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**Feasibility Study: The economic
impact of industrial plant closure in
the UK, with an emphasis on energy
intensive industries**

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RESEARCH

A report by ICF GHK in association with Newcastle University and Quadrangle

The views expressed in this report are that of the authors and not necessarily those of the Department for Business, Innovation and Skills or any other Government Department

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Executive Summary

Study Aims and Methodology

Industrial plant closure remains an on-going challenge to sub-national and national economies in an era of global competitiveness. Recognising that the existing evidence base on the impact of plant closures is limited, BIS commissioned Quadrangle, in association with ICF GHK and CURDS (Newcastle University), in January 2013 to undertake a feasibility study to support the development of the evidence base on industrial plant closures, with an emphasis on Energy Intensive Industries (EIs).

The two main objectives of the study were:

1. To review available and relevant evidence on the overall (direct, indirect and induced) short and long term economic impacts of industrial plant closure in the UK with a specific focus on Energy Intensive Industries; and,
2. Appraise options for how research on plant closure impacts could be further developed, in general and with specific references to Energy Intensive Industries.

The study methodology involved:

1. A review and synthesis of literature and data on the economic impacts of industrial plant closure in the UK. This required the creation of an *analytical framework* (see Section 2, Main Report) on closure impact assessment as the basis for:
 - i. searching for literature and data (Bibliography creation, see Annex 1);
 - ii. entering and classifying such literature (within a Database, see Annex 2); and,
 - iii. a synthesis of findings (Summary Tables, see Annex 3 and Main Report).
2. The generation and appraisal of Options ('feasibility') to develop the evidence base on impact assessment of industrial plant closures in the UK.

The Analytical Framework: A Plant Closures Impact Assessment Framework

Traditionally, 'standard' impact assessment methodologies of plant closure delineate the direct, indirect and induced effects of loss of output and employment in any particular locality – essentially tracking particular 'economic entities' such as employees (labour in a labour market) or expenditure / purchases (supply chain in the local economy) through the economic and industrial system.

In certain instances, on-going economic impacts such as income losses to the Exchequer and Local Authority have also been estimated alongside costs of additional benefit and service provision. Generally, however, the fullest potential wider impacts of plant closure have been raised only in theoretical terms (such as on

industrial competitiveness caused by depleted supply chains or the 'loss of economic rationale' and subsequent expenditure flows for communities and places).

In contrast, for the purposes of this study, further more detailed definition of the 'economic actors' in any industrial plant - and the tracking of their subsequent fortunes on closure - was taken as the founding principle for an impact assessment framework. This comprised, then:

- **Five identified economic actors:** Investment Capital; Fixed Capital; Employees; Suppliers; Loans, Taxes and Payments;
- **Three core impact domains:** Income; Employment; Place/Community;
- **Three time periods:** Immediate; Adaptation; Longer Term.

Table ES1 overleaf presents this template. Arguably, the most comprehensive impact assessment would seek to track all five actor sets (rows), through the three sets of impacts (columns) over the accumulating time periods from immediate to longer term.

It was against this 'gold standard' impact assessment framework that the literature and evidence base was mapped.

Table ES1: Plant Closures Impact Assessment Framework

Actor	Time	Income Impact	Employment Impact	Place / Community Impact
Investment capital (shareholders)	<i>Immediate</i>			
	<i>Adaptation</i>			
	<i>Longer term</i>			
Fixed capital (equipment, buildings, land, brand/IPR)	<i>Immediate</i>			
	<i>Adaptation</i>			
	<i>Longer term</i>			
Employees (Managing Director – shop floor)	<i>Immediate</i>			
	<i>Adaptation</i>			
	<i>Longer term</i>			
Suppliers	<i>Immediate</i>			
	<i>Adaptation</i>			
	<i>Longer term</i>			
Loans, taxes and payments (Creditors, HMRC, LAs, etc.)	<i>Immediate</i>			
	<i>Adaptation</i>			
	<i>Longer term</i>			

A Summary Table of the Literature Review Findings is presented below.

A Summary Table of the Literature Review Findings

Methodologies
<ul style="list-style-type: none"> • The vast majority of studies identified were UK-based and used regions as the economic geography for analysis of impact. • Most studies used a mix of qualitative and quantitative data to assess costs post plant closure. • Combinations of dismissed worker surveys (used in over 50 per cent of studies) and case studies (used in over 70 per cent of studies) were the most frequently used methods. • Approximately 25 per cent of the literature used administrative databases to track the experience of employees. This method was most frequently used in non-UK studies.
Data Sources
<p>A wide range of data sources were used to collect data relating to costs and benefits of plant closures. The most commonly used sources of data were dismissed workers surveys; Government-held data (local and national); insertion of key plant activity and expenditure figures into a range of generally pre-existing 'regional economic models'; and stakeholder/task force estimates.</p> <ul style="list-style-type: none"> • The small number of studies that identified impact on capital following plant closure used data sources including: the closing firms' financial records; Local Authority records; and, literature review evidence from previous studies. • The most common data source – used in a majority of studies reviewed – was survey research with dismissed workers. Overall, assessment of impact based on employment and income was frequently established through dismissed worker surveys; stakeholder estimates; and, literature review evidence from previous closures. In the case of non-UK studies, empirical Government administrative data was frequently used to track the future income and employment experiences of dismissed workers. • The most common approach to estimating impact on suppliers was relatively simple economic modelling using input-output analysis. Data inputs included closing firm financial records, task force member interviews, and local authority estimates. In a few cases, supply chain business interviews/surveys occurred. • Most significant data sources in determining loans, taxes and payments were central Government spending data (including benefit claimant data); economic modelling; Local authority data; and, health service use statistics.
Impacts
<p>Studies examined as part of the literature review identified a range of impacts on economic actors from plant closures. Most studies focussed on the costs associated with plant closures; around a quarter established a combination of costs and benefits.</p>

- Only one identified study assessed the impact on investment capital; this study outlined costs associated with managing the income and employments rights of dismissed workers and pension benefits written into collective bargaining agreements in the USA.
- The few studies relating to impact on fixed capital identified immediate impacts relating to the write-down costs of plant and machinery; costs from the loss of raw materials and (more significant) costs of loss of raw material assets. Longer term impacts identified included: site remediation work and future economic benefits of reemployment in new industries.
- A small number of studies identify costs to dismissed workers in the form of immediate loss of income. More analysis is undertaken of impact on dismissed workers as they adapt to closure in the longer term. Such analysis illustrates:
 - Strong evidence of mostly negative impacts on income and employment for dismissed workers, with some evidence of long term wage scarring.
 - Some evidence of long term increased vulnerability of dismissed workers in future economic downturns.
 - Negative income and employment impacts are most acute and long lasting for older workers.
 - Dismissed workers that do not find new employment are more likely to report health problems compared to those who do find work.
 - Reemployment rates for dismissed workers are heavily influenced by the level of vacancies and economic growth in the regional economy.
 - Over the longer term, changes to travel to work patterns for dismissed workers are more likely. The extent of this change is heavily dependent on local factors.
 - New employment is often in a diverse range of sectors and is typically more likely to be on part-time or temporary contracts.
 - Overall, employee impacts are highly segmented - even individualised – including costs and benefits, with outcomes highly dependent on the substantial contextual influence of (national, regional and local) labour markets.
- The impact of plant closure on suppliers is established in a number of studies. This analysis is limited to negative impacts associated with short-term responses and adaption to plant closure. The analysis establishes that plant closure can result in immediate significant financial loss to suppliers, including the precipitation of job loss.
- The impact of plant closure on loans, taxes and payments is a limited feature of studies examined within the literature. The following impacts are identified and quantified:
 - Some analysis establishes the scale of cost to government from providing assistance through formation of a ‘task force’, with some

indicative costs to the exchequer provided.

- Additional impacts in terms of loss to Local Authorities as a result of reduced business rates are also identified.
- Impacts in terms of increased social security payments are also established in some cases.
- Costs associated with negative health impacts have been estimated in rare cases

Policy Responses

A range of policy responses are identifiable in the literature – predominantly focused on immediate and adaptation support to dismissed workers.

- The literature does not identify policy responses in relation to investment capital, although a range of responses related to fixed capital are outlined. Regeneration of the local economy through investment in new infrastructure and site development (to enable new forms of economic activity) is clearly noted as an important element of post-plant closure strategy. In this regard, three considerations are noted:
 - Housing and neighbourhood policy must compliment economic development investment.
 - Creation of high-tech jobs can have negative consequences (for example, increased commuting and labour market segregation).
 - A balance between high tech job creation and other economic development policy is important.
- In relation to employees, four main policy responses are identified in the literature:
 - Addressing psychological issues of dismissed workers is important to prevent long term underemployed and unemployed.
 - Continued effort and investment is required to increase the skill levels of workers in ways that are appropriate to the potential job opportunities available to them.
 - Ongoing monitoring of strategic companies is noted as an important element of modern industrial policy for local economic development policy makers (as a means of anticipating, preventing and/or planning to mitigate job losses).
 - Support for those with the lowest skill levels is also consistently identified as an important policy response.
- The increasingly global nature of supply chains is highlighted as an issue which makes policy responses to impacts on suppliers difficult. The literature suggests that local assessment of supply chain employment levels is important, especially where a diverse range of firms outside of the sector within which the main plant closure has occurred are found in the supply chain – implying scattered, hard to identify but nevertheless negative multiplier effects.
- The literature does not identify policy responses in relation to loans, taxes and payments.

Summary Findings from Literature Review

- The international literature identified on plant closure is small – less than 100 articles and, in essence, a core group of accessible studies in the order of 30 - 40 odd.
- These studies are, virtually entirely, of high quality.
- Paradoxically, even though the majority of these cover only a small number of economic actors in the system (essentially, employees and supply chain), this core material is then substantially fragmented by country, approach, methodology, timescale for assessment, and period when study was undertaken.
- The commonest methodology is analysis of individual plant closures through surveys of dismissed workers.
- There are a number of international examples exemplifying the ability for robust and comprehensive labour market assessments of impacts through tracking of cohorts of dismissed workers in government administrative systems and databases.
- Tracking of impacts on forms of capital (investment and fixed) is, overall, negligible.
- Tracking of fiscal impacts in terms of loans, taxes, payments, etc. is limited, partial and sporadic.
- Tracking of supplier impacts remains limited – and use of input output models are used as a resource effective approach.
- Tracking of employee impacts illustrates the substantial contextual influence of labour markets – including national characteristics (for example, gender participation rates, part time), sectoral (occupational and skills profile) and, critically, local labour market dynamics. These combine to produce highly segmented, even individualised, outcomes for dismissed workers – and which are generally viewed as costs rather than benefits.
- A few longer term studies have illustrated the potential substantial reduction in any such costs to some groups of dismissed workers.
- Policy responses focus on immediate and adaptation support to dismissed workers – and learning reflects the need for support to seek to be personalised - mirroring the finding that labour market outcomes from redundancy seem to be highly individualised.
- Local economic development strategy has the potential to provide a longer term response – bringing together policy on fixed assets such as land and premises, sector development and skills strategy, and with connection to broader community and well being policies.

Extending the Evidence Base: Options, Feasibility and Recommendations

Mapping the existing literature and evidence base of impact assessments against the template provided a clear set of findings as to the extent to which the components of the Analytic Framework had been covered in the literature, through what methods, and to what depth. As a result a 'state of play' assessment could be made, identifying a series of gaps in the evidence base and / or weaknesses in the depth of understanding on the impacts of plant closures.

Given these evidence base findings and the study objectives, Options were generated for investigation to identify the value and feasibility of developing the evidence base on plant closure impacts.

Option 1: Investment Capital – a previously untraced impact

It is the withdrawal of this economic actor – for whatever reasons – that precipitates the plant closure in the first place; yet review of the evidence base highlights that virtually no methodologies (or even attempts) exist to track the impacts of closure on investment capital.

For this Option the feasibility assessment focused on *the process of generation of the research questions* that need to be asked, and against which a subsequent research methodology could be designed – in order for the impacts on investment capital to be (fully) incorporated into any comprehensive assessment of the impacts of plant closure.

Option 2: Fixed Capital – developing a consolidated methodology

Following disinvestment, fixed capital remains – in machinery, in buildings, in land and other intangibles such as brand and reputation. In the immediate term it is, however, a set of assets that have lost their economic function and associated value. The critical issue – especially for the economy, places and communities – is how quickly such assets can be redeployed and revalorised, and at what cost ('creative destruction or simply destruction').

Review of the evidence base illustrates quite limited attempts to assess the impacts of plant closure on fixed capital – in terms of the number of studies undertaken, the methodologies employed, and the short time period of assessment. The research questions are known but research methodologies have been limited. Feasibility assessment for Option 2 investigated further definition of the methodology of impact assessment for fixed capital.

Option 3: Employees – extending the potential for comprehensive impact assessment

The economic significance of the impact on employees from plant closure cannot be contested. This is reflected in a far larger evidence base concerned with assessing impacts on this set of economic actors when a plant closes compared with any other economic actor.

A wide range of issues have been examined using a variety of primary (predominantly survey) and secondary (predominantly Government social security) data to quantify impact. Analysis has also sought to understand impact in terms of immediate, adaptation and long term impact. In this regard, there is particular interest and concern around the long term impact on the employment and income trajectories of individuals made redundant – ranging from enforced economic inactivity to enhanced careers as new and more productive positions are achieved through the ‘push’ of redundancy.

In particular, three findings were evident: firstly, very few studies exist comprised of long term and comprehensive understanding of the subsequent labour market experiences of those made redundant (and any subsequent impact on fiscal flows); secondly, that those studies that do exist involve some form of tracking that, in the main, involved substantial primary survey based activity (and/or interviewing of small numbers of ex-employees); and, thirdly, that secondary data sets potentially incorporating the income and employment trajectories of individuals are collected through routine Government social security administration.

Given the substantial costs and resources involved in tracking of employees through primary research, Option 3 investigated the feasibility of tracking employees through data that is routinely collected given a UK individual’s economic activity and / or citizenship rights.

Option 4: Suppliers – indirect impact but churn or structural?

In the literature on plant closure impact assessment, the income and employment impact on the supply chain (and economic base) ranks second only after impact on plant employees. The response of suppliers and supply chains are taken as the key form of indirect impact of plant closures. Particular concern revolves around the spatial distribution of any impact – whether concentrated in the closure locality and thus reinforcing the economic impact felt or, conversely, impacting far flung communities and economies with unforeseen effects.

The immediacy of this concern is, however, reflected in the assessment methodologies utilised with the vast majority of studies concerned only with the immediate impacts. Little or no assessment has been undertaken of adaptive and longer term responses by supply chains – whether it be decline and /or closure, survival, or a ‘kick start’ to new markets, new products and growth trajectories.

Feasibility assessment of this Option 4 focused on the potential to support greater understanding of the indirect supply chain longer term costs and benefits of plant closure.

Option 5: Loans, Taxes, Payments – a framework for impact assessment

The impact assessment framework illustrates the range and diversity of fiscal impacts that may occur over time following plant closure. These fiscal flows are generated by impacts on the range of components of the system – capital (transaction taxes, etc.), businesses (corporation tax, pension liabilities, etc.), employees (income tax, welfare benefits, etc.), fixed assets (business rates, etc). Impacts may be positive and / or negative and their balance varies over time.

The literature review illustrates partial and scattered attempts to assess such flows – generally dependent on the impact aspect of plant closure (for example, employees or place) that is the focus of any individual study. Looking across the literature as a whole, a framework for assessing fiscal flows can begin to be determined.

In terms of policy, understanding the balance of such flows, at what time, and to whose cost and benefit is clearly a key component of any decision by the state to intervene. The basis of Option 5, then, was to: a) define (draw together) a framework to comprehensively incorporate fiscal impacts (including confirmation of research questions); and b) identify the range of methods and data sources for the framework's implementation, itself partially based on the tracking methodologies for other economic actors in the system.

Table ES2 overleaf provides a ranked summary of the feasibility assessments for each Option.

Table ES 2: Ranked Summary of Options

	Rank	Impact Research Questions Known	Methodology Developed	Metrics and Data Sources Exist	Feasibility Assessment	Initial development requirement	Repeat activity
Option 3 – Employees: extending potential for comprehensive impact assessment	1	Yes	Partly	Yes	Very high value to stakeholders Methodology requires testing but is a substantial task	Implementation project 6 months £50k - £75k	Once in place – update data feeds and analysis; defining new dismissed worker cohorts
Option 2 – Fixed Capital: developing a consolidated methodology	2	Mostly	Partly	Mostly	Evidence base gap Limited effort could gap fill to substantial extent and deliver stakeholder value	Policy consultancy 3 – 4 months £30k	Update and /or population and analysis of template created in initial study in new closure instances
Option 5 – Loans, Taxes, Payments: a framework for impact assessment	3	Partial	No	Uncertain	Developmental: of high value but likely to require several stages to reach fully robust framework	Policy consultancy (with academic experts) 3 – 4 months £40k	Update template as impact methodologies are developed in field and further data sources become available
Option 1 – Investment Capital: a previously untraced impact	4	No	No	Uncertain	Needed to fill a theoretical 'hole' in the impact assessment framework for plant closure	Research project 3 - 6 months £25 -50k Doctoral thesis?	Project application of impact methodology created in a closure instance
Option 4 – Suppliers: indirect impact but churn or structural	5	Yes	Mostly	Yes	Achievable with limited effort but value is incremental	2 month project by IDBR specialist < £20k	Minimal costs to update tracking over time

Recommendations

Recommendation One: To seek to contract a project to develop a methodology – based on existing secondary data sets – to fully track the short, medium and long terms effects of redundancy on employees (utilising HMRC and DWP datasets)

Current impact assessment tends to be short term, primary in nature (and thus resource intensive) and fails to provide full overview of the costs and benefits to individuals and broader labour market impacts. Such evidence gaps hinder policy responses. The potential exists to put in place a robust tracking methodology – although it is unlikely to be able to offer retrospective tracking of substance.

