i.e. after construction of commercial units is complete). This would provide additional insight into the origins of incoming firms and facilitate additional scrutiny of the importance of RGF funded developments in influencing the location decisions of firms (although such results could not be used to make causal inferences). Insufficient information is available on the number of likely volumes of occupants at this stage, and it is suggested that a survey is planned in detail once developments are complete and early indications of occupancy rates are available.

6. Other Interventions

This final section examines how other types of intervention that might be expected to deliver benefits at an area level might be treated in the evaluation of RGF (in particular, transport and destination marketing programmes). These projects and programmes do not account for a substantial share of overall RGF funding, and are highly diverse, and a case study approach may be preferred in these instances.

6.1 Transport

The role of transport infrastructure as a driver of economic performance has been the subject of much interest in recent years, although there appears to be very little evaluation work which has attempted to quantify this effect ex-post. The Eddington Review²⁰ sought to better understand the relationship between transport and the economy in a UK context, and concluded that transport matters to the economic performance of countries and regions. For developed economies, Eddington advised focusing transport investment on improving the capacity and performance of the existing network, as opposed to investing in significant infrastructure with the hope of delivering substantial economic benefits. Importantly, the review noted that where the transport network is established, transport improvements are most likely to deliver economic benefit where the investment is a response to signals of transport demand exceeding capacity. Eddington suggested that future transport policy and investment should be focussed on urban areas, commuter and intra-urban networks, ports and airports that are showing signs of increasing congestion and unreliability. It is also important to note that transport on its own is far from the complete answer to improving the economic performance of an area or region. Nevertheless, Eddington concludes that targeted, carefully planned transport infrastructure investment may be expected to significantly improve overall economic performance:

'...the performance of the UK's transport networks will be a crucial enabler of sustained productivity and competitiveness: a 5 per cent reduction in travel time for all business travel on the roads could generate around £2.5 billion of cost savings - some 0.2 per cent of GDP.'

Transport impacts on the economy in a number of different ways, directly through improved journey times, cost, reliability, network coverage/connectivity, comfort or safety/security of the journey which can, in turn, impact on:

- Business efficiency - through time, cost and journey reliability savings, particularly for business and freight traffic.

²⁰ The Eddington Transport Study, HM Treasury, 2006. Available at: <http://webarchive.nationalarchives.gov.uk/20090104005813/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/> (accessed July 2014)

- Business investment and innovation - where direct savings (time, cost and reliability) lead to a higher rate of business investment.
- Clusters/ agglomerations - by facilitating the expansion of clusters/ agglomerations by reducing travel time and costs, bringing firms, workers and consumers closer than otherwise would be the case.
- Labour markets - by supporting the overall efficiency and flexibility of labour markets, through better matching of people and skills to jobs.
- Competition - by offering consumers a greater choice of goods and services; and allowing businesses to trade over a wider, previously unattainable area, access more suppliers and reach more potential consumers.
- Domestic and international trade - through reductions in transport costs.
- Globally mobile connectivity - by attracting, retaining and expanding globally and nationally mobile activity through good transport links.

In addition, transport interventions can also contribute to social and environmental goals, which may ultimately impact on GDP and welfare.

6.1.1 Current practice

The Department for Transport (DfT) has produced extensive guidance and tools for the appraisal of transport schemes, which are compliant with the Green Book. The focus is on appraising the effect of scheme options and identifying the resulting benefit cost ratio, drawing on the outputs of available traffic models and software solutions.

In relation to roads, the Highways Agency undertakes a programme of post-opening project evaluation (POPE) which applies to both Major Schemes and Local Network Management Schemes and is focused on determining whether a scheme has delivered the benefits that were anticipated by comparing the costs and benefits predicted by the appraisal with the outturn figures. The assessment framework covers the five New Approach To Appraisal (NATA) objectives but only quantifies impacts in monetary terms for the safety (based on accident rates) and economy (based on journey times) objectives.

The POPE assessment adopts what DfT evaluation guidance refers to as an 'outcome approach' where 'any observed changes which reflect anticipated effects are assumed to result from the intervention' and there is also no consideration of how the scheme has impacted on the economic performance of the area (beyond the assessment of journey times). Other than POPE, evaluation of transport interventions tend to be confined to the evaluation of road safety, travel behaviour change or sustainable travel projects, rather than infrastructure investment meaning there is little precedent for the evaluation of the effect of this type of capital scheme on the economy.

6.1.2 Analysing the Economic Impacts of Transport Investment

Building on the work of Eddington, transport improvements may impact on the economic performance of an area in a number of different ways:

- **Journey time** - the direct benefits to users (whether firms or individuals) of transport improvements can be measured in terms of time saved and/or reduced costs (and traditionally this has formed the focus of evaluation of transport improvements).
- **Inward Investment, locational patterns and land use** - transport schemes can impact on the location decisions of firms and can influence housing policy and other land uses by helping to 'unlock' development sites.
- **Spending patterns and the visitor economy** - transport may have an important influence on the willingness of consumers and visitors to travel, therefore having implications for the retail and tourism sectors.
- **Wider impacts** - refer to the impact of transport schemes on productivity and competitiveness, building on the conventional analysis of costs and time savings to understand how such effects are translated into wider, macro-level outcomes on key economic variables, such as productivity. Wider impacts derive from both reducing the costs of existing economic interactions and enabling new ones. The key elements are :
- **Impacts of imperfect competition** - reduced costs of travel for businesses will result in increased profits and/or will allow the firm to reduce the price of their product or service . Lower prices are a benefit to the consumer and make the firm's good/service more competitive resulting in increased sales and therefore output (and associated employment).
- **Agglomeration effects** - the benefits of increased transport connectivity between firms and other firms and their potential employees, bringing benefits such as increased communication of ideas and innovation and increased choice of inputs and employees, improving the ability to match choices to needs.
- **Improved access to labour supply** - which depends on workers factoring in the cost of travel (including time) when deciding whether/where to take up employment. Reduced costs of commuting effectively increase the distance a commuter is willing to travel for employment, potentially encouraging greater participation in the labour force or a move to more productive jobs. This represents an increase in the labour supply available to a firm and potentially a reduction in labour costs.

The following sections discuss how the different types of impact may be assessed in the context of the RGF evaluation.

6.1.3 Transport benefits

The key metric here is journey time which, once established, can be translated into a monetary value using standard value of time estimates provided by the DfT. The POPE programme produces such estimates based on traffic surveys and, more recently, satellite navigation data. For the RGF evaluation, realistically there would a reliance on project

promoters or partners (such as the Highways Agency or local authority) providing relevant journey time data (before and after the intervention) from which an assessment of the change in cost could be made.

For other types of project (e.g. rail, port and airport related schemes), passenger numbers and/or freight volumes will provide an indication of the level of use. However, this information would need to be provided by the operators as published data is unlikely to provide the required level of detail. Where passenger routes have been introduced or improved it will also be possible to look at the change in connectivity and journey times.

6.1.4 Land use and development

Transport schemes can have an important role in helping to 'unlock' development sites, for example where planning permission is contingent on improvements to transport infrastructure being made. Public funding may be required to support these investments where the end values of development land are insufficient to make the cost of the transport scheme affordable to the developer/owner.

A review of local development framework documents and relevant planning decisions should reveal which sites were constrained in this way (though some specific sites are also referenced in the project application forms). Discussions with planning officers and an assessment of available data on end values compared to the cost (of the development and the transport scheme) and/or a review of the viability assessment for the development in question (where available) would inform an assessment of the extent to which public funding was required (and the likelihood of the scheme going ahead without RGF support).

The evaluation will also need to assess the level/type of development which has been unlocked by the scheme. This can be done by reviewing the relevant planning applications. Furthermore it will also be necessary to estimate the number of jobs associated with the development. If the development is still in progress, the job creation potential could be estimated using HCA job density benchmarks. If construction has been completed at the time of the evaluation then an employment figure could be produced with reference to those businesses actually occupying the development (based on a survey or reference to secondary data on employment). It will also be important to establish the previous location, the reasons for locating in the development and extent to which the new location has led to the creation of safeguarding of jobs in the area. In the case of residential development, the analysis should focus on establishing the number of households which occupy the site and the extent to which they are new to the area. The economic impact of new residents can be estimated in terms of their likely expenditure in the local area which will help to support local businesses and jobs.

The extent to which transport improvements encourage investment, business retention or relocations in the wider area (i.e. on sites other than those which are directly unlocked by the scheme) is also important. It can be assumed that this behaviour would occur only if the scheme creates improvements (or perceived improvements) in connectivity/journey times (see above). If transport benefits have occurred then the effect on business location could be assessed by analysis of business data and/or a survey, perhaps using time series data to assess the previous pattern of relocation/retention/growth of business activity in the area.

6.1.5 Visitors and spending

Effects on the visitor economy have most relevance where schemes result in new passenger routes at ports and airports. The literature distinguishes between three components of travel demand, i.e. given a change in travel time (or cost), a proportion of travellers will be induced to travel by alternative modes, travel to alternative destinations or initiate/cancel travel plans.

However, any increase in inbound visitors is likely to be off-set to some degree by an increase in local residents travelling out of the area. De Salvo has developed a method for estimating these (net) effects on spending in the context of an airport, although it appears that the scope for projects funded to date to impact significantly on the visitor economy is fairly limited so this analysis is unlikely to be appropriate.

Transport schemes may also help to encourage or retain consumer spending in an area, e.g. by encouraging local residents to shop in the town centre rather than going to a nearby town. An assessment of these effects could be informed by looking at footfall or turnover in retail areas over time.

6.1.6 Wider impacts

Measuring the impact of transport improvements on productivity is an extremely complex undertaking and there is very little ex-post evidence that transport improvements actually give rise to productivity benefits.

One example is the work undertaken by Gibbons et al²¹ on behalf of DfT to develop and then test a methodology for estimating the effect of road schemes on firm productivity, employment and wages. The research explored a number of possible approaches including those based on estimation of production functions and indirect methods, including using wage and employment data to estimate productivity changes and concluded that direct production function methods based on micro-data were likely to be most appropriate. The proposed method involved the capture of firm-level changes in productivity before and after the transport improvement was delivered, using a difference-in-difference approach with a control group of firms thought to be unaffected by the scheme to provide a counterfactual. It was noted that this proposed approach should, at a minimum, provide a direct assessment of the wider impacts associated with agglomeration economies, and also provide information on the size of labour market effects and the possible significance of other wider impacts.

The subsequent pilot study began by measuring the extent of change in employment accessibility at locations close to the chosen schemes as an indicator of the extent to which it had brought firms closer to other firms and workers (agglomeration effects), requiring construction of detailed origin-destination matrices (although the authors note that for some schemes these may have already been constructed as part of the appraisal

²¹ New Road Infrastructure: The Effects on Firms, SERC Discussion Paper 117, Gibbons, Lytikainen, Overman, and Sanchis-Guarner, 2012. Available at http://eprints.lse.ac.uk/58527/1/_lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_SERC%20discussion%20papers_2012_sercdp0117.pdf (accessed July 2015)

process). It was anticipated that this method would detect productivity changes caused by travel time savings, in so far as these are correlated with accessibility changes in the firms' locations. The authors then estimated firm level production and employment functions using microdata from the ONS Annual Respondents' Database and also linking to the IDBR and ASHE to enable the analysis of employment, productivity and wages.

However, the study was unable to detect a statistically significant change in total factor productivity, labour productivity or wages associated with improvements in employment accessibility occurring as a result of the road transport schemes that were considered. The authors considered that the most likely explanation was that the changes in employment accessibility generated by the schemes in question were too small and geographically localised to generate detectable changes in agglomeration-related productivity, leading them to conclude that the study offers little support for the idea that it is necessary to consider agglomeration-related firm productivity changes when conducting appraisals of small-scale improvements.

It would appear likely that the transport schemes supported by RGF are also going to be too small-scale to generate detectable firm level productivity effects, suggesting that any attempt to replicate the methodology developed by Gibbons et al would be unlikely to find a significant effect, notwithstanding the significant resource implications and technical challenges that implementing this methodology would entail.

Recommendation

- The transport infrastructure projects funded through the RGF are mainly small scale in nature, and have primarily been funded to support the release of employment sites rather than improve transport connectivity. Application of quasi-experimental methods may well be disproportionate, given that past studies of large strategic projects have found it difficult to identify firm level productivity effects. Given these issues, it is advised that transport projects are scrutinised using a case study approach using secondary evidence on effects on journey times and land use and development alongside qualitative evidence gathered from local planning officers, project delivery staff and other local stakeholders.

6.2 Other infrastructure

There has been very little RGF investment in non-transport infrastructure. In fact, among all successful bids in Rounds 1-4, only one was solely focused on area-based infrastructure not related to transport. This was a project to improve flood defences in Leeds city centre. In this case, a similar approach should be adopted as proposed above for land use and development impacts of transport schemes. An improvement in flood defences may unlock new development sites that would otherwise be unviable due to risk of flooding. Moreover, investment in infrastructure may have impacts more widely on the location decisions of firms in the affected area, attracting inward investment and safeguarding jobs in existing businesses in the area that may otherwise be tempted to relocate. An assessment of these impacts should be made on a case-by-case basis, possibly including review of planning documents, consultations with property agents or planning officers and surveys of local businesses.

Recommendation

- There is a single non-transport infrastructure project funded between Rounds 1 to 4. While further projects may be funded through Rounds 5 and 6, it is likely there will be insufficient numbers to facilitate robust quasi-experimental approaches. A case study approach is recommended to looking at these types of projects (and ultimately, this category of intervention may not have absorbed sufficient levels of funding to merit detailed attention through a main-stage evaluation).

6.3 Tourism

Only two bids in the first four rounds of the RGF are classified as tourism interventions. One relates to investment in a museum in the Lake District while the other is a national destination marketing programme. These schemes can also be considered to have a spatial focus, as the aim is to stimulate growth in the visitor economy of an area (or nationally) rather than directing support at individual businesses. However, tourism projects and programmes are very different to transport and infrastructure schemes and any case study evaluations are likely to involve a very distinct set of methodologies.

6.3.1 Gross outcomes

The key outcome of interest for tourism interventions is visitor expenditure; that is the amount spent by people while on holiday or making a tourism-related day visit within the area of interest. At a national and regional level, this information is collected through the International Passenger Survey (IPS) for overseas visitors, and the Great Britain Tourism Survey (GBTS) and the Great Britain Day Visits Survey (GBDVS) for domestic visitors. These sources also collect data on the number of visitors.

While these national surveys provide a breakdown of visitor expenditure by region, they do not drill down to the level of local areas. Therefore, alternative methods should be considered to assess the gross numbers of visitors and volume of visitor expenditure in an area. One approach is to monitor changes in hotel occupancy in the local area following the intervention. However, this is likely to underestimate visitor numbers as it does not include day visitors coming either from home or from accommodation outside of the local vicinity. Alternatively, monitoring data relating to the project or programme itself can also be used to generate gross outcomes. For example, it should be relatively straightforward to monitor the number of visitors to a museum over a given period of time. While these approaches would generate estimates of visitor numbers, estimates of visitor expenditure would have to be based on assumptions about average spending per visitor night or per visit to an attraction.

6.3.2 Additionality

A further challenge is to make an assessment of the extent to which this gross visitor expenditure would have been experienced anyway in the absence of the investment. In practice, it will be very difficult to establish a counterfactual using a quasi-experimental design as this would involve surveying, or directly observing the behaviour of, a matched set of people that did not visit the area in question. Therefore, it is likely that an assessment of additionality will be based on self-reporting, although caution should be exercised in view of the propensity for survey respondents to overstate impact.

To aid the recent meta-evaluation of the London 2012 Olympic and Paralympic Games, additional questions were added to the IPS, the GBTS and the GBDVS to ascertain the percentage of visitors attending Games-related events and (in the case of the IPS) the percentage who would not have visited the UK, or would have come for a shorter amount of time, in the absence of the Games. This approach may be suitable for the evaluation of larger national or regional programmes, although smaller projects with a more local focus would have to conduct bespoke surveys (e.g. by asking a sample of visitors to an attraction to assess the extent to which they would have visited the area if it were not for that attraction).

For destination marketing campaigns, an assessment of impact may involve a large-scale survey among the target population to measure the extent to which people were aware of the campaign and the extent to which this exposure has or is likely to influence visitor behaviour. This approach was used to evaluate the impact of the VisitBritain GREAT image campaign with results indicating that, among recent international travellers in 13 cities around the world where the campaign was implemented, 72% recalled the campaign, of which 29% reported a strong intention to visit the UK within three years. Moreover, it was estimated that 10% of the target population definitely or probably booked a trip to Britain as a direct result of the campaign and 9% definitely or probably stayed for longer.

6.3.3 Displacement and crowding out

The evaluation of projects and programmes focusing on sub-national visitor economies must also take account of displacement. It is possible that any additional increase in visitors to an area is partially or fully offset by a reduction in visitor numbers in other areas. This could be assessed empirically by examining hotel occupancy rates in neighbouring localities to estimate the net effects on visitor numbers across a wider target area. However, in reality displacement effects are likely to be very diffuse across the country so direct observation of visitor behaviour is unlikely to capture this displacement fully. Therefore, it is suggested that questions are included in any visitor survey to ascertain where (if anywhere) people would have visited had they not come to the area.

For domestic visitors, the evaluation would also have to consider wider displacement in product markets. While this will be difficult to measure, it might be assumed that any increase in spending in the UK visitor economy by UK residents would fully displace spending on other goods and services produced in the UK, except where this causes a reduction in demand for imports (including holidays abroad).

Crowding out will also be an issue for national and sub-national tourism interventions. In the medium term, once any under-utilised factors (e.g. unemployed people) are used up, an expansion of the visitor economy will cause factor prices (e.g. wages) to increase and induce other firms to reduce output and employment to retain profitability. It is recommended that any crowding out effects be assessed on a case-by-case basis.

Recommendation

- The two tourism interventions funded through the RGF over Rounds 1, 2, 3 and 4 have focused primarily on domestic tourists and the net economic impacts involved are likely involve high rates of displacement at a national level. A detailed assessment of impact would likely entail large scale visitor research, which would be likely disproportionate given the small scale of investment that has been made in these types of project. It is recommended that tourism projects are instead covered through analysis of secondary evidence on hotel occupancy rates, and employment in tourism related industries alongside qualitative research with local economic development officers, and project delivery officers.

6.4 Spatial programmes

Three larger programmes included in Rounds 1-4 of RGF have been classified as more complex spatial programmes. These are: a programme to redirect the A45 to facilitate an extension of the runway at Birmingham Airport; a combined transport and infrastructure scheme in Sunderland; and a programme of skills, business support and physical development to support the offshore wind sector in Hull. As these more complex programmes tend to involve a combination of different interventions all focused on the same area, it is recommended that a hybrid of approaches be adopted based on the methodologies covered in this report. However, further work may be required to understand any synergies between the different elements of the programme to assess the extent to which these different elements are complementary and hence produce added value or produce a duplication of outcomes at an area level. These issued should be addressed on a case-by-case basis.

Recommendation

- Spatial programmes should be handled on a case-by-case basis using a hybrid of the methodologies set out in this report.

6.5 Recommended evaluation strategy

Other intervention types, including those focused on area-level rather than firm-level intervention, should be evaluated on a case study basis. This is due to the fact that these projects and programmes are small in number, account for a small proportion of the overall RGF budget and are diverse in nature.

