Working paper

The Department for Work and Pensions Social Cost-Benefit Analysis framework

Methodologies for estimating and incorporating the wider social and economic impacts of work in Cost-Benefit Analysis of employment programmes

by Daniel Fujiwara

DWP Department for Work and Pensions

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Daniel Fujiwara

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Abbreviations

AME	Annually Managed Expenditure
CBA	Cost-Benefit Analysis
DCSF	Department for Children, Schools and Families
DEL-A	Departmental Expenditure Limits – Administration
DEL-P	Departmental Expenditure Limits – Programmes
DfE	Department for Education
DfT	Department for Transport
DWP	Department for Work and Pensions
ESA	Employment and Support Allowance
GP	General practitioner
HMT	Her Majesty's Treasury
IIA	Independence from irrelevant alternatives
JSA	Jobseeker's Allowance
LFS	Labour Force Survey
NHS	National Health Service
NLSY	National Longitudinal Survey of Youth
OECD	Organisation for Economic Cooperation and Development
PMC	Product Market Corrector
PSI	Policy Studies Institute
QALY	Quality-Adjusted Life Year
SOCEF	Social Cost of Exchequer Finance
SWF	Social Welfare Function
WTC	Working Tax Credits
WTP	Willingness to Pay

Glossary of terms

Economic surplus	The satisfaction or welfare an individual derives from consuming a given good or service.
Elasticity of marginal utility	The rate at which the welfare value of money declines as total income increases.
Opportunity cost	The possible gain that could be realised by employing resources in their best alternative use.
Social Cost of Exchequer Finance	The welfare loss that results from the disincentive effect of taxation.
Social Welfare Function	A framework for ranking different distributions of income in terms of their social desirability. Distributions assigned a high number are more desirable than those that are assigned a low number.
Utility	Welfare or wellbeing.
Utility function	A framework for ranking bundles of goods in order of preference. Bundles of goods assigned a high number are preferred to bundles assigned a low number.
Willingness to pay	The maximum amount that a consumer would be willing to pay in exchange for a particular good.
Welfare weight	A factor assigned to transfers to take into account the higher relative value of money to low income groups.

Summary

This report provides a series of recommendations for the integration of social impacts into the Department for Work and Pensions (DWP) Cost-Benefit Analysis (CBA) framework for employment programmes. This will ensure that the wider impacts on society are considered when evaluating the effectiveness of policies and programmes.

The main aims were to:

- provide a review of the main evidence on the social impacts of employment and employment programmes;
- use this evidence to derive quantitative estimates of the social costs and benefits associated with implementing employment programmes in the UK;
- integrate these estimates into the existing CBA framework.

This is a thorough and comprehensive review that draws on a full search of the relevant academic literature and evaluation evidence. The review encompasses the most robust and highly cited UK and international research and all efforts have been taken to ensure the applicability of evidence to employment programmes within the UK.

Based on this review we have considered the following key wider social impacts of employment programmes:

- the increase in individual wellbeing due to higher income;
- the costs incurred in work, such as childcare and travel costs;
- the individual cost of leisure time forgone;
- the effects of employment programmes on employment rates elsewhere in the labour market;
- the social costs associated with funding programmes through taxation;
- improved health outcomes;
- reductions in crime rates;
- multiplier effects on the economy;
- the value of increased economic output.

The main findings and recommendations of the report are as follows:

Increases in income

The value that individuals place on each additional pound they receive or lose is higher for people with low incomes relative to people with higher incomes. It is possible to account for this phenomenon in CBA through the use of welfare weights, in which the monetary outcomes that accrue to lower income groups are weighted higher than those that accrue to higher income groups. In CBA of employment programmes this implies that we should weight the monetary gains for programme participants higher than the costs for taxpayers who fund the programmes.

We find consensual evidence to suggest that the welfare weight for programme participants is about 2.5 (relative to the average taxpayer). This weight is applied to any increases or losses in income incurred by participants as a result of the employment programme.

In-work costs

When someone moves into employment from unemployment/inactivity there are some unavoidable costs they must incur. These costs reduce the real gains from working. They include travel to and from work, and possible childcare costs for lone parents or families with second earners.

We estimate average childcare costs for lone parents and couples and average travel costs for programme participants who move into employment. These costs should be subtracted from the income received from employment.