Recommendation Two: Development of plant closure impact assessment methodology should not be sector specific - virtually all evidence base and methodological developments in impact assessment of plant closures will be applicable across all sectors of the economy

Whilst the plant closure literature to date is dominated by that associated with Energy Intensive Industries, tracking and assessment methodologies do not, from the evidence to date, vary to any significant extent whatever the sector of study. Direct, Indirect and Induced effects are evident on employees, supply chains, places and communities whatever the sector within which a closure may take place – and whilst the difficulty of tracking and assessment of the balance of costs and benefits may vary by plant closure this is influenced by a range of factors (sector, size, geography, business type, stakeholder relations, etc.)

Recommendation Three: That BIS create an internal multi-stranded ‘Action Plan’ for the development of the evidence base on the economic impact of industrial plant closure in the UK

Given the economic importance and expected institutional and policy responses to plant closure, it remains problematic that the evidence base to support policy remains limited. Development of such a plan could usefully be taken forward through inter-departmental activity given the range of policy interests in plant closures.

This feasibility study has identified a variety of projects of value to develop the evidence base – and which could be taken forward relatively quickly, through a number of routes, within a limited resource base. Furthermore, in certain instances potential stand alone projects are inter-linked and economies possible.

Recommendation Four: Development of an ‘information ask’ from exiting employers

In modern day economies, the announcement of plant closures is likely to trigger partnership responses between governmental and other stakeholders. In many cases, such partnership will include exiting employers who recognise both issues of corporate responsibility and reputation as regards their employees, place-based stakeholders and customers. Recent examples of such responses in the UK include ‘Taskforce responses’ and, for example, the European Commission utilises the European Globalisation Fund to support employee adaptation to redundancy.

For the purposes of policy responses and impact assessment, review of the literature (and some of the Options assessed) highlight that the extent and accuracy of such assessment is very substantially enhanced by the provision of key data by exiting employers (employees, expenditure, decision making, etc).

This Recommendation suggests bringing such learning together in one place to support the policy response and impact assessment in the face of future plant closures.

1. Introduction

1.1 Introduction

Industrial plant closure remains an on-going challenge to sub-national and national economies in an era of global competitiveness. Such closures may be driven by a range of short or long term factors and BIS is aware, in particular, of the concerns expressed by some European energy intensive industries (EII¹) that rising energy costs are impacting on their cost competitiveness. In certain instances, closures may reflect longer term factors related to structural economic change, and thus the potential of longer term benefits from redeployed resources should be set alongside the more immediate costs of closure.

Recognising that the existing evidence base on the impact of plant closures is limited, BIS has sought to improve its understanding of closure impacts. It is not clear, however, how the current evidence base should be improved. Given this, Quadrangle, in association with ICF GHK and CURDS (Newcastle University), were commissioned in January 2013 to undertake a feasibility study to support the development of the evidence base on industrial plant closures, with an emphasis on EIIs.

1.2 Study Aims and Objectives

The aim of this feasibility study, then, has been to inform Government's understanding of the existing evidence base and options for future research on the (fiscal) impact of industrial plant closure. Given this, the two main objectives of the study were:

1. To review available and relevant evidence on the overall (direct, indirect and induced) short and long term economic impacts of industrial plant closure in the UK with a specific focus on Energy Intensive Industries; and,
2. Appraise options for how research on plant closure impacts could be further developed, in general and with specific references to Energy Intensive Industries.

1.3 Study Methodology

Given the study objectives, the study methodology involved:

1. A review and synthesis of both literature and data on the economic impacts of industrial plant closure in the UK. This required the creation of an *analytical framework* on closure impact assessment as the basis for:

¹ DECC define Energy Intensive Industries for the purpose of eligibility for Climate Change Agreements (CCAs). EIIs are companies whose energy costs are more than 3 per cent of their production costs and have an import penetration of 50 per cent. This includes a wide range of industry sectors, from major energy-intensive processes such as steel, chemicals and cement, to agricultural businesses, such as intensive pig/poultry-rearing (see <https://www.gov.uk/climate-change-agreements>).

- i. searching for literature and data (Bibliography creation);
 - ii. entering and classifying such literature (within a Database); and,
 - iii. a synthesis of findings (Summary Tables and Synthesis Report).
2. The generation and appraisal of Options ('feasibility') to develop the evidence base on impact assessment of industrial plant closures in the UK.

1.4 This Report

This Final Report provides the following:

- Section 2: The Analytical Framework that provided the 'mapping' template for literature on industrial plant closure and subsequent summary of the scale and scope of literature on industrial plant closure. A full Bibliography and completed Excel Literature Database are provided as Annexes;
- Section 3: Synthesis of key findings and conclusions drawn from the literature on the economic impact of industrial plant closure in the UK, with an emphasis on Energy Intensive Industries; and,
- Section 4: appraisal of Options to support expansion of the current research base on the impacts of industrial closure, including Recommendations.

2. Analysing the evidence base on industrial plant closure

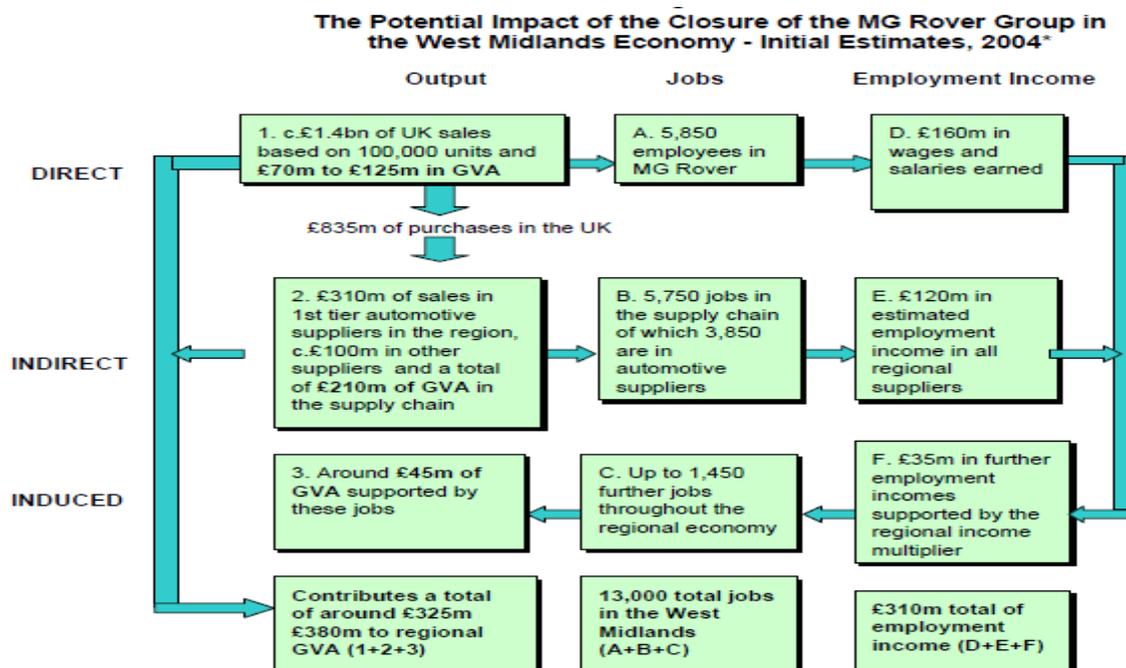
2.1 Introduction

The following section introduces the Analytical Framework established for this study in order to analyse literature and data relating to plant closure. The Analytical Framework provided a tool by which to identify and map relevant literature and data, and to draw out findings from the literature coverage as the basis for discerning future impact assessment methodologies. A summary of these findings is presented at the end of this section.

2.2 The Analytical Framework: a Plant Closures Impact Assessment Framework

Traditionally, ‘standard’ impact assessment methodologies of plant closure delineate the direct, indirect and induced effects of loss of output and employment in any particular locality – essentially tracking particular ‘economic entities’ such as employees (labour in a labour market) or expenditure / purchases (supply chain in the local economy) through the economic and industrial system (see Figure 2.1).

Figure 2.1: A standard impact assessment methodology for plant closure



Source: MG Rover Task Force (2005) Closure of MG Rover: Economic Impact Assessment, Report by Regeneris Consulting

In certain instances, on-going economic impacts such as income losses to the Exchequer and Local Authority have also been estimated alongside costs of

additional benefit and service provision. Generally, however, the fullest potential wider impacts of plant closure have been raised only in theoretical terms (such as on industrial competitiveness caused by depleted supply chains or the 'loss of economic rationale' and subsequent expenditure flows for communities and places).

In contrast, for the purposes of this study, further more detailed definition of the 'economic actors' in any industrial plant - and the tracking of their subsequent fortunes on closure - was taken as the founding principle for an impact assessment framework. This comprised, then:

Five identified economic actors:

- *Investment capital:* those (such as shareholders, directors, etc.) whose investment formed the basis of the plant initially and whose withdrawal or loss has triggered the closure. Such capital is generally recognised to have aspects of almost 'hypermobility' in its ability to move across and through global economic systems;
- *Fixed Capital:* the assets purchased or generated by the investment capital such as land, buildings, machinery and plant, brand, etc. In most cases, this capital is recognised as lacking mobility – being essentially fixed in place;
- *Employees:* the labour power employed to produce goods and services utilising the fixed capital – drawn from a labour market and defined by commuting patterns;
- *Suppliers:* the owners of the materials, goods and services purchased by the plant and which are purchased in order for the plant to produce its own good and services and, in so doing, add value – the supply chain in contemporary economies is likely to comprise both localised elements, even clusters, alongside global chains; and,
- *Loans, taxes and payments:* the fiscal flows which are generated to a variety of local and national organisations and actors (creditors, HMRC, LAs, etc.) on the basis of the plant's existence and operation.

Three core impact domains:

- *Income:* Within a functioning economic system, income impacts are generated for a range of actors (for example, dividends for shareholders, wages for employees and taxes for government);
- *Employment:* Core to the economic system is the combination of capital with labour to create employment – within occupations, sectors and the labour market. Given the welfare state, social costs are incurred and/or social benefits provided when individuals are unemployed or not economically active; and,
- *Place /community:* Plants are located in places and communities, and economic function is demonstrated to be a strong determinant of place and community identity. This is so especially where larger plants (physically or employment wise) exist and hold aspects of dominance within local economies.

Three time periods:

- *Immediate*: taken as the actual time of announcement of closure and the immediate aftermath;
- *Adaptation*: dependent on the process of closure generally up to around 12 months after announcement as redundancy periods are completed, workers enter back into the labour market, suppliers seek new customers and, overall, the economic system seeks to adapt through revalorisation of ‘unproductive assets’ such as unemployed workers, underutilised supply chains and redundant land and buildings;
- *Longer term*: a time period that provides perspective on the ‘released’ assets (capital, labour, capacity, etc.) and the extent and manner of re-valorisation. What has re-use entailed, does it reflect the ‘churn’ process which is part of any healthy market economy (and associated with aspects of creative destruction) or a more deep-rooted harbinger of structural change and economic restructuring².

Table 2.1 presents the Analytical Framework and illustrates how different economic outcomes and impacts at different time periods may be determined through ‘tracking’ the experience of the economic actors.

Arguably, the most comprehensive impact assessment would seek to track all five actor sets (rows), through the three sets of impacts (columns) over the accumulating time periods from immediate to longer term.

It was against this framework that the literature and evidence base was mapped.

² See GHK (2011) Impacts of Structural Change: implications of policies supporting transition to a Green Economy, Final Report to DG Environment
http://ec.europa.eu/environment/envec0/resource_efficiency/pdf/transition_costs.pdf;

Table 2.1 Plant Closures Impact Assessment Framework

Actor	Time	Income	Employment	Place / Community
Investment capital (shareholders)	<i>Immediate</i>	Loss of investment income		Investor attractiveness (+/-)
	<i>Adaptation</i>	Redeployment of capital	New employment opportunities	
	<i>Longer term</i>	Sectoral redistribution of investment	New occupations, new sectors	
Fixed capital (equipment, buildings, land, brand/IPR)	<i>Immediate</i>	Loss of asset value		Potential redeployment of assets (sites, buildings, environmental effect, change in place identity, community cohesion, redeployment costs)
	<i>Adaptation</i>	Redeployment of assets	New employment opportunities Entrepreneurship	
	<i>Longer term</i>	Change in factor markets	New occupations, new sectors	
Employees (Managing Director – shop floor)	<i>Immediate</i>	Loss of wage income	Loss of employment	Change in labour market, Migration, Education and training policy Change in employment / career aspirations, Economic activity rate
	<i>Adaptation</i>	Welfare / wage income	Economic activity rate Unemployment rate Reemployment (sector / occupation) Entrepreneurship (new firm formation)	
	<i>Longer term</i>	Level of income	Career trajectory	
Suppliers	<i>Immediate</i>	Loss of sales Reduced profitability	Underemployment Potential loss of employment	Change in labour market, Migration, Education and training policy Change in employment / career aspirations, Economic activity rate
	<i>Adaptation</i>	New customers (existing/diversified) Mergers and acquisitions Closure of business	Employment decline, static or growth Change in occupational profile	
	<i>Longer term</i>	Competitiveness Sectoral restructuring	Employment decline, static or growth	

Actor	Time	Income	Employment	Place / Community
		Sectoral development	Change in occupational profile	
Loans, taxes and payments (Creditors, HMRC, LAs, etc.)	<i>Immediate</i>	Corporation tax, LA business rates, income tax, welfare payments, loan defaults		Change in local service provision (housing, schools, transport) Change in local authority business rate base Local welfare payments Redeployment costs
	<i>Adaptation</i>	Dependent on utilisation of factors of production		
	<i>Longer term</i>	Dependent on utilisation of factors of production		

2.3 Literature Review Profile

A wide range of international and UK studies relating to the impact of plant closures were identified, for example, academic articles, book chapters, evaluations carried out by Regional Development Agencies, ad hoc analysis undertaken by Local Authorities, etc. A full Bibliography comprising over 80 documents is provided in Annex 1 – and is believed to comprise a comprehensive listing of literature on the topic.

2.3.1 Summary of literature review coverage

Key features of the Literature Database (provided in Annex 2) include:

- Fifty two studies were included. Exclusions included an inability to source all references identified, replication in studies (for example, progress and interim reports or summary write-ups of longer studies), and relevance (principally, managerial decision making processes and studies focusing on generalised sectoral adjustments in the economy rather than direct connection to closure activity);
- Publication dates of the literature ranged from 1972 to 2012;
- The literature was primarily related to plant closures in the UK, with half a dozen in Australia, a small number relating to Nordic countries (Sweden, Norway and Denmark) and two studies relating to the USA;
- The vast majority of studies used regions as a functional economic area within which to understand the impact of plant closures, with some consideration of national impact and implications;
- Three quarters of studies can be classified as impact assessment - to varying degrees of detail and coverage of factors but mostly in terms of employment and income impacts. A quarter considered potential benefits of closures;
- For most studies impacts were identified and examined post-closure, with a range of 6 months to 10 years post-closure used to measure impact. A small number of studies predicted future impact of a plant closure less than 6 months after the closure;
- Most studies used a combination of quantitative and qualitative evidence, with primary research predominantly involving surveys of dismissed workers;
- A small number of studies also considered the range of industrial policy options available in response to closures, or potential closures; and,
- A very small number of studies provided analysis of factors influencing decision makers considering plant closure. Generally, these factors related to poor financial performance of the plant (contraction in demand) and/or plant relocation to lower cost centres (globalisation of production).

Energy Intensive Industries

More than three quarters of the literature relates to Energy Intensive Industries, with coverage spanning a wide range of sectors within this broad category³. This is perhaps reflective of the fact that EIs are responsible for a significant share of total employment and have traditionally been dominant employers in local labour markets. The strongly dominant share of studies concerned with EIs indicates that the literature review results are considered comprehensive in relation to methodologies and data coverage to understand the economic impact of EI plant closures.

2.3.2 Summary of literature review coverage by economic actor

Mapped against the impact assessment framework (Table 2.1), the studies that were part of the literature review covered the following issues:

- Investment Capital: only one of the studies considered examined investment capital impact. The focus of this was on the cost of redundancy packages provided to dismissed workers, as a cost to the owners of investment capital.
- Fixed Capital: less than a quarter of studies considered the result of plant closure on fixed capital. Factors considered included: the cost of write-down of equipment; loss of profit on-hand raw materials; acquisition costs; and new employment as a result of site redevelopment.
- Employees: the vast majority of impact assessments analysed were undertaken from the perspective of individuals directly impacted by plant closures, with a focus on understanding impact on their income and employment. The substantial majority of these studies were based on primary survey research with employees.
- Suppliers: a significant number of studies mapped the indirect impact of plant closures through consideration of the income and employment impact on the closed plant's supply chain. This required details of actual suppliers for the basis of survey or economic modelling to predict likely impact.
- Loans, taxes and payments: about half of the literature reviewed recognised the fiscal impact of plant closures, with a wide range of issues highlighted, most notably:
 - Cost of Government intervention through support provided to redundant workers was considered as part of just less than a quarter of studies;

³ The Department of Energy and Climate Change define EIs as companies whose energy costs are more than 3 per cent of their production costs. This includes a wide range of industry sectors, from major energy-intensive processes such as steel, chemicals and cement, to vehicle production to agricultural businesses, such as intensive pig- and poultry-rearing.