- Transport and infrastructure schemes make up the bulk of these other interventions, most of which are focused on 'unlocking' property development at sites which are otherwise constrained or unviable. Assessing the impacts of downstream land and property development will be key to evaluating these transport and infrastructure schemes although consideration should also be given to direct outcomes (e.g. travel times) and the wider impacts on productivity and agglomeration.

- Tourism schemes are small in number but require a specific set of approaches to estimate the net impact on visitor expenditure and the wider economy.
- Spatial programmes can sometimes involve a wider package of area-based interventions. These should be assessed on a case-by-case basis but are likely to involve a hybrid of approaches depending on the specific nature of the programme.

7. Economic Evaluation

This section sets an assessment of the economic evaluation options for the Regional Growth Fund building on the analysis of the impact evaluation options sets out in the preceding sections. This covers an assessment of how the key resource costs and social benefits of the Regional Growth Fund might best be understood, how they might be brought together in cost-effectiveness analysis (CEA), and how they might be monetised as part of a cost-benefit analysis (CBA).

7.1 Economic evaluation

The definition of ‘economic evaluation’ set out in the HM Treasury Magenta Book²² has been adopted for the purposes of this scoping study. This implies a focus on how far the costs of public intervention are justified by their benefits. The Magenta Book identifies two key types of analysis that might form the focus of an economic evaluation:

- **Cost Effectiveness Analysis (CEA):** A cost-effectiveness analysis seeks to value the inputs that have been absorbed by the delivery of an intervention, and then relates these to the quantity of impact delivered by the intervention (i.e. leading to measures such as cost per additional job created).
- **Cost-Benefit Analysis (CBA):** A cost-benefit analysis seeks to value the impacts of the interventions concerned alongside valuing the costs involved. This type of analysis seeks to determine how far the value of the benefits justifies the cost of interventions.

This report elaborates on the issues that will be involved in implementing both of these types of analysis in an economic evaluation of RGF, and establishes how far the scope of an economic evaluation might be inhibited by the results it is possible to credibly generate through an impact evaluation of RGF.

7.2 Key Issues

A range of key issues will need to be considered in an economic evaluation of the RGF.

7.2.1 Difficulties in robustly measuring net economic impacts

As set out in the impact evaluation options, it will be highly challenging to provide estimates of the net economic impacts of the Regional Growth Fund owing to difficulties in generating robust estimates of the scale of displacement and multiplier effects in the short run, and crowding out in the medium term (beyond effects at very local level for some types of intervention). Ex post-evaluation survey evidence may provide indicative findings on the possible scale and spatial pattern of these effects, though there are significant issues with the robustness of these approaches.

²² The Magenta Book: Guidance for Evaluation, HM Treasury, April 2011

This has substantial implications for the potential scope of a cost-benefit analysis of RGF, as this implies it will not be possible to gauge or value any benefits achieved through dealing with hysteresis effects (for example, by reducing unemployment): any increase in employment observed may well have been achieved through loss of employment in other firms or locations and an evaluation will not be able to robustly assess whether or not this has been the case. As such, a cost-benefit analysis will need to focus primarily on improvements in economic efficiency that can be observed at firm or area level (largely productivity gains or other improvements in aggregate supply).

7.2.2 Rebalancing

An economic evaluation of the Regional Growth Fund will need to consider how far the programme has been effective in achieving its objective in supporting growth in sustainable private sector jobs in areas highly dependent on public sector employment. This assessment will need to be made in parallel to judgements on the overall cost-effectiveness of the programme. Some (or even full) displacement of jobs may be tolerable to some extent if this has been achieved through a redistribution of those jobs from areas of low to high dependency on public sector employment. In quantitative terms, such a judgement will require a detail spatial disaggregation of the net additional employment impacts of the RGF. Even with use of ex-post evaluation surveys, such a disaggregation will be difficult to achieve (as surveys cannot provide the level of spatial detail required).

7.2.3 Apportionment of impacts between public sector partners

Funding for projects and programmes funded through the Regional Growth Fund has in some cases been matched with other funding from the public sector. These funding streams are varied: for example, other public sector funding could comprise as a diverse a range of funding as European Regional Development Fund (ERDF) grants, Technology Strategy Board grants (in the case of innovation projects), the Growing Places Fund (in the case of land remediation) or local authority funds. The availability of match funding is primarily an issue for programmes, where programme intermediaries have blended different sources of public sector funding to increase the overall scale of activity involved.

This raises a number of complexities in disentangling the impacts of RGF funding from those provided through other public sector programmes:

- **Impacts:** Comparisons of the relative performance of businesses benefitting from RGF funding against non-recipients will establish the overall impact of grants provided. Where RGF has been pooled with other funding streams, then the effects of the RGF 'treatment' will be difficult to disentangle from those associated with other public funding sources.
- **Overstatement of effects:** Nevertheless, RGF will have only contributed a share of the overall public sector costs involved. Such comparisons will overstate the contribution of RGF in the delivery of the impacts of interest.

It is suggested that this particular issue is handled by apportioning the overall impact of projects and programmes funded to RGF on the basis of its overall share of the public

sector costs involved. This approach aligns with wider Government evaluation guidance²³ and offers a straightforward approach for apportioning impacts across funding streams (though, a cost-benefit analysis of the programme will need to consider the overall resource costs and benefits involved).

7.2.4 Coverage of costs and benefits

All resource costs and benefits (including opportunity costs) should be incorporated into the CBA as far as it is feasibly possible to monetise the benefits involved. Where it is not possible to monetise impacts alternative appropriate methods should be used in line with HM Treasury Green Book and BIS guidance. Transfer payments should be treated as welfare neutral.

7.2.5 Additionality

Costs and benefits should only be included as far as they would not have been incurred in the absence of RGF. This assessment can be reached by subtracted the estimated counterfactual (i.e. the reference case) from the costs and benefits that have been observed. Alternatively, the evaluation could seek to establish additional costs and benefits directly. An assumption will be adopted that all costs to the public sector involved with the administration of RGF would not have been incurred in the absence of the programme.

7.2.6 Discounting

In the main, future costs and benefits will be discounted at a rate of 3.5 percent per annum (in line with the rate of social time preference recommended in the HM Treasury Green Book). However, where RGF has led to additional lending of private sector funds, a higher (real) discount rate of 10 percent will be applied to those funds. For the purposes of evaluation, 2010/11 (the first year in which expenditure on the programme was incurred) is suggested as the baseline year against which discounting might take place (the choice of base year is arbitrary, as long as results are presented in real rather than nominal prices).

7.2.7 Prices

Costs and benefits should be presented in real terms. It is suggested that the HM Treasury GDP deflator is used to deflate the nominal value of costs and benefits to the base year of 2010/11.

7.2.8 Uncertainties and Risks

The scale of the benefits delivered by the Regional Growth Fund will depend on their persistence over time. While an ex-post evaluation may be able to observe impacts that have been achieved to date, there will be a range of uncertainties and risks associated with their future impacts that will need to be accommodated in the evaluation:

²³ See OffPAT Combined Technical Indicator Note 31, OffPAT, May 2008.

- **Long term view:** In order to establish the permanence of any impacts delivered by the fund, the evaluation will require a long term view. An evaluation of RGF may need to extend to up to 2020 in order to demonstrate the long term effects of the projects and programmes funded (particularly in the case of innovation and land and property schemes).
- **Uncertainty and risk:** Even allowing for a long term evaluation, there may be residual risks and uncertainties associated with the persistence of aggregate supply effects. Any assessment of benefits extending beyond the lifetime of the evaluation will need to be subjected to sensitivity analysis based on the known uncertainties and risks involved.

8. Costs

Both cost-effectiveness analysis and cost-benefit analysis approaches to economic evaluation will require estimates of the resource costs that have been absorbed by the administration and delivery of RGF. This section sets out a framework of different types of costs that may need to be accounted for in an economic evaluation of RGF and issues that will be encountered in their estimation.

8.1 Central management costs

The Regional Growth Fund will absorb a range of resources through programme administration and management, including:

- **Direct costs of RGF:** The delivery of RGF will absorb staff, capital and other resources through both the activities of the RGF Secretariat and the GDT network in managing the application and appraisal process, and fulfilling performance management and monitoring functions.
- **Indirect costs to other organisations:** The activities of RGF will also place indirect costs on other areas of the public sector through placing the demands on the time of other staff. This includes the role played by policy officers and economists within BIS, BIS Local, and other Government Departments, as well as wider external groups involved in RGF delivery processes (such the Independent Advisory Panel and the Industrial Development Advisory Board).
- **Indirect costs to RGF applicants:** Finally, both successful and unsuccessful applicants will incur indirect costs as a consequence of their involvement in the management and delivery of Regional Growth Fund processes. These costs will primarily relate to the staff time absorbed by the preparation of RGF applications, and in the case of successful applicants, costs incurred through due diligence, and compliance with monitoring requirements. As applicants engage third parties (such as accountants and consultants) in these processes to greater or lesser degrees, there will also be direct financial costs that would ideally be assessed as part of an economic evaluation.

The following sections assess how far these costs might be established through monitoring information and the potential role of primary research in enhancing these estimates.

8.2 Direct costs of RGF Secretariat and GDT Network

The financial costs of administering the Regional Growth Fund through the RGF Secretariat and the GDT network are collected by finance teams within BIS and CLG respectively (covering staff as well as overheads). The assessment of these costs will be comparatively unproblematic as far as the RGF Secretariat is concerned. However, GDT staff will often be involved in the monitoring of multiple programmes (ERDF in particular), though costs will only be available for the GDTs as a whole and will need to be apportioned to RGF on an appropriate basis.

Ideally, these costs would be apportioned on the basis of the proportion of staff time dedicated to the monitoring of RGF. Such information is not captured through management information (monitoring officers do not complete timesheets), and will need to be estimated if they are to be included in an economic evaluation:

- **Approximation:** The most straightforward approach to apportioning these costs to the programme would be to ask five GDT leads to estimate the percentage of monitoring time dedicated that is dedicated to the RGF (from which an average - weighted by overall RGF resources under management - could be derived).
- **Time diaries:** An approach that may yield more accurate results would be to ask a random sample of monitoring officers across the GDT network to complete on-line or paper time diaries for a short period of time. While this may improve accuracy, it would also impose an additional burden on monitoring officers.

The cost of GDT staff is unlikely to be a significant component of the overall cost of the Regional Growth Fund, and uncertainties relating to these costs will have a limited influence over any CEA or CBA undertaken as part of an economic evaluation. In light of these considerations, it is suggested that the former of these approaches is adopted for the purposes of an economic evaluation.

8.3 Indirect costs to the public sector

The delivery of RGF absorbs a range of staff inputs that will not be captured through an assessment of the costs associated with the RGF Secretariat and the GDT Network. These indirect costs include:

- **Economists and policy officials:** Policy officials and economists within BIS and other Government Departments are involved by the RGF Secretariat to provide specialist inputs into the appraisal process (for example, sector experts and policy officials are asked to provide comments on any key policy issues raised by each bid received). BIS Local and Sector Teams (as well as other organisations, such as Local Enterprise Partnerships) may also provide informal advice to applicants on how far their project proposals align with RGF objectives.
- **Independent Advisory Panel and Ministerial Group:** As part of each funding round, the Independent Advisory Panel and Ministerial Group are convened to review the bids received, their appraisals, and select the successful applications.
- **Industrial Development Advisory Board (IDAB):** IDAB provides a range of advisory inputs into the contracting process (particularly around advising case officers on the strength of incentive effects and arguments associated with the likely additionality of projects and programmes).

The staff inputs absorbed as part of these processes carries an opportunity cost, as the time involved could have otherwise been diverted to other productive purposes. In

principle, these costs could be valued through the adoption of the Standard Cost Model²⁴, which expresses the cost of regular processes as the product of the length of time a process takes to complete, the frequency with which the process is undertaken, and the cost of staff time (earnings).

However, the absence of any management information providing estimates of these items of information will create challenges in collecting the evidence needed to value these costs. A primary research exercise involving an on-line or telephone survey of the individuals involved would be needed to establish estimates of the key variables of interest (and there would likely be additional complexities in creating a reliable sampling frame of individuals that have been involved). The costs involved are also likely to be comparatively insignificant relative to the overall cost of the scheme, and it is suggested that such an exercise would be disproportionate relative the likely importance of reducing uncertainties in this area.

8.4 Compliance costs

Finally, both successful and unsuccessful applicants will incur a range of costs as a consequence of their participation in the Regional Growth Fund and compliance with monitoring processes. The key relevant stages of the RGF process are as follows:

- **Preparation of RGF applications:** Applicants may invest substantial staff time in the preparation of their RGF applications (the design of projects and programmes may often require complex financial modelling, as well as board or other senior approval). Costs may extend to contracting consultants or other third parties in advising on the development of RGF bids (or their preparation in full).
- **Due diligence and contracting:** The conditions of RGF require that successful applicants complete a due diligence process undertaken by an independent third party. The due diligence process (normally led by an accountancy firm) must be completed at the cost of the applicant.
- **Monitoring:** For successful applicants, staff time will also be absorbed by compliance with on-going monitoring processes. While this includes the completion of claim forms and provision of appropriate supplementary evidence, applicants will also need to engage a third party to provide annual Independent Accountants Report as part of the validation of expenditure and job outcomes claimed.

Again, these processes can be valued with the application of the Standard Cost Model. A range of management information is available to support such an analysis: the RGF Secretariat hold records of the number of applications (successful and unsuccessful) received, record of the number of claims (and annual Independent Accountants Reports) submitted by successful applicants.

²⁴ The Standard Cost Model values the cost of administrative processes as the product of the frequency at which the process needs to be completed, the time taken to complete the process, and the wage of the member(s) of staff required to complete the process.

A parallel process evaluation of the Regional Growth Fund is underway at the time of writing. This study involves a random probability survey of unsuccessful applicants and a census of successful applicants, and has been designed to capture both the staff time absorbed and financial expenditures associated with third party inputs. These results will provide time based estimates of the average time absorbed by the processes outlined above (which can be valued on the basis of average earnings), and financial estimates of payments made to third parties. The results will be available for the economic evaluation to support an assessment of the management costs involved.

These results will understate the overall costs involved and will be subject to measurement error. In particular, there are likely to be costs incurred by non-applicants to the scheme (as a consequence of aborted applications) that will not be captured. While it may not be proportionate to collect evidence on any resources absorbed by aborted applications, the potential for uncertainty should be acknowledged in any CEA or CBA.

8.5 Programme management costs

A high proportion of RGF funding has been allocated to programme intermediaries. This introduces a second layer of management, and any CEA or CBA will need to account for the resources absorbed by additional management and monitoring of these schemes. An economic evaluation should focus on establishing two key items of cost:

- **Administration costs:** The administration costs incurred by programme intermediaries will be largely captured by monitoring and should be relatively unproblematic to account for. In some cases, programme intermediaries may contribute additional resources to the management of programmes that are not captured through monitoring processes (and survey research with programme intermediaries will be required to establish how far reported costs understate overall administration and management costs).
- **Compliance costs:** There will be further compliance costs for the beneficiaries of programmes in complying with monitoring and performance managements put in place by programme intermediaries. These can be estimated in a similar manner to the approach outlined for direct compliance costs set out in Section 8.4, though additional survey research with programme beneficiaries will be required to establish the evidence required.

8.6 Additionality

For the purposes of an economic evaluation, it is suggested that an assumption is adopted that all management and compliance costs incurred through the Regional Growth Fund would not have been incurred in its absence.

8.6.1 Apportionment issues

An economic evaluation will ideally break down management and compliance costs:

- by different types of intervention; and,
- at a project and programme level.

In order to do so, ideally it would be possible to observe the management overhead associated with individual projects and programmes. The majority of the costs outlined above can be broken down on this basis (as they can be observed directly at the project or programme level, or where they are driven by survey results, findings can be broken down by project type or at project and programme level).

However, the central costs associated with the RGF Secretariat and the GDT network cannot be attributed to individual projects and programmes. A range of potential strategies for apportioning these costs are potentially available. For example, such costs might be assumed to be uniformly distributed across successful projects and programmes (implying that the monitoring of each project and programme involves a similar management overhead), or weighted according to total RGF expenditure involved (implying the monitoring of larger scale programmes is more intensive than for smaller programmes). No strategy is likely to resolve all issues involved, and it is suggested that different options are explored in sensitivity analysis to establish their influence over CEA and CBA results.

8.7 Cost of capital

A large share of RGF projects and programmes involve investment in capital assets (including investment in training facilities or new instruments as part of R&D projects). In principle, the cost of capital investment should be valued at the rate of depreciation of the capital asset concerned and appropriately discounted to reflect the opportunity costs involved (though the opportunity costs of Government capital expenditure should not be included in the counterfactual).

8.7.1 Availability of data

The RGF Secretariat collects a substantial range of information describing the nature of expenditures made by projects, and it will be viable to isolate expenditure on different categories of asset (through a combination of monitoring information, supporting evidence supplied as part of the quarterly claims process, and the annual Independent Accountants report). In line with the categorisation adopted in the Annual Respondents Database, it is suggested that expenditure is classified in terms of investment in land and buildings, and investment in plant machinery and equipment.

The information on expenditures made by programme beneficiaries is substantially less rich, and such a classification of expenditure will not be viable. However, programme intermediaries have largely been able to classify projects by type, and it may be necessary to assume that all projects classified as 'capital investment' solely involve expenditure on capital assets (with innovation and training projects assumed to be primarily revenue expenditure). Alternatively, ex-post evaluation surveys could be employed to collect information on the breakdown of costs in terms of capital expenditures and revenue costs.

8.7.2 Depreciation

Depreciation of capital assets will vary by asset class and it will not be possible to observe these costs directly. As such, assumptions will need to be adopted on likely economic lifespan of the assets concerned.

8.7.3 Opportunity costs

The opportunity cost of capital investment should also be priced into the cost of the capital assets. This could be assumed to be the risk free rate of return that would be obtained from lending this resource to the market (with the interest rate on Government bonds serving as an appropriate discount factor on this issue). However, as public sector funding has been used to leverage capital investment, this share of the investment involved should arguably be discounted at the rate of social time preference recommended in the Green Book (3.5 percent). Additionally, the capital costs of projects involving social overhead capital (such as new transport links) should be discounted at this rate.

8.7.4 Additionality

Ideally, both cost-effectiveness and cost-benefit analyses would be driven by estimates of the additional capital investment costs associated with the RGF. However, as suggested by the impact evaluation scoping study, it will only be viable to make this assessment for firm level projects (of all types). It may be possible to estimate an additionality ratio for capital expenditure from these results that could be extended to programme beneficiaries. However, as this would be based on large firms (arguably those that are less likely to be subject to financial constraints), this may understate the impact of RGF on the capital investment expenditure of programme beneficiaries (largely small firms).

As such it is advised that estimates of both the gross and net cost of capital investment are presented in cost-effectiveness and cost-benefit analyses, clearly highlighting the caveats associated with extrapolating any findings of the impact evaluation to programme beneficiaries (with these uncertainties explored further through sensitivity analysis).

8.8 Revenue Costs

RGF projects and programmes will also involve a range of revenue costs (and in particular, the salaries of research and development staff and training expenditures). These types of cost should be treated as direct costs to the firms concerned (and discounted at the rate of social time preference set out in the Green Book).

8.8.1 Availability of data

As with capital costs, the RGF Secretariat collects a substantial range of information describing the nature of expenditures made by projects, and it will be viable to isolate revenue expenditures using a similar approach. The main challenge is again with programme beneficiaries where evidence on expenditure is substantially less detailed. Again, it may be necessary to assume that all projects classified as 'innovation' and 'training' solely involve revenue expenditures on capital assets. Alternatively, ex-post evaluation surveys could be employed to isolate revenue expenditures funded by grant and loan programmes.