Leisure time foregone

When someone moves into employment they must substitute some of the amount of time spent on non-market activities for time spent at work. This is a loss and cost to the individual.

There are very few studies which can be drawn upon to estimate the cost of foregone leisure time; those which are available are not robust. In addition, it is likely that there are also intangible benefits to being in work which may offset some of these welfare losses. Recent evidence on wellbeing and work suggests that these intangible benefits can be very large. Consequently, we do not propose to include the cost of leisure time foregone in the cost-benefit framework.

Effects on employment rates (substitution effects)

There is some evidence to suggest that those who find work through employment programmes may displace other workers. This effect appears to be larger for programmes that subsidise employers to hire participants than for programmes which focus on job search and training. The estimates of the impact are sensitive to a number of assumptions and therefore, we recommend that substitution effects be used in sensitivity analysis only.

Social costs associated with funding programmes through taxation

Economic theory suggests that taxation causes people to change their behaviour. In terms of the labour market, income tax reduces people's net wage/pay and this can have a downward effect on the amount that they work. Funding employment programmes through taxation can, therefore, have welfare consequences and ideally this effect should be acknowledged in Cost-Benefit Analysis.

However, there is some uncertainty over the size of this effect. International estimates are varied and there is little evidence from the UK. Thus, we recommend that the social cost of taxation be considered when conducting sensitivity analysis only.

Improved health outcomes

There is strong evidence of a positive causal effect of employment on individual health outcomes. Robust quantitative evidence comes from studies that look at the effect of employment on medical service usage rates. We use this evidence to estimate National Health Service (NHS) savings per additional person employed. We predict greater NHS savings for Employment and Support Allowance (ESA) participants who find work as they incur greater initial public health costs. These resource savings should be included in the cost-benefit framework.

Reductions in crime rates

We find that increases in income have a negative effect on the propensity to commit acquisitive crime. Helping someone into work will, therefore, reduce crime rates as the participant benefits from an increase in income.

We estimate the total savings from reduced acquisitive crime for different demographic groups and propose a method for including these impacts in the framework. This calculation does not take into account the possible benefits from reductions in violent crime and it does not generalise to specific groups such as ex-offenders.

Multiplier effects on the economy

The impacts of Government spending on employment programmes can spread to other sectors of the economy through multiplier effects. Spending made on operating the programmes and spending made by programme participants who find work can induce growth in the economy through increased demand.

In practice, it is very difficult to measure these multiplier effects. We do not have information on spending patterns in other markets and thus cannot predict impacts on growth with any degree of certainty. We, therefore, recommend excluding multiplier effects from CBA of employment programmes.

The value of increased economic output

The value of what workers produce can be greater than the value of the wages they receive. If this were the case, estimates of programme impacts which rely solely on earnings outcomes will understate the overall economic benefits from participants who move into work.

However, estimates of the difference between the value of work and the wage paid to the employee are subject to high degrees of uncertainty. Therefore, it is recommended that the additional impact on economic output not be included in CBA.

1 Introduction

The Department for Work and Pensions' (DWP) *Cost-Benefit Framework Guidance (2007)*[1] provides a framework for systematically assessing the relative and actual cost effectiveness of DWP's labour market policies in fiscal terms. These are the costs and benefits as measured from the point of view of the Exchequer. This comprises of the changes in benefit and tax credit payments, taxes received and programme operational costs. The guidance aims to ensure that public funds are spent efficiently.

Labour market policy and employment programmes may also have important impacts on the economy and society in general. Moving people into work can have impacts on, for instance, health, self-esteem, economic activity and crime rates.

Considering these wider impacts together with the fiscal ones in a full Social Cost-Benefit Analysis (CBA) would allow the policymaker to assess whether a policy is worthwhile from the point of view of society as a whole. Ideally, the Government would fund policies that generate the most net benefits to society taking account of all the costs.

The sizes of the impacts on these wider outcomes are rarely measured and, even when they are, it can be difficult to place a monetary value on them. As a consequence, in the past, CBA in the Department has mentioned the existence of these wider impacts but has avoided explicitly estimating a monetary value.

The DWP has recently undertaken a thorough programme of re-assessing the available evidence on the key wider impacts of employment and it has derived a set of recommendations for including them in CBAs of employment programmes.