- A small number of studies also considered the loss of business rates income to Local Authorities and impacts on local service provision such as housing and regeneration policy; and,
- Health impacts form part of the analysis in a small number of studies examined, with the focus on changes in frequency of access to services (rather than analysis of the severity of any health issues).

Annex 2 provides a detailed mapping of the literature by economic actor and the following Section 3 a synthesis of findings.

3. The Economic Impact of Industrial Plant Closure in the UK: Summary Findings

Section 3 reports findings from analysis of the literature on plant closure through the lens of the Analytical Framework (as set out in Section 2 above). The findings are structured by methodologies utilised, data sources, impact by economic actor and policy responses. The section concludes with a set of key findings.

3.1 Methodologies

Before discussing the various methodologies employed in detail, the following findings on research approach employed may be made:

- *UK-based:* approximately 70 per cent of the studies were UK-based, looking at the domestic impacts of plant closure. The relevance of the literature reviewed to the UK market is therefore high.
- *The region:* the vast majority of studies used regions as the functional economic area within which to understand the impact of plant closures. Very few studies considered national impacts and implications.
- *Costs focused:* three-quarters of the studies looked primarily at the costs of plant closures, with only a quarter touching on any potential benefits or opportunities for the region/economy.
- *Time dimension:* for most of the studies impacts were identified and examined post-closure predominantly looking at the immediate and adaptation time dimensions. There was some consideration of long-term impacts, particularly around the impact on regeneration and the local economy; however, only four longitudinal studies attempted to capture the longer term impacts on the same individuals. A small number of studies predicted future impacts of plant closures less than 6 months after the closure.
- *Qualitative and quantitative information:* most studies used a combination of quantitative and qualitative evidence.
- *Primarily case studies:* approximately 70 per cent of the literature is based on case studies, prompted by specific plant closures (for example, the closure of MG Rover in 2005 and the potential closure of Rio Tinto Alcan Lynemouth in 2012). The studies are therefore isolated to assessing the impacts of each closure. A few studies took an international comparative perspective.

- *Methodologies employed included:* worker and business surveys; quantitative analyses; literature reviews; analysis of government documentation, stakeholder interviews and, often, a combination of these.

Survey methodologies

Over half of the studies reviewed used survey methodology. These studies drew a sample from the population of the dismissed workers of the plants (or, other subjects of study) conducting surveys to answer a range of quantitative and qualitative questions. The survey responses were then used to make statistical inferences about the redundant workers, providing insight into post-closure impacts (see Box 1 example).

Box 1: Armstrong (2006)

In this study for The Work Foundation, Armstrong tracked the job search, re-training and employment experiences of former MG Rover workers and families in order to experiences over a 6-month period following the closure.

Initially, letters were sent to all MG Rover workers inviting them to participate in the study. The participants were asked if they would agree to be interviewed over the telephone twice over a period of six months. A series of reminder letters were sent to the workers to encourage them to participate. In addition to this, there was some press coverage in local newspapers and on the local radio about the study.

The data was collected in two waves; ex-workers were interviewed in July 2005 and again in December 2005. In the first wave, 273 interviews were conducted with ex-MG Rover workers. In the second wave, 232 interviews were conducted (86 per cent of the original sample).

The majority of studies used postal surveys, with a number conducting follow-up interviews with respondents (e.g. Armstrong 2006, Bailey et al 2012). Interviews with stakeholders and focus groups were the alternative methodologies adopted (e.g. Donnelly et al 1998).

The sampling method for the survey methodologies was relatively consistent. Most sent out postal surveys or letters to the population of the dismissed workforce, with responses then forming the study sample (e.g. Dawley 2007, Hinde 1994, Tomaney et al 1997). Such sampling techniques present limitations regarding selection bias. In most instances, authors were cautious about this, assessing demographic details to consider such bias. A general conclusion was that there existed little bias in the results due to the cross-sectional representation of the workforce in most responses. For example, in a study on the impact of the closure of MG Rover in Longbridge, Armstrong (2006) concluded the demographic profile of the sample was reasonably representative of the Rover workforce according to gender, age, department and length of service.

Generally, response rates to surveys were low-to-moderate, with responses usually approximating to 20-30 per cent of the former workforce. Some studies have

achieved high response rates; for example, the study of the closure of Swan Hunter on Tyneside by Tomaney et al (1999) had a response rate of 75 per cent.

Tracking through secondary data

Approximately 25 per cent of the literature used administrative databases to track the experience of employees – and which was then used to derive conclusions in answer to questions around the impacts of plant closures. In principle a more robust methodology in comparison to surveying beneficiaries, the application in UK plant closure instances has been limited.

Over 60 per cent of such studies are international using national administrative data – a method generally not available for the UK. Countries studied included France, Germany, Denmark, Sweden, Norway and the USA. All of the studies had adequate sample size and used random sampling. Box 2 below summarises the methodology of one such study.

Box 2: Eliason & Storrie (2006)

Recently improved Swedish register data made it possible to link employer-employee data. Using this data, all workers displaced in 1987, due to an establishment closure, were followed over a pre-displacement period of 4 years and a post-displacement period stretching until 1999.

In Sweden, every resident and business is given a unique identity number, making it possible to link various registers based on administrative sources. In addition to this, an establishment closure is identified by the disappearance of its identity number. Instances of this were therefore used as a prompt to collect information on employees linked with that establishment.

To estimate the average effect of job displacement, matching techniques were used to match each displaced worker with the nearest non-displaced worker with respect to a propensity score. A balanced panel, spanning from 1983 to 1999, of 4,397 displaced workers (from a range of industries) and 115,696 non-displaced workers was the sample base for the study.

Using the linked employee-employer data these workers were tracked, collecting observations on employment, earnings and labour-market positions. The outcomes allowed conclusions to be made about the long-term impacts of establishment closures.

The empirical studies based in the UK ranged from prospective studies attempting to predict the closure cost to the local economy using aggregate labour and industry data (e.g. Dawson et al 2012) to using the plants' HR data to track specific employees (see Box 3). Sampling methods generally utilised population or aggregate statistics.

Box 3: Chapain & Murie (2008)

Chapain and Murie explore the impacts of the MG Rover factory closure in Longbridge, looking at the spatial and economic impacts. The report aimed to focus on the wider impacts of displacement and unemployment instead of focusing on the narrow employment experiences of the redundant workers alone.

In taking this wider perspective, the paper utilised three sources of data: (1) the payroll dataset of MG Rovers at two points in time to analyse the extent of the spatial impact of the closure of the MG Rover workers, and using corresponding postcodes from these two points in time; (2) analysing monthly claimant count database for claimants of unemployment-related benefits; (3) data from the Census 2001 and the Annual Business Inquiry 2005.

Chapain and Murie assessed the long-term spatial impacts by comparing the HR datasets from 1998 to 2005 (the year following the announcement of the closure), using the postcodes as a proxy for residential distribution. Long-term economic impacts were assessed using key statistics for selected areas, looking at long-term unemployment and reabsorption into other regional labour markets.

The study was able to make conclusions about the 'second wave' effects from factory closures not picked up by methodologies focusing on short-term impacts.

Other methodologies

Additional methodologies adopted were: literature reviews (11 per cent), synthesising previous studies and evaluations; government evaluations (6 per cent); and, rarely, the use of input-output modelling (see Box 4 for an example of this).

Box 4: Braidford, Hunt & Stone (2012)

This report forms part of the research into the economic, social and community impacts of the closure of the Lynemouth aluminium smelter. It is developed with the purpose of forming the basis for a potential longitudinal research project.

The study drew on: an input-output model; the firm's HR information; lessons learnt from similar plant closures and indicator data from the Office of National Statistics to estimate the impacts of the closure.

The economic model used, the North East Economic Model, is an input-output model of the North East economy based on purchasing and sales linkages between businesses and household expenditure. It allows the estimation of the multiplier effects on other businesses stemming from the closure of the Alcan plant. Using the model, the study assessed the overall impact calculating direct effects, indirect effects and induced effects; predicting job losses, GVA losses and the impact on council spending. The authors cautioned against the accuracy of the predicted impacts of the model due to the incomplete nature of the data and the unpredictability of the current economic environment.

Quality assessment

Over 89 per cent of the literature had been peer reviewed and /or produced by an Academic Research Institute. This constitutes a form of self-regulation by qualified members' superior to other determinants of quality. The remaining literature was sourced from government policy documents (7 per cent) and consulting organisations (4 per cent). In both these instances, documents were used to inform government evaluations and policy discussions. Overall, the quality and robustness of the evidence base can be deemed to be high.

A key aspect – namely the potential for bias (principally through self-selection) – was reviewed across the literature. Virtually all studies recognised this aspect explicitly, the potential likelihood of bias in terms of the adoption of particular methodologies, and sought measures to mitigate such effects.

As a whole, there were few limitations identified with the literature:

- *Stability of findings:* due to the lack of a longer-term perspective in the studies, there is substantial uncertainty around findings to a longer time horizon.
- *Lack of a holistic view:* although many studies highlighted the need for a holistic and all-encompassing perspective when evaluating plant closures, no authors adopted this in their methodologies. A large proportion of the literature focused predominantly on the impact on employees and suppliers, assessing them only in isolation.
- *Time relevance of the studies:* over 40 per cent of the studies reviewed are over 10 years old.

3.2 Data Sources

Given the study objectives to develop plant closure impact data sources and methodologies, this section look at the data used in the literature, mapped against the impact assessment framework. A full break-down of data sources can be found in Annex 2, including specific metrics/indicators.

3.2.1 Investment Capital

Clark (1990) was the only author to look at the impact on investment capital. The study, assessing the closure of Wisconsin Steel in Chicago, focused on the cost of redundancy pay outs. The nature of this study meant the specific financial records from the plant closure were used for the evaluation.

Table 3.2: Investment Capital Metrics / Indicators identified during Literature Review

Immediate:	• <u><i>The cost of redundancy package & pension benefits: Closing firm financial records</i></u>
Adaption:	• <u><i>None</i></u>

Longer term: • None

3.2.2 Fixed Capital

Similar to investment capital, fixed capital was considered by only a few studies. All of the immediate impacts of closures were drawn from firms' financial records (e.g. Clark 1990).

Data used in assessing longer time frames were predictions and/or forecasts of the changes to the local economy (e.g. Burfitt et al 2008, Shutt et al 2003). In most cases, these forecasts were made on the basis of assumptions of the redeployment (regeneration) of the land and fixed capital (e.g. Henderson et al 2003). In such instances, historical trends played a role in predicting the expected future effects.

Table 3.3: Fixed Capital Indicators identified during Literature Review

Immediate:	<ul style="list-style-type: none"> • <i>Cost of write-down of equipment: Closing firm financial records</i> • <i>Loss of profit on on-hand raw materials: Closing firm financial records</i>
Adaption:	<ul style="list-style-type: none"> • <i>New employment from redevelopment: Local Authority Records</i>
Longer term:	<ul style="list-style-type: none"> • <i>Changes in transport & motorways: Local Authority Records, Assumed changes</i> • <i>Changes in surrounding housing: Assumed reduction</i> • <i>Acquisition: Literature Review of previous closures, Forecasts of potential closures</i>

3.2.3 Employees

The primary source of data when assessing employee impacts was survey data. The qualitative and quantitative data drawn from these was then used to make an impact assessment. In Bailey et al (2012), for example, the survey data was aggregated to make an overall assessment of the economic and social impact following the MG Rover plant closure.

Some international studies utilised government administrative data as their source of information (as was seen in Box 2). Eliason et al 2006 argue such government administrative data sources overcome some of the weaknesses of survey data such as the lack of a robust control group, small sample size and sample attrition. In their study of the long-term effects of job-displacement, Swedish employee and employer data was linked. Registers can be merged in some countries, linking employees to their place-of-work due to the existence of a unique identification number and business' organisation number. Other examples of the use of such administrative data include Huttenen et al 2006; using data from Norway, Bender et al 1999; using data from France and Germany and Browning et al 2006; using data from Denmark. No UK studies utilised this type of data source due to constraints around such linking.

GVA loss modelling was also a source of data utilised to assess economic loss. For example Regeneris (2005) calculated GVA by adding total employment costs (wages/salaries plus pension and national insurance costs) and gross operating profit and depreciation. The Task Force used this to model the likely change in income from employment by area as a result of the closure. This is more reference data, aiding the support of other findings, as there are problems differentiating between skill levels and earnings.

Qualitative assessments and stakeholder estimates also supplemented the above mentioned data sources.

Table 3.4: Employee Indicators identified during Literature Review

Immediate	<ul style="list-style-type: none"> • <i>Loss of income/- benefits:</i> Employer records , Survey information , Economic modelling • <i>Value of redundancy package:</i> Survey information • <i>Number of lost jobs:</i> Employer records , Survey information • <i>% claiming out of work benefits:</i> Employer records, Survey information
Adaption:	<ul style="list-style-type: none"> • <i>Salary comparison pre/post redundancy:</i> Survey information , Case study, Government data (non-UK) , Stakeholder estimates • <i>% re-employed:</i> Survey information , Government data (non-UK), Case study • <i>% unemployed:</i> Survey information , Government data (non-UK) • <i>% full-time work:</i> Survey information, Government data (non-UK) • <i>% part-time/casual/temporary:</i> Survey information, Government data (non-UK) • <i>% re-training:</i> Survey information, Government data, Local training providers, Stakeholder estimates • <i>% self-employed:</i> Survey information, Government data • <i>% exit workforce:</i> Survey information • <i>% migration to find work:</i> Survey information • <i>% commuting for work:</i> Survey information, Stakeholder estimates • <i>% in manufacturing sector:</i> Survey information • <i>Characteristics of re-unemployed:</i> Survey information, Government data • <i>Job satisfaction:</i> Survey information, Stakeholder estimates • <i>Job duration:</i> Survey information • <i>Pathway to work:</i> Survey information • <i>Access local/regional labour market:</i> Survey information, Labour market expert opinion • <i>Geographical residential choice:</i> Survey information

Longer term:	<ul style="list-style-type: none"> • <i>Debt and cost savings</i>: Survey information • <i>Salary comparison pre/post – longer term</i>: Survey information, Case study • <i>% re-employed</i>: Survey information • <i>% long-term unemployed</i>: Survey information, Government data (non-UK) • <i>% in manufacturing sector</i>: Survey information • <i>% in up-skilled employment</i>: Survey information • <i>% >1 jobs since redundancy</i>: Survey information • <i>% commuting for work</i>: Survey information • <i>Health concerns</i>: Survey information, Stakeholder estimates • <i>Marital status</i>: Survey information, Literature review estimates • <i>GVA loss</i>: Economic modelling • <i>Financial exclusion</i>: Qualitative assessment • <i>Impact of fall in household income</i>: Survey information • <i>Housing prices/requirements</i>: Survey information (P), Stakeholder estimates • <i>Crime</i>: Stakeholder estimates
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3.2.4 Suppliers

When assessing the impact on suppliers, economic modelling was the most popular source of data. In these instances, studies used input-output modelling to quantify the impacts on supplier networks. For example, in Braidford et al (2012) an input-output model of the North East economy was used, with the model based on purchasing and sales linkages between businesses and household expenditure. Such models facilitated analysis of knock-on, or induced, effects.

Another source of information was via an assessment of the plant's financial statements, assessing the direct loss to the supplier network with this expenditure withdrawn. In Regeneris (2005) supplier dependence is calculated from this information, with the financial consequences for the supply chain being inferred from this.

Task Force interviews and local authority estimates served as the other sources of data. For example in the House of Commons Report on the UK car manufacturing industry (2006-07), stakeholder interviews with General Motors and PSA Peugeot-Citroën after closure announcements formed the basis of impact inference.

Table 3.5: Supplier Indicators identified during Literature Review

Immediate:	<ul style="list-style-type: none"> • <i>Financial loss</i>: Economic modelling (input-output analysis), Survey information • <i>Degree of dependence</i>: Economic modelling (input-output analysis), Plant's financial records • <i>Bad debts and redundant stock</i>: Local labour market experts • <i>"Domino effect"</i>: Economic modelling (input-output analysis) • <i>Job losses</i>: Economic modelling (input-output analysis), Local labour market experts
Adaption:	<ul style="list-style-type: none"> • <i>Closure of business</i>: ONS Business Demography, Local labour market experts
Longer term:	<ul style="list-style-type: none"> • <i>None</i>

3.2.5 Loans, taxes and payments

The most popular area of analysis when assessing the fiscal impacts of plant closures was looking at the financial cost of policy interventions (if any). For example, the Rover Task Force was set up following the announced closure of the Longbridge plant, costing £176 million to establish. In such cases, government spending data was the most useful and accessible data source.

Other fiscal costs were the increases in job benefit claims and the resultant loss of tax income. Sources of information for these were JSA Claimant data and Local Authority Business rate data.

In terms of measuring the *effectiveness* of the intervention, survey data was the key source of information – looking at indicators to weigh up the success of the Task Force or policy intervention (e.g. Bailey et al 2008).