8.8.2 Additionality

As suggested by the impact evaluation scoping study, it will be highly challenging to determine how far any increase in revenue expenditure would have otherwise been incurred by beneficiary firms in the absence of RGF (though it may be viable to assess

impacts on wage and R&D expenditure for some firms, it is highly unlikely that it will be possible to examine any effects on training expenditure). As such, the economic evaluation will need to present revenue costs in gross terms for all cost-effectiveness and cost-benefit analyses.

8.9 Summary

The management and compliance costs associated with the delivery of the Regional Growth Fund can be largely captured without additional primary research:

- **Central management costs:** The costs of the RGF Secretariat and the GDT Network can be obtained from central financial monitoring information. However, the costs of the GDT network will need to be apportioned to RGF on the basis of the estimated proportion of monitoring officers' time absorbed by the administration of the fund.
- **Compliance costs:** The costs incurred by successful and unsuccessful applicants can be estimated on the basis of monitoring information collected by the RGF Secretariat and survey findings collected through the process evaluation.
- **Programme management costs:** Programme administration costs can be largely estimated from monitoring information, though additional research will be required to estimate the costs incurred by programme beneficiaries in their engagement with the programme.
- **Apportionment:** An economic evaluation will need to apportion central management costs to individual projects and programmes. A range of options for implementing this apportionment should be integrated into an economic evaluation to test the sensitivity of results to the approach adopted.

In terms of the resource costs associated with the delivery of projects and programmes funded through RGF:

- **Project costs:** There is sufficient information available through financial monitoring and other sources to provide a detailed assessment of the capital and revenue costs associated with RGF. The cost of capital will need to be estimated on the basis of assumptions relating to the economic lifespan of different types of asset as well as the risk free rate of return.
- **Programme costs:** There is less information available on the costs incurred by programme beneficiaries. An appropriate revenue and capital split will either need to be estimated on the basis of assumption or through ex-post evaluation surveys of the beneficiaries concerned.
- **Additionality:** Assessing the additionality of costs is likely to prove problematic other than for the capital investment costs associated with projects. While it may be possible to apply assumptions from the impact evaluation extrapolating these estimates to other types of scheme, this is unlikely to be wholly reliable. As such it is suggested that costs are presented both on a gross basis, and a net basis applying sensitivity analysis to the key assumptions driving uncertainties.

9. Benefits

This section provides options for valuing the net benefits and disbenefits of the Regional Growth Fund. A cost-benefit analysis will only be viable where it is possible to provide estimates of the causal effects of projects and programmes. As such, the scope of this section has been limited to consideration of capital investment, innovation, training and land and property initiatives.

9.1 Jobs Created and Safeguarded

The impact evaluation will provide estimates of the causal effects of RGF the gross additional jobs created or safeguarded for firm level projects, grant and loan programmes and land and property projects (while surveys may provide some indicative evidence on the possible scale of displacement and other wider effects). These impacts have been routinely monetised in past evaluations in GVA terms (or Net Value Added by adopting appropriate assumptions on the depreciation of capital assets).

However, there are a range of issues with such an approach:

- **Failure to account for all costs:** Such an approach does not account for all costs involved in supporting the employment of workers (such as childcare costs, or travel) and will overstate net benefits at the level of society. This could be partly addressed by adopting appropriate assumptions on the likely size of these costs (see for example DWP guidance on cost-benefit analysis and its application in an evaluation of the Future Jobs Fund).
- **Difficulties in separating aggregate supply and demand effects:** It is highly challenging to separate impacts on aggregate supply (improvements in the productive capacity of the economy which can be treated as a net economic benefit in cost-benefit analysis) and demand effects (stimulus driving aggregate demand which may only be short term in nature, and at the national level, likely to be subject to high rates of displacement) in evaluation owing to the difficulties in establishing robust measures of displacement, multiplier effects and general equilibrium effects. Any monetisation of the jobs created and safeguarded on the basis of GVA produced will be subject to uncertainties as to how far these effects have led on to offsetting effects in factor markets (through placing pressure on wages and the price of other inputs).

As such, it is suggested that the GVA impacts of RGF are included in a cost-benefit analysis through sensitivity analysis (providing an upper bound on the possible benefits of the fund).

9.2 Capital Investment

The RGF involves substantial subsidies for fixed capital investment. As described elsewhere, these subsidies will lead to an improvement in social welfare where there are market failures constraining access to credit, thereby causing firms to employ sub-optimal levels of capital in production processes (either as a consequence of being quantity constrained or where credit is priced in excess of the risks involved). However, capital

investment subsidies may also generate positive externalities through productivity spill-overs if they are effective in attracting globally mobile FDI.

9.2.1 Addressing capital market imperfections

In a scenario of perfect capital markets, firms have no incentive to make capital investments that will earn profits at a lower rate than the risk free rate of return. If capital subsidies could not be targeted at these marginal investments, firms would not increase their levels of capital (as they would earn a superior rate of return by lending to the market), and subsidies would effectively represent a transfer payment to the firms concerned.

The administration of RGF involves a range of processes to increase the probability that subsidies reach marginal investments (i.e. those that would not have made in the absence of public support). To the extent that these processes are effective, firms would be expected to deploy greater levels of capital but earn rates of return lower than the risk free rate. This implies an overall loss of social welfare as the capital resources involved would have been more productively deployed elsewhere.

However, in the presence of capital market imperfections, capital investments earning higher rates of return may be available to firms that are quantity constrained or face other credit constraints. Capital subsidies in these cases may ease these constraints, enabling firms to earn additional profits in excess of the risk free rate of return. As such, the social welfare benefits of capital investment subsidies provided through RGF can be understood as the present value of profits over the lifetime of the additional capital employed in excess of the risk free rate of return and the cost of capital. These latter elements will be valued as a cost as described in the preceding sections, so the focus of this analysis will be on establishing the impact of RGF on the profits of beneficiary firms.

As suggested in Section 3, it will be viable to assess the impacts of RGF on the firm level profits for projects (and a less reliably for grant and loan programmes). The key challenge for such an assessment will be in terms of estimating the present value of future profits associated with the investments concerned. It is suggested that an assumption is adopted that any effects on profitability are assumed to endure for the lifetime of the assets concerned as estimated as part of the analysis of costs (and this could potentially be verified through long term evaluation).

9.2.2 Productivity spill-overs

Capital investment projects may lead to improvements in Total Factor Productivity amongst a wider pool of firms if they lead substantial increases in FDI (for example, through encouraging more efficient working practices amongst supplier firms). As suggested through the impact evaluation scoping studies, such effects will be highly challenging to estimate robustly and it will not be viable to include these types of benefit.

9.3 Innovation

Subsidies for innovation projects may often be justified on a similar basis to capital investment subsidies. However, innovation projects may lead to improvements in the efficiency with which factor inputs are used in the production process (through introduction of higher quality products, technological progress, or more efficient working arrangements), alongside improvements in the profitability of firms. This improvement in efficiency will increase the amount of output that might be produced by a fixed amount of labour, capital and other inputs, implying that innovation projects may directly lead to an expansion in the productive capacity of the economy. In line with HM Treasury Green Book guidance, such productivity growth should be treated as net improvement in social welfare.

Secondly, and as set out in Section 2, there are potentially additional positive externalities with innovation (which drive sub-optimal investment in research and development). As such, any expansion in productivity growth may not be limited to the firms benefitting from the RGF, particularly if other firms are able to exploit any knowledge through incremental innovation or learning by imitation.

9.3.1 Addressing capital market imperfections

As with capital investment projects, subsidies for innovation projects may also help address capital market imperfections, and a similar methodology as outlined above for capital investment projects should be applied. Such an approach would be viable for firm level projects (including grant and loan programmes) where it is possible to establish the key outcomes of interest.

9.3.2 Improvements in Total Factor Productivity

However, innovation projects in the longer term may lead to improvements in Total Factor Productivity if they lead to substantial improvements in product quality or organisational efficiency. This will represent an expansion in aggregate supply, and can be unproblematically treated as a net improvement in social welfare. The value of impacts on TFP can be understood as the marginal increase in output achieved by RGF beneficiaries, conditional on the labour, capital and finished goods and services used as inputs to the production process. An estimate of this value will need to combine estimates of the average impact of RGF on TFP and the results of econometric models used to develop estimates of TFP for each period.

Exploration of these types of effect will only be possible for projects. For programmes, it would in principle be possible to examine the impact of RGF on turnover per worker as a proxy measure for productivity. However, if RGF subsidies have encouraged financially unconstrained firms to undertake investment projects with lower expected returns than the risk free rate of return to capital, then there is a risk that such an approach would show positive effects on average labour productivity while having no positive benefits in terms of economic efficiency.

It should also be anticipated that such impacts may not be visible in the short term (or even in the performance of UK based firms). Research and development projects may take substantial amounts of time to come to their conclusions, and further time may be

needed to translate those outcomes into improvements in working practices, processes or products. Additionally, where multi-national firms have benefitted from subsidies for R&D projects, those improvements in efficiency may accrue to non-UK firms. As such, it may be difficult to demonstrate such effects over any reasonable timescale for the evaluation.

9.3.3 Innovation Spill-overs

Again, it will be highly challenging to estimate the impact of RGF through innovation spill-overs through diffusion of innovations or knowledge transfer. It will not be possible to include these types of benefit in a cost-benefit analysis of RGF projects.

9.4 Training

Training projects are typically justified by the presence of poaching externalities driving sub-optimal investment in training by employers. To the extent that any training provides skills that are industry or occupation rather than firm specific, firms may find it difficult to internalise the full benefits of training if there is risk of losing workers trained to competitors. Subsidies for training will make those risks more manageable for firms, and to the extent that training helps enhance the skills of workers receiving training, will lead to improvements in the productive capacity of the firms concerned. Such benefits extend beyond the workers concerned if any learning by imitation effects are significant (where non trained workers are able to learn from those trained), and beyond the firms concerned if trained workers are able to exploit their learning in the wider labour market.

9.4.1 Improvements in TFP and Average Labour Productivity

The impacts of training will potentially be observable in estimates of the effects of RGF on both average labour productivity and on TFP (as it will not be viable to control for the quality of human capital inputs in modelling). The value of these productivity gains can be extrapolated to the firms concerned on the basis of the numbers of workers employed (and such effects may be visible over shorter time horizons than innovation projects). Additionally, it will be possible to value these benefits for programme beneficiaries through examining impacts on turnover per worker (as a proxy measure for average labour productivity), as well as explore them directly where it is possible to collect longitudinal data through surveys.

9.4.2 Training spill-overs

Training spill-overs internal to the firm will be captured within the estimates above. However, it will not be possible to capture any spill-over effects accruing to firms beyond those benefitting from training subsidies through RGF.

9.5 Land and Property

Land and property projects and programmes may lead to improvements in social welfare if they are successful in addressing market failures inhibiting development of commercial and industrial floorspace, or if they lead to the removal of significant environment externalities or visual disamenities.

9.5.1 Market failures inhibiting development

Under normal circumstances, if land and property projects address failures in land markets restricting the optimal supply of commercial and industrial floorspace, then the benefits of investment can be comparatively straightforwardly understood. In principle, the increase in supply will lead to a decrease in rental values at the margins (i.e. closer to optimal prices). In turn, this reduction in factor prices will increase the profitability of firms benefiting from these reductions, stimulating an expansion of output. The benefits therefore might be understood as the present value of the profits associated with the additional economic activity accommodated by the developments in question.

The annual value of these benefits might be approximated using estimates of the increase in consumption of commercial and industrial floorspace by local firms and reduction in annual rents. While it will be viable to explore these effects on a qualitative basis through the case studies recommended, the impact evaluation will not supply the quantitative estimates required to implement such an analysis (largely due to an absence of quantitative data at a sufficiently local level to enable an assessment of these impacts).

In addition, even if it were possible to generate estimates of this nature, the distortions to land markets caused by the planning system may make such a CBA highly challenging to implement. The high prices of land designated for residential development may act as an incentive for developers to avoid bringing forward commercial and industrial land in the expectation of higher end values if they can achieve a change in designation in the future. As such, it frequently may not be optimal to bring forward employment land schemes if these sites could be put to more valuable use through residential development.

9.5.2 Environmental Externalities

In the case of land and property projects, the market failure is likely to be one of externalities caused by combination of high (abnormal) development costs and low end values which means that the cost to the private sector would exceed the benefits which could be captured resulting in the development not going ahead even though this would generate wider (social) benefits. As noted above, this can be tested by comparing development costs to likely end values. Negative externalities resulting from derelict or disused sites include blighting the development potential of other nearby sites, impacts on visual amenities (and therefore value) of nearby properties and health and safety issues (e.g. as a result of contamination or dereliction).

A more detailed quantitative approach to testing the presence of those externalities might be feasible through the implementation of hedonic pricing models. These models place a value on the negative externalities by examining the relationship between distance from the brownfield sites and the value of local residential and commercial property. This approach has been used to evaluate the benefits of a large land remediation scheme in the US (the Superfund).

The viability of such an approach will depend largely on the number of property transactions that have taken place in the neighbourhood of the sites concerned. While data on residential property transactions are collected systematically by the Land Registry (and are available on a property by property basis), if insufficient volumes of property transactions have taken place, then there will be insufficient data points upon which such a

detailed analysis might take place. Evidence from the aforementioned evaluation of the Superfund suggests that the negative externalities involved may be highly localised, accruing mainly to adjacent properties. The current lack of information on the location of sites treated through the RGF makes it challenging to make an assessment of the viability of such an approach (for example, one site being targeted by one programme are derelict properties in the port of Sunderland: these properties are not surrounded by substantial volumes of residential properties and it may be challenging to implement such an approach in such cases).

Overall, it is not possible at this stage to make an assessment of the viability of the application of hedonic pricing techniques to value the externality benefits of land remediation activity funded through the RGF. Additionally, given the wider evidence, it is likely that such effects will be small, and might be considered as a second order outcome for an evaluation.

10. Value for Money

In light of the difficulties in establishing the net economic impacts of the RGF, it is likely that cost-effectiveness will form a key element of the assessment of value for money for the programme. Cost-effectiveness analysis seeks to relate the impacts achieved by public intervention to its cost, providing a measure of how efficiently the policy has delivered its objectives.

10.1 Summary of costs and benefits

The table below provides a summary of the costs and benefits it may be feasible to capture within an evaluation of RGF.

Table 10.1 – Summary of Core Costs and Benefits

Costs	Benefits
Opportunity cost of additional private capital investment	Present value of profits associated with additional investment
Revenue expenditures	Increases in Total Factor Productivity / Average Labour Productivity
Central administration costs	
Programme administration costs	
Compliance / transaction costs	

10.2 Cost per additional job created

As suggested by the impact evaluation scoping study, it will only be possible to provide scheme wide estimates of the causal effects of RGF at a firm level in terms of:

- Average jobs created (or safeguarded)²⁵; and,
- Average turnover growth.

These measures can potentially be used to develop VFM measures for firm level projects and grant and loan programmes. As a core objective of RGF is to support job creation and growth of beneficiary firms, these measures will provide an appropriate metric of how efficiently the scheme has met its objectives.

Given the difficulties in measuring the additionality of the costs involved, it is suggested that measures of cost per job created or safeguarded and £s of turnover per £1 of

²⁵ It is important to be clear that these estimates will not include construction jobs except in the case of land and property interventions.

expenditure are presented using two measures of cost. Firstly, VFM metrics should be presented in terms of the cost of RGF to the public sector to provide a measure of how efficiently public sector spending has been used in delivering job creation activity (with job outcomes apportioned appropriately as outlined in Section 7). Secondly, VFM metrics should also be calculated on the basis of the total gross costs of projects and programmes to provide a measure of the cost of the programme to society overall (incorporating estimates of total job creation activity).

Presentation of cost-effectiveness analysis should be clear that the estimates of impact do not account for displacement and other wider effects, and as such only represent impacts amongst RGF beneficiaries (rather than impacts on the total stock of jobs in the economy). As such, estimates of cost per job created or safeguarded are likely to overstate the cost-effectiveness of the programme in delivering such effects.

10.3 Rebalancing Effects

The RGF was also designed to create jobs in areas with high dependency on public sector employment. Again, the difficulties in establishing the scale and spatial distribution of displacement effects will prevent an economic evaluation from determining whether and how cost effectively this objective has been achieved (since it will not be possible to robustly determine how far job creation activity has led to offsetting negative effects within the same areas).

As such, an examination of rebalancing effects may need to focus only on how far RGF resources have reached the areas with high dependency on public sector employment (and associated job creation outputs) to reach a an indicative judgement on how any impacts observed have reached such areas.

10.4 Leverage

Finally, the RGF was created with an objective of stimulating private sector investment. For firm level projects, it will be possible to estimate the causal effects of RGF on capital investment levels. As such, it will be viable to estimate the increase in capital investment per £1 of RGF spending for these types of initiative projects. However, given the narrower range of outcomes it is possible to robustly explore for grant and loan programmes and other intervention types, such estimates of cost-effectiveness in terms of leverage will not viable.

10.5 Cost Benefit Analysis

The evaluation of RGF will need to combine estimates of costs and benefits to make an assessment of the overall value for money. There are a variety of ways in which these could be combined through the evaluation:

- **Benefit to Cost Ratios:** The ratio of the present value of benefits to the present value of costs associated with RGF will provide an estimate of the overall increase in social welfare achieved per £1 of costs incurred.
- **Internal rate of return (IRR):** The internal rate of return (IRR) is the discount rate that would give a proposal a present value of zero.

- **Net Present Value (NPV):** The discounted value of a stream of either future costs or benefits. The NPV is used to describe the difference between the present value of a stream of costs and a stream of benefits.

The approaches represent three different ways in which the cost-benefit equation can be presented, based on the same dataset. Whilst every effort should be made to provide monetary estimates of costs and benefits, it will not always be possible to do so robustly or indeed at all. The presentation of the results of the analysis will, therefore, need to allow for uncertainties in estimation (e.g. through sensitivity analysis) and for the presence of non-monetised costs and benefits (e.g. using multi-criteria analysis).

Annex A: Firm Level Control Variables

There are a series of organisational actions at work impacting upon business performance ranging from Governance structures to the gender diversity of the boardroom. However, there are also other economic factors that are important to consider such as innovation and export intensity which are in themselves driven by a number of determining factors. This Annex explores the range of control variables it may be desirable to account for in analysis of firm level observations.