This report sets out these recommendations as a series of stand-alone papers. The **recommendation boxes** in the papers provide a quick ready-reckoner estimation procedure. The papers use the best available UK and international evidence from academia, previous CBAs of labour market interventions and evaluation reports and where possible have derived monetary estimates of the wider impacts. For many of the analyses there is a lack of good evidence for the UK and there is potential for the DWP to undertake primary analysis in the future to further improve the CBA framework.

The recommendation papers can be found in Chapters 3 and 4. In Chapter 2 we set out the main assumptions made in undertaking Social CBA of employment programmes. This is with the aim of clarifying the conclusions reached on key issues such as what costs and benefits are included, how to measure them, transfers and double counting in CBA of employment programmes.

[1] This is an unpublished, internal DWP document.

2 The Social Cost-Benefit Analysis framework for employment programmes

2.1 Basic framework of the Social Cost-Benefit Analysis

2.1.2 The Social Welfare Function

A Fiscal Cost Benefit Analysis (CBA) evaluates the costs and benefits of a policy from the perspective of the Exchequer. A Social CBA requires us to consider and compare the impacts of employment programmes on different individuals and groups in society. The normative assumption which forms the microeconomic foundations of CBA is that people and thus society as a whole are **rational utility-maximisers**[2]. The metric for measuring impacts in a Social CBA is, therefore, set in terms of changes in welfare. The framework for doing this is the social welfare function (SWF). In its most generic form the function can be represented as:[3]

$$W = f\,[U_1\,(y_1),\, U_2(y_2),\, ...U_n(y_n)] \tag{1}$$

where W = social welfare; U_i = welfare or utility of individual i and y_i = income of individual i.

There are numerous functional forms of the SWF suggested in the literature[4]. We assume a Utilitarian SWF as is standard in CBA (Brent, 2006; Boardman *et al.,* 2001). The Utilitarian assumption simply states that the welfare of each individual in society is valued equally which implies that total social welfare can be described as simply the sum of all utilities[5]:

$$W = U_1\,(y_1) + U_2(y_2) + ... + U_n(y_n) \tag{2}$$

The effects of a policy intervention can be depicted as follows:

$$\Delta W = U_1\,(\Delta y_1) + U_2(\Delta y_2) + ... + U_n(\Delta y_n) \tag{3}$$

If a policy intervention results in $\Delta W > 0$, then this indicates that the policy has a positive overall impact on social welfare and therefore, given the utility-maximising assumption, is worthwhile undertaking.

CBA is simply a practical tool for measuring the magnitude of the changes in social welfare (ΔW). Given the form of the SWF in (2) Social CBA estimates the social welfare impact of a policy as the sums of all the costs and benefits to each individual in society that **result from** the policy.

Equation (3) illustrates that the first step in Social CBA is to derive monetary estimates of the impacts of a policy to all individuals in society (i.e., Δy). Here some Δy will be positive and others negative. For the purposes of CBA of employment programmes we can simplify (2) by assuming

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2 Utility refers to welfare or wellbeing. This assumption simply states that individuals try to do the best for themselves by maximising their levels of wellbeing.

3 This generic format is known as the Bergson-Samuelson social welfare function.

4 For a discussion see Layard and Walters (1978).

5 This implies that there is no utility interdependence between different people.

society is made up of two groups – Group 1: programme participants and Group 2: taxpayers and others in society. In general the benefits of employment programmes accrue to Group 1 whilst the costs are borne by Group 2[6]:

$$W = U_1(y_1) + U_2(y_2) \quad (4)$$

2.1.3 Monetising the impacts

Since we are interested in changes in welfare in society, the monetary estimates of the impacts should represent the full welfare gains and losses as depicted by the level of economic surplus[7] rather than values based simply on market prices – which would underestimate the welfare impacts of a policy (Brent, 2006; Boardman *et al.,* 2001). Surplus gains and losses can be estimated by an individual's willingness to pay (WTP) (which is negative for surplus losses). Our final version of the SWF for the purposes of the Social CBA then becomes:

$$W = U_1(WTP_1) + U_2(WTP_2) \quad (5)$$

Many of the outcomes of employment programmes are in monetary format – such as income, benefit payments and tax receipts – which are measures of WTP for the outcomes of employment programmes[8].