Adaptive and longer-term impacts were assessed more so with economic modelling. For example, when assessing the long term re-employment impacts on tax incomes and the loss of business rates from the supply chain, Regeneris (2005) relied on an input-output model as their data source.

Other impacts in the longer-term on health, skills, housing and the impact on the local economy predominantly relied on qualitative assessment by field experts. These were all case-by-case. For example, Burfitt et al (2008) sought to predict the housing impacts in the south of Birmingham as the local economy regenerated post-closure. A combination of national data sets served as the starting point for their qualitative assessment of the changes. The datasets included: local labour force survey, the socio-economic characteristics of the south of Birmingham and the housing characteristics of a proxy high-tech workforce.

Table 3.6: Loans, Taxes and Payments Indicators identified during Literature Review

Immediate	<ul style="list-style-type: none"> • <i>Cost of intervention:</i> Government spending data • <i>Job benefit claims:</i> Local labour market experts, JSA Claimant rate • <i>Loss of tax income:</i> Economic modelling, Local Authority Business rate data
Adaption	<ul style="list-style-type: none"> • <i>Persistent unemployment job benefit claims:</i> Survey information • <i>Re-employment tax income:</i> Economic modelling, HMRC tax records • <i>Employment exit tax income:</i> Economic modelling • <i>NHS cost of health concerns:</i> Survey information, Qualitative assessment with health experts • <i>Loss of business rates income:</i> Economic modelling, Local Authority Business rate data
Longer term	<ul style="list-style-type: none"> • <i>Value of intervention:</i> Survey information, Labour market experts/case study evidence • <i>Housing & regeneration policies:</i> Housing market experts/case study evidence • <i>Skill shortage:</i> Survey information, Labour market expert opinion • <i>Diversifying regional economy:</i> Labour market expert opinion • Health concerns: Survey information, GP visits and health records

3.3 Impacts

Studies examined as part of the literature review identified a range of impacts from plant closures. Most studies focussed on the costs associated with plant closures; a smaller number established a combination of costs and benefits. No studies established only benefits associated with plant closures. The following subsections outline the range of impacts identified in the literature using the impact assessment framework (economic actors) to present findings.

3.3.1 Investment Capital (Shareholders, directors, etc.)

Only one study examined the issue of impact on investment capital, this analysis illustrated the immediate scale of the capital costs of closure. The impacts observed included: managing the income and employments rights of dismissed workers and pension benefits written into collective bargaining agreements (Clark, 1990).

The study focussed on the extent to which plant closures can occur as part of a complex corporate strategy, with management protecting core economic interests through limiting company liabilities (in this case, pension liabilities). The core emphasis of the study is in examining the significance of these issues as drivers for decision makers. The geographic focus of the study is the USA, so the legal analysis is of limited use to this study; however it is interesting to note the importance of

investment capital costs in plant closure decision making. Within economic geography a small literature does exist at a broader level on this aspect of what has been termed 'sunk costs'⁴.

3.3.2 Fixed capital (equipment, buildings, land, brand)

Immediate impacts were identified in one study. Impacts identified related to the write-down costs of plant and machinery and costs from the loss of raw materials. Write-down costs of plant machinery were noted to be relatively small by comparison with the most significant cost identified, loss of raw material assets. It should be noted, however, that this finding is specific to the sector within which the particular plant closure occurred. The author notes that, 'In the steel industry the combined age and technology of most plant and equipment is so old that the single biggest asset is often the on-hand raw materials of production, rather than the actual physical capital' (Clark, 1990).

Both Dawley, 2008, which focuses on the closure of a semi-conductor plant in the North East of England; and, Shutt et al, 2003, which analyses the impact of the Selby Coalfield closure on the Yorkshire and Humber region, provide evidence of the impact of plant closure on employment land. Whilst each of these studies is predominately focussed on employment impacts for dismissed workers, they each also provide qualitative assessment of the extent to which sites and premises that remain post-closure may not be suitable for new investors. These analyses conclude that there is a poor match between the requirements of both potential inward investors and indigenous business expansion – highlighting the issue of remediation and brownfield sites.

New employment benefits from redevelopment of sites and premises post-plant closure are considered in three studies. Burfitt and Ferrari, 2008, identify impacts associated with the adaption and long-term impact on community housing from attempts to regenerate the local economy through investment in technology and knowledge-intensive activities. The study focuses on redevelopment of the Longbridge site in Birmingham in the UK, a key element of which was the establishment of a science park. The study notes that the resulting changes in the make-up of the local workforce generates new forms of demand for housing which may not necessarily be met by the residential offer of neighbourhoods worst affected by the initial closure. The study examines the capacity of local workers to take up the anticipated high-technology jobs; the likely configuration of an incoming workforce; and the fit between the housing requirements of these new workers and the residential offer of neighbourhoods in the Longbridge area. The study concludes that the impact of the proposed science park is likely to be a mis-match between the housing and residential characteristics of neighbourhoods most closely associated with the plant closure and the requirements of an incoming high-tech workforce.

Shutt et al, 2003 identify possible future potential reemployment opportunities as a result of site redevelopment that were identified by the Task Force set up to assist

⁴ See, for example, Clark, G. and Wrigley, N. (2008) The spatial configuration of the firm and the management of sunk costs, *Journal of Economic Geography* 73, 3, pp. 285 - 304

dismissed workers, but the study does not quantify these opportunities. Similarly the Clyde Shipyard Taskforce Report (Scottish Executive, 2002) outlines a range of required land remediation and potential redevelopment work, identifying priorities and indicative delivery timescales. The study also outlines a wide range of costs associated with redevelopment, along with potential sources of funding.

In summary, there were few studies (7) which identified fixed capital costs associated with plant closure. This analysis is largely qualitative, recognising the importance of land remediation and regeneration. No study, however, has attempted to fully establish the costs of each element of fixed capital impacted by plant closures or, indeed, to track the longer term outcomes of redeployment of fixed capital assets.

3.3.3 Employees

Income Impacts

The immediate loss of income to dismissed workers is identified in only four studies included in the literature review (Regeneris, 2005; Tomaney et al, 1999; Cardiff Research Centre, 2005; Weston, 1990). These studies establish the immediate loss of income to workers and, therefore, the extent to which expenditure is lost to the local economy immediately following plant closure. Conversely, the literature review identified two examples of studies that quantified the income to dismissed workers through redundancy payment (Donnelly, M. & Scholarios, D.1998; and, Shuttleworth, I., Tyler, P. & McKinstry, D. 2005). On the whole the analysis examined in the literature was undertaken in order to provide an indicative picture of the significance of plant closures to the local economy.

A significant number of studies (just less than half) identify income adaption impacts for dismissed workers. Typically these studies provide survey-based analysis comparing employees' salary prior to closure with their salary following closure. There is strong evidence that income of dismissed workers reduces over the longer term. Some examples quantifying income loss were identified, for instance:

- On average, workers in full-time employment were found to be earning £3,523 a year less than they did at MG Rover prior to dismissal. Those who were working part-time were earning on average £10,153 a year less following reemployment. (Armstrong et al. 2006).
- In the case of Amtel in the North East of England, Dawley (2008) found that 40% of respondents reemployed in the North East were earning lower salaries than experienced at Amtel, with 39% stating that the skills requirement in their new employment was lower than required in their previous employment; however, 72% stated that job satisfaction was higher.
- Donnelly and Scholarios (1998), found that workers in defence-related industries that lost their jobs as a result of plant closure experienced poorer working conditions and pay as they adapted to the plant closure. The average reduction for males was £120 per month. For females the average reduction was £75 per month, although the average monthly pay for females was £200 less than that of males prior to plant closure. Huttunen et al (2006) analysed earning losses for dismissed workers in defence-related industries in Norway, concluding that there

was an average annual salary reduction of 3% in the seven months post-dismissal.

- Elliason and Storrie (2006) noted that there were average earnings reductions for workers dismissed in Sweden during the 1990s equivalent to US\$723. Further, the authors noted that, tracked over a longer term, average earnings for dismissed workers decreased during periods of economic downturn at a greater rate than the average of non-dismissed workers, suggesting that dismissed workers may be more vulnerable to subsequent economic shocks.
- Mason and Pinch (1991) present evidence from two plant closures in Southampton during the 1980s. This analysis finds that 80% of workers in one case considered pay and benefits to be lower in their employment post-plant closure, in the other case only 42% of workers considered pay and benefits to be inferior.
- Analysis presented by Jacobsen et al (1993) concludes that earnings loss for dismissed workers following plant closures is significant and persistent. The analysis shows that six years post-closure quarterly earnings remain US\$1,600 lower than their previous levels, with earnings losses for male workers more significant than those for females.
- In the USA Coughlin and Plazek (2010) illustrated a number of studies using administrative data from the 1970s and 1980s which demonstrated earnings losses for workers dismissed following manufacturing plants closure. The authors demonstrated that immediate earnings reductions for workers as a result of firm closure in Connecticut in the 1990s were 32 to 33 per cent and 40 per cent in Pennsylvania. Six years later income reductions were 13 to 15 per cent in Connecticut and 25 per cent in Pennsylvania.
- In the case of Rio Tinto Alcan it was noted that those dismissed workers that gained new employment in the town would be paid significantly less than they had previously been paid, due to the fact that workers at the former plant were paid significantly more than the average for the town. This illustrates the fact that plant closures can have a more significant impact on areas where the plant is the largest employer or the largest employer of comparatively highly paid workers (Braidford et al, 2012).

Whilst these examples indicate dismissed workers may earn less when reemployed, it should be noted that evidence using actual Government administrative data for earnings in France and Germany is not consistent with this finding. One study (Bender et al, 1999) examines the earnings data held by Government for dismissed workers. The analysis compares earnings one year prior to plant closure and one year after. The study found that in France average earnings actually slightly increased in the year following plant closure. In Germany earnings decreased but only by less than one per cent. The authors note, however, that these findings run contrary to most analyses of the impact of plant closures. This evidence is useful for this review of impacts because it indicates that income reductions for dismissed

workers over the longer term should perhaps not be assumed to be automatic and other income drivers must be considered.

Employment Impacts

There are some examples of studies that contain some analysis of the immediate expected job losses following plant closure, providing headcount analysis of the likely number of redundancies. For example, Cardiff Research Centre, (2005) provide analysis of the total number of jobs lost in the immediate term. Most studies, however, focus analysis on the way in which dismissed workers adapt and/or are impacted over the longer term.

A useful example, of the way in which immediate impacts and adaption impacts have been observed is provided below in Box 5. The range of impacts identified in this example are typical of a number of studies, particularly in labour markets where there is low demand for dismissed workers (see also Dawley, 2008).

Box 5: Impact of the MG Rover Closure

The MG Rover plant at Longbridge closed in 2005, the closure marked the loss of the last remaining British-owned car manufacturer in the UK

Immediate / First Wave Impacts

- Most workers (60%) were unemployed, with most seeking employment and a smaller number seeking retraining;
- If all dismissed workers had remained unemployed it would have resulted in an increase in the unemployment rate around Longbridge of 6.7 per cent to 10.3 per cent;
- Three months after the closure only a quarter of dismissed workers had found employment;
- Of those who had found employment, 52 per cent considered themselves as doing it for the foreseeable future; and,
- More than a third (37%) saw their new job as a stop-gap until something better came along.

Adaption / Second Wave Impacts

- Only 34% of dismissed workers were still unemployed and seeking work;
- More than half ex-MG Rover workers were in full-time employment; and,
- unemployed ex-MG Rover workers were more likely than employed ex- MG Rover workers to:
 - Be older;
 - Be separated/divorced or single (vs. married);
 - Report the need for further support;
 - Report higher levels of anxiety; and,
 - Report that health problems interfered with ability to carry

out normal tasks.

- Loss of raw material assets.

Source: Work Foundation, 2006; Armstrong et al. 2006; and, Regeneris, 2005.

Tomaney et al, 1997 provide empirical evidence of the impact on employment following the closure of Swan Hunter shipyard in the North East of England in the mid-1990s. This research found that there was a reemployment rate of 44% with an average period of unemployment of just 19 weeks. The highest proportions of unemployed were in the 50 to 59 age bands, close to half of all workers in these groups remained out of work in the long term.

Demand-side factors are critical in determining employment rates

Evidence of the impact of demand-side factors in reemployment is also provided by Mason and Pinch (1991). In this case, workers were dismissed during the mid-1990s with strong local demand for the skills of dismissed workers. Two cases are considered, each in the manufacturing sector. In these cases only 24% of workers remained unemployed 18 months after the plant closure, the majority of whom had previously operated in supervisory roles.

Strong local demand for the skills of dismissed workers was also cited as an important factor in the reemployment outcomes for dismissed workers as a result of the closure of the Harland and Wolff shipyard in Belfast in 2001. This case is analysed by Shuttleworth et al. (2005). This study shows that 6 months following the closure 67% of workers had found alternative employment; one year later 80% of workers had found new jobs. The authors further note that there appeared to be a high degree of sustainability in these job outcomes (95% of those in employment at six months were still in employment at eighteen months).

Shuttleworth et al. (2005) also note that in Northern Ireland: nine months after the Coats Viyella factory closed in Lurgan in 1997 some 70% of the former employees were in work again (CPC, 1998). Significantly, over 50% had found work in other companies in the textile sector. Due to the fact that many nearby companies had unfilled vacancies, many former Coats Viyella employees were in a position to choose between several jobs.

Increased travel to work impacts are more likely for highly skilled workers

Armstrong et al. 2006 identified a requirement for dismissed workers to increase their travel to work distance when looking for new employment. This is important in areas with relatively few employment opportunities, such as Northumberland. Further, the authors note that in the case of the Rio Tinto Alcan closure in Northumberland, workers were faced with a choice of increasing their travel to work distances to secure comparable employment, or lowering aspirations and taking jobs in different occupations or sectors with lower wages and possibly part-time or fixed term employment tenures. Similarly, Dawley, 2008 notes that in the case of the closure of Amtel in the North East of England in 2008, 17% of workers resettled outside of the region following the closure. A high share of relocating workers was in higher level

occupations. Most redundant workers with low skills, however, do not move in search of work (see for example, Tomaney et al, 1997, 15 per cent)

Interestingly evidence presented by Shuttleworth et al. (2005) suggests that in stronger labour markets dismissed workers may use redundancy as an opportunity to minimise their commuting in comparison with their previous employment. This study showed an increase in the share of workers employed at the Harland and Wolff shipyard in Belfast that were travelling shorter distances to work in their new jobs. There was, however, also an increase in the share of workers travelling larger distances to work.

New employment is often part-time and/or temporary

The nature of employment contracts obtained by dismissed workers finding new jobs is also analysed in a number of studies. Donnelly and Scholarios (1998) note that a higher share of dismissed workers in defence-related industries had to take up part-time or temporary employment following plant closure. Of those previously employed full-time the study found that in the three years following plant closure 23 per cent were in temporary employment, with 5 per cent on part-time contracts. A further 3 per cent were self-employed. Mason and Pinch (1991) noted that 33 per cent of new employment for dismissed workers was on a temporary basis in one case and 15 per cent were temporary in another case. In the case of Swan Hunter, Tomaney et al, 1997 found that 43% of dismissed worker reemployment was on a temporary basis.

New employment can be in a diverse range of sectors

The nature of reemployment for dismissed workers also presents some interesting findings, for example Dawley 2008 notes that, in the case of the Amtel closure in the North East, reemployment was in a diverse range of sectors. In this case no more than 12% of reemployment took place in any single 2 digit SIC. This example is illustrative of the limited extent to which engineering and technician level skills were absorbed and transferred into engineering and manufacturing activities within many of the region's strategic sectors. The study notes, however, that given the limited opportunities in these sectors in the region this outcome is not surprising.

Skills mismatches

Donnelly and Scholarios (1998) identified skills mismatch issues which made it more difficult for dismissed workers to find reemployment. The study examined the impact of plant closure in defence-related industries; the majority of employees in these industries are skilled or semi-skilled workers. Demand for such skills did provide sufficient opportunities for many dismissed workers. The study noted that many workers were considered over-qualified or that their skills were considered too narrow or inflexible for non-defence industry jobs. As a result many felt that they were forced to find jobs in which they felt underemployed or to retrain. Similarly, Dobbins et al, 2012, illustrated the challenge faced by dismissed workers at the Anglesey Aluminium plant through a qualitative review of worker experiences. This study found that the resulting over-qualified/underemployed workforce required retraining but with little insufficient quality jobs commensurate to those that they had lost within a travel to work distance.

Health and well-being: hidden unemployment?

Tomaney et al, 1997 note that illness was the reason cited by the largest group of people leaving the labour market (12% of all not seeking employment) in the case of the closure of Swan Hunter on Tyneside in the 1990s. This finding is consistent with a number of other sources indicating the negative impact of plant closures on health and well being.

In the case of the closure of MG Rover, a majority of survey respondents rated their health as significantly poorer currently compared to the year before the plant closure. Those in short-term part-time education or training reported the largest decreases in their state of health. Those still unemployed six months after redundancy were also much more likely to report that health problems were interfering with their ability to carry out normal tasks (Work Foundation, 2006).

For those individuals still unemployed six months after closure (Work Foundation survey Wave 2), health and poor self-esteem were ongoing issues, particularly for the older workers (unemployment at Wave 2 was highest in the 45-54 age group, at 41%). Those in part-time education or training reported the largest decreases in their state of health. Those who were unemployed were much more likely to report than those employed that health problems were interfering with their ability to carry out normal tasks (see, for example, Armstrong et al. 2006; and Hinde 1994).