Organisational factors

The literature identifies a number of key organisational factors that directly impact upon business performance at the firm level:

- Size of board:** Much of the debate on board structure has centred on pressure for smaller board size. It is argued that although larger board size initially facilitates key board functions, there comes a point when larger boards suffer from coordination and communication problems and hence board effectiveness (and firm performance) declines. The empirical evidence appears to support this view, with a majority of studies documenting a significantly negative relation between board size and corporate performance. If larger board size indeed 'causes' weaker performance, then larger boards would represent inefficient governance that could possibly be improved by a 'one size fits all approach to board size. For example, some scholars have argued that board size should be no greater than 8 or 9^{26,27}) for all firms. However, this interpretation is by no means universally held. A number of recent papers^{28,29,30,31,32} show that board size is determined by firm-specific variables, such as Tobin's Q³³, profitability and firm size.
- Corporate Governance:** Few studies have found a positive relationship between corporate governance and measures of performance. In information rich, competitive stock markets, such as those of the UK or the USA, it would be surprising to find that companies with particular governance arrangements consistently provided a higher return to their shareholders. Most studies have found either a negative influence or no influence of measures of 'good governance' (such as the independence of the board) on corporate performance. Some studies, however, have found that a period of poor

²⁶ Lipton, M., and J.W. Lorsch. 1992. A modest proposal for improved corporate governance. *Business Lawyer*

²⁷ Jensen, M.C. 1993. The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance*

²⁸ Lehn, K., P. Sukesh, and M. Zhao. 2004. Determinants of the size and structure of corporate boards: 1935–2000. Katz Graduate School of Business

²⁹ Boone, A.L., L.C. Field, J.M. Karpoff, and C.G. Raheja. 2007. The determinants of corporate board size and composition: man empirical analysis. *Journal of Financial Economics* 85: 65–101.

³⁰ Coles, J.L., N.D. Daniel, and L. Naveen. 2008. Boards: Does one size fit all? *Journal of Financial Economics*

³¹ Guest, P.M. 2008. The determinants of board size and composition: Evidence from the UK, *Journal of Corporate Finance*.

³² Linck, J., J. Netter, and T. Yang. 2008. The determinants of board structure. *Journal of Financial Economics*

³³ The Q ratio is calculated as the market value of a company divided by the replacement value of the firm's assets. For example, a low Q (between 0 and 1) means that the cost to replace a firm's assets is greater than the value of its stock. This implies that the stock is undervalued. Conversely, a high Q (greater than 1) implies that a firm's stock is more expensive than the replacement cost of its assets, which implies that the stock is overvalued.

performance may precede governance improvements and it has been suggested that investors do not concern themselves much with governance when companies are performing well, but that boards come under pressure to change their governance in periods of underperformance³⁴.

- **Board diversity:** Gender diversity is one aspect of board diversity. A more diverse board could add value by bringing new ideas and different perspectives to the table. Better decision-making occurs as a result of directors having a range of experiences and backgrounds. Boards are often criticised for having similar board members, with similar backgrounds, education and networks, such homogeneity is not conducive of new ideas and suggestions being challenged³⁵. Research has shown that strong stock market growth among European companies is most likely to occur where there is a higher proportion of women in senior management teams. Companies with more women on their boards were found to outperform their rivals with a 42% higher return in sales, 66% higher return on invested capital and 53% higher return on equity.
- **Chief Executive Power:** The greater the degree of decision-making discretion retained by a CEO and the more severe are information asymmetries between the CEO and the owners, the greater the likelihood of weak governance and non value-adding decisions will be made³⁶. In this context, owners are likely to establish a combination of contractual incentives for their agents and directly monitor their behaviour – for example, by means of annual audits³⁷. Indeed, improving managerial incentive contracts, such as linking executive compensation to agreed performance targets and promoting outsider representation on corporate boards, are common mechanisms designed to increase the traded value of firms³⁸. Too much CEO power can also create a moral hazard problem when the CEO's preferred projects differ from those of shareholders³⁹. In other words, when an individual CEO has complete autonomy to make decisions, he/she can use such authority to make personal economic gains, such as through increased rates of perquisite consumption and/or 'rigged' payoffs under compensation plans, and thus reduce shareholders' wealth⁴⁰. However, while most scholars contend that there is a negative correlation between CEO power and financial performance, it need not be the case in all firms. A dominant CEO can give force and direction to corporate strategy thereby increasing entrepreneurialism, and reducing the risk of delays and disputes that often comes with more democratic board-level decision-making⁴¹. Dominant CEOs are more likely to be unconstrained in their capacity to take risky strategic decisions CEOs who are in a structurally powerful position inside an organisation are more likely to be innovative and take entrepreneurial-type risks that generate on average higher profits than are less powerfully positioned CEOs⁴².

³⁴ Abdullah, A. & Page, M. 2009. Corporate Governance and corporate performance: UK FTSE 350 companies

³⁵ Maznevski, M. L. (1994) Understanding our differences: Performance in decision-making groups with diverse members, *Human Relations*

³⁶ Brown, R., & Sarma, N. (2007). CEO overconfidence, CEO dominance and corporate acquisitions. *Journal of Economics and Business*.

³⁷ Watts & Zimmerman (1986) *Positive accounting theory*. Prentice Hall.

³⁸ Morse, A., Nanda, V., & Seru, A. (2011). Are incentive contracts rigged by powerful CEOs? *Journal of Finance*.

³⁹ Adams, R., Ferreira, D., 2007. A theory of friendly boards. *Journal of Finance*

⁴⁰ Morse, A., Nanda, V., & Seru, A. (2011). Are incentive contracts rigged by powerful CEOs? *Journal of Finance*.

⁴¹ Sah, R. K., & Stiglitz, J. (1991). The quality of managers in centralized versus decentralized organizations. *Quarterly Journal of Economics*, 106(1), 289–295.

⁴² Adams, R. B., Almeida, H., & Ferreira, D. (2005). Powerful CEOs and their impact on corporate performance. *Review of Financial Studies*, 18(4), 1403–1432.

Structural factors

The literature also identifies a number of key structural factors that directly impact upon business performance at the firm level:

- **Firm size and age:** Firm age, which is highly correlated with size, is an indicator of when a firm has a high probability for exit. A single plant enterprise in UK manufacturing that is less than a year old and which is taken over by a US multinational during the 1980s is 165 times more likely to exit than the average plant⁴³. Older plants, they argue are more likely to be able to withstand the process of creative destruction. Small young firms that are new to a market experience the most rapid growth. Recent evidence for the UK highlights that surviving firms aged between two and three years are much more likely to experience high growth (growth rates greater than 20 per cent) than firms over the age of six years⁴⁴. Firms in new industries are likely to be younger on average, and so industries in the more mature stages of their life cycle are likely to be dominated by older, larger firms. However, it is important to note that a recent study found that as many as half the high growth firms they have identified are older than 10 years and point out that mature high growth is often ignored because of a strong policy focus on ‘gazelles’⁴⁵.
- **Internationalisation:** Economic theory would suggest that exports and FDI are substitutes for one another, with the choice between exporting and FDI dependent upon the relative costs of market entry under either scenario. The empirical research based on firm level micro data documents a positive relationship between exporting and productivity – exporters are more productive than non-exporting firms of the same size from the same narrowly defined industry⁴⁶. There are two main reasons for this:
- **Self-selection of the more productive firms into export markets:** There are additional costs of selling goods in foreign countries. The range of extra costs include transportation costs, distribution or marketing costs, personnel with skill to manage foreign networks, or production costs in modifying current domestic products for foreign consumption. These costs provide an entry barrier that less successful firms cannot overcome. Furthermore, the behaviour of firms might be forward-looking in the sense that the desire to export tomorrow leads a firm to improve performance today to be competitive in the foreign market.
- **Learning-by-exporting:** Knowledge flows from international buyers and competitors help to improve the post-entry performance of export starters. Furthermore, firms participating in international markets are exposed to more intense competition and must improve faster than firms who sell their products domestically only.
- MNEs are expected to perform better than domestically-owned non-MNE plants because they are assumed to possess individual intangible assets that provide them

⁴³ Harris R and Hassaszadeh P (2002) ‘The Impact of Ownership changes and age effects on plant exits in UK manufacturing’, *Economics Letters*, 75, 309-317.

⁴⁴ Bishop K, Mason G and Robinson C (2009) *Firm Growth and its effects on Economic and Social Outcomes: Literature and Statistical Review*, Report to the National Endowment for Science Technology and the Arts (NESTA).

⁴⁵ *Ibid*

⁴⁶ Bernard, Andrew B. and J. Bradford Jensen (1995), *Exporters, Jobs, and Wages in U.S. Manufacturing: 1976 – 1987*. Brookings Papers on Economic Activity, *Microeconomics* 1, 67-119.

with a competitive advantage with respect to competitors in the host market⁴⁷. The intangibles may take the form of specialised knowledge (including patents) or superior marketing capabilities (including branding). Such assets enable the MNE to overcome the advantage that local plants would otherwise have in terms of knowledge of local markets. MNE plants may also benefit if there are multi-plant economies of scale and if there are network spill-overs that may occur between plants. UK research of manufacturing firms has examined the total factor productivity of manufacturing plants that changed, and compared those acquired by UK-owned firms and those acquired by foreign-owned firms⁴⁸. The findings highlighted that plants with higher productivity tended to be more likely to be acquired by foreign-owned. More recent research found that manufacturing plants belonging to foreign-owned and domestically-owned MNEs were more productive than domestic non-MNE plants (i.e. the foreign-owned advantage noted by Harris and Robinson is in fact an advantage shared by all MNEs)⁴⁹.

External factors

It is also important to consider the wider economic environment as a driver of business performance.

- Macro-economic environment:** In a buoyant economic cycle with rapid employment and output growth business and consumer confidence is high, encouraging corporate investment and household spending. It is easier for firms to make higher profits during such periods, with spending high less marketing and promotion is required to encourage consumers to purchase their products. Periods of rapid economic growth can lead to overspending based on credit, causing spending in the short term that is in excess of sustainable levels, as witnessed in the aftermath of the financial crisis of 2007/08 where consumer spending was squeezed as a result of falling levels of disposable income and rising unemployment as corporates reigned back on recruitment (as well as investment). The recent financial crisis also highlight that firm performance is influenced by economic factors outside of the country. For example, world trade (in both value and volume terms) fell sharply, creating a difficult trading environment for export orientated companies. Equally, at the sectoral level the asset price bubble affected some sectors more than others (such as the construction sector owing to its close links to the housing market), and it is important to take sector specific influences into account when examining firm level performance.
- Geography:** Geography is an important external factor to consider when analysing firm level performance. The economic environment in some parts of the UK is very different from others, e.g. in London workforce jobs are now approximately 4% above their pre-recession peak, whereas in the North East the number of jobs remains 3% below its pre-recession peak. Businesses which operate only in domestic markets, particularly those with a limited catchment area, face a much tougher trading environment than other similar firms located in other parts of the UK. The business structure is also very different across regions, for example a region such as London is heavily dependent

⁴⁷ Caves R (1996) *Multinational Enterprise and Economic Analysis*, 2nd ed., Cambridge, MA: Cambridge University Press

⁴⁸ Harris R and Robinson K (2002) 'The effect of foreign acquisitions on total factor productivity: plant level evidence from UK manufacturing 1987-1992', *Review of Economics and Statistics*, 84, 3: 562-568.

⁴⁹ Martin R and Criscuolo C (2009) 'Multinationals and US productivity leadership: evidence from Great Britain', *Review of Economics and Statistics*, 91, 2: 263-281.

upon finance and business services, whereas other regions are more dependent on other sectors such as public services in the case of the North East. Any 'economic shocks' can have differing impacts on different regions in terms of severity, and any assessment of firm performance should take into account the prevailing local business conditions against which the business is operating.

Summary

A summary of the potential matching variables of interest are set out in the table below.

Table C.1: Possible Matching Variables

Theme	Variable	Rationale
Organisational	Board size	<ul style="list-style-type: none"> An incremental increase in board size increases financial performance up to a point, then the marginal rate of performance improvement diminishes as the board level becomes unwieldy.
	CEO power	<ul style="list-style-type: none"> Too much CEO power can also create a moral hazard problem when the CEO's preferred projects differ from those of shareholders . It is important to consider the alignment of CEO interests with the interests of the shareholders (i.e. is the CEO rewarded with share options as part of his reward package?).
	Executive pay / incentives	<ul style="list-style-type: none"> Improving managerial incentive contracts, such as linking executive compensation to agreed performance targets and promoting outsider representation on corporate boards, are common mechanisms designed to increase the traded value of firms
	Board diversity	<ul style="list-style-type: none"> Better decision-making occurs as a result of directors having a range of experiences and backgrounds.
Structural	Firm size and age	<ul style="list-style-type: none"> Small young firms are more likely to experience faster growth than large older firms.
	Export orientation	<ul style="list-style-type: none"> The empirical research based on firm level micro data documents a positive relationship between a firms export intensity and both productivity and employment.
	Ownership type	<ul style="list-style-type: none"> MNEs are expected to perform better than non-MNE plants because they are assumed to possess individual intangible assets such as specialised knowledge (including patents) or superior marketing capabilities that provide them with a competitive advantage.
External factors	Macroeconomic environment	<ul style="list-style-type: none"> Growth influences the trading environment and therefore firm performance (in both upturns and downturns) Some economic 'shocks' tend to be sector specific
	Geography	<ul style="list-style-type: none"> Trading traditions differ across UK regions

Annex B: Other Government Programmes

The Regional Growth Fund may not be the only contributory factor involved in bringing about any job creation or investment outcomes observed amongst grant beneficiaries. Alongside the external influence of the wider economy, the availability of wider programmes of Government support may also have a complementary role in supporting the delivery of these objectives. An impact evaluation designed to establish the causal role of RGF in bringing about these outcomes would ideally explicitly account for the contributions of these wider Government programmes.

This section provides a review of the monitoring supporting a range of wider programmes, and considers the feasibility of utilising this information to strengthen an evaluation of the Regional Growth Fund (based largely on a series of consultations with monitoring and policy officers responsible for their administration and management).

Objectives of this review

The Regional Growth Fund may interact with a wide range of other publicly funded programmes that have a parallel or complementary role in bringing about the economic impacts the programme was designed to generate (job creation outcomes). An evaluation of the programme would be made more robust if the causal contribution of RGF in delivering these outcomes could be explicitly separated from programmes funded elsewhere by the Government (embedding a systems thinking approach into quantitative evaluation).

Qualitative methods are normally applied to give consideration to these issues, relying on the judgement of the evaluator to make inferences on the relative contribution of different public programmes in delivering the outcome of interest (and will remain an important element of any impact evaluation). Quantitative impact evaluations have normally focused exclusively on the treatment effects associated with the programme of interest (largely due to data availability), making an implicit assumption that receipt of other complementary types of support are randomly distributed across treatment and control groups (and can thus be ignored). There are a range of scenarios in which such approaches may overstate the causal impacts of programmes (for example, if the treatment group of interest benefits jointly from one or more additional programme over the period of interest, such methodologies may incorrectly attribute the sum total of those impacts to the programme of interest).

The need to make these simplifying assumptions could potentially be avoided if it is possible to obtain and link monitoring information associated with wider programmes with the potential to interact with RGF. For example, an individual firm may benefit from grant funding for capital investment through RGF to facilitate the production of an innovative new product that was developed through grant funding provided by the Technology Strategy Board, following relocation to a Local Enterprise Zone. Each of these programmes may have a role in explaining the changes observed in total employment and productivity within the firm, and if it is possible to establish how far RGF beneficiaries have benefitted from

these programmes (in the past or in the future) then it may be feasible to separate the effects of RGF from these wider programmes.

Such an exercise would involve the construction of a longitudinal panel dataset of RGF grant beneficiaries (and potentially an appropriately selected counterfactual group). Alongside describing the timing of any RGF grant funding they have received, this dataset would also describe the timing and nature of their direct or indirect participation in wider publicly funded programmes.

Programmes covered

A long list of potential programmes of interest was identified at the Inception Phase, and was subsequently refined to those with the greatest potential to interact with RGF. Schemes were selected to cover those involving direct financial or advisory support to individual businesses (that may also have an important role in delivering employment or productivity growth amongst RGF beneficiaries), or subnational programmes with the potential to deliver regeneration benefits in areas highly dependent on public sector employment (either through direct investment or through the creation of complementary incentives). Universal schemes (those likely to affect all businesses in England, such as tax reform) were excluded from this review.

As part of this review, eleven programmes were covered (with a number of key informants unavailable during the consultation window for this report). As highlighted above, the remainder of these programmes will be covered as a matter of priority as part of the scoping studies. The table below shows the range of programmes forming the scope of this review (with cells highlighted in blue illustrating those that have been covered at this stage).

Table D.1: Wider programmes of interest

Advisory support			
Growth Accelerators	BIS	International Trade Advisors	UKTI
Export Marketing Research Scheme	UKTI	Overseas Market Introduction Service	UKTI
Gateway to Global Growth	UKTI	Passport to Export	UKTI
Tradeshaw Access Programme	UKTI	Manufacturing Advisory Service	BIS
Training			
Employer Ownership Pilot	BIS		
Finance			
Business Bank	BIS	Grants for Business Investment	BIS
Enterprise Finance Guarantee	BIS	Low Carbon Innovation Fund	BIS
Bond Support Scheme	UKEF	Export Working Capital Scheme	UKEF
European Investment Fund	EIF	JEREMIE	DCLG
JESSICA	DCLG	Enterprise Capital Fund	BIS
European Regional Development Fund	DCLG	AMSCI	BIS
Innovation			
Catapult	TSB	Collaborative R&D	TSB
Smart Grants for R&D	TSB		
Sub-national initiatives			
City Deals	DCLG	Coalfields Fund	DCLG
Growing Places Fund	DCLG	Enterprise Zones	

Inter-linkages with RGF

The review of wider programmes suggests that there are a wide range of potential inter-linkages between the Regional Growth Fund and wider initiatives currently funded by the public sector:

- Advisory support:** The availability of universal advisory support for SMEs has declined in recent years with the closure of the regionally structured Business Links as part of the BIS funded Business Improvement Programme. Provision of business advice migrated to on-line and telephone based delivery mechanisms (such as the national Business Link Helpline). However, more intensive support for businesses for the potential for high growth is available through Growth Accelerators programme (with a strong emphasis on unlocking the growth potential of those firms). Overlap with RGF may be limited, but the support may be an important precursor to a successful bid for grant funding for capital investment (particularly in relation to the smaller grant programmes managed by programmes).
- Access to Finance:** BIS has funded a number of programmes over recent years to address the constraints faced by firms in obtaining credit to fund capital investment (such as guaranteeing loans to small businesses or aiding access to venture capital). These programmes are strongly related to the RGF in that these schemes aim to provide working capital for similar expansion of production facilities (although in some cases, entrepreneurs will be looking for working capital with a view to develop a

particular idea or innovation to the point at which they profit from the sale of the firm, and in those cases, overlap with the objectives of RGF may be minimal).

- **Export support:** A wide range of export advice and support is provided by UKTI. This ranges from grants for researching the potential of overseas markets through to one-to-one advice to inexperienced and experienced exporters, and the creation of opportunities to market specific products overseas through introductions and trade shows. Given the strong emphasis on the manufacturing sector through the RGF and the likely contributory role of export markets in supporting output and employment growth amongst beneficiaries, it is plausible that the support provided through UKTI will have a contributory role in achieving that growth.
- **Export finance:** Similarly, two UK Export Finance schemes have been developed to provide working capital and to guarantee performance bonds associated with large contracts between UK manufacturers and overseas buyers. The availability of these schemes may also support the growth of RGF beneficiaries (and in some cases may directly compete with some programmes funded through the RGF).
- **Training:** RGF may lead to increases in the efficiency and productivity of grant beneficiaries alongside expansions in their production capacity. The availability of publicly funded training directly managed by employers (such as the Employer Ownership Pilot) will also potentially contribute to productivity growth outcomes, and an evaluation of RGF may need to explicitly account for their role to the extent that grant beneficiaries make extensive use of those programmes.
- **Sub-national initiatives:** Finally, there are a number of spatially focused programmes largely funded by DCLG. RGF beneficiaries may benefit more or less directly from these schemes (for example, by relocating to an Enterprise Zone to take advantage of tax relief). There may also be important interactions between RGF programmes and these schemes: for example, the consultations with programmes revealed one example where a Revolving Infrastructure Fund was being targeted at accelerating the development of brownfield sites within an Enterprise Zone. In these cases, there may be substantial synergies between Government programmes in delivering urban regeneration effects.