Our estimates on the impacts of employment on crime and health are derived using market prices and values and thus do not represent the full social WTP for reductions in crime and improvements in health. They are, therefore, understatements in this respect. This is an issue encountered in many CBAs and is often an unavoidable one (Boardman *et al.,* 2001).

With the exception of health and crime, we are able to derive good approximations of WTP for most of the fiscal and social impacts of employment programmes. This is because the majority of the costs and benefits of employment programmes are already in monetary terms, which represent good approximations of WTP. This is true of, for instance, administrative costs and increases in wages.

2.1.4 The overall welfare impact

WTP is a monetary representation of the amount of welfare gained or lost through the consumption of a good or service. It is the amount individuals would pay for a good or service. To derive the **actual** welfare change (or the value of consuming the good/service) as depicted in (5) we need to make an assumption regarding the value of money to people, i.e., the form of the utility function $U_i(y_i)$.

It is fairly common practice in CBAs to ignore this final stage of analysis by assuming that the value of the marginal pound is equal across all people. The SWF then reduces to:

$$W = WTP_1 + WTP_2 \quad (6)$$

and the overall cost-benefit result or ratio is just the sum or proportion of WTPs.

The HM Treasury Green Book (2003) recommends that the differing welfare impacts for different groups be incorporated explicitly in CBA and policy evaluation. Diminishing marginal utility of income implies that an individual's valuation of money depends on their initial levels of wealth or income.

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6 There will of course be some benefits to Group 2 such as reduced crime rates.

7 Surplus (or economic surplus) refers to the satisfaction or welfare an individual derives from consuming a given good or product.

8 This result simply derives from the fact that the willingness to pay for a given amount of money such as £1 is equal to £1.

People from different income groups will, therefore, experience very different welfare impacts from policies that impact on their income.

The actual welfare impacts can be derived using a relative measure of welfare and weighting outcomes to different income groups differently. We can derive a **welfare weight**[9] based on the valuation of the marginal pound to lower income groups relative to higher income groups. The welfare weight provides an estimate of the overall welfare impacts of a policy in **relative monetary terms**.

It should be noted that although monetary outcomes accruing to lower income groups will be weighted higher in a Social CBA, a welfare weight does not actually embody any social concern or preference for income distribution or equality (hence our preference for the term 'welfare weight' over 'distributional weight')[10].

In CBA by weighting the monetary outcomes of a policy – as measured by changes in WTP – on the basis of relative differences in the marginal utility of income across different groups, we derive a close approximation of the SWF as set out in (5). We measure the impact of an employment programme as (where α_i is the welfare weight for group i):

$$\Delta W = \alpha_1 (WTP_1) + \alpha_2 (WTP_2) \quad (7)^{11}$$

Set out in this way the CBA framework will thus provide a good estimation of the overall impacts on social welfare of a policy intervention[12].

2.2 What impacts should be measured in the Social Cost-Benefit Analysis?

In 2007 the Department of Work and Pensions (DWP) commissioned the Policy Studies Institute (PSI) to review the CBA framework for employment programmes. The review highlighted the key wider impacts that should be considered in CBAs of employment programmes. For the purposes of a Social CBA, it is useful to define the impacts of employment programmes in two distinct categories: **primary market impacts** and **secondary market impacts**.

The primary market is the market into which the Government directly intervenes. For employment programmes this is the labour market. Impacts that occur in the labour market comprise of:

- changes in income;[13]
- in-work costs;

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9 An alternative terminology is a **distributional weight**.

10 For more discussion please see the paper on **welfare weights** in CBA.

11 One of the weights will be set equal to 1. This is usually the weight for the higher income group (α_2).

12 It should be noted that the form of the SWF in (7) does not imply that we have moved away from the assumption of the Utilitarian SWF. (7) states that social welfare is concave with respect to income but this does not change the assumption that social welfare is still linear with respect to utilities and is thus Utilitarian. For a detailed discussion see Cowell and Gardiner (1999).

13 Changes in income as people move off benefits and into work are estimated using evaluation evidence and can be found in the Taxben model.