The anxiety levels associated with this loss of income were considerable in the case of workers dismissed at the MG Rover plant; particularly for those constrained to take part-time work. While those working part-time in the survey sample had a much lower ratio of job applications to job offers compared to other workers, it appeared from their anxiety levels that many were still plagued by financial and other concerns. One could surmise that these workers were not working part-time by choice. Rather, they were accepting what employment they could obtain and as such, were under-employed. (Armstrong et al. 2006).

Donnelly and Scholarios, 1998, note that feelings of fear, humiliation and depression, particularly among those who had remained unemployed for some time, older individuals, and those suffering from poor health were attributed directly to the 'shell shock' of redundancy. Those who accepted other jobs quickly adapted more easily to the change.

3.3.4 Suppliers

The literature recognises that a range of suppliers face costs as a result of plant closures, however, when compared with direct income and employment analysis, relatively few studies identify specific indirect impacts on suppliers. A small number of studies (for example, Henderson et al, 2003; and, Dawson and Rowe, 2012) identify the number of supply chain firms potentially at risk following plant closure but this analysis is undertaken in order to inform the design and required scale of appropriate immediate post-closure support, rather than quantifying adaption and/or longer term costs and benefits.

A range of longer term supplier impacts are identified as a result of the closure of MG Rover, this analysis is based on data relating to actual suppliers and their individual

degrees of reliance on MG Rover (see Regeneris 2005). The most significant impacts identified are:

- A major portion of the estimated potential loss of GVA and employment as a result of the plant closure comes from the supply chain. It is further noted that the impact on the supply chain in such analysis may be underestimated due to the possibility that significant numbers of companies may cease trading altogether as a result of the cash flow impacts from the loss of business, bad debts and redundant stock.
- The analysis identifies a total of 74 firms and 3,780 jobs with a significant level of dependence on the closing plant, of which 57 are located in the West Midlands region.
- There are likely to be further impacts and need for support for suppliers in the region to MG Rover who fall outside the production/automotive purchasing arena.

A contrasting approach to identifying costs is taken by Cardiff University (2005). This analysis illustrates the economic impact on suppliers as a result of the closure of the NEG's Cardiff Bay site. The study states that the impact on suppliers is not likely to be as significant as in other plant closures due to the fact that the majority of raw materials are sourced from Japan. Nonetheless, Input-Output analysis predicted the following impacts:

- A total employment loss in other sectors of the economy of 304 jobs (in addition to the 490 on-site dismissals); and,
- A total annual loss of earnings in other sectors of the economy of £5m.

3.3.5 Loans, taxes and payments (Creditors, HMRC, LAS)

Impacts of plant closure in terms of loans, taxes and payments are not a common feature of the literature and the approaches used make cross-study comparison of the relative cost to Government problematic. There is some analysis of the immediate cost of providing support to dismissed workers (for example Armstrong et al., 2005; Cowling et al, 2005; and, Bailey et al., 2005). Costs associated with adaption to plant closure and longer term impact are less evident, however and, as noted earlier, the methods used vary. Some useful examples of adaption and longer term impacts are provided below.

An indicative estimate of the cost to the Exchequer from plant closure is provided for the closure of MG Rover (Regeneris, 2005). This analysis illustrates the total annual tax loss to the exchequer. The results are summarised in Table 3.7.

Table 3.7: Closure of MG Rover: annual predicted loss of Treasury income (£m)

Source	Corporation Tax	Employer NI	Employee Income Tax & NI	Total Tax loss	Additional benefits paid	Total Exchequer Cost
MG Rover	-	16.5	40.7	57.2	45.8	103.1
Automotive Supply Chain	4.6	7.2	17.5	29.3	31.0	60.3
Other Supply Chain	1.8	4.6	11.4	17.9	14.9	32.8
Induced demand	1.4	3.6	8.8	13.8	11.5	25.3
TOTAL	7.8	32.0	78.5	118.3	103.2	221.5

Closure of MG Rover Economic Impact Assessment (2005)

Braidford et al, 2012 do not quantify the range of costs to central Government outlined above but do provide an estimate of costs from the loss of the Alcan plant closure in Northumberland in terms of the loss of revenue to the Local Authority. This estimates the future annual loss of business rates income at £3,485,380, based on Local Authority business rates in 2012. This study also presents the cost to DWP in terms of increased Job Seekers Allowance claimants (this analysis is also a feature of a small number of other studies, for example Dawson and Rowe, 2012; and, Westin 1991).

Whilst not a consistent feature of the literature, a number of studies focus on negative health impacts for dismissed workers. An interesting feature of the Beale and Thethercott (1985) study which carried out a longitudinal study to investigate the consequences of unemployment on health was the fact that health impacts for workers were evident prior to closure. This study is useful due to the longitudinal nature of impact observed, the study considered impact two years prior to closure and four years after plant closure. The main findings are summarised in Box 6.

Box 6: Beale, N. & Nethercott, S. (1996)

This study demonstrates that unemployment results in a negative effect on health and not merely on welfare and morale. The results show a significant increase in the number of times that both men and women employees consult their doctors when subjected to compulsory redundancy.

The increase in stress exhibited was sufficient not only to provoke the families of dismissed workers into seeking the help of their doctors more often but also to give them symptoms which necessitate more frequent specialist advice. An equally important finding was quite unforeseen; an increase in morbidity began two years before redundancy - at the time when it became apparent to workers' families that their economic futures were not secure.

3.3.6 Influences on impacts

Influence on income and employment

An important issue relating to the ability of workers to gain new employment is their level of transferable skills. For example skilled trades workers and managers and professionals are highlighted in several studies as more likely to find new employment quickly following plant closures, with the latter group of workers also more likely to start their own business (Braidford et al, 2012).

In relation to employment impacts a number of issues influencing reemployment are evident in the literature:

- Firstly, the importance of job quality and job security in new employment are identified as important issues in relation to the sustainability of reemployment for workers made redundant following plant closures. (see, for example, Armstrong et al., 2006; Tomaney et al, 1997; and, Stern 1972)
- Secondly, the likelihood of dismissed workers finding sustainable new employment decreases over time (see, for example, Hinde, 1994; and Tomaney et al, 1997). It should be noted though that the extent to which reemployment is delayed through retraining (rather than unsuccessful job searching) is an important consideration. For example, evidence presented by Regeneris 2005, suggests that more than half of registered job seekers with Jobcentre Plus were seeking retraining.
- Thirdly, it is noted that well-being is only improved for those in employment, compared to those not in employment, where people find jobs that they are satisfied and which have similar or higher pay utilising their skills. (Armstrong et al., 2006)
- Lastly, skill level of dismissed workers is a key issue in determining their success in finding a new job. A number of studies have found that workers operating in occupations with a high degree of transferable skills have higher reemployment rates (see for example, Braidford et al, 2012; Dawley, 2008; Regeneris 2005; Tomaney et al, 1997). There is some evidence, however, that unskilled workers are more likely to remain in new jobs (Hinde, 1994, for example, presents evidence that average new job tenure for unskilled workers is higher for unskilled workers than skilled workers).

Issues surrounding reintegration extend beyond merely providing 'jobs' or 'job opportunities' for displaced workers. They extend to job quality as well as income security. This is particularly pressing for displaced workers who are only able to obtain casual or part-time work after redundancy. Indeed, there is evidence to suggest that individuals who subsequently obtain such work can become 'trapped' in precarious cycles of intermittent work and unemployment (see for example Westin, 1990; and Stern, 1972).

A longitudinal study illustrates that the impact on employment rates is significant over the longer term. Westin, 1990 found that even after 10 years, sardine factory workers in Norway spent less time in paid work than those at a 'sister' factory. They had also

accessed considerably higher levels of disability benefits and many were no longer active in the labour market (Westin 1990).

The literature also suggests that the age and gender of dismissed workers also appears to have an impact on the impact of plant closure. For example:

- Donnelly and Scholarios, (1998), note that a greater share of those citing difficulty in finding new employment in new industries were male. The reasons for difficulty in finding new work varied significantly;
- Mason and Pinch (1991) found that of those unemployed 18 months after plant closure more than three quarters were male;
- Donnelly and Scholarios, 1998, note that particular age groups seemed to find more difficulty in obtaining new employment; for example, under 29s and over 60s. The authors note that the effect on younger workers may reflect their generally lower levels of qualification and experience (a particular issue in competitive labour markets). For older people, the study concludes that the barriers to training were more pronounced;
- Elliason and Storrie (2006) also note that older displaced workers generally have less favourable labour market outcomes. The authors note that this may be due to a number of issues, for example, older workers tend to have longer tenure and more accumulated firm-specific capital that new employers do not value. They may also be less willing to move or change occupation to get a new job and may have less recent formal education and lack the skills demanded by new employers. Furthermore, Shuttleworth et al. (2005) noted that, in the case of the at the Harland and Wolff shipyard in Belfast, older workers appear to have made the decision to use the income from redundancy to disengage from the labour market.

3.4 Policy Responses

A wide range of policy responses and recommendations are evident in the literature, these are discussed in the following sub-sections:

3.4.1 Investment Capital (Shareholders)

The literature does not contain recommendations and policy responses in relation to investment capital.

3.4.2 Fixed capital (equipment, buildings, land, brand)

Burfitt and Ferrari, 2008; and, the Clyde Shipyard Taskforce Report (Scottish Executive, 2002) are broadly consistent in their policy recommendations in relation to the impact of attempts to adapt to plant closures through prioritising regeneration of the local economy through investment in new infrastructure and site development to enable new forms of economic activity, for example technology and knowledge-intensive activities. It is noted that the success of economic restructuring strategies is dependent on a well-developed understanding of how the wider impacts may impact on local communities over the longer term. Three broad policy implications are identified:

- economic development strategies need to be partnered with complementary housing and neighbourhood policies;
- there are possible negative outcomes associated with the creation of high-tech jobs such as increased commuting and segregation, which may run counter to local policy agendas; and,
- the nature of the balance between high-tech jobs growth and other strands of economic development strategy must be carefully considered.

3.4.3 Employees

A range of studies illustrate the importance of active government intervention, without which labour market polarisation and exclusion may be accelerated:

1. Specific interventions are needed that build the psychological resources of the underemployed and unemployed workers and help to limit the negative impact of their lack of good work on their psychological and physical wellbeing;
2. Continued effort and investment is required to increase the skill levels of workers in ways that are place specific, i.e. with full consideration of the potential job opportunities available to dismissed workers (see for example, Shuttleworth et al., 2005);
3. Ongoing monitoring of strategic companies is an important element of modern industrial policy for local economic development policy makers, rather than just dealing with the consequences of industrial plant closure. (Armstrong et al., 2006); and,
4. Support for those with the lowest skill levels is also consistently identified as an important policy response (see Box 7 below).

Box 7: Policy support to low skilled workers

In the case of the Rio Tinto Alcan closure it was noted that those with lowest skills would likely make up the majority of those still unemployed one year after the plant closure. It was recommended that support for these workers be given the highest priority (Braidford et al, 2012). The study also establishes policy recommendations in relation to the type of support required by dismissed workers, the study notes that:

‘Support should attempt to segment workers as far as possible into small groups with similar circumstances, and provide information on managing finances, self-employment, benefit claims and signposting to other agencies, as appropriate. It should also have longer-term horizons, as well as seeking to alleviate short-term difficulties’.

Specific recommendations regarding the role and activities of Public Employment Services also feature in the literature, for example:

- Following the closure of MG Rover in Birmingham the Regeneris impact assessment (2005) noted that provision of information to dismissed workers that had not contacted Jobcentre Plus (who may be high skilled and may leave the region to work elsewhere) required further action;
- Elliason and Storrie (2006) note that employment services should focus more on finding high-quality matches rather than quickly finding new jobs. It is stated that this is important in facilitating sustainable employment outcomes;
- Donnelly and Scholarios (1998) note the importance of personalised support for dismissed workers. In the case of defence-related industry plant closures in the 1990s they state that their survey of dismissed workers revealed little evidence of advice which attempted to highlight each person's range of skills and which skills were readily transferable to other jobs. In total, 70 per cent of those who managed to find new work reported that they had done so as a result of their own efforts rather than the assistance offered by the Job Centre. It was also evident that there was insufficient information about or encouragement towards self-employment;
- The value of general skills training is questioned due to low uptake and the perception that it is irrelevant. The success of training that is linked to specific employment opportunities is a key finding in the case of dismissed workers in the Harland and Wolff shipyard in Belfast. This training proved popular with dismissed workers as it was of relatively short duration, and applied to learning the skills for a job that the trainee could expect to have a good chance of obtaining (Shuttleworth et al., 2005).

3.4.4 Suppliers

An increased propensity for firms to operate global supply chains is noted in the literature as an issue for public policy makers in assessing the scale of impact in, and appropriate support for, supply chain firms. This is an issue that must be assessed on a case by case basis, even industry –specific generalisations are not necessarily helpful. This issue is widely recognised within the literature (and may provide a reason as to the relatively low level of analysis, due to the fact that most studies are commissioned by policy makers concerned with regional and sub-regional economic geographies and impacts). A useful example of this is provided in a UK House of Commons report (2007), which states that:

Automotive manufacturers have adopted different approaches to their supply chain: some prefer to acquire components from suppliers close to the final assembly plant, whereas others have centralised the purchase of components and prefer to send them out from a single source or limited number of suppliers to their plants throughout Europe.

Regeneris 2005 notes that understanding the impact of and needs of support for suppliers in the region to the recently closed MG Rover plant who fall outside the production/automotive purchasing arena is a further complicating factor in designing

appropriate policy responses. This issue is, however, recognised as an important consideration for policy makers designing appropriate interventions post-plant closure due to the fact that impact on income and employment can act as a negative multiplier on impact.

3.4.5 Loans, taxes and payments (Creditors, HMRC, LAS)

The literature does not contain recommendations and policy responses in relation to loans, taxes and payments.

3.5 Key Findings

Overall, key findings suggest:

- The international literature identified on plant closure is small – less than 100 articles and, in essence, a core group of accessible studies in the order of 30 - 40 odd;
- These studies are, virtually entirely, of high quality;
- Paradoxically, even though the majority of these cover only a small number of economic actors in the system (essentially, employees and supply chain), this core material is then substantially fragmented by country, approach, methodology, timescale for assessment, and period when study was undertaken;
- The commonest methodology is analysis of individual plant closures through survey methodology of dismissed workers;
- There are a number of international examples exemplifying the ability for robust and comprehensive labour market assessments of impacts through tracking of cohorts of dismissed workers in government administrative systems and databases;
- Tracking of impacts on forms of capital (investment and fixed) is, overall, negligible;
- Tracking of fiscal impacts in terms of loans, taxes, payments, etc. is limited, partial and sporadic;
- Tracking of supplier impacts remains limited – and use of input output models are used as a resource effective approach;
- Tracking of employee impacts illustrates the substantial contextual influence of labour markets – including national characteristics (for example, gender, part time), sectoral (occupational and skills profile) and, critically, local labour market dynamics. These combine to produce highly segmented, even individualised, outcomes for employees – and which are generally viewed as costs rather than benefits;

- A few longer term studies have illustrated the potential substantial reduction in any such costs to some groups of dismissed workers;
- Policy responses focus on immediate and adaptation support to dismissed workers – and learning reflects the need for support to seek to be personalised - mirroring the finding that labour market outcomes from redundancy seem to be highly individualised;
- Local economic development strategy has the potential to provide a longer term response – bringing together policy on fixed assets such as land and premises, sector development and skills strategy, and with connection to broader community and well being policies.

4. Extending the evidence base: Options, Feasibility and Recommendations

4.1 Introduction

The Analytical Framework for Plant Closure Impact Assessment set out in Table 2.1 above provides the potential parameters and coverage of what might be described as the 'ultimate gold standard' impact assessment.

The Analytical Framework comprises a deeper, more expansive and longer term tracking of the Direct, Indirect and Induced Impacts of plant closure to support an understanding of both the costs and benefits of closure that might occur and the subsequent impacts of closure on the economic and social system.

Mapping the existing literature and evidence base of impact assessments against this gold standard template provided a clear set of findings as to the extent to which the components of the Analytic Framework have been covered in the literature, through what methods, and to what depth (see Section 2.3.2 and Annex 3).

In essence, then, a 'state of play' assessment can be made, including the ability to identify a series of gaps in the evidence base and / or weaknesses in the depth of understanding on the impacts of plant closures:

- *Investment Capital*: Whilst the reason for the exit of such capital – precipitating the closure – may be known in the most general of terms (administration, re-deployment, etc), the literature on plant closure makes virtually no short or long term assessments as to the calculations undertaken (actual and perceived costs and benefits) by (owners of) investment capital in exiting. Such understanding would, for example, support mitigation activity, account management of key employers and broader industrial policy and, potentially, even support negotiation around the need for, and extent of, closure.

Given virtually no coverage of the impact on investment capital in the plant closure literature, no methodology has been identified to assess such impacts (including any potential data sources).

- *Fixed Capital*: greater recognition exists in the plant closure literature as a whole of the impact on a range of fixed capital assets. This asset diversity has led, however, to a tendency to assessment of particular assets in any one instance leading to partial and generally short term assessment of impacts as costs alone. A comprehensive methodology to assess the cost and benefits of redeployment of the fixed capital assets of production is not evident in any one study reviewed – yet critical to supporting place-making efforts after closure has occurred.