Monitoring of wider programmes

The capacity of any evaluation to explicitly account for these issues will depend largely on how far there is monitoring information available describing the potential participation of RGF employers in the programmes of interest or relevance. For this to be viable, the monitoring information would ideally provide the following:

- Details of the firms receiving support (names, addresses, company registration numbers) to enable it to be linked to RGF monitoring information and a potential control sample;
- The timing of support received;
- Details of the nature or level of intervention received.

In addition, for a data-linking exercise of the nature described above to be feasible, appropriate provisions will need to be in place to permit the sharing of the relevant information with third parties. Consultations with the relevant programmes addressing these key issues, and results are set out in the table below (in some cases, programmes are monitored using the same systems, and some findings have been grouped).

Overall, the findings of this review were positive: evidence gathered suggested that substantial detail is being collected by wider programmes of interest, with no major obstructions identified in sharing this information for the purposes of an evaluation. Sub-national programmes (such as City Deals) may be more difficult to integrate into a firm level dataset, and further work on this issue is needed to fully scope how these can be accommodated in an evaluation of RGF.

Wider work of note

This initial review has revealed that there is currently wider work of note that is being undertaken within BIS that it may be possible to exploit in an evaluation of RGF. Of key interest is a current IT project that is exploring the feasibility of establishing a 'central data spine' of SMEs and other businesses reached by the different programmes funded by BIS. This exercise is being driven by the needs of communications teams within BIS to aid the targeting of publicity and marketing associated with different programmes. However, as the exercise may potentially lead to a linked dataset describing the full range of participation in BIS funded initiatives for each SME, this could potentially be a highly valuable resource for evaluation in general (particularly if that dataset can be linked into the Virtual Microdata Laboratory to obtain information on the financial performance of those firms).

Table 5.2: Wider monitoring availability

Organisation	Schemes	Monitoring Information	Names / address	Reg/ numbers	Timing	Nature of support	Willingness to share for an RGF evaluation
UK Export Finance (credit guarantees for UK based exporters)	Export Working Capital Guarantee (credit guarantees) Bond Support Scheme (credit guarantees)	UK Export Finance hold records of the firms benefitting from credit guarantees in central monitoring.					Details of UK Export Finance's beneficiaries are in the public domain. Additional detail could potentially be assembled from UKEF's CRM systems to support datalinking (e.g. companies house registration numbers).
UKTI (advisory support for existing and potential exporters)	Export Marketing Research Scheme (finance) Gateway to Global Growth (advice) International Trade Advisors (advice) Overseas Market Introduction Service (other marketing support) Passport to Export (advice) Tradeshaw Access Programme (other marketing support)	UKTI operate a single CRM system across all programmes. This is supplemented by the PIMS monitoring survey that collects information on jobs created as a consequence of support.					Initial views suggested that UKTI would not foresee any obstacles in sharing company information for the purposes of an evaluation of RGF. Further clarification and confirmation is being sought from UKTI.
BIS	Employer Ownership Pilot (training)	EOP is being monitored using the Individualised Learners Record maintained by the Skills Funding Agency. While this is an employee level dataset, each employee is associated with an employer code which can be matched to the 'Blue Sheep' database to provide a record of the firms benefitting from training through the programme.					Firm level data would need to be obtained through a data request to the Skills Funding Agency. The EOP team did not foresee any major obstruction in obtaining this information (particularly as any such request will be submitted on an internal basis).

BIS (cont)	Growth Accelerators (advisory support and access to venture capital)	Growth Accelerators is managed externally by consortium of providers led by Grant Thornton. However, a single CRM system is used by the lead contractor to monitor the programme, including capturing details of all firms benefitting from the various streams of support and training available through the programme.				While obtaining an extract of monitoring information may not necessarily be straightforward due to the design of the system, no major obstructions were envisaged in terms of sharing this information within BIS for evaluation purposes.
	Enterprise Capital Funds (access to venture capital) Enterprise Finance Guarantee (credit guarantees)	Monitoring of these programme have been undertaken externally by CfEL. Information is available at a firm level, though attempts to use this information for evaluation purposes showed that in some areas the monitoring information was incomplete.		Unknown		Monitoring information will in principle be available for these schemes. However, owing to the nature of the schemes in some cases, linking will be difficult to achieve (particularly where entrepreneurs have sought to sell their business, resulting in changes in name and ownership). Additionally, datalinking to VML data of EFG beneficiaries suggested some issues with the quality of the match available.
	Business Bank (various)	The Business Bank is an amalgamation of schemes outlined above and is likely to have similar monitoring arrangements. However, there is a significant addition in the form of wholesale finance for SME lending. In this case this involves boosting the capital available for lending to SMEs amongst banks and there will be no records of the individual firms benefitting from this element of the programme.			<i>Unknown at this stage though likely to be similar to the schemes above.</i>	-
DCLG	City Deals (additional freedoms for LAs – no funding attached)	The City Deals are not programmes in the conventional sense: there is no funding attached to the programme, but a negotiation of additional freedoms and flexibilities. There was no formal monitoring of Wave 1 City Deals, though Wave 2 City Deals will monitor progress against city specific indicators.			<i>Not applicable</i>	It is highly unlikely that the City Deals will produce any detailed monitoring information that could potentially be used in detailed econometric modelling for the purposes of an evaluation of RGF. In order to accommodate City Deals, it will be necessary to delve into the precise plans of individual cities and collect any appropriate information at that level.

	<p>Coalfields Programme (physical regeneration and reclamation of contaminated land)</p>	<p>The consultation mainly focused on the Coalfields Fund (a £15m revolving equity fund to managed by an external contractor, EV). Monitoring was held at arms length with DLCG receiving only summary reports on the outputs and results of the scheme (although in principle this information is available to DLCG if required). The land remediation element of the scheme is completely delegated to the HCA and follow up research will be needed to explore this scheme in more detail.</p>		<p>Unknown</p>	<p>Unknown</p>	<p>Unknown</p>	<p>Consultations suggested a strong hesitancy within DLCG to share this information for the purposes of an evaluation of RGF owing to data protection restriction. The consultation suggested that details of land based schemes are in the public domain but follow up research with the Homes and Communities Agency will be needed to confirm the scope of what is available.</p>
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Annex C: Spatial Impacts

This Annex explores the potential to examine the spatial economic effects of the RGF (including the spatial patterns of displacement and multiplier effects).

Issues

A spatial disaggregation of the gross effects of the Regional Growth Fund is relatively unproblematic. However, when considering the impact associated with the projects and programmes funded, the absence of a defined area that the fund is intended to benefit introduces a number of complications:

- With a clearly defined target area, it is straightforward to conceptualise concepts such as displacement within the framework set out in the HCA Additionality Guide. If economic activity is displaced from within the target area, then it should be subtracted from estimates of the net impact of projects and programmes.
- In the absence of such a zone (particularly in the case of a national programme like RGF), these concepts are difficult to operationalise for the purposes of sub-national analysis. For example, an attempt to understand the impacts of RGF on a selection of towns in the West Midlands would not only need to account for any displacement occurring within those towns, but also for any negative effects within those towns caused by projects and programmes funded in other places. This implies a need to understand the spatial pattern of these types of effect in substantially greater detail than might be required for a straightforward area based initiative.

These issues might be simplified if it were possible to define an artificial target area for the programme. The following sections explore the feasibility of doing so on both policy grounds and on the basis of the geographical distribution of the projects and programmes funded.

Areas dependent on public sector employment

A key objective of the Regional Growth Fund is to create jobs in the private sector to support the rebalancing of areas highly dependent on public sector employment. However, dependency on public sector employment is not defined for targeting purposes. Nevertheless, it may be possible to define an RGF target zone on this basis, for example:

- **Areas with above average dependency on public sector employment:** Such an approach would take the local authorities or Travel to Work Areas with above average dependency on public sector employment to be included within the RGF target zone.
- **Areas with high dependency on public sector employment:** Alternatively (and reflecting the wording of the White Paper on Local Growth), it may be desirable to limit such a definition to those that 'need it most', and only include (for example) the 25 percent of local authorities or TTWAs with the highest dependency on public sector employment.

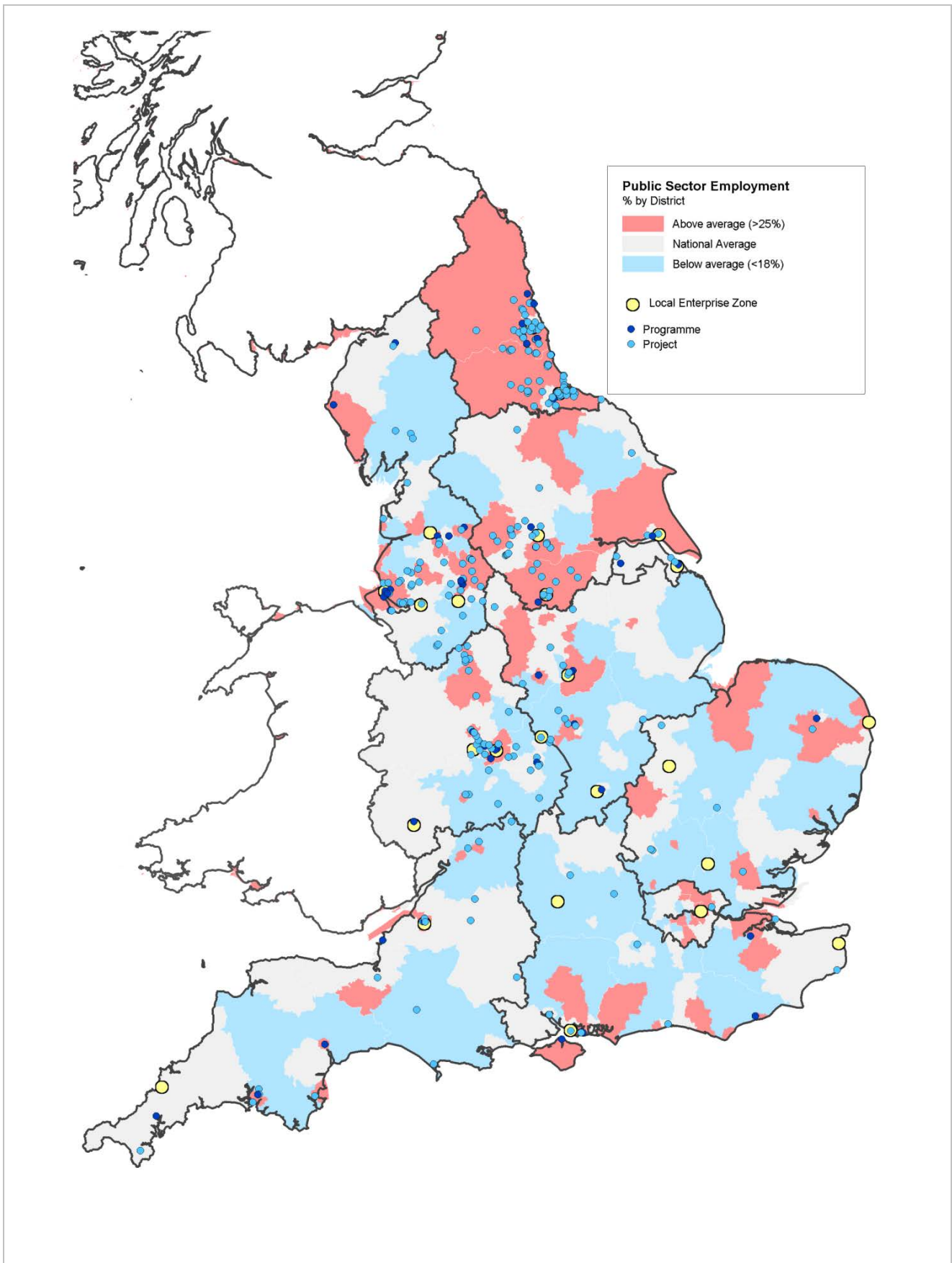
However, as illustrated in the preceding sections, both area definitions may be difficult to implement. There is not a strong link between dependency on public sector employment and the projects funded (and the evidence suggested that location was not a substantial influence over the probability of selection). These issues are drawn out in slightly more detail in the map overleaf: many of the projects and programmes that have been funded are in areas with less than average dependency on public sector employment. Additionally, numerous areas that are highly dependent on public sector employment have received little in the way of RGF funding.

This may be problematic as any area definition based on dependency on public sector employment will exclude large volumes of RGF projects and programmes. This could be accommodated by considering the impacts achieved by any projects outside the zone as leakage (and following the HCA Additionality Guide, any effects associated with these projects would be subtracted from estimates of the total net additional impacts of RGF). Such an approach would align closely with the research questions identified above (a key objective of the economic evaluation will be to understand how far the benefits of the programme have accrued to areas highly dependent on public sector employment⁵⁰).

In terms of implementing the framework, the economic evaluation will need to separate any short term displacement and multiplier effects that have occurred within areas of high dependency on public sector employment from those that have occurred outside of those areas. As the map overleaf suggests, such a 'target area' would be highly fragmented. In order to make such a framework actionable, an economic evaluation would need to be able to disaggregate the spatial distribution of displacement and multiplier effects at an appropriate spatial level (local authorities or TTWAs).

⁵⁰ Though in the absence of a precise target area defined in policy documents, it is suggested that both definitions outlined above are adopted for the purposes of an evaluation.

Figure 13.1 Dependency on public sector employment relative to the England average



Location of projects and programmes

An alternative approach would be to base an RGF target area on the location of projects and programmes (which could be constructed on the basis of creating a buffer zone around the projects and programmes funded, on the basis of either the local authorities or TTWAs receiving RGF ‘treatment’ to reflect local functional economic geographies). The map overleaf illustrates how such an area might be defined on the basis of creating 10km and 20km buffer zones around each project and programme (and show that while individual projects may not be located within areas dependent on public sector employment, the workers involved may do).

Given the geographical dispersion of the projects and programmes funded, however, broader area definitions may cover a large proportion of the country (for example, the presence of a single project in East London would imply the entire region would be included within the target area if it were to be defined on the basis of TTWAs⁵¹). More localised definitions (such as the set of local authorities receiving an RGF ‘treatment’) may be more helpful for the purposes of analysis (although this does not help reduce the level of spatial complexity associated with the effects involved, unless an assumption is adopted that displacement and multiplier effects only occur at the local level⁵²).

Standard administrative boundaries

Finally, given the interest in sub-national breakdowns of findings at regional, LEP or local authority level it would be helpful if any strategy for identifying displacement and multiplier effects would enable such a disaggregation. As the approaches outlined above will require a great level of detail on the spatial distribution of displacement and multiplier effects, if it is feasible to implement such an approach, an aggregation of the results involved will also enable an assessment of net impacts at these higher spatial scales.

National programmes

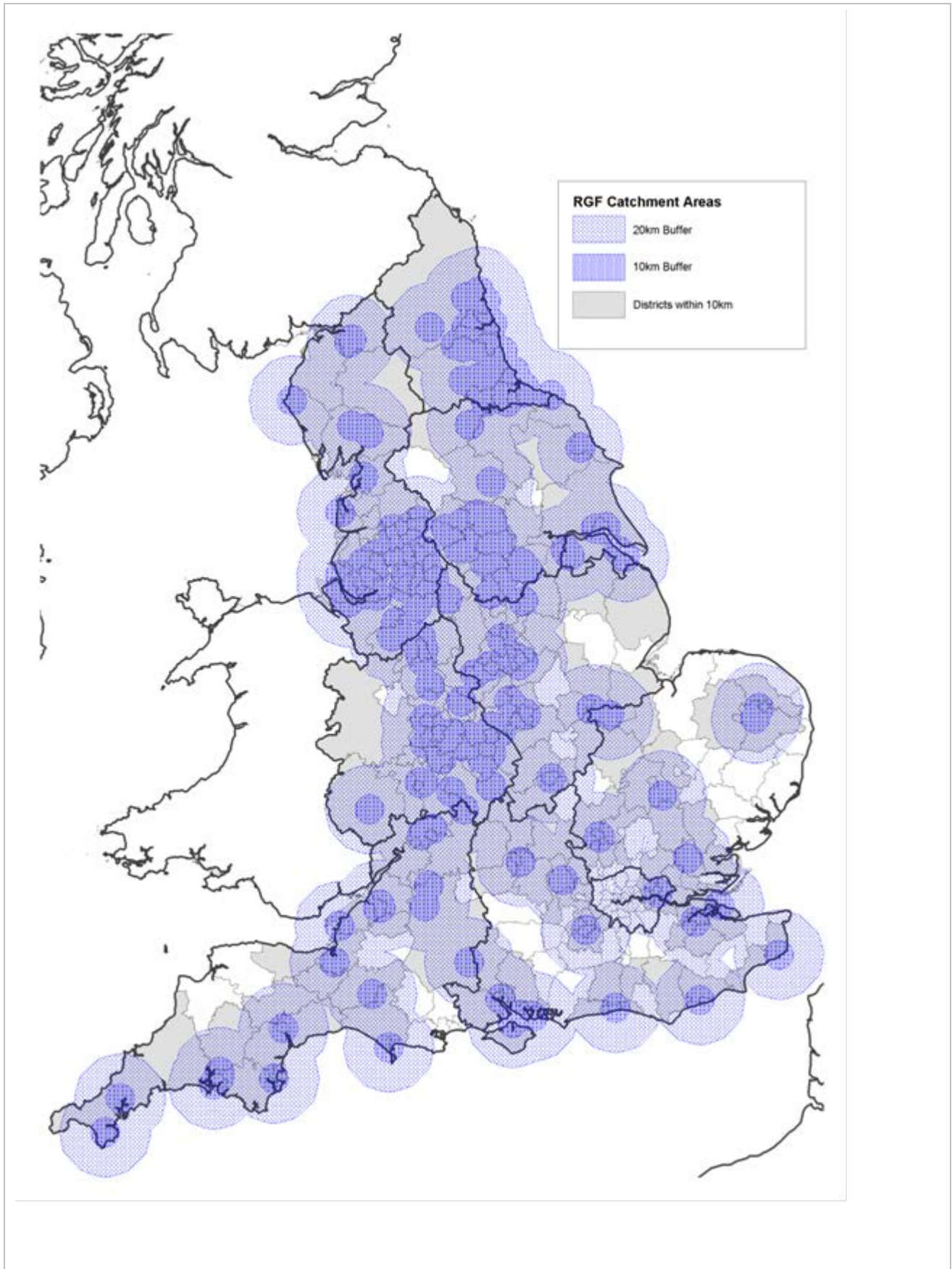
A number of national programmes have been funded through the RGF, which will also need to be integrated into the economic evaluation. As far as it is possible to obtain information on the geographical location of the firms⁵³ concerned, the effects of these programmes should be incorporated within the overall framework outlined above. Beneficiary firms may be located inside or outside of areas highly dependent on public sector employment, and the effects of projects funded may have positive or negative effects on private sector employment in those areas. Although the spatial distribution of the beneficiaries of national programmes is unknown at this stage, this is likely to have some implications for the possible identification of untreated areas (there may be few local authorities outside of London with no businesses benefitting from RGF in some way).

⁵¹ Adopting such an approach may not lead to a target area that is substantially different to a national level evaluation.