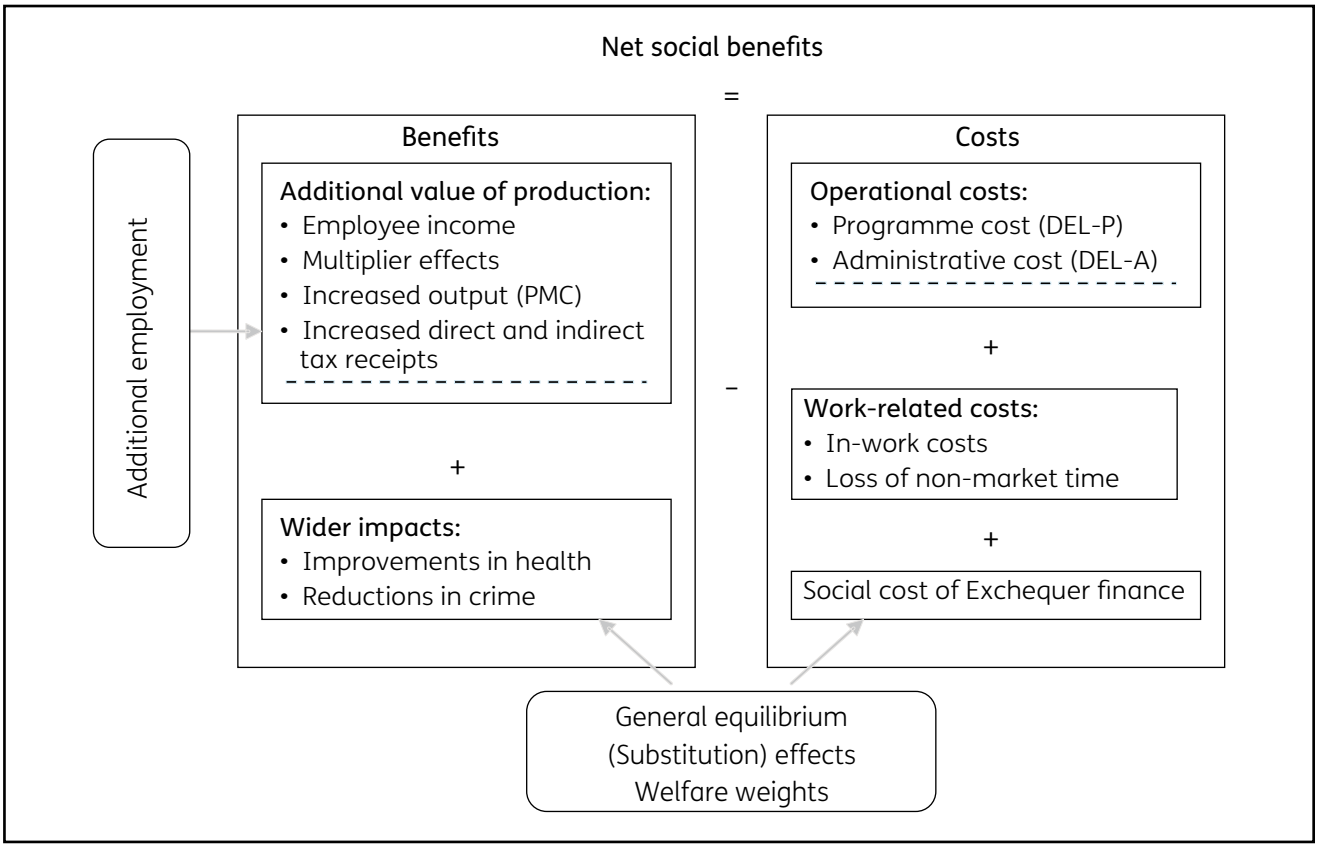
- loss of non-market time;
- equilibrium effects in the labour market; and
- The Social Cost of Exchequer Finance.[14]

Secondary markets are the other markets in which labour market interventions could have knock-on effects. This includes:

- multiplier effects on the economy;
- increased economic output: Product Market Corrector (PMC); and
- the impacts on health and crime rates

In the Social CBA these wider impacts are added to the fiscal costs and benefits and weighted to derive the full net benefits and the overall effectiveness of a programme. Net benefits are calculated as shown in Figure 2.1.[15]

Figure 2.1 The Social CBA framework



The recommendations concerning these impacts are set out in detail in the subsequent chapters of this document.

14 The Social Cost of Exchequer Finance (SOCEF) is not included in recommended Green Book analysis but has been included as a part of sensitivity analysis here following consultation with HM Treasury. See the section on SOCEF for further details.