- *Employees*: the substantial majority of impact assessments in the literature have assessed the impacts on individual workers directly impacted by plant closures, with a focus on understanding impact on their income and employment. Strong methodologies exist – particularly primary survey research with employees – with the potential for deep and long term understanding of labour market impacts. Review of the impact assessment ‘state of play’ for this economic actor, then, is focused on the costs, benefits and value for money of alternative research and impact assessment methodologies (for example, survey, interviewing and / or tracking through secondary database analysis) in order to understand the longer term labour productivity impacts of closure.
- *Suppliers*: This economic actor is identified to a substantial extent in the impact assessment literature. Alternative assessment methodologies are available (especially survey based or economic modelling projections) to understand immediate costs to suppliers, but few attempts are evident to assess the adjustment or longer term costs and benefits from plant closure on suppliers. For example, does the closure impact on the supply chain reflect greater processes of structural adjustment in the economy – or a diminution of the competitive advantage of the UK and / or local economy.
- *Loans, taxes and payments*: as with fixed capital, the literature as a whole recognises the range of fiscal impacts that arise from plant closure, but individual studies tend to be partial in their focus on any one aspect of fiscal flows (for example, welfare benefits, or business rates) with – bar a few exceptions - limited attempts at quantification. In essence, then, knowledge of the full fiscal costs and benefits for government of plant closure – and as the basis for intervention rationales – does not exist.

Given these evidence base findings and the study objectives, Options were generated for investigation in order to identify the value and feasibility of developing the evidence base on plant closure impacts.

This process of Option generation included initial appraisal of their potential role, position and added value to stakeholders given the current ‘state of play’ of the evidence base for plant closure impact assessment (see Table 4.8).

The following Options were generated:

- Option 1: Investment Capital – a previously untraced impact;
- Option 2: Fixed Capital – developing a consolidated methodology;
- Option 3: Employees – extending the potential for comprehensive impact assessment;
- Option 4: Suppliers – indirect impact but churn or structural?; and,
- Option 5: Loans, Taxes, Payments – a framework for impact assessment.

Table 4.8 Development Options for Investigation mapped against current Plant Closure Impact Assessment Evidence Base

(KEY = H = High / M = Medium / L = Low)

	Option 1 – Investment Capital	Option 2 – Fixed Capital	Option 3 - Employees	Option 4 - Suppliers	Option 5 – Loans, Taxes, Payments
Stakeholder* Significance of impact	L	M	H	H	M/H
Current knowledge in evidence base	L	L/M	M	M	L
Potential added value to impact framework	M	H	H	L	H

*Stakeholder: Government, Local Authorities, Social Partners, Communities

4.2 Options for Further Research: Feasibility Assessments

Each of the proposed Options was investigated further for feasibility of development, including: rationale, potential methodology, cost and timescale for activities required, and issues and risks. The Feasibility Assessment for each Option is set out below.

Option 1: Investment Capital – a previously untraced impact

Rationale

The impact assessment framework identifies the economic actor of ‘investment capital’ as one of the five key actors in plant closure impacts. Indeed, it is the withdrawal of this economic actor – for whatever reason – that precipitates the plant closure in the first place.

Yet, review of the evidence base highlights that virtually no methodologies (or even attempts) exist to track the impacts of closure on investment capital. For example, what happens to this capital flow on its exit? And what are the costs and benefits of exit to owners of investment capital (in the short, medium and long term)?

Section 3 outlines that a literature does exist on the reasons and motivations for initial plant closure but the literature does not address key issues, for example, have these reasons been evident in the subsequent investment activity of withdrawn capital? Are the drivers of economic change in the sectoral, regional and national economy evident in subsequent investment patterns? Are certain plant closures reflective of efficient reallocation of capital (intra/inter-sectorally) as part of the capitalist process of ‘creative destruction’ and thus a source of longer term benefits? Or, as some have argued in certain plant closure cases (such as MG Rover Longbridge), has capital exit related to ‘financial engineering’ and the balance of benefits to exiting investment capital in contrast to any ‘sunk costs’ such as redundancy payments, pension liabilities, etc.?

Impact Assessment Methodology and Activities

For this Option, then, the feasibility assessment is more a focus on *the process of generation of the research questions* that need to be asked, and against which a subsequent research methodology would be designed – in order for the impacts on investment capital to be (fully) incorporated into any comprehensive assessment of the impacts of plant closure.

Research questions, then, might include:

- Who are the investors (shareholders / stakeholders) and what type of investment capital (individuals, venture capital, MNEs, patient capital, etc.)?
- What are the investment motivations and drivers of such capital and, relatedly, disinvestment motivations?
- What are the ‘barriers’ and associated costs to disinvestment for investment capital? What costs are ‘fixed’ and relatively immobile?
- What are the benefits to disinvestment for investment capital?
- Relatedly, what are the costs and benefits of disinvestment that fall outside the remit of investment capital (and to other stakeholders, including society)?

In turn, the methodology might entail:

- Mapping the owners (and flows) of investment capital for any particular plant (and its related assets);
- Tracking exited capital and reinvestments;
- Identifying and quantifying the costs (redundancy payments, etc.) to investment capital of exit (and any benefits, for example, tax write-offs)
- Sources of knowledge and data would entail: company accounts and reporting, financial, industrial and market literature and sector studies, Companies House (for example, Register of Directors), HMRC, etc.
- Given this, the assessment is that any impact assessment methodology in this field is in its infancy; indeed, the conclusion to be drawn is the need for a ‘research pilot’ to define the research questions and test potential research methodology and activity.

Resource costs and timescales

- Essentially, this Option should be defined as a research project or pilot – entailing research activity.
- Activities would entail desk-based research and semi-structured interviewing.
- In the long term it could be imagined as a doctoral thesis (3 years); in the short term, a potential research project of 3 – 6 months of £25 – £50k incorporating a dedicated researcher overseen by an expert in economic/financial geography and business investment.

Initial set-up / pilot activity

Following confirmation of research questions, an initial research task would be to map the range of investment capital impacted by plant closure. The extent to which this will be relevant to different plant closures will vary but the initial scoping stage should provide a “check-list” for future researchers.

Research activity would then involve pilot activity to fully scope and assess the feasibility and quality of available data and information. In order to do so would require visits and discussion with the holders of data and information. This will be important for the pilot activity to establish the range and quality of data available and understand any blockages in data access which may require further consideration.

Fully understanding the accuracy and quality of data held may require undertaking scoping analysis for several closures during the pilot study in order to get a fuller sense of the issues which may occur in this analysis - including the potentially high degree of geographical mobility associated with investment capital.

Repeat activity

The aim would be for the pilot activity to produce a 'toolkit' for any subsequent assessment of investment capital relating to a plant closure, including research questions, checklist of coverage, data and information sources.

Undertaking such an analysis for an individual closure would still incur a project resource cost.

Potential issues, challenges and risk

As a research activity or pilot, risk would be limited as knowledge and learning would be enhanced. An outcome might be, however, that the complexity of investment flows and the limits of data sources provide severe limitations on any impact assessment methodology – or imply the requirement for a detailed and intricate mapping methodology in each instance of plant closure.

A mitigating aim might be to seek the development of a simple template which at least sets out, in theory, the menu of potential costs and benefits incurred by investment capital exiting through plant closure.

Option 2: Fixed Capital – developing a consolidated methodology

Rationale

The impact assessment framework identifies the economic actor of ‘fixed capital’ as one of the five key actors in plant closure impacts. The contrast to ‘investment capital’ and to Option 1 is, however, that this capital is relatively immobile. Disinvestment sees the substantial balance of investment capital depart, whilst fixed capital remains – in machinery, in buildings, in land and other intangibles such as brand and reputation. In the immediate term it is, however, a set of assets that have lost their economic function and associated value. The critical issue – especially for the economy, places and communities – is how quickly such assets can be redeployed and revalorised, and at what cost.

The (physical) profile and importance of such assets as factors of production has seen a long tradition of policies, agencies and interventions in the UK to support such processes of redeployment and revalorisation. More specifically, within policy responses to plant closures, such assets (alongside redundant workers) have been the focus of Task Forces that deliberately seek to bring such agencies together in a concerted and joined-up effort at redeployment.

The range of stakeholders with interest in such assets (LAs, LEAs, HCA, DCLG, UKTI, BIS, development industry, etc.) implies that substantial data sources focused on such assets do exist.

Yet, review of the evidence base illustrates quite limited attempts to assess the impacts of plant closure on fixed capital – in terms of the number of studies undertaken, the methodologies employed, and the short time period of assessment.

As with Option 1 and investment capital, however, understanding the subsequent adaptation and long term futures of such productive assets (‘creative destruction or just destruction’) is critical to full understanding of the true costs and benefits of any plant closure.

Impact Assessment Methodology and Activities

Drawing from the limited work to date, the research questions for impact assessment are known but research methodologies have been limited. Feasibility assessment for Option 2, therefore, has investigated further definition of the methodology of impact assessment for fixed capital.

A starting point is to create the ‘menu’ of assets that exist at plant closure – such as plant, buildings, land and more recent developments such as ‘place – based’ brands and develop tracking methods for this variety. To a large extent, it is the focus on only aspects of such a menu that illustrates the limitations of those studies to date that have assessed fixed capital. For example, plant machinery may be ‘sold on’ relatively quickly and is potentially traceable in the case of (at least) administration.

At LA level, substantial land use statistics exist for major sites and premises (including planning approvals and completions) and may be linked to longer term development plans and expenditure and – when often with EII especially sites are

large – major infrastructure developments. The full set of potential economic and non-economic activities (such as housing) can be tracked, including land and rental values.

The methodology is, then, multi-stranded and the process can be characterised as the population of a template from existing secondary data sources. Furthermore, the data sources to be drawn from have existed for numbers of years, are updated regularly, generally accessible and have longevity. There is strong potential, therefore, for adaptation and longer term tracking – and the insights on benefits especially that may be drawn from longer term perspectives.

Resource costs and timescales

Essentially, this Option would entail confirmation of a ‘fixed capital template’ (or evaluation and monitoring framework) including metrics and data sources and data collation.

The process would require multi-agency buy-in and so visits to partner agencies alongside desk based activity. Site visit would also be recommended.

The project is the type that might be expected to be undertaken by a public policy consultancy – in the first instance for up to £30k and leaving a toolkit/spreadsheet that could be updated with ease by stakeholder parties.

Initial set-up / pilot activity

Initial research would be required to establish a ‘fixed capital template’. This would outline the range of fixed capital assets associated with plant closure; these are well documented in the literature. Additionally the template would include metrics and data sources for tracking identified fixed capital assets.

Due to the fact that most of the data associated with these assets are likely to be held locally discussion with local holders of this information is recommended. At the initial set-up and pilot stage this also has the benefit of testing the quality of data held and feasibility of collecting it. Experience of conducting similar past analysis does, however, suggest that data held locally has the potential to vary significantly. As a result the pilot activity should include a range of metrics with different information sources.

Repeat activity

Repeat activity would require completion or update of the template – essentially, desk-based analysis and consultation with local holders of information sources (some of which may not be held in electronic form). This would require resource – but of an order, for example, that might be expected as a task at Officer level.

Potential issues, challenges and risk

The process of achieving multi-agency buy-in can be time consuming – but these organisations are used to working together.

The quality of land use statistics and dataset accessibility varies across LAs and agencies (for example, from portals and automated systems to filing cabinets), time lags can exist and some information may be based on speculative futures and plans.

Option 3: Employees – extending the potential for comprehensive impact assessment

Rationale

The economic significance of the impact on employees from plant closure cannot be contested. This is reflected in a far larger evidence base concerned with assessing impacts on this set of economic actors when a plant closes compared with any other economic actor.

A wide range of issues have been examined using a variety of primary (predominantly survey) and secondary (predominantly Government social security) data to quantify impact. Analysis has also sought to understand impact in terms of immediate, adaptation and long term impact. In this regard, there is particular interest and concern around the long term impact on the employment and income trajectories of individuals made redundant – ranging from enforced economic inactivity to enhanced careers as new and more productive positions are achieved through the ‘push’ of redundancy.

In particular, three findings are evident: that very few studies exist comprised of long term and comprehensive understanding of the subsequent labour market experiences of those made redundant (and any subsequent impact on fiscal flows); that those studies that do involve some form of tracking have, in the main, involved substantial primary survey based activity (and/or interviewing of small numbers of ex-employees); and that secondary data sets potentially incorporating the income and employment trajectories of individuals are collected through routine Government social security administration.

Impact Assessment Methodology

Given the substantial costs and resources involved in tracking of employees through primary research, this Option has investigated the feasibility of tracking employees through data that is routinely collected given a UK individual’s economic activity and / or citizenship rights.

National Insurance Numbers (NINOs) provide a unique identifier for individuals which can theoretically be used to (i) track individuals (ii) look backwards and forwards; and (iii) link across different Government Department systems (for example, HMRC and DWP). It is this ability to link unique identifiers to individuals which Government holds data on – within a broader population database - and to use this to map ‘what happens / has happened’ to a discrete group of individuals within the labour market that makes this impact methodology so - potentially – insightful. Indeed, NINO provides the potential ability to track individuals across the economy and society.

The primary enabler of this work is that it requires a full payroll data set from which to begin assigning and tracking individuals. The payroll data needs to, as a bare minimum, deliver individual NINOs although, to be of real use, it should also link these unique identifiers to other individual employment details such as:

- Date of Birth;
- Occupation;
- Organisational level/ grade;
- Salary information;
- Personal address;
- Service tenure; and,
- Redundancy package data (where feasible).

It is from this initial profile / snapshot of information that a baseline for tracking and mapping exercises can be started.

Assuming permissions have been obtained, the primary task is to establish a series of 'flags' on the NINO numbers in the systems of different Government departments and to then arrange for a regular (perhaps quarterly) feed of data into an (impact assessment) team responsible for carrying out the work. In other words, multiple strands of data are capable of being brought together and 'warehoused' for data analysis for cohorts of the (working) population, including those made redundant. Once set up, then, NINO systems would be a time and cost efficient process of analysing data for cohorts within populations across a full spectrum of policy domains.

Furthermore, such a process is especially pertinent at this moment in time concerning HMRC who have introduced a 'Real Time Information' (RTI) work program to support detailed on-going assessments of the income details of the population.

Nevertheless, whilst this route to data collection would be likely to yield good quality understanding and data on income levels / changes, other data on location or other factors would likely be far less complete within the data set – so highlighting the value of linking of datasets through NINO. For example, changes in location can be tracked through PAYE codes of employers, but the location where the business is registered will not define exactly where the actual person lives. This data can be accessed in principle, but it is contingent upon up to date information on addresses being accessible through HMRC data and this is not always accurate.

It should be noted, also, that whilst the value of 'looking backwards' would be substantial to gain early understanding on the longer term impacts of plant closure redundancy, consultations have highlighted that this is not a viable approach to instigate given legacy systems, data discontinuities and the lack of practical solutions to facilitate this either in HMRC or DWP. Nevertheless, for long term studies of the impact of closures on defined employee populations it offers a direct route in to empirical understanding unmediated by the vagaries of survey responses.

In addition, the potential exists for the experiences of the cohort of individuals to be matched against the more general population (or other defined samples within the population).

Resource costs and timescale

Initial set-up / pilot activity

The potential methodology outlined above – based only on ‘looking forwards’ - does face operational challenges which need to be overcome. There are, for example, issues of data protection and confidentiality, data integration issues including the robustness and reliability of different dataset variables, protocols for cross-Departmental working as well as the need for development of data analytics. Different teams and systems might need, also, to be engaged over the project lifetime. None of these issues, however, should be deemed insurmountable and, if kept ‘in-house’, the resource implications are primarily within Government data / analytics teams. For example, with RTI it should be possible to set up a special project – as HMRC does for other purposes – and flag ‘cases’ to be tracked, with reports then run at regular intervals.

Overall, an expedient route might be to bring together an inter-departmental working group to undertake up front planning and gain co-operations. Examples in the UK system do exist also; for example, HMRC already ‘flags’ specific groups for tracking for their own purposes, most commonly within HMRC Risk and Intelligence Service (RIS) and DWP has also used a similar approach to understand local populations through JSA data.

The ‘Tell Us Once’ initiative led out of DWP would be an example of where cross departmental working has been successfully achieved for a different, but related, purpose⁵.

Repeat activity

The major resource requirements occur at set up stage. Update activity, in principle, should require little more than refreshing data feeds in to the ‘spreadsheet’ and desk-based analysis. Similarly, whilst setting up new cohorts to track would require greater effort (‘flagging’) with systems, databases and protocols in place this still implies a relatively small scale desk-based task.

Potential issues, challenges and risk

Substantially, it must be recognised that without initial access to the payroll data of the closing plant (and related NINOs) there is no baseline against which data can be linked. This approach requires access to company payroll details as well as, most likely, the permissions of those affected to be tracked due to data protection issues. In circumstances where similar work (based on survey tracking of individuals) has taken place the permissions and data have usually been obtained up front and been

⁵ See http://www.local.gov.uk/c/document_library/get_file?uuid=007c3eb6-d5bc-4094-a9cf-f25ffac9a0ac&groupId=10171; <http://www.dwp.gov.uk/docs/tell-us-once-wr2011-ia.pdf>; <http://www.guardian.co.uk/public-leaders-network/2011/nov/10/tell-us-once-birth-death>

facilitated by a 'Taskforce'. There are potentially private sector confidentiality issues for the businesses involved also.