⁵² Such an assumption may be difficult to adopt given the level of resource allocated to manufacturers, that will likely compete in national markets.

⁵³ Consultations with national programmes taking place as part of Phase One suggested that this was the case in the large majority of cases.

Figure 13.2 Buffer Zones around Local Authority Projects and Programmes



Implications

- **Absence of a defined target area:** The RGF does not have defined target area against which concepts such as displacement and multiplier effects might be conceived for the purposes of the economic evaluation.
- **Areas dependent on public sector employment:** A key objective of the RGF is to encourage the growth of private sector employment in areas highly dependent on public sector employment (and a key research question will be to establish how far those effects have been achieved). While it will be necessary to construct a definition of these areas, the geographical profile of projects and programmes suggests that numerous schemes have been funded outside of any areas that might normally be considered as dependent on public sector employment. This implies any such assessment will need to consider the possible negative short run displacement effects of those projects and programmes on areas of public sector employment (alongside similar effects within those areas). This issue is made more problematic by the issue of workplace based or residence based measures of employment (it may sufficient that the workers involved reside in areas of high dependency on public sector employment).
- **Spatial detail:** In order to make such an assessment, the economic evaluation will need to provide a spatial disaggregation of resident based employment and displacement effects at a fine level of geographical detail owing to the fragmentation of areas highly dependent on public sector employment (e.g. at the level of the local authority).
- **Other sub-national disaggregation:** Provided it is viable to provide such a disaggregation of displacement and multiplier effects at a local level, then other sub-national disaggregation of results (such as at the regional or the LEP level) might also be feasible.

Displacement, Multiplier Effects, and Crowding Out

In order to understand the net impacts of Regional Growth Fund projects and programmes in the short run, the evaluation will need to adjust any estimates of firm level outcomes generated through the impact evaluation for any displacement and multiplier effects. For land and property projects this will need to extend to an assessment of how far the employment associated with the occupants of any commercial and industrial units might be considered additional to the areas concerned.

Issues

There are a range of different types of effect that will be considered as part of the economic evaluation:

- **Relocation effects:** The extent to which any jobs created (or perhaps more precisely, jobs accommodated) by land and property projects and programmes might be considered additional to a local area will be partly dependent on (1) the originating location of the occupants of those developments (if they had moved from another location locally then there is a high risk that the jobs involved have merely represent displacement at the local level), and (2) how far the availability of the premises

concerned was critical in their decision to relocate to (or establish a new location in) the area concerned.

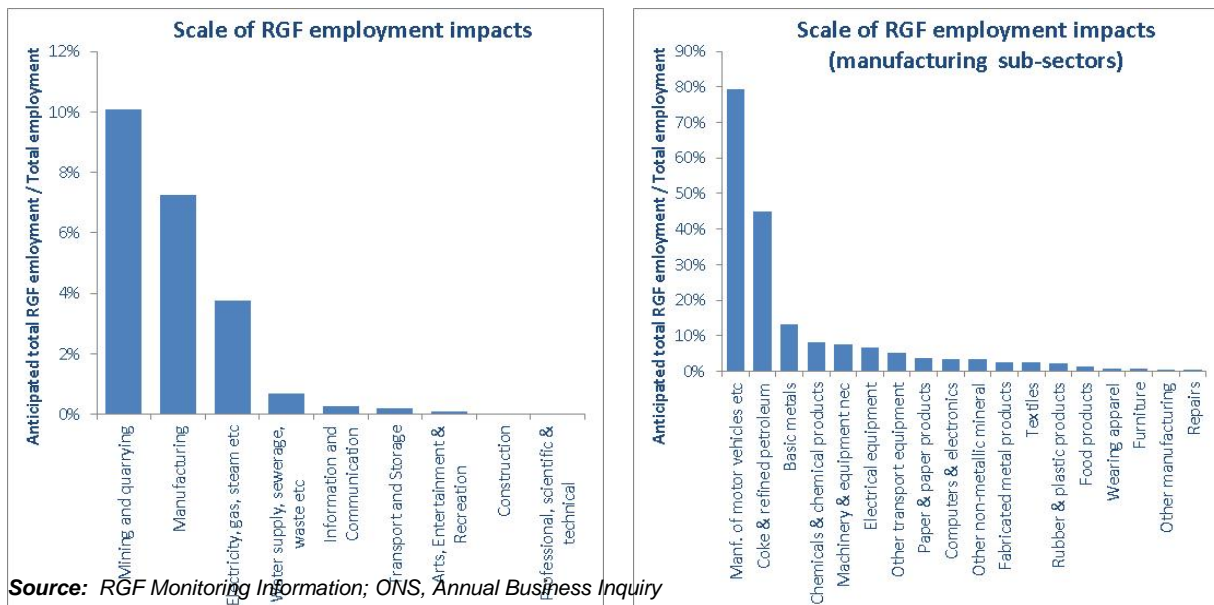
- **Product market displacement:** The expansion of the productive capacities of grant beneficiaries may also lead to displacement in product markets if subsidised firms are able to expand their market share at the expense of non-subsidised firms. Such effects might occur locally, regionally or nationally depending on the nature of the industry concerned. However, the extent of product market displacement is likely be minimised to the extent that any increase in sales is achieved through export growth (since at least a share of the displacement involved will represent the loss of market share for overseas firms).
- **Supply chain multiplier effects:** Expansion in sales amongst subsidised firms is likely to be accompanied by an associated increase in demand for intermediate goods and services. To the extent that the suppliers of those intermediate goods and services are locally, regionally, or nationally based, this increase in demand might lead onto increased output (and employment) amongst those suppliers concerned.
- **Induced effects:** Finally, any net increase in jobs achieved through intervention may lead onto further effects through the additional consumption of the workers obtaining employment.
- **Crowding out:** Short run effects of the nature outlined above will place pressure on factor prices in the medium term. Rises in wages, rents and the price of goods and services may create disincentives for firms to reduce their output and employment to maintain profitability, leading to offsetting crowding out effects.

While these issues are routinely explored in evaluations of spatial programmes, the difficulties in identifying the parties affected has led estimates of the effects involved to be made either using assumptions more appropriately applied in an ex-ante context (such as the ready reckoners published in the HCA Additionality Guide), or using responses to beneficiary surveys to infer likely values for these parameters on the basis of a set of implicit assumptions. This section gives a review of the potential options that have been applied in these contexts, alongside their strengths and weaknesses.

15.3 Product market displacement and multiplier effects

Scope of possible effects

The figures below show the scale of the anticipated jobs created and safeguarded associated with the Regional Growth Fund projects and programmes relative to overall employment in the sectors concerned (though it should be noted that this will include the jobs associated with any construction activity involved).

Figure 15.1 Expected employment impacts relative to sector level employment

At a sector level the anticipated employment impacts represent a maximum of 10 percent of total employment at a sector level (and 7 percent of manufacturing employment). At a sub-sector level, the magnitude of expected employment effects is substantially higher in some manufacturing sectors. For example, total expected jobs created and safeguarded in the automotive sector are expected to be 80 percent of 2011 employment levels. Provided these figures are not overstated (and are achieved by grant beneficiaries), then unless rapid growth in employment is observed in these industries (and employment in the automotive manufacturing sector fell year on year between 2008 and 2011), then it is likely that the overall scale of displacement (as well as any supply chain multiplier effects) might be substantial in some industries.

The extent to which any displacement effect might be observed at a firm level may also be influenced by the structure of the industries concerned. In industries with relatively small numbers of firms, it may be more straightforward to observe a loss of market share resulting from displacement effects than amongst firms operating in industries with substantial volumes of market participants (in which case such effects might be expected to be highly diffuse and difficult to observe). The spatial distribution of such effects will be also be highly variable across industries: in industries where firms are largely competing for local customers (such as retail), displacement effects would likely be highly locally concentrated, whereas manufacturers may be more likely to be competing in national markets, so the effects involved might be expected to be more spatially diffuse.

Finally, rates of displacement might also be expected to be dependent on level of exporting activity within the industry concerned. Each sector has a different degree of orientation towards exporting: furniture and food products remain largely domestic industries, for example, while sectors such as computers and electronics have greater export intensity.

Survey based approaches

Surveys of grant beneficiaries have been the primary tool used to estimate the level of displacement in past evaluation of economic development programmes. These surveys have usually sought to establish the spatial pattern of competition faced by beneficiaries alongside measures of the spatial distribution of their competitors (usually with reference to some target area). These measures are then combined to provide an indicative estimate of the likely scale of displacement. Estimates of multiplier effects based on surveys have also largely been derived by taking estimates of the spatial distribution of suppliers (or the application of assumptions defined in Government guidance).

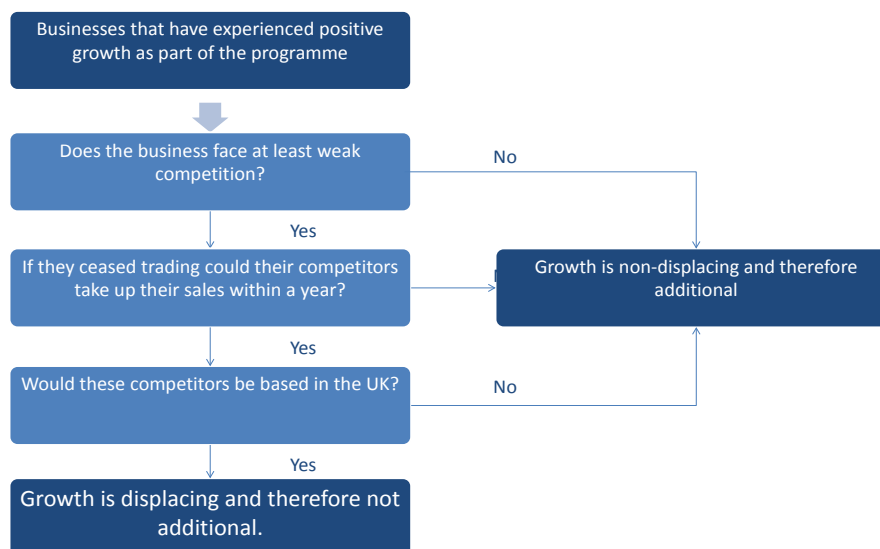
Displacement

There are two approaches to estimating displacement set out in BIS guidance. The first of these was commonly applied in the evaluation of RDA interventions and is set out in the 2009 guidance⁵⁴ on implementation of the prior Impact Evaluation Framework (2005). This approach is straightforward, and involves asking survey respondents to report the percentage of their competition and customers that are located within the zone of interest. A point estimate of displacement is derived by multiplying these values together.

This approach rests on a number of assumptions about the nature of competition faced by beneficiaries. Firstly, there is an implicit assumption that the products or services involved are perfect substitutes (or at least as good a substitute for the products or services produced within the target area as for those produced outside the target area) - so an increase in sales translates to a 1:1 loss of sales for competitors. A second assumption is that displacement only occurs with respect to sales within the area of interest (i.e. firms in the same zone do not compete with each other for sales outside of that zone). Thirdly, an assumption is made that the pattern of competition associated with any new sales generated as a result of intervention is in alignment with the beneficiaries' overall pattern of competition (which may not hold if beneficiaries have used subsidies to enter new markets). The approach also rests on the assumption that survey respondents have an adequate knowledge of their customers and the geographical structure of their competition to report these variables to within an adequate margin of error.

A second approach has been developed by BIS' Enterprise and Economic Development Directorate (and has been implemented in recent evaluations of the Business Link Helpline and the Enterprise Finance Guarantee). The overall approach is illustrated in the figure below. This framework has been implemented in different ways: the evaluation of the Enterprise Finance Guarantee made the assumption that only firms that reported the full value of their sales would be taken up by UK competitors in the event they ceased trading were considered as displacing. The evaluation of the Business Link Helpline made some allowance for the percentage of sales that would be taken up UK competitors in the event they ceased trading. These differences in approach led to different estimates of the overall scale of displacement (with the latter leading to higher estimates of displacement).

⁵⁴ RDA Evaluation: Practical Guidance on Implementing the Impact Evaluation Framework, January 2009

Figure 15.2 BIS Framework for understanding displacement

Multiplier effects

Survey methods have had substantially less use in the estimation of supply chain multiplier effects. Where such methods have been applied, evaluations have tended to focus on establishing the proportion of turnover that is spent on intermediate goods and services, and the percentage of suppliers that are based within the area of interest (to approximate first round supply chain effects). Similar effects are assumed to apply through the supply chain, to reach an estimate of the overall multiplier effect.

Weaknesses

Despite their widespread prevalence, survey based methods of estimating displacement and multiplier effects fall substantially short of empirically demonstrating that the effects claimed have in practice emerged. Given the substantial influence these estimates have over the scale of estimated net impacts (and conclusions relating to the cost-effectiveness of those interventions), this fundamental weakness has substantial implications for credibility of the conclusions of these studies (and any decisions made on the basis of those findings).

Additionally, given the highly fragmented nature (and non-standard) nature of the target zone, any survey based approach attempting to establish the spatial distribution of the effects involved would need to integrate substantial additional detail. For example, surveys may need to be expanded to capture the precise location of each beneficiary firm's key competitors and customers (to identify any potentially wider effects within areas highly dependent on public sector employment).

While it is not suggested that surveys cannot play a useful role in establishing some understanding of the nature and spatial distribution of the competition faced by, and customers of, beneficiaries of RGF projects and programmes, some hesitancy will be required before using surveys of the nature described above to provide estimates of displacement and multiplier effects.

Assumption driven model

A purely assumption driven approach might also offer some insight in the possible spatial pattern of displacement and multiplier effects. The first step would be to assume that for each treatment firm, any sales growth estimated through the impact available can be apportioned into domestic and export sales (on the basis of survey results, for example). If it is then assumed that (1) any growth in domestic sales will represent displacement at the national level, and (2) this displacement is uniformly distributed across competitors (weighted by employment), this assumed displacement could be apportioned across different areas and provide at least some means of disaggregating these effects on spatial basis. Clearly, such an assumption driven approach is less than ideal: but unlike methods based on surveys, could at least be implemented.

Identifying competitors

A more robust approach to establishing displacement and multiplier effects would be to attempt to identify the effects of RGF intervention on the sales and employment of competitors and suppliers. This would ideally incorporate a 'treatment group' of competitors and suppliers that were known to compete with or supply beneficiary firms, and a 'comparison group' of firms operating within the same industries that were known to have no supply chain or competition linkages with beneficiary firms. Comparisons of the performance of these firms over time (both pre-treatment and post-treatment) would potentially yield estimates of the causal effects of (firm level) RGF intervention on their performance. In this scenario, it might be more reasonable to assume that the treatment of interest is exogenous: unobserved characteristics of the firms concerned that might be driving performance will be less correlated with the probability that beneficiary firms obtain grants.

In principle, the Business Structure Database provides the evidence that might be required to implement such an approach. As the dataset provides a longitudinal record of the sales and employment of close to 99 percent of businesses operating in the UK, it may be possible to use this evidence to empirically demonstrate the displacement and supply chain multiplier effects involved. The effectiveness of such a strategy will be limited by (1) how far such effects accrue across a large number of different firms (if the effects are too diffuse, such a strategy may falsely conclude that no displacement took place), and (2) how far it is possible to filter this data to identify a set of firms meeting the criteria outlined above.

There might be a range of possible strategies for refining the sample to identify those most likely to experience displacement and multiplier effects:

- **Correlations in market share and sales:** If firms compete with each other, an increase in the market share of one firm may be reflected in the decrease in the market share of another. Equally, a supplier firm may expect an increase in sales if a customer firm expands their production. An examination of the correlations between changes in (pre-treatment) market share and sales of RGF beneficiaries and non-beneficiaries over time might form a way of identifying a sample of firms of interest. Timing issues may also be significant: while the presence of displacement effects might be observed in a simultaneous loss of market share for competitor firms, suppliers may experience expansions in sales in advance of customer firms expanding their output (and tests

might be needed to explore how far the selection of samples are robust to different lag structures).

- **Four or five digit SIC codes:** Clearly, such a strategy might risk falsely identifying individual firms as competitors. These risks might be reduced by limiting the selection of firms to only those operating within the same industry (as defined by four/five digit SIC codes). A variety of ways of drawing the sample might also be employed: for each RGF beneficiary, it would be possible to select the 10, 20, and 50 firms with strongest and weakest correlations in market shares over time as means of selecting a treatment group and a comparison group. Another strategy might be to draw the entire sample of firms operating in the same industry and allow treatment effects to vary according to the strength of past correlations in market share.
- **Input-output tables:** To refine the sample selection in the case of establishing multiplier effects, it may be viable to select the sample on the basis of known industry linkages established through input output tables. These define the strength of supply linkages between different sectors, and could be employed to refine the sample of potential supplier firms to a more limited number of industries.
- **Geography:** If firms are more likely to compete with or supply firms that they are most geographically proximate to, then a further means of refining the sample would be to restrict the focus to those firms based in geographically proximate areas (local authority areas, or buffer zones drawn around RGF beneficiaries).
- **Modelling the ‘treatment’:** Individual firms in any comparison sample might be exposed to multiple treatments if they compete with or supply multiple RGF beneficiaries at different times. This could potentially be allowed for by modelling the treatment as an incremental variable depending on the number of RGF beneficiaries involved (e.g. taking the value of 1 in periods where one inferred competitor or customer has received RGF subsidies, 2 where two have received subsidies, and so on). This could be weighted by past correlations in market share to allow for variable effects, or could take the value of 0 for all firms inferred to be non-competing or non-supplier firms.
- **Robustness checks:** Employing a variety of strategies, employing different sets of treatment groups and controls along the lines outlined above would provide one means of exposing the results to a series of checks. Additionally, drawing a series of smaller random sub-samples and repeating the analysis might help increase confidence that any results indicate a causal relationship.

Such an approach would identify a displacement or supply chain multiplier effect if sales amongst competing firms had fallen following the receipt of subsidies by RGF beneficiaries (or risen in the case of multiplier effects). It may also be helpful to allow for time invariant unobserved firm, area, and sector characteristics as fixed effects. As the Business Structure Database incorporates postcodes of the firms concerned, it would in principle be viable to provide a detailed spatial disaggregation of the estimated displacement and multiplier effects involved.

The literature review identified no study that had attempted to use firm level data in this way to explore these types of issue in the evaluation of industrial policy (the studies on spillover effects all benefitted from access to evidence on direct links between those

affected directly and those affected indirectly). As such, no wider confirmation can be offered that such an approach to exploring these types of effect might be effective or robust, and adopting this strategy will be experimental. However, given the general lack of replicable methods to provide more empirically based estimates of these short run effects over large spatial areas (i.e. the review of the literature did not suggest any other option might be viable), it may be worth further investigation.

Local effects

Local displacement and multiplier effects associated with spatial and industrial policy has received a greater level of detailed empirical treatment in the literature (though, again, the volume of studies is relatively small). This section examines approaches that have been adopted, and explores how far they might be replicated in an evaluation of the Regional Growth Fund.

Discontinuities in target zones

A 2011 study⁵⁵ examining the effects of the Local Enterprise Growth Initiative (LEGI) exploited both spatial discontinuities in the availability of the programme (the programme was delivered in a small number of local authority areas) and discontinuities in eligibility for programme funding (only fifty areas were eligible to apply for programme funding, based on scores on the Index of Multiple Deprivation) to establish estimates of the displacement effects associated with the programme.