15 In a Social CBA, Annually Managed Expenditure (AME) costs (i.e., benefit and tax credit payments) are transfers from the Government to programme participants. They essentially cancel out and thus are not included in the diagram.

2.2.1 Dealing with the issue of transfers in Social CBA of employment programmes

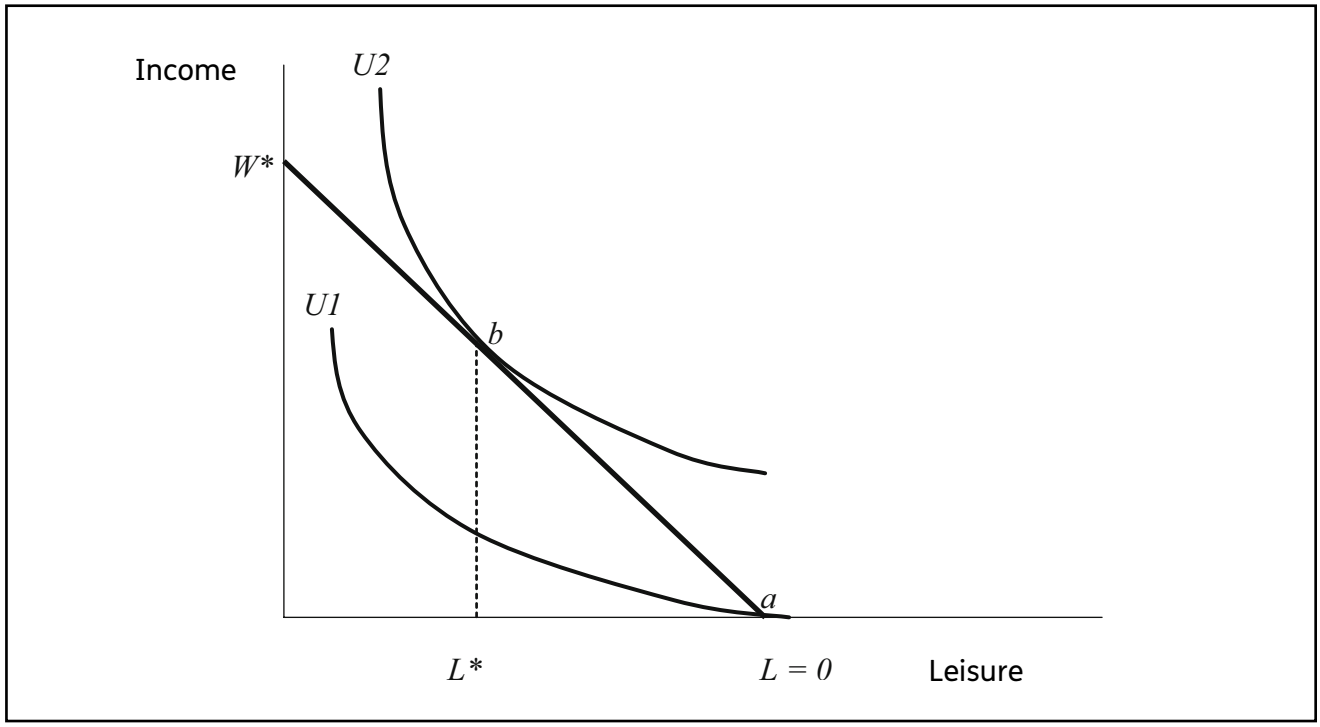
In measuring these wider impacts in CBA, it is essential to understand which impacts are genuine welfare changes and which ones are just transfers. We must return to the critical issue of economic surplus. Social CBA measures changes in surplus accruing to different groups in society in order to evaluate the effectiveness or merit of a policy. We are, therefore, interested in surplus changes in the primary and secondary markets. To understand these surplus changes, we make a number of plausible assumptions and in the process this throws light on how to deal with issues regarding transfers and double-counting in CBA.

The key assumption we make in the Social CBA of employment programmes is that some labour markets are imperfect as there are market failures. This assumption is made based on the fact that the Government intervenes in the labour market. It should be noted that we do not make assumptions about any other (secondary) markets in the Social CBA.