The methodology is, also, only feasible looking forwards from this moment and which would mean tracking for at least 18-24 months to generate a data set from which robust and reliable conclusions could be drawn. For example, with the use of HMRC data, there is a need to allow for the impact of a move to self-employment, which could take 18-24 months to become apparent due to legal requirements around completion of Self Assessment.

Option 4: Suppliers – indirect impact but churn or structural?

Rationale

In the literature on plant closure impact assessment, the income and employment impact on the supply chain (and economic base) ranks second only after impact on plant employees. The response of suppliers and supply chains are taken as the key form of indirect impact of plant closures.

Particular concern revolves around the spatial distribution of any impact – whether concentrated in the closure locality and thus reinforcing the economic impact felt or, conversely, impacting far flung communities and economies with unforeseen effects.

The immediacy of this concern is, however, reflected in the assessment methodologies utilised with the vast majority of studies concerned only with the immediate impacts. Little or no assessment has been undertaken of adaptive and longer term responses by supply chains – whether it be decline and /or closure, survival, or a ‘kick start’ to new markets, new products and growth trajectories. Similarly, and reflecting the weaknesses of employee tracking outlined in Option 3, there is virtually no evidence of the adaptive and longer term impacts on supplier employees.

Feasibility assessment in this instance focused on the potential to support greater understanding of indirect longer term costs and benefits of plant closure.

Impact Assessment Methodology

Current impact assessment of indirect impacts in supply chains tends to take one of two forms. The first uses economic models, generally based on input-output tables, to hypothesise the supply chain linkages of the closing plant and, in turn, project the expected impacts on the supply chain. In certain instances this may be supported by expenditure information provided by the closing plant (on what and with whom to greater or lesser detail).

An alternative methodology – and assuming support from the closing plant – utilises full provision of expenditure and supply chain contact details, to survey suppliers to understand the significance of any lost sales to their business (threat of bankruptcy, redundancies, short term working, negligible, etc.).

The proposed methodological extension utilises the contact details of suppliers made under the alternative methodology.

Each supplier has a unique reference number – a Companies House registration number. This allows also for the company to be identified within the Inter Departmental Business Register (IDBR)⁶.

⁶ The IDBR is a comprehensive list of UK businesses is used by the Office for National Statistics (ONS) and other government departments, it covers businesses in all parts of the economy, except

The IDBR allows tracking of the individual fortunes of businesses through time, including turnover, employment and products. In principle, then, the performance of the business before and after the closure can be tracked through reference to a secondary database that is updated annually as part of required corporate reporting.

Longitudinal tracking through secondary data is the basis of Option 3 also; in that case, however, the study object is redundant employees rather than impacted suppliers. In a similar vein, the same methodological development set out under Option 3 could be applied to any employees made redundant within the supply chain.

Resource costs and timescales

Initial set-up / pilot activity

An initial small cost (£<10k) to set up the tracking process of suppliers, which requires in-person attendance at ONS (Office for National Statistics) micro-lab in either London or Cardiff by an 'approved researcher'. Additional control group analysis could also be carried out for a similarly small fee – setting up an equivalent sample of businesses to the supply chain to compare experience over time against impacted businesses.

Repeat activity

Once the tracking (and / or matching) cohort has been set up, minimal costs exist to update and analyse IDBR data (circa £50 per day on-site in London or Cardiff). Further resource would be required in terms of desk-based analysis of the results.

Potential issues, challenges and risk

IDBR analysis would be based on annual return figures (for example, turnover and employment) and therefore may smooth impacts making it difficult to differentiate between immediate and adaption impacts. Its usefulness is for longitudinal analysis.

The issue of attribution: whilst the performance of the supplier can be tracked, it cannot be assumed automatically that this performance relates solely (or even mostly) to the impact of the plant closure.

The methodology is only possible if supplier information is provided by the closing plant.

some very small businesses (self-employed, those without employees and low turnover) and some non-profit making organisations

Option 5: Loans, Taxes, Payments – a framework for impact assessment

Rationale

The impact assessment framework illustrates the range and diversity of fiscal impacts that may occur over time following plant closure. These fiscal flows are generated by impacts on the range of components of the system – capital (transaction taxes, etc.), businesses (corporation tax, pension liabilities, etc.), employees (income tax, welfare benefits, etc.), fixed assets (business rates, etc); in other words, the other economic actors identified in the Analytical Framework. Furthermore, the impacts may be positive and / or negative and their balance varies over time.

The literature review itself illustrates partial and scattered attempts to assess such flows within the literature – generally dependent on the impact aspect of plant closure (for example, employees or place) that is the focus of any individual study. Looking across the literature as a whole, a framework for assessing fiscal flows can begin to be determined.

In terms of policy, understanding the balance of such flows, at what time, and to whose cost and benefit is clearly a key component of any decision to intervene. It is important to establish the ‘whole’ cost / benefit, especially to HMG, and tracking of such flows recognises the wider impacts on public services as a consequence of plant closure at local and national level. The approach recognises fully the social costs and benefits of plant closure.

Impact Assessment Methodology

The basis of this Option, then, is to:

- define (drawing together) the framework to comprehensively incorporate fiscal impacts (including confirmation of research questions); and,
- identify the range of methods and data sources for the framework’s implementation, itself partially based on the tracking methodologies for other economic actors in the system.

The first process is desk-based and theoretical – to look across the Impact Assessment Analytical Framework created as part of this study to identify in detail those points at which fiscal flows are generated / impacted (for example, payment of business rates).

The second process is to determine how those impacts may be tracked and quantified. The ultimate position would be to incorporate ‘fiscal tracking’ within the tracking methodologies for all the other economic actors recognising the ‘economies of scale’ potential for these discreet methodologies to generate and or support the data requirements for fiscal impact assessment. For example, redundant employees identified in HMRC and DWP databases (Option 3 above) would provide information on income tax and welfare payments over time. HMRC could also identify corporation taxes and so on. If such ‘fully fiscally developed’ methodologies were in place then

understanding the whole cost / benefit to HMG would involve a process of aggregation.

Given this scenario would require continued developments across the evidence base and methodologies of plant closure, a shorter term solution might be to identify a foreshortened pragmatic monitoring and evaluation framework against the defined framework for fiscal impacts. This would entail looking across the range of secondary data sources, (predominantly held by national and local government) to identify a key 'basket of metrics' which were achievable in order to provide a 'ready reckoner' understanding of the whole cost of a plant closure.

Resource costs and timescales

Initial set-up / pilot activity

The project would be developmental, incorporating theoretical expertise on fiscal flows, knowledge of monitoring and evaluation practice, and understanding of the diversity of UK (in the main government) data sets. A framework and associated spreadsheet might be developed and subsequently tested.

The project is the type that might be expected to be undertaken by a public policy consultancy using academic experts – in the first instance for up to £40k.

Repeat activity

The project would generate a template to be upgraded and/or used in future plant closure instances. Repeat activity would require desk-based analysis to populate and interpret the data. Given the range of data required this might be expected to involve some 'bespoke' activity requiring a certain level of resource.

Potential issues, challenges and risk

The project is developmental – creating a framework – but one that is a regular occurrence in policy development. Challenges might be expected to include getting agreement on the framework and that data gaps are likely to be identified – potentially requiring 'work-arounds' to be created.

It should be noted that any developments in the other impact methodologies discussed above would, in parallel, act as developmental 'inputs' within this proposed Option.

4.3 Options: Ranked Summary

Table 4.9 provides a ranked summary of the feasibility assessments for each Option.

Table 4.9 Ranked Summary of Options

	Rank	Impact Research Questions Known	Methodology Developed	Metrics and Data Sources Exist	Feasibility Assessment	Initial development requirement	Repeat activity
Option 3 – Employees: extending potential for comprehensive impact assessment	1	Yes	Partly	Yes	Very high value to stakeholders Methodology requires testing but is a substantial task	Implementation project 6 months £50k - £75k	Once in place – update data feeds and analysis; defining new dismissed worker cohorts
Option 2 – Fixed Capital: developing a consolidated methodology	2	Mostly	Partly	Mostly	Evidence base gap Limited effort could gap fill to substantial extent and deliver stakeholder value	Policy consultancy 3 – 4 months £30k	Update and /or population and analysis of template created in initial study in new closure instances
Option 5 – Loans, Taxes, Payments: a framework for impact assessment	3	Partial	No	Uncertain	Developmental: of high value but likely to require several stages to reach fully robust framework	Policy consultancy (with academic experts) 3 – 4 months £40k	Update template as impact methodologies are developed in field and further data sources become available
Option 1 – Investment Capital: a previously untraced impact	4	No	No	Uncertain	Needed to fill a theoretical 'hole' in the impact assessment framework for plant closure	Research project 3 - 6 months £25 -50k Doctoral thesis?	Project application of impact methodology created in a closure instance
Option 4 – Suppliers: indirect impact but churn or structural	5	Yes	Mostly	Yes	Achievable with limited effort but value is incremental	2 month project by IDBR specialist < £20k	Minimal costs to update tracking over time

4.4 Recommendations

Review of the evidence base on plant closure impact assessment reveals a number of omissions and gaps – from the full array of impacts that should be considered, to the ability to adequately quantify impacts, to the timescale over which any balance of costs and benefits of plant closures is assessed.

Unsurprisingly, combinations of these gaps informed the basis of a series of Options for BIS to develop the evidence base on plant closure. Each Option was assessed for feasibility and ranked (see summary Table 4.9 above), and this assessment forms the basis for the following Recommendations.

Recommendation One: To seek to contract a project to develop a methodology – based on existing secondary data sets – to fully track the short, medium and long terms effects of redundancy on employees (utilising HMRC and DWP datasets)

The impact of plant closure on employees remains the impact of greatest significance to the full array of stakeholders. Current impact assessment tends to be short term, primary in nature (and thus resource intensive) and fails to provide full overview of the costs and benefits to individuals and broader labour market impacts. Such evidence gaps hinder policy responses.

The potential exists to put in place a robust tracking methodology – although it is unlikely to be able to offer retrospective tracking of substance.

Recommendation Two: Development of plant closure impact assessment methodology should not be sector specific - virtually all evidence base and methodological developments in impact assessment of plant closures will be applicable across all sectors of the economy

Whilst the plant closure literature to date is dominated by that associated with Energy Intensive Industries, tracking and assessment methodologies do not, from the evidence to date, vary to any significant extent whatever the sector of study. Direct, Indirect and Induced effects are evident on employees, supply chains, places and communities whatever the sector within which a closure may take place – and whilst the difficulty of tracking and assessment of the balance of costs and benefits may vary by plant closure this is influenced by a range of factors (sector, size, geography, business type, stakeholder relations, etc.)

Recommendation Three: That BIS create an internal multi-stranded ‘Action Plan’ for the development of the evidence base on the economic impact of industrial plant closure in the UK

Given the economic importance and expected institutional and policy responses to plant closure, it remains problematic that the evidence base to support policy remains limited.

Development of such a plan could usefully be taken forward through inter-departmental activity given the range of policy interests in plant closures.

This feasibility study has identified a variety of projects of value to develop the evidence base – and which could be taken forward relatively quickly, through a number of routes, within a limited resource base. Furthermore, in certain instances potential stand alone projects are inter-linked and economies possible – with advances in one project supporting the work programme of another. Most obviously, for example, incorporating assessment of fiscal impacts in to methodology – whether following dismissed workers (Option 3), supply chains (Option 4) or fixed capital (Option 2) – would contribute to a ‘meta framework’ designed to assess the full fiscal costs and benefits of plant closure.

Recommendation Four: Development of an ‘information ask’ from exiting employers

In modern day economies, the announcement of plant closures is likely to trigger partnership responses between governmental and other stakeholders. In many cases, such partnership will include exiting employers who recognise both issues of corporate responsibility and reputation as regards their employees, place-based stakeholders and customers. Recent examples of such responses in the UK include ‘Taskforce responses’ and, for example, the European Commission utilises the European Globalisation Fund to support employee adaptation to redundancy.

For the purposes of impact assessment, review of the literature (and some of the Options assessed) highlight that the extent and accuracy of such assessment is very substantially enhanced by the provision of key data by exiting employers.

Such data would include, for example:

- Employees and dismissed workers:
- Suppliers and expenditure:
- Financial (capital owners, investments and flows): and,
- Management decision making.

It is likely also that other reviews and evaluations of plant closure responses have highlighted other desired information and actions by exiting employers in supporting the adaptation process in response to closure.

This Recommendation suggests bringing such learning together in one place to support the policy response and impact assessment in the face of future plant closures.

ANNEXES

Annex 1: Industrial Plant Closure: A Bibliography

- Andersson, F. and Vejsiu, A. (2001) 'Determinants of plant closures in Swedish manufacturing. Working paper 2001: 6'. *Office of Labour Market Policy Evaluation*.
- Armstrong, K. (2006) 'Life after MG Rover. The Impact of closure on workers, their families and the community. A report prepared for BBC Radio 4'. *The Work Foundation*.
- Armstrong, K., Bailey, D., De Ruyter, A., Mahdon, M. and Thomas, H. (2008) 'The Impact of Plant Closures on Workers: a Comparison of MG Rover in the UK and Mitsubishi in Australia'. *Policy Studies*. 29(3): 343-55.
- Bailey, D., Beer, A. and Holli, T. (2008) 'A tale of two regions: comparative versus competitive approaches to economic restructuring'. *Policy Studies*. 29(3): 343-55.
- Bailey, D., Chapain, C., Mahdon, M. and Fauth, R. (2008) 'Life after Longbridge: Three Years on. Pathways to Re-employment in a Restructuring Economy'. London: The Work Foundation.
- Bailey, D., Kobayashi, S. and MacNeill, S. (2008) 'Rover and out? Globalisation, the West Midlands auto cluster, and the end of MG Rover'. *Policy Studies*. 29(3): 267-79.
- Bailey, D. and MacNeill, S. (2008) 'The Rover Task Force: A Case Study in Proactive and Reactive Policy Intervention?' *Regional Science Policy and Practice*. 1(1): 1-16.
- Bailey, D., Chapain, C. and de Ruyter, A. (2011) 'Employment Outcomes and Plant Closure in a Post-industrial City: An Analysis of the Labour Market Status of MG Rover Workers Three Years On'. *Urban Studies*. 1-18.
- Bailey, N. and Turok, I. (2000) 'Adjustment to Job losses in Britain's Major Cities'. *Regional Studies*. 34(7): 631-653.
- Beale, N. and Nethercott, S. (1985) 'Job-loss and family morbidity: a study of a factory closure'. *Journal of the Royal College of General Practitioners*. 35(280): 510-514.
- Beer, A. and Thomas, H. (2007) 'The Politics and Policy of Economic Restructuring in Australia: Understanding Government Responses to the Closure of an Automotive Plant'. *Space and Polity*. 11(3): 243-261.
- Bender, S., Dustmann, C., Margolis, D. and Meghir, C. (2002) 'Worker displacement in France and Germany'. In P. Kuhn (Ed.), *Losing Work, Moving On International Perspectives on Worker Displacement*. W.E. Upjohn Institute for Employment Research.

- Bluestone, B. and Harrison, B. (1982) 'The Deindustrialisation of America: Plant Closing, Community Abandonment and the Dismantling of Basic Industry'. Basic Books: New York.
- Braidford, P., Hunt, A., Stone, I. (2012) 'Rio Tinto Alcan Lynemouth closure evidence of likely economic impact. Report for Northumberland County Council'. *Durham Business School Policy Research Group: University of Durham*.
- Burfitt, A. and Ferrari, E. (2008) 'The housing and neighbourhood impacts of knowledge-based economic development following industrial closure'. *Policy Studies*. 29: 293-304.
- Browning, M., Dan, A.M. and Heinesen, E. (2006) 'Job displacement and stress-related health outcomes'. *Health Economics*. 15(10): 1061-1075.
- Cardiff Research Centre. (2005) 'The Economic Impact of the Closure of Nippon Electric Glass (NEG) – A Draft Quantitative Assessment'
- Chapain, C. and Murie, A. (2008) 'The impact of factory closure on local communities and economies: the case of the MG Rover Longbridge closure in Birmingham'. *Centre for Urban and Regional Studies. University of Birmingham, UK*
- Clark, G.L (1990) 'Piercing the corporate veil: the closure of Wisconsin Steel in South Chicago'. *Reg. Studies*. 24: 405-420.
- Clyde Shipyards Task Force. (2002) 'Clyde Shipyards Task Force Report'.
- Couch, K.A. and Placzek, D.W. (2010) 'Earnings Losses of Displaced Workers Revisited'. *The American Economic Review*. 100(1): 572-589.
- Cowling, M. and Isles, N. (2005) 'Sent to Coventry? The re-employment of the Longbridge 5,000: An analysis of the re-absorption of Longbridge car workers into the local/regional economy of the West Midlands'. *The Work Foundation*.
- Dawley, S. (2007) 'Making labour-market geographies: volatile 'flagship' inward investment and peripheral regions'. *Environment and Planning*. 39(6): 1403-1419.
- Dawley, S. (2008) 'Advanced manufacturing skills tracking survey: A report investigating the post-closure resettlement patterns of the former Atmel workforce'. *Centre for Urban and Regional Development Studies*.
- Dawley, S., Marshall, N., Pike, A., Pollard, J. and Tomaney, J. (2008) 'Plant closures, large-scale redundancies and labour market resettlement: an initial review of the literature. Evaluating the impact of and policy response to restricting at Northern Rock'. *Centre for Urban and Regional Development Studies*.