The study employed a difference-in-differences framework to examine the impacts of the initiative at a lower super output area (LSOA) level on employment (aggregating firm level data from the BSD to provide estimates of employment over time at a fine spatial scale, and using a set of area characteristics observable at the LSOA level to act as controls). LSOAs within LEGI boundaries were defined as areas receiving treatment, and LSOAs outside those areas were defined as untreated areas. In order to account for the possibility that there were unobserved differences between treated and untreated areas over space, it was assumed that these characteristics could be treated as invariant within the neighbourhood of LEGI areas (on the basis that local authority boundaries do not fully reflect functional economic geographies at their edges). Rings of control LSOAs were defined within 0 to 2km, 2 to 4km, and 4 to 5km of the boundary of LEGI areas. Specification of the models allowed for variable effects within these different rings to support an assessment of displacement of employment from neighbouring LSOAs into the LEGI area. The observation of a positive impact on employment within the LEGI area would be net of any displacement or multiplier effects within the zone.

As highlighted in both Part Two and in the preceding sections, there is no defined target area for the Regional Growth Fund that would permit a replication of this methodology. However, it could potentially be applied to assess the impacts of the sub-regional programmes funded through the RGF: eligibility for these programmes is typically defined along administrative boundaries (such as LEP areas or local authority boundaries), which

⁵⁵ The Effects of Spatially Targeted Enterprise Initiatives, Einio and Overman, 2011.

would enable a similar conceptual framework. Implementation would need to account for the possible role of RGF projects funded directly by the RGF Secretariat, which could also have a contributory role in raising employment growth within particular LSOAs and within the boundaries of programmes.

Spatial aggregation

The aforementioned 2012 study examining the long run effects of RSA⁵⁶ adopted an alternative strategy to identify the extent of any displacement effects. Here, the main focus of the study was on establishing the impacts of the programme at a plant level (in principle, similar to the approaches outlined for the Impact Evaluation scoping study). In order to address the question of how far the employment impacts were achieved at the expense of other firms based within the Assisted Areas or the relevant Travel To Work Areas, the methods were reapplied by aggregating observation units (firms) to the spatial units of interest. Underlying this approach was the reasoning that if there had been any substantial displacement of activity within the target areas in the long run, any treatment effect identified at a plant or firm level would disappear at higher levels of spatial aggregation. Results were also aggregated to TTWA level on the basis of average eligibility for subsidies (weighted by lagged employment across wards), to account for any possible displacement effects from ineligible to eligible areas⁵⁷.

This approach was made feasible by the adoption of an instrumental variable that was defined at an area rather than at a firm level. As set out in Part Two, there are two possible instruments that could be defined at an area level: maximum subsidy rates (in a similar manner to the study above), and the geographical coverage of programmes. Provided these prove robust strategies (which will be unknown until the evaluation takes place), the reasoning above could be extended to examine the local displacement effects of both projects and programmes.

Area based methods

A third approach is offered by in a recent study examining the local labour market impact of the Lyons Review⁵⁸, which involved the relocation of public sector jobs to regions outside of London. This approach involved splitting England into a large number of local areas: the study employed census output areas, of which there are about 200,000 in the UK. For each area, coordinates are calculated for the geographic centre of the area and concentric circles are plotted around this central point at one kilometre intervals (there is no limit to the number of concentric circles used in the model, but Faggio goes up to 50km).

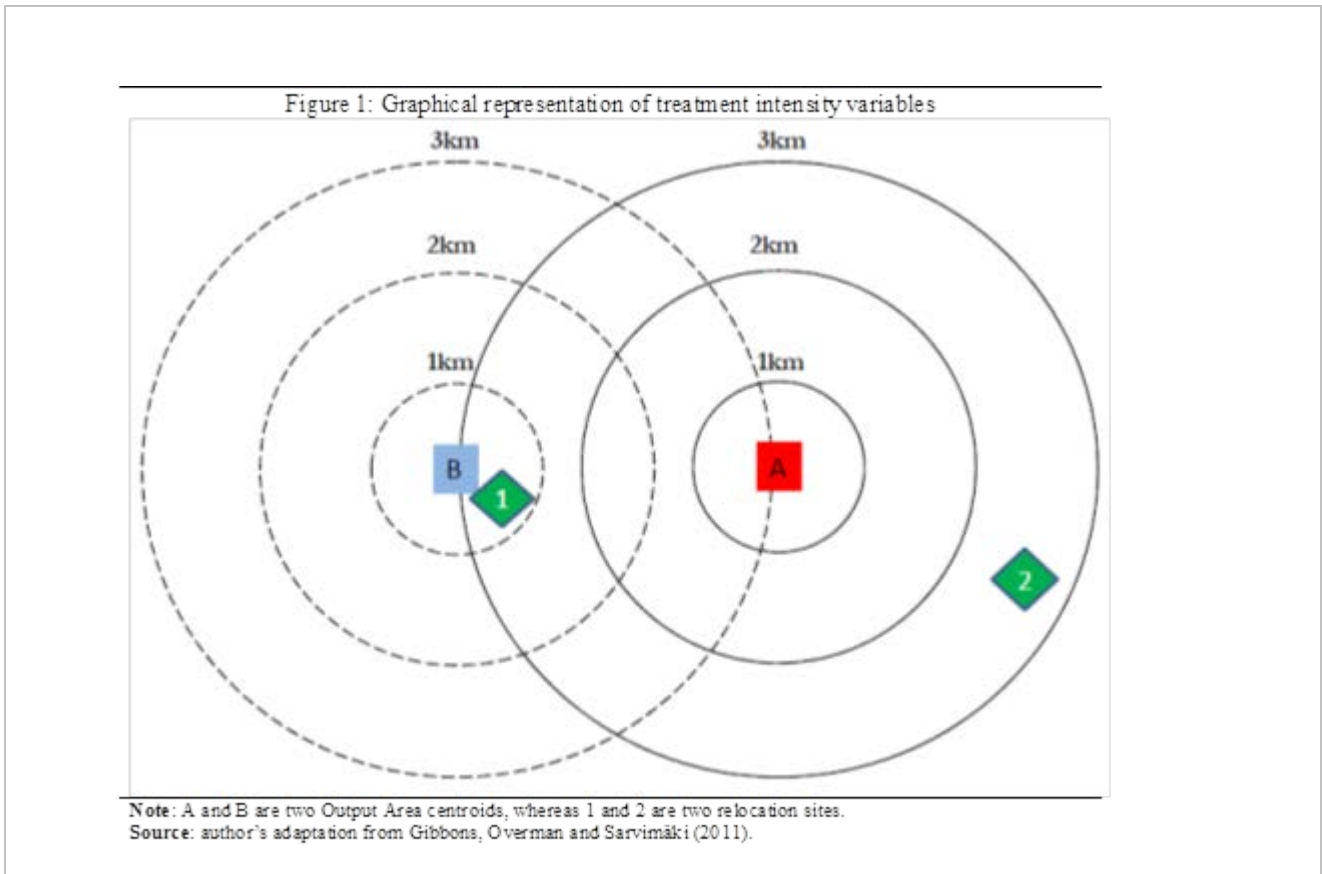
We would then plot on the map the locations of all RGF projects (analogous to Faggio's public sector relocation sites). The following diagram (taken directly from Faggio and adopted from Gibbons et al, 2011) shows the concentric rings around the geographic

⁵⁶ The Causal Effects of an Industrial Policy, Criscuolo, Overman, Van Reenan, 2012

⁵⁷ However, by using employment as the outcome of interest, it is likely that this approach simultaneously captures both displacement and multiplier effects at the local level.

⁵⁸ Faggio, G. (2013) "Relocation of Public Sector Workers: The local labour market impact of the Lyons Review"

centres of two neighbouring areas (A and B). It also shows the locations of two intervention sites (1 and 2). Site 1 is within the 1km locus of area B and within the 3km locus of area A. Site 2 is also within the 3km locus of area A but outside the 3km locus of area B (although, of course, if further concentric circles were drawn, site 2 would be captured within the 5km or 6km locus of area B).



Source: Faggio (2013)

This data would then be used to run a regression based on something similar to the following linear model used by Faggio:

$$\Delta y_i = \sum_c I_i^c \Delta N_i^c \gamma^c + \sum_n \beta^n X_{i,2001 \text{ (or 1991)}}^n + \Delta \varepsilon_i$$

In this model, Δy denotes the outcome variable of interest. In this analysis, this is the change in private sector employment within each area i over a fixed period of time over which the intervention took place. The data Faggio uses to measure this at census output area is the Business Structure Database which provides an annual snapshot of the Inter-Departmental Business Register (IDBR). The IDBR contains employment data on all VAT-registered businesses and this can be used (by matching businesses to areas based on postcode) to estimate total private sector employment in each area in any given year (and hence the change over time). Given the objective of the RGF is to create private sector

jobs, this seems like a sensible outcome variable to use in an evaluation. However, it may also be possible to use IDBR data on turnover to estimate the change in GVA in each area.

In terms of the independent variables in the above model, for each area i and concentric circle c , I is a binary variable which is 1 if there is an intervention site (i.e. RGF project) within that concentric circle and 0 otherwise. For example, looking at the diagram, where i = area A and c = 1km, I = 0 as there are no sites within 1km of the centre of area A. However, where i = area A and c = 3km, I = 1 as there is at least one site (in this case two) within 3km of the centre of area A. I would also be equal to 1 for all higher values of c for area A. By the same logic, I = 1 for all values of c where i = area B.

The variable ΔN is a measure of the intensity of the intervention. In the study, this refers to the number of jobs relocated to the sites located within c km of the centre of area i . For our purposes, this could perhaps apply to the amount of RGF funding awarded to projects within c km of the centre of area i or the number of direct jobs created in those projects (although it is debatable whether the latter can really be used as an independent variable).

The variable X controls for any area level data that might explain variation in Δy between areas, such as economic activity of residents, industry and occupation structures, age of residents, population density, education shares, household size and dwelling characteristics (n measures in total).

Having estimated an impact on private sector employment in each area i , we can simply add together the impacts in every area which is considered part of the total RGF area to find an overall impact. In theory, if the number of concentric circles c was unlimited, this approach allows the impact of every RGF project to be felt in every area of England (though it may difficult to be confident in results over very long distances).

Controlling for other interventions

When applying these spatial methods to understanding the impacts of the Regional Growth Fund, further issues need to be considered as to how to isolate the effects of RGF from other Government support targeted at similar areas, including the Growing Places Fund, City Deals, and Enterprise Zones. In the above econometric “difference-in-differences” specification, it is assumed that, in the absence of RGF projects, economic performance in each area would take the same trajectory from its baseline position, or at least that trajectory would only vary in random ways unrelated to the intervention. However, the intensity of RGF intervention is likely to be highly correlated with the intensity of other interventions over the same period (i.e. focusing on the same areas). Therefore, we may risk overestimating the impact of RGF on the RGF area(s) unless these other interventions are adequately controlled for.

If the data were available, this issue could be rectified by inserting additional control variables into the model to denote whether or not a given area i was treated by another intervention over the evaluation period and the relative intensity of that intervention. This would need to focus on sub-national programmes that aim to address specific local areas, including:

- Local Enterprise Zones
- Growing Places Fund
- European Regional Development Fund;
- City Deals, and,
- Growth Deals.

Each of these programmes has a defined treatment area that could be incorporated into spatial analysis of the nature described above (at postcode, ward, or local authority area). The necessary details to account for the role of these programmes can be straightforwardly collected from publicly available sources as such it should not prove problematic to assemble the data to examine how far results are robust to the addition of these controls.

Crowding out

As highlighted in Part One, a key issue for the evaluation will be to understand how far any short run demand side effects might have been crowded out by effects in factor markets. Any short run expansion of RGF beneficiaries will lead to additional local demand for workers, placing pressure on wages (to the extent that there is not excess labour supply). Increase in demand for other inputs (such as premises and raw materials) will also place pressure on prices. As prices rise, this will create incentives for firms to reduce their overall employment and output levels to maintain profitability, leading to offsetting crowding out effects. If labour supply is perfectly inelastic then any short run effects will be entirely offset in the medium run. If labour supply responds to increases in wages, then there will be a net increase in employment and output resulting from the associated increase in aggregate supply.

These longer term issues have rarely received systematic treatment in evaluations of economic development programmes. Evaluations are often commissioned at a time close to the point at which the programmes are due to finish, giving little opportunity for evaluators to explore these longer term issues (which may emerge over a 5 to 10 year period). However, the studies outlined above were able to explore these longer term effects of the interventions of interest by replicating the analyses for a wider range of key outcomes:

- **Employment:** As noted above, if crowding out is complete, then no long term effect on employment should be observed. If a causal effect on RGF can be observed at an area level in the long run, then this suggests some persistence of the initial demand side effects. A comparison of short and long run estimates of impacts will provide an estimate of the extent of any crowding out.
- **Unemployment:** Another question of interest will be to explore how any long run increases in employment at an area level were achieved by reducing unemployment levels. The DWP publish localised counts of the numbers claiming Jobseekers Allowance (though the shift to Universal Credit may change the nature of the statistics available) that could replace employment as the outcome variable of interest to establish how far the RGF has led to a long run reduction in unemployment within the areas receiving RGF 'treatment'.

- **Wages and property markets:** An assessment of the long run impacts of RGF on wages and property markets, however, will be highly challenging. Estimates of average weekly earnings across the economy are estimated by ONS through the Annual Survey of Hours and Earnings, which cannot be disaggregated at fine enough spatial detail to support the implementation of the strategies outlined above. Additionally, there is very little information available on the commercial property market.

Again, by examining the long run effects of RGF using the same methods outlined above to estimate short run displacement and multiplier effects (and using additional outcome measures), it may be viable to establish the scale of any crowding out effects (at least at local level) and identify the long term impact of RGF on job creation.

Summary

- **Relocation effects:** It will be highly challenging to develop robust estimates of the effects of the land and property projects and programmes in influencing firms' decisions to locate within the areas of interest: both due to difficulties in constructing a robust counterfactual, and the challenges associated with small samples sizes (as the number of firms likely to be affected by these projects will be small in overall number).
- **Survey based approaches:** Although survey based approaches to establishing displacement effects in the past have had widespread application in the evaluation of economic development programmes, they fall short of providing an empirical demonstration that the effects being claimed have occurred in practice. While surveys might provide some useful insight into the patterns of competition faced by beneficiary firms, it is recommended that these survey results are not used to provide quantitative estimates of the extent of displacement for the purposes of assessing the causal effects of RGF on employment.
- **Local displacement and multiplier effects:** A number of evaluation studies have examined displacement effects at a local level by using area rather than firm level data. The strategies adopted could be replicated for the purposes of identifying these short run effects through RGF evaluation, exploiting discontinuities in the geographical coverage of the programmes funded through RGF as well as the State Aid regulations (in a similar manner to that outlined in Part Two). Implementation of these approaches would rely primarily on secondary data rather than extensive collection of additional information. Approaches could also be repurposed to account for the contributory role of other spatial programmes, and extended over time to account for both short and long term effects. However, the scope of effects estimated is limited to effects on local areas (and in some cases, the immediate neighbouring areas), and there may be concerns that such strategies would overstate the short term net impacts of intervention if there were substantial displacement (or multiplier effects) over greater distances (particularly given that many of the firms concerned are likely to be operating in national markets).
- **Wider econometric study:** A wider econometric study may also be viable using the Business Structure Database within the VML. A number of strategies might be available to identify the competitors of and suppliers to RGF beneficiaries, which may aid identification of the causal effects of RGF subsidies on short term displacement through the programme. Again, such an approach would rely primarily on secondary evidence (the Business Structure Database) and could also provide estimates of short term

displacement and multiplier effects over greater spatial distances. However, no studies have been identified that have taken a similar approach to identifying these types of displacement effects, so adopting such an approach will not be without risks.

- **Crowding out:** An assessment of crowding out will require a long term evaluation strategy, but similar approaches to those identified for exploring local displacement effects could be extended to a wider range of outcomes of interest. A comparison between short and long run estimates of impacts on employment at a local level will provide an estimate of the overall rate of crowding out, while an examination of impacts on unemployment might help illustrate how far the effects have been achieved through a redeployment of the unemployment for productive purposes. The secondary data available to describe wages and property markets is insufficiently detailed to extend the approach to an analysis of impacts on factor prices themselves.

Annex D: Agglomeration and Spillover Effects

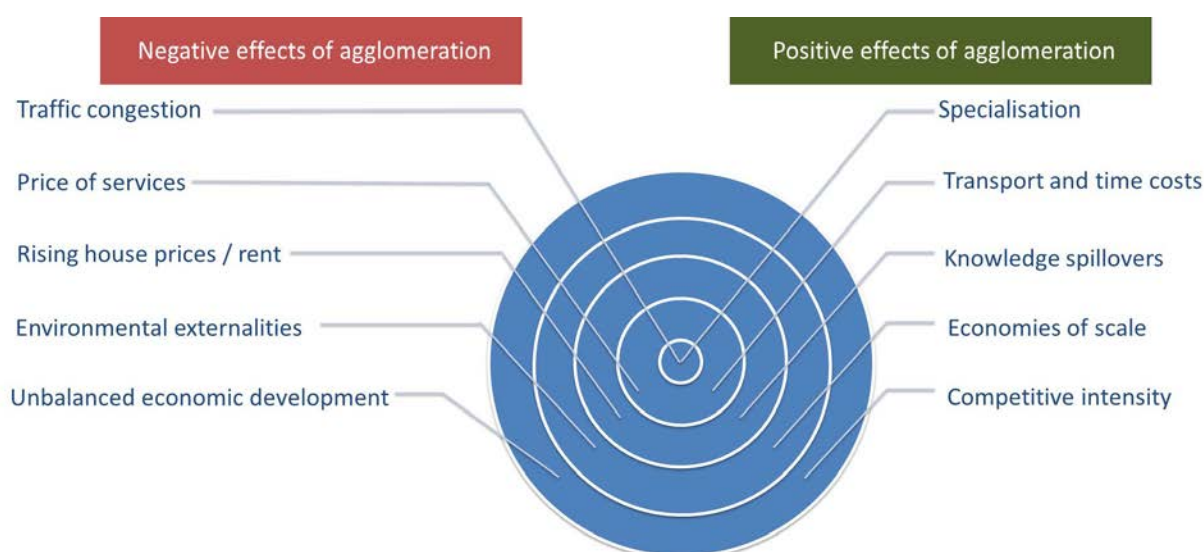
As highlighted in a review of evaluation studies feeding into the national evaluation of the Regional Development Agencies⁵⁹, the quantification of agglomeration effects has received little attention in the evaluation of regional economic development initiatives. This section examines how these effects might arise as a consequence of the Regional Growth Fund, the potential scale and pattern of these types of effect and how an assessment of these impacts might be incorporated into an evaluation of the programme.

Agglomeration effects

The term agglomeration effect is used to describe the pattern of externalities arising from increases in local concentration of economic activity. Agglomeration forces emerge for a number of reasons. Firms want to locate in large markets, close to customers, to reduce trade costs. But by locating in a large market, they make the market larger because workers spend their wages locally, firms supply to each other, etc. In addition, positive knowledge spill overs can occur due to regional specialisation when firms operating in the same sector locate close to each other (Marshallian intra-industry externalities)⁶⁰. Equally, a more diverse regional industry structure in hand with close proximity stimulates opportunities to imitate, share and recombine ideas and practices across industries. The larger the diversity of firms across industries within a region the bigger is the scope for innovation and growth⁶¹.

Figure 1 below lists the main positive and negative consequences associated with agglomeration.