At the going wage, there are people who would like to work but cannot due to market failures such as information asymmetries, skill mismatch and job search friction. In this sense we are assuming that unemployment is **involuntary** as depicted in Figure 2.2. This assumption is in line with findings from the work on subjective wellbeing and unemployment (e.g., Clark and Oswald, 1994, 2002; Winkelmann and Winkelmann, 1998).

Given the going wage (W^*) the individual would supply L^* of labour but due to market failures is unemployed and supplies $L = 0$ amount of labour at the corner solution at point a. By working, the individual increases labour supplied and moves up the budget constraint to a point such as b, where they derive surplus which can be seen in the increase in utility from $U1$ to $U2$.

Figure 2.2 Involuntary unemployment[16]



16 Without loss of generality we assume that there are no employment benefits which implies we can assume a linear budget constraint.

Figure 2.3 depicts the market failure at the aggregate level for a given labour market. The equilibrium level of employment is L^* but due to market failures only L level of people are employed, where $L^* > L$. For (L^* - L) people there is a surplus gain to moving into employment as the marginal benefits from work (the wage W^*) are greater than the marginal costs as depicted by the labour supply curve. **If an employment programme gets an extra person into work we can assume that this leads to a surplus gain and thus we count this as a benefit in the Social CBA framework.**

For an increase of (L^* - L) people in work, this gain is the area a, b, c in Figure 1.3. Our measure of the surplus gain (which is the estimated wage), however, approximates the area a, b, L^*, L. As discussed in the paper on *Non-market time in CBA* we do not subtract area c, b, L^*, L, which is the loss in utility due to leisure time foregone. This is because the going wage (W^*) is an understatement of the marginal benefits of work and thus a, b, c would be an understatement of the surplus gains accrued by people who move into work.

Any reduction in benefit payments or increases in tax receipts due to this increase in employment should subsequently be acknowledged in Social CBA as further benefits (to the Exchequer).

Figure 2.3 shows that there are also surplus gains to employers hiring the unemployed as the marginal benefits to hiring are greater than the costs (the difference between labour demand curve and wage rate W^*). This issue is taken up in the paper on the *Product Market Corrector in CBA*.

Since we do not assume labour market equilibrium, we can assume that moving people into work does not have any downward pressure on wages[17]. In this sense we do not need to consider and evaluate the behavioural changes of those already employed in the labour market who would be affected by changes in wages[18]. If labour markets were in equilibrium, we would have to recognise that an increase in labour supply would have the dual effect of increasing surplus for those moving into work whilst at the same time reducing surplus for those already in work as wages are forced down.

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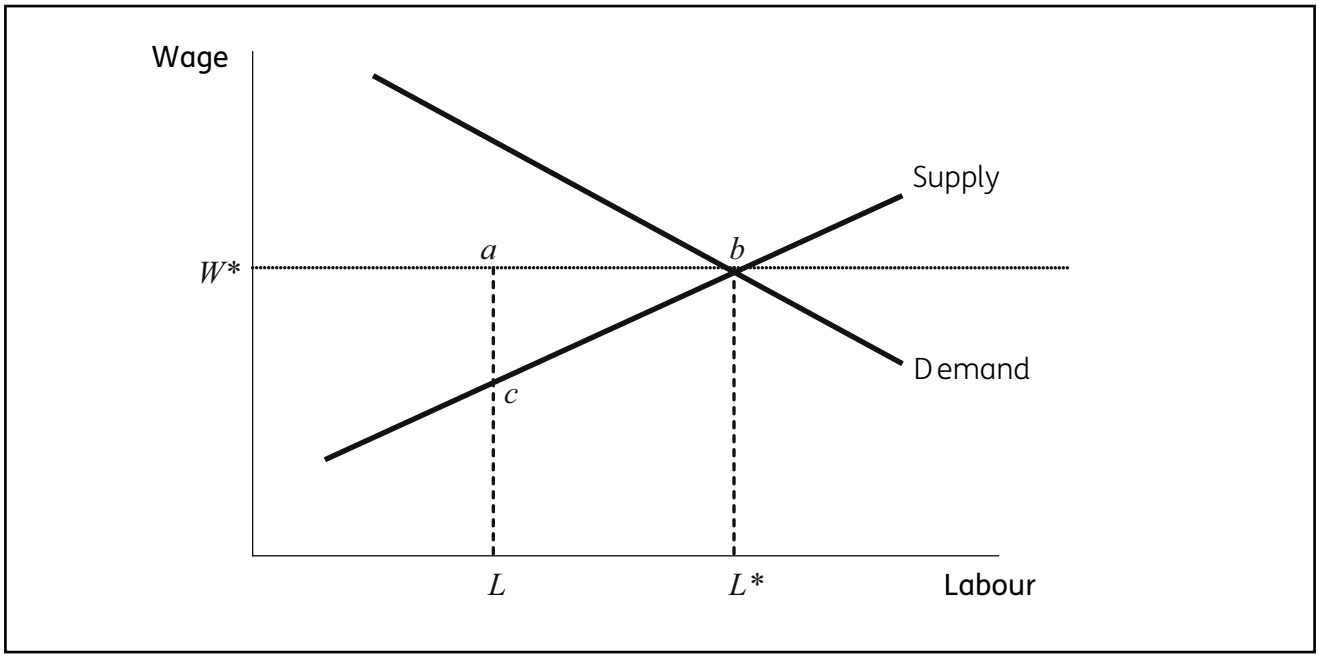
17 This may not hold if the employment programme gets a very large number of extra people into work relative to the current work force but this is unlikely. The section on *General Equilibrium Effects in CBA* shows that there is unlikely to be any downward pressure on wages from employment programmes.