- Dawson, J, Rowe, I. (2012) 'Economic Indicators to Support Alcan Response Group Strategic Economic Impact Work Stream'. *Northumberland Council*.
- Dobbins, T., Plows, A, Lloyd-Williams, H. (2012) 'Labour precariousness and 'make do and mend' after redundancy at Anglesey Aluminium: critiquing Human Capital Theory'. *Bangor University*.
- Donnelly, M. and Scholarios, D. (1998) 'Workers' experiences of Redundancy: Evidence from Scottish Defence-Dependent Companies'. *Personnel Review*. 27(4).
- Ecotec. (2008) 'Evaluation of the Rover Task Force 2000 and MG Rover Task Force 2005 Programmes'. *Final Report to AWM*.
- Elliason, M. and Storrie, D. (2006) 'Lasting or latent scars? Swedish evidence on the long-term effects of job displacement'. *Journal of Labour Economics*. 24(4): 831-856.
- Elliason, M and Storrie, D. (2009) 'Job loss is bad for your health: Swedish evidence on cause-specific hospitalization following involuntary job loss'. *Social Science & Medicine*. 68(8): 1396-1406.
- Fallick, B. (1996) 'A Review of the recent empirical literature on displaced workers'. *Industrial and Labour Relations Review*. 50(1): 5-12.
- Finch, J.H. (1998) 'The Re-employment Experiences of Former Aerospace Employees Within a Local Economy'. *Regional Studies*. 32(5): 421-433.
- Fothergill, S. and Guy, N. (1990) 'Retreat from the Regions: Corporate Change and the Closure of Factories'. London: Jessica Kingsley.
- Gardiner, J., Stuart, M., MacKenzie, R., Forde, C., Greenwood, I. and Perrett, R. (2009) 'Redundancy as a critical life event: moving on from the Welsh steel industry through career change'. *Work Employment and Society*. 23(4): 727-745.
- Gripiaios, P. and Gripiaios, R. (1994) 'The impact of defence cuts: the case of redundancy in Plymouth'. *Geography*. 79: 32-41.
- Healey, M. (1982) 'Plant closures in multi-plant enterprises – the case of a declining industrial sector'. *Reg. Studies*. 16: 37-51.
- Henderson, R. (1980) 'An analysis of closures amongst Scottish manufacturing plants between 1966 and 1975'. *Scottish Journal of Political Economy*. 27: 152-174.
- Henderson, R., Shutt, J. and Kumi-Ampofo, F. (2003) 'Responding to a regional economic crisis: an impact and regeneration assessment of the Selby Coalfield

Closure on the Yorkshire and Humber Region'. *Paper delivered to the Regional Studies Association International Conference in Pisa, Italy.*

- Henderson, R. and Shutt, J. (2004) 'Responding to a coalfield closure: old issues for a new regional development agency?' *Local Economy*. 19(1): 25-37.
- Hinde, K. (1994) 'Labour market experiences following plant closures: The case of Sunderland's shipyard workers'. *Regional Studies*. 28: 713-24.
- Holli, T., Beer, A. and Bailey, D. (2008) 'A tale of two regions: comparative versus competitive approaches to economic restructuring'. *Policy Studies*. 29(3): 357-370.
- Hooper, N. and Butler, B. (1996) 'A case study of redundant workers'. *Defence and Peace Economics*. 7: 149-167.
- House of Commons Trade and Industry Committee. (2007) 'Success and failure in the UK car manufacturing industry. Fourth report of session 2006-07'. HC399. London: The Stationary Office.
- Howland, M. (1988) 'Plant closure and local economic conditions'. *Regional Studies*. 22: 193-207.
- Huttunen, K., Moen, J. and Salvanes, K.G. (2006) 'How destructive is creative destruction? Effects of job loss on job mobility, withdrawal and income', *Journal of the European Economic Association*. 9(5): 840-870.
- Iversen, L., Sabroe, S. and Damsgaard, M.T. (1989) 'Hospital admissions before and after shipyard closure'. *British Medical Journal*. 299(6707): 259-278.
- Jackman, R and Savouri, S. (1992) 'Regional migration in Britain: an analysis of gross flows using NHS Central Register Data'. *Economic Journal*. 102(1): 433-450.
- Jacobson, L.S., LaLonde, R.J. and Sullivan, D.G. (1993) 'Earnings losses of displaced workers'. *The American Economic Review*. 83(4): 685-709.
- Jacobsen, L., LaLonde, R. and Sullivan, D. (2005) 'Estimating the Returns to Community College Schooling for Displaced Workers'. *Journal of Econometrics*. 125(1-2): 271-304.
- Jacobsson, A. (2008) 'Handling downsizing in the process industries – experiences from the Swedish process industries'. Institute of Chemical Engineers. Swedish Rescue Services Agency.
- Keefe, V. et al. (2002) 'Serious health events following involuntary job loss in New Zealand meat processing workers'. *International Journal of Epidemiology*. 31: 1155-1161

- Kirkham, J. and Watts, H.D. (1997) 'The influence of plant profitability on plant closures in multi-locational firms'. *Growth and Change*. 28:
- Kirkham, J. and Watts, H. (1998) 'Multi-locational manufacturing organisations and plant closures in urban areas'. *Urban Studies*. 35(9): 1559–75.431-446.
- Leana, C.R. and Feldman, D.C. (1995) 'Finding new jobs after a plant closing: Antecedents and outcomes of the occurrence and quality of reemployment'. *Human Relations*. 48: 1381-1401.
- Mason, C. and Pinch, S. (1991) 'Redundancy in an expanding labour market: a case-study of displaced workers from two manufacturing plants in Southampton'. *Urban Studies*. 28(5): 735-757.
- Maclachlan, L. (1992) 'Plant closure and market dynamics: competitive strategy and rationalisation'. *Economic Geography*. 68: 128-145.
- Marshall, J.N., Pike, A., Pllard, J.S., Tomaney, J., Dawley, S., and Gray, J. (2011) "Placing the run on Northern Rock". *J. Econ. Geogr.* (2012) 12: 157-181.
- Morris, J.K. and Cook, D.G. (1991) 'A critical review of the effect of factory closures on health'. *British Journal of Industrial Medicine*. 48(1): 1-8.
- National Audit Office. (2006) 'The Collapse of MG Rover'. HC961 Session 2005-06. London: The Stationary Office.
- O'Farrell, N. and Crouchley, P. (1983) 'Industrial closures in Ireland 1973-1981: analysis and implications'. *Regional Studies*. 17: 411-427.
- Osterland, M. (1989) 'Declining industries, plant closing and local labour markets: a case study of the region of Bremen'. In Albrechts, L., Moulert, F., Roberts, P and Swyngedouw, E. (Eds) *Regional Policy at the Crossroads*. P154-169. Jessica Kingsley: London.
- Pike, A. (2005) 'Building a geographical political economy of closure: the case of RandDCo in North East England. *Antipode*. 39(1): 93-125.
- Pinch, S. and Mason, C. (1991) 'Redundancy in an expanding labour market: a case-study of displaced workers from two manufacturing plants in Southampton'. *Urban Studies*. 28(5): 735-757.
- Plows, A and Lloyd-Williams, H. (2011) 'Responses to Redundancy at Anglesey Aluminium, report by Wales Institute of Social and Economic Research, Data and Methods (WISERD)'. *Bangor University*.
- Regeneris Consulting. (2005) 'Closure of MG Rover: economic impact assessment. Stage 2 report'.

- Rogerson, R. (2005) 'Sectoral Shocks, Human Capital and Displaced Workers'. *Review of Economic Dynamics*. 8(1): 89-105.
- Shuttleworth, I., Tyleer, P. and McKinstry, D. (2005) 'Redundancy, readjustment, and employability: what can we learn from the 2000 Harland and Wolff redundancy?' *Environment and Planning*. 37: 1651-1668.
- Stern, J. (1972) 'Consequences of plant closure'. *The Journal of Human Resources*. 7: 3-25.
- Tomaney, J., Cornford, J., Whittingham, D., Hayward, S., Pike, A. and Thomas, D. (1997) 'Workers' experience of plant closure: the case of Swan Hunter on Tyneside. Discussion Paper No. 97/1'. *Centre for Urban and Regional Development Studies*. University of Newcastle Upon Tyne.
- Tomaney J., Pike, A. and Cornford, J. (1999) 'Plant closure and the local economy: The case of Swan Hunter on Tyneside'. *Regional Studies*. 33(5): 401–11.
- Turner, R. and Gregory, M. (1996) 'Life after the pit: the post-redundancy experiences of mineworkers'. *Local Econ*. 10: 149-162.
- Vector Research. (2006) 'MG Rover and Supplier Employee Longitudinal Study Report 4'. *Prepared for Advantage West Midlands, Birmingham*.
- Walker, S. (1992) 'Branch plant closures in the west of Ireland'. *Irish Geography*. 76: 43-66.
- Watts, H.D. (1991a) 'Understanding plant closures: the UK brewing industry'. *Geography* 76: 315-330.
- Watts, H.D. (1991b) 'Plant closures, multi-locational firms and the urban economy: Sheffield UK'. *Environment and Planning*. 23: 37-58.
- Watts, H.D. (1991c) 'Plant closures in urban areas: towards a local policy response'. *Urban Studies*. 28: 803-817.
- Weiler, S. (1995) 'Effects of Industrial restructuring on regional labour markets: An International Comparison. Research Paper 9507'.
- Weller, S. (2012) 'Financial stress and long-term outcomes'. *Work, employment and Society*. 26(1): 10-25.
- Weller, S. and Webber, M. (1999) 'Re-employment after retrenchment: Evidence from the TCF Industry Study (Australia)'. *The Australian Economic Review*.
- Weller, S. and Webber, M. (2001) 'Ansett Airlines Employees: A preliminary survey of post-retrenchment outcomes'. *University of Melbourne*.

- Westhead, P. (1988) 'Manufacturing closures in Wales, 1980-84: a route to new firm formation'. *Cambria*. 15: 11-36.
- Westin, S. (1990) 'The structure of a factory closure: Individual responses to job-loss and unemployment in a 10-year controlled follow-up study'. *Social Science Medicine*. 31(12): 1301-1311.
- Westin, S. (1990) 'The Structure of a Factory Closure: Individual Responses to Job Loss and Unemployment in a 10 Year Controlled Follow up Study'. *Social Science Medicine*. 31(12): 1301-1311.
- Wooden, M. (1988) 'The impact of redundancy on subsequent labour market experience'. *Journal of Industrial Relations*. 30(3): 3-3

Annex 2: Mapping the Literature against the Impact Assessment Framework

The Tables below provide further detail on the coverage of plant closure literature in terms of impact area, methodologies, metrics and indicators used to track impacts across economic actors and the data sources utilised.

Given the study objectives to develop plant closure impact methodologies further, initial suggestions for additional known data sources – beyond those noted in the literature - have been included in the tables (in italics).

Summary Tables: Coverage of Plant Closures Literature by Economic Actor and Impact

Investment Capital

P = Primary research S = Secondary research

	Income	Employment	Community
Immediate	Cost of redundancy package & pension benefits (1 study) Closing firm financial records (P) HMRC redundancy payment data (e.g. average of circa £9.5k ppn in 2011) (S)	-	
Adaptation	-	-	
Longer term	Register of Directors Companies House data	-	

Fixed Capital

P = Primary research S = Secondary research

	Income	Employment	Community
Immediate	Cost of write-down of equipment (1 study) Closing firm financial records (P) Loss of profit on on-hand raw materials (1 study) Closing firm financial records (P) Current market commodity prices (S)	-	Changes in transport & motorways Changes in surrounding housing 1. Assumed reduction (S) 2. <i>Land Registry</i> (S)
Adaptation	-	New employment from redevelopment (3 studies) Local Authority records (S) English Partnership land use job densities (S)	
Longer term	Acquisition (2 studies) Literature Review of previous closures (S) Forecasts of potential futures (S)	-	

c) Employees

P = Primary research S = Secondary research

	Income	Employment	Community
Immediate	Loss of income/ - benefits (4) Employer records (P) Survey information (P) Economic Modelling (S) Value of redundancy package (2) Survey information (P)	Number of lost jobs (10 studies) Employer records (P) Survey information (P) HMRC tax records (S) % claiming out of work benefits (5) Employer records (P) Survey information (P) JSA Claimant rate (S)	Health concerns (11) Survey information (P) Stakeholder estimates (P) GP visits / Medical records (S) Marital status (3) Survey information (P) Literature review estimates (S) GVA loss (4) Economic Modelling (S) Financial exclusion (3) Qualitative assessment (P)
Adaptation	Salary comparison pre/post redundancy (24) Survey information (P) Case study (applied proxy values) (S) Government Data (non-UK, e.g. Dept of Labor) (S) Stakeholder Estimates (P)	% re-employed (27) Survey information (P) Government Data (non-UK, e.g. Dept of Labor) (S) Case study (applied proxy values) (S) HMRC tax records (S) % unemployed (19) Survey information (P)	Government Data (non-UK, e.g. Dept of Labor) (S) JSA Claimant rate (S) % full-time work (12)

	Income	Employment	Community
		HMRC tax records (S) % part-time/casual/temporary (11) Survey information (P) Government Data (non-UK, e.g. Dept of Labor) (S) HMRC tax records (S) % re-training (17) Survey information (P) Government Data (e.g. apprenticeship grants) (S) Local Training providers (S) Stakeholder estimates (P) Government Data (Jobcentre Plus funded activity) % self-employed (12) Survey information (P) Government Data (e.g. apprenticeship grants) (S) HMRC tax records (S) % exit workforce (13) Survey information (P) DWP & Jobcentre Plus claimant data (S) HMRC tax records (S) % migration to find work (11) Survey information (P) % commuting for work (5)	Impact of fall in household income (3) Survey information (P) HMRC tax records (S) Housing prices /requirements (2) Survey information (P) Stakeholder estimates (P) Land registry records (S) Crime (2) Stakeholder estimates (P) Home Office crime statistics (S)

	Income	Employment	Community
		Survey information (P) Stakeholder estimates) (P) % in manufacturing sector (5) Survey information (P) HMRC tax records / PAYE (S) Characteristics of re/un-employed (18) Survey information (P) Government Data (non-UK, e.g. Dept of Labor) (S) Job satisfaction (8) Survey information (P) Stakeholder estimates (P) Job duration (5) Survey information (P) HMRC tax records / PAYE (S) Pathway to work (4) Survey information (P) Assess local/regional labour market (12) Survey information (P) Labour market expert opinion (P) Geographical residential choice (6) Survey information (P)	
Longer term	Debt and cost savings (1) Salary comparison pre/post – longer term (3)	% re-employed (5) Survey information (P) HMRC tax records (S)	

	Income	Employment	Community
		% long-term unemployed (6) Survey information (P) Government Data (non-UK, e.g. Dept of Labor) (S) JSA Claimant rate (S) % in manufacturing sector (1) Survey information (P) HMRC tax records / PAYE (S) % in up-skilled employment (1) Survey information (P) % >1 job since redundancy (3) Survey information (P) HMRC tax records / PAYE (S) % commuting for work (1) Survey information (P) Characteristics on skills and positions held (2) Survey information (P) Geographical residential choice (3) Survey information (P)	

d) Suppliers

P = Primary research S = Secondary research

	Income	Employment	Community
Immediate	Financial loss (7) Economic modelling (input-output analysis) (S) Closing company purchases data (P) Degree of dependence (4) Economic modelling (input-output analysis) (S) Local labour market experts (qualitative analysis) (P) Closing company purchases data (P) Bad debts and redundant stock (1) Local labour market experts (qualitative analysis) (P) “Domino effect” (1) Economic modelling (input-output analysis) (S)	Job losses (6) Economic modelling (input-output analysis) (S) Local labour market experts (quantitative assessment – predicted job losses) (P) HMRC tax records / PAYE (S)	
Adaptation	Closure of business (2) ONS Business Demography (S) Local labour market experts (qualitative analysis) (P)	-	
Longer term	-	-	

e) Loans, taxes and payments

P = Primary research S = Secondary research

		Fiscal Impact	Community
Loans, taxes and payments (Creditors, HMRC, LAs, etc.)	Immediate	Cost of intervention (10) Government spending data Job benefit claims (6) Local labour market experts (qualitative analysis) (P) JSA Claimant rate (S) Loss of tax income (2) Economic modelling (S) Local Authority Business rate data (S)	Skill shortage (5) Survey information (P) Labour Market expert opinion (P) Diversifying regional economy (1) Labour Market expert opinion – qualitative assessment (P)
	Adaptation	Persistent unemployment job benefit claims (2) Survey information (P) Re-employment tax income (1) Economic modelling (S) HMRC tax records Employment exit tax income (1) Economic modelling (S) NHS cost of health concerns (2) Survey information (P) Qualitative assessment with health experts (P) GP visits and health records Loss of business rates income (2) Economic modelling (S) Local Authority Business rate data (S)	Health concerns (3) Survey information (P) GP visits and health records (General Health Questionnaire)

		Fiscal Impact	Community
	Longer term	Value of intervention (4) Survey information (P) Labour market experts / case study evidence (P) Housing & regeneration policies (1) Housing market experts / case study evidence (P)	

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