Figure 1: The positive and negative effects of agglomeration



⁵⁹ Research to Improve the Assessment of Additionality, BIS Occasional Paper No. 1, October 2009

⁶⁰ Damijan, J.P. and Konings, J. (2013) Agglomeration Economies, Globalization and Productivity: Firm level evidence for Slovenia*

⁶¹ Jacobs, J., 1969. The Economies of Cities. Random House, New York.

Firms will potentially derive a range of productivity benefits from being located in geographical proximity to suppliers, competitors and customers. Density allows a higher degree of specialisation, increasing efficiency. For example, by being located close to customers enables businesses to specialise in a particular portion of the discipline developing sustainable markets.

The most obvious productivity gains associated with increased economic density are reduced transport time and costs for products/goods/services from one stage to the next, or from producer to consumer. Time spent accessing clients and suppliers, delivering goods to markets, transporting goods between intermediate stages, acquiring business support services, and other associated transactions can be reduced in denser areas. This reduction in time and cost of transport is a direct contribution to productivity (as well as sustainability). Increased agglomeration might also be achieved through increasing connectivity between places through upgrades in transport infrastructure. By reducing journey times, such interventions effectively reduce the distance between places, enabling firms to more straightforwardly serve the range of markets connected and facilitating reciprocal access to the factor inputs offered. Again, these benefits might be observed in higher rates of productivity amongst those firms benefitting from improved transport connectivity.

The agglomeration process will also create incentives for appropriately skilled labour to locate in proximity to firms (supporting improvements in the efficiency of labour markets), as well as support knowledge spill-overs (via both increased connections between workers, poaching externalities, and through the ability of firms to observe advances made by competitors)⁶². The idea that knowledge spillovers occur and are important to innovation and productivity is widely acknowledged. The role of location and agglomeration in this process, however, is more complex. In the most basic of terms, innovative ideas are rarely kept secret when employees from different firms can easily get together and talk, gossip, or even spy on one another, and a high density of economic activity facilitates such an exchange of information⁶³.

Increased density can increase productivity through access to denser markets – both on the supplier side and on the consumer side. On the supplier side, access to more competing suppliers helps firms' procure more efficient, cheaper, and more appropriate inputs. Competition encourages efficiency and survival of the most productive firms. This holds true for labour, as well. Firms in denser areas have access to a larger labour pool, aiding recruitment and retention⁶⁴.

However, there are also negative externalities associated with increased economic scale (or diseconomies of agglomeration). The process of agglomeration will also be associated with increased demand for fixed factors (such as land and property), placing pressure on land values and rents. High rents may force workers to live in cheaper locations a greater geographic distance from their place of employment, leading to increased commuting times and increased pollution.

⁶² The Market Failure Approach to Regional Economic Development Policy, Bartik, T.J, Economic Development Quarterly, 1990, Vol.4 No.4, pp.361-370.

⁶³ Harris, T. and Ioannides, Y. (2000) Productivity and Metropolitan Density. Tufts University Discussion Paper Series. Medford, Massachusetts: Tufts University

⁶⁴ Colin Buchanan and Partners (2008) The economic impact of high density development and tall buildings in central business districts

Greater circulation of individuals and goods will also place pressure on local transport networks, leading to congestion and environmental disbenefits. If density increases where transport capacity is already overstretched, additional density causes increased congestion and associated costs until the situation is corrected. If transport improvements are made in the long term as a result, then density can deliver its net benefits from reduced travel distances and times. However, if not, then negative externalities from congestion and overcrowding may counteract any benefits.

Some studies have also shown that agglomeration places pressure on some local amenities such as urban parkland⁶⁵, while the effects of increased land and rent prices will also be reflected in the prices of other services (such as childcare)⁶⁶. Price increase in such services (particularly in childcare) can have some further unintended consequences by squeezing disposable income and reducing the incentive to work.

Methodological issues

Overall, the evidence from the econometric literature is not conclusive on the scale of agglomeration benefits, and is also subject to considerable limitations. These are due partly to data limitations and difficulties in specifying econometric models that adequately capture the effects being investigated, and has led to a complex and diverse literature. Relevant variables are measured in wide variety of ways, often imperfectly reflecting the theoretical concepts involved. Specification of regressions also differs greatly, sometimes reflecting differences in the nature and structure of the data available. Different outcome variables are used to measure effects on economic activity.

The bullets below provide an overview of some of the difficulties faces in measuring the impacts of agglomeration effects.

- **Data availability:** In estimating the impact of agglomeration the outcome of interest is often total factor productivity. A direct measure of this requires suitable measures of inputs (for example employment, land, capital and materials) – that are rarely comprehensively available in a consistent, accurate or coherent manner. Omission of some inputs that may vary systematically by geography size (or industry concentration) will lead to biased estimates of effects⁶⁷.
- **Measurement of agglomeration:** Employment density tends to be the main variable used for the measurement of the agglomeration effect. The main advantages of employment density are twofold: first, they can better capture the productivity benefits of spatially concentrated economic activities, whereas total population in a given area will also proxy for urban amenities and potential congestion costs; secondly, density-based measures are robust to differences in land area sizes. The main limitation, as with total population, is the assumption that the effects from agglomeration economies are confined to the boundaries of the geographic units used. To account for possible spatial spillovers from agglomeration effects more recent studies have adopted a “market

⁶⁵ Determinants of Agglomeration Economies and Diseconomies: Empirical Evidence from Tokyo, Xiao-Ping Zheng, 2001, Socio-Economic Planning Sciences 35 pg 131-140.

⁶⁶ The London Childcare Market, London Development Agency, February 2011

⁶⁷ Basu, Susanto and John G. Fernald (1995) "Are apparent productive spillovers a figment of specification error?" Journal of Monetary Economics

potential” type measure of agglomeration economies that is not restricted to geographic boundaries, and allows the effects of agglomeration externalities to be realised over space and diminish with increased distance.

- **Measurement of the agglomeration effect:** A number of studies estimate the size of agglomeration effects – using four main strategies. The first group looks at effects on labour productivity; the second on employment growth; the third at effects on wages and rents; and a fourth group looks at effects on new establishment location, or on the probability of an industry having a significant presence in a city. Each of the different methods produces slightly different results (e.g. studies using wages as a productivity proxy will often tend to underestimate the strength of the relationship).
- **Own sector versus cross sector agglomeration:** One of the most fundamental distinctions in the economics of agglomeration is between own-sector effects (also referred to as localisation economies or Marshall externalities) and cross-sector effects (also referred to as urbanisation economies or Jacobs externalities). Any study drawing upon data from a set of sub-regions will need to adjust for industry mix if results are aggregated to a national total, researchers have introduced measures such as the Herfindahl index to account for this).
- **Issues of causality:** Researchers trying to verify empirically whether agglomeration enhances performance inevitably face the major difficulty that causality could run both ways. If a particular location offers some inherent features that improve the profitability of certain economic activities, firms will be attracted to that location. Such inherent features may be related to natural endowments or regulatory specificities, but they could also have to do with essentially unmeasurable factors such as local business cultures. How to isolate the effect that runs from agglomeration to performance (rather than the other way) thus represents a considerable challenge to the empirical researcher. Telling these explanations apart is complicated when the econometrician does not observe all the variables that determine total factor productivity. Potential solutions to the problem include:
- **A two-stage-least-squares (2SLS) estimation:** In the first stage, “instrumental” variables are used to predict values for the explanatory variables that will appear in the second stage regression. Instruments must be correlated with these explanatory variables, but uncorrelated with the unexplained variation in plant productivity. The predicted values of the explanatory variables are, in effect, “stripped” of any effects due to the other variables in the second stage regression. The coefficients in the second stage can then more readily be interpreted as representing a causal effect. In practice, it is frequently difficult to find suitable instruments that are sufficiently strongly correlated with the explanatory variables, and not correlated with the unexplained variation in the second-stage dependent variable.
- **Estimate regressions in ‘first differences’:** If the data is available for various points over time (a panel), an alternative may be to estimate regressions in “first-differences”. This will remove the effect of any time unvarying unobserved heterogeneity. If establishment level data is being used, time specific “dummies” may be used to capture the effect of unobserved time varying characteristics of the geography being measured. However, the use of panel data in differences can exacerbate measurement error. It can

also cause problems with sample selectivity due to attrition – particularly if firm level data is used, given high rates of firm births and deaths over time.

Evidence

There are a number of studies that have attempted to quantify the impact of agglomeration effects on labour productivity. Although the productivity gains of urban agglomeration economies are generally found to be positive, there is a great deal of variability in the magnitude of reported estimates. Rosenthal and Strange⁶⁸ argue that the consensus view of elasticities of urban agglomeration is that doubling urban size increases productivity between 3 and 8%. Some of the major studies are summarised the table below:

Table 16.1: Evidence on Agglomeration Effects

Study title	Geographic area	Measurement	Methodology	Results
Baptista (2003) ⁶⁹	UK -	Labour productivity	Develops an empirical model of local productivity where the spatial density of economy activity is the source of economic increasing returns.	Doubling employment density in a county would increase average labour productivity by almost 7%.
Fingleton (2003) ⁷⁰	UK – NUTS 4 regions	Labour productivity and wages	Assuming equal technology among areas, his model brings to the fore the importance both of spillovers across regions – so including spatial effects in his estimations - and the role played by differential access of each area to knowledge and human capital.	The results show one of the smallest values of the agglomeration effect among the studies reviewed up to this point, estimated at around 1.5% in several specifications. Although it should be noted that the agglomeration effect tends to be underestimated when wages are viewed as the dependent variable.
Graham (2007a,b) ⁷¹ ⁷²	UK Ward level	Total factor productivity an transport investment	This research explicitly tries to introduce some elements related to transport infrastructure. The research attempts to investigate, within a trans-log production function framework the link between urban density, productivity and road traffic congestion.	The results range from elasticities of around 0.04 for manufacturing sectors up to 0.18 for certain service sectors, although all the sectors analysed show some degree of diminishing returns to urban density. That being said, as the author argues, the policy implications are that positive agglomeration effects rely on investment in transport infrastructure.
Rice, Venables and Patacchini (2006)	UK – Government Office Region	Labour productivity	This research estimated the relationship between regional labour productivity and proximity to economic mass across British regions, controlling for occupational composition.	The researchers obtain an elasticity of 3.5%.

⁶⁸ Rosenthal, Stuart S. and William Strange. 2004. Evidence on the nature and sources of agglomeration economies. In Vernon Henderson and Jacques-François Thisse (eds.) Handbook of Regional and Urban Economics, volume 4

⁶⁹ Baptista, R. (2003), Productivity and the Density of Local Clusters, in Bröcker, J., D. Dohse & R. Soltwedel (Eds.), Innovation Clusters and Interregional Competition, SpringerVerlag, Berlin, 163-181

⁷⁰ Fingleton, B. (2003): Increasing returns: evidence from local wage rates in Great Britain Oxford Economic Papers 55,

⁷¹ Graham, D. J. (2007a). Agglomeration, productivity and transport investment. Journal of Transport Economics and Policy 41, 1–27.

⁷² Graham, D. J. (2007b). Variable returns to agglomeration and the effect of road traffic congestion. Journal of Urban Economics 62, 103–120.

Ciccone, A. (2000) ⁷³	France, Germany, Italy and the UK – NUTS 3 regions	Labour productivity	Using data from NUTS 3 regions in France, Germany, Italy and the UK estimated a positive relationship between agglomeration effects and labour productivity.	There were no significant differences between the countries and using an ordinary least squares method estimated that a doubling of the employment density increases average labour productivity by approximately 5%
Brühlhart, M. & Mathys, N. (2007) ⁷⁴	Europe – France, Germany, Italy, Poland, Spain and the UK. NUTS 2 regions.	Labour productivity	The research used data from European regions, testing for both cross sector and own sector productivity	Researchers have determined the existence of positive net productivity effects of employment density, with an estimated elasticity of some 13%. With the notable exception of financial services, own-sector “localisation” effects, however, are mostly negative, suggesting dominance of congestion diseconomies.
Cingano and Schivardi (2004) ⁷⁵	Italy - Cities	Total factor productivity	The study draws on a panel of plant-level data across Italian cities to research the relationship between plant productivity and city employment.	The researchers estimated a long-run elasticity of plant productivity to city employment of 6.7%.
Combes et al. (2004) ⁷⁶	France – 341 French NUTS 4 regions	Wages used as productivity proxy	This study examines the impact of local economic structure on employment dynamics. Local employment is decomposed into the product of the average plant size and the number of plants in the area and industry. We estimate the dynamics of both components simultaneously using French yearly data on 36 industries and 341 areas between 1984 and 1993. The careful specification of short-run dynamics and the control for fixed effects and endogeneity are shown to be critical in the empirical model	The results suggest that density of local employment plays an important role, and endowments a secondary one. Although controlling for skilled individuals, the estimated coefficient for agglomeration falls dramatically from 6% to 3.7% (then down to only 2% when controlling for endogeneity and reverse causality). According to their research, then, a small but significant effect of agglomeration on productivity is found; but it should be noted that using wage data as the proxy for productivity tends to bias the agglomeration coefficient downwards.
Broersma and van Dijk (2008) ⁷⁷	Netherlands – NUTS 2 regions	Total factor productivity	The researchers employed a growth accounting framework to investigate productivity growth in the Netherlands.	Using this approach it turns out that the slow productivity advances of those regions can be explained by the fact that positive agglomeration advantages (between 0.341 and 0.357) are overruled by negative congestion effects (between -0.285 and -0.455).

⁷³ Ciccone, A. (2000) Agglomeration effects in Europe, American Economic Review

⁷⁴ Brühlhart, M. & Mathys, N. (2007) Sectoral Agglomeration Economies in a Panel of European Regions

⁷⁵ Cingano, F. & Schivardi, F. (2004). Identifying the Sources of Local Productivity Growth, Journal of the European Economic Association, MIT Press, vol. 2(4), pages 720-742, 06.

⁷⁶ Combes, P & Magnac, T. & Robin, J. (2003). The Dynamics of Local Employment in France, CEPR Discussion Papers 3912, C.E.P.R. Discussion Papers.

⁷⁷ Broersma, L. & Vvan Dijk, J. (2008) The effect of congestion and agglomeration on multifactor productivity growth in Dutch regions," Journal of Economic Geography, Oxford University Press, vol. 8(2), pages 181-209, March.

Ciccone, A. and Hall, R. (1996) ⁷⁸	US – state level	Labour productivity	Cross-sectional non-linear regression using historic agglomeration patterns as instruments. An index of inputs for each state is adjusted for density of labour, and human capital at the county level. The elasticity of output with respect to employment density is estimated as a parameter in the density index. Using state level input data avoids systematic measurement problems at the county level.	The study found that found that a doubling of employment density in a country leads to a 6% increase in average labour productivity.
Nakamura (2008)	Japan	Labour productivity	The study aimed to estimate industrial agglomeration effects on the observed disparities of per capita value-added.	The results suggest, at first sight, estimated elasticities around 0.15 for the Japanese case.
Henderson (1997) ⁷⁹	US – state level	Employment	GMM panel estimation of city-industry employment growth, with contemporaneous and lagged explanatory variables, differencing out fixed effects, and using lagged variables as instruments. Explanatory variables: Own industry employment, share of own industry employment in total employment, an Herfindahl like index of lack of diversity, with controls for metro area total employment, and average county wages in all other industries.	Long run elasticities of county industry employment with respect to metropolitan scale are in the range of 0.7 to 2.4.
Wheaton and Lewis (2002)	US metropolitan areas	Wages	OLS of log wages on demographic variables, and measures of occupational, industry and establishment specialisation and concentration.	A doubling at the mean of the relevant variable is associated with the following wage increases: Occupation specialization: four per cent; Occupation concentration: 0.5%; Industry specialisation: 3%; industry concentration: 2%.

Likely magnitude of effects

It should be noted that although the studies more often than not highlight a positive relationship between agglomeration and productivity, the scale of impact varies depending on the method used. The RGF employment impacts are likely to be quite small relative to the studies which have estimated the relationship between growth of urban areas and productivity over long term periods of 20-30 years. The gross anticipated increase in employment density in most districts benefitting from RGF is small (before accounting for deadweight and displacement), and given the results above, any impacts on total factor productivity driven by agglomeration processes are likely to be negligible. As a

⁷⁸ Ciccone, A. and Hall, R. (1996) Productivity and the density of economic activity

⁷⁹ Henderson, J. Vernon (1997) Externalities and industrial development. *Journal of Urban Economics* 42: 449-470

consequence, it is suggested that the economic evaluation does not seek to quantify the impacts of the programme in this area.

Innovation Spill-over Effects

The main area in which the RGF may have significant spill-over effects is through the spill-over effects associated with any knowledge produced by the firms involved in developing new products or processes. There are two main mechanisms by which these effects might happen:

- **Knowledge transfer:** New knowledge acquired by workers through the innovation processes might be transmitted to other individuals via social networks (or equally through poaching). The exchange of this knowledge may encourage other individuals to build on the knowledge acquired: either through exploiting this knowledge in existing production processes, or through stimulating further innovation.
- **Innovation diffusion effects:** The adoption and diffusion of the products and processes developed by beneficiaries on a broader basis throughout the economy may lead to further benefits through their use. Some firms may be able to extract further productivity gains not captured by the originators of the innovation through the sale of products, for example.

A review of literature did not highlight a single study that gave credible treatment to these types effects in the evaluation of public sector innovation programmes (though some studies have examined these types of effect in general terms). There are numerous methodological challenges. Firstly, as highlighted in BIS guidance⁸⁰, in order to empirically demonstrate a spill-over effect has been realised, an evaluation will need to credibly establish the links between beneficiary and those expected to benefit from the spill-over effect (a similar challenge to those involved in investigating displacement effects). Clearly, this is problematic in the case of innovation projects: in the case of the former, a researcher would need to establish social and professional networks of the workers employed by RGF beneficiaries (and the firms for which they worked), in order to identify the population of firms that might notionally benefit from any knowledge transfer activities.

In the case of diffusion effects, an evaluation might need to establish a sample of firms using the innovation concerned. This might be achievable through general surveys of the business population (though such an exercise may need to be highly extensive, depending market penetration rates). However, a much more substantial complication is the likely time horizon over which any new products might be brought to market. For example, in the case of the development of a new drug in the pharmaceutical sector there are a number of stages that the development of the product must go through. For example, there must first be a business case for the development of the product, the development phase itself which can take a long period of time, testing through randomised control trials to demonstrate the effectiveness of the product, protecting the intellectual property by securing a patent, and a process to gain approval from medical bodies internationally (e.g. FDA approval in the US) before commercialisation of the product can even begin. It can

⁸⁰ Evaluating the Impact of Interventions on Business, BIS, 2011

take up to 15 years before the product finally reaches the market, and then some time is needed for the product to establish itself in the market before impacts can be assessed. The same issue is relevant for other sectors (although the time period may not quite as lengthy). For example, new technology in the automotive sector will need to pass various safety tests before it is able to proceed to market.

Again, given these challenges, attempts to establish robust estimates of the impacts of innovation spill-over effects is either unlikely to yield any material results in the short or even long term, or virtually impossible to implement.

Summary

- **Viability of examining spill-over effects:** While it may be in principle possible to explore any agglomeration economies or innovation spill-over effects achieved by the Regional Growth Fund, the scale of these effects are likely to be either too small, so far in the future, or too difficult to credibly establish to merit detailed exploration through an economic evaluation of the Regional Growth Fund.



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