18 This refers to the income and substitution effects of a change in wage. For a full discussion refer to the section on the *Social Cost of Public Finance in CBA*.

Figure 2.3 Market failure in labour markets



A second assumption we make in the Social CBA is the exclusion of **socially unacceptable preferences**[19]. This is relevant for the measurement of the impacts of employment programmes on crime rates and costs. We do not count gains to criminals from acquisitive crime as a benefit in the Social CBA.

These assumptions are critical for assessing where transfers occur – which is a key issue for undertaking CBA correctly. There are fundamentally two issues related to transfers: i) Some costs may turn up as benefits to other parties elsewhere and thus should be offset in CBA; ii) Some benefits accrued by a certain group may provide knock-on benefits to other parties. In certain cases these can be pure transfers of the benefits and in this case they should not be counted in CBA in order to avoid double-counting the benefits. We look at these issues for the wider impacts of employment programmes.

For Social CBAs of employment programmes point i) concerns in-work costs, non-employment off-flows and the costs of crime. We have shown that impacts in the primary (labour) market – in the form of increases in employment – are genuine surplus gains. Any cost that is incurred in order for individuals to undertake work (e.g., travel and childcare costs) is an opportunity cost[20].

We do not acknowledge these costs as transfers that materialise as benefits elsewhere, say as revenue to childcare providers, and they are, therefore, not offset. This is because we do not have knowledge of the market structure for goods such as travel and childcare and we do not make any assumptions regarding these markets. If, for example, these markets were perfectly competitive then there are no surplus gains as people are paid their marginal product and in such a case spending in these secondary markets should not be included in Social CBA.

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19 This is standard in economics and CBA (Boardman *et al.,* 2001)

20 This is because individuals do not make these consumption decisions (for childcare and travel) to directly maximise utility and therefore they entail losses in surplus and should be subtracted from the wage increase.

Although travel and childcare markets may not be perfectly competitive we do not have evidence to suggest the amount of surplus gain that may occur in these markets. In the Social CBA, therefore, the overall net impact of in-work costs on society is taken to be negative.

In employment programmes there may be a proportion of participants who flow off benefits but not into work (non-employment off-flows). This will result in a gain for the Exchequer as benefit payments fall. However, in Social CBA we must also consider the loss to the individual.

In Appendix A we show that this cost to the individual can be estimated from the level of benefit income lost and hence we subtract these individual costs from the fiscal Exchequer gains. The result is that individual costs offset the benefits to the Exchequer; non-employment off-flows should be considered as a transfer from welfare recipients to the taxpayer with no real net social impact[21].

Some authors frame reductions in acquisitive crime rates as losses to criminals and thus any gains to society from reduced crime are simply transfers (Boardman *et al.* 2001). As we exclude socially unacceptable preferences, reductions in crime are not counted as transfers and are thus reported as genuine gains to society.

Point ii) concerns multiplier effects that spending by newly employed programme participants have on the economy. As is highlighted in the paper on *Multiplier Effects in CBA*, in a similar vein to in-work costs, a lack of information on the structure of secondary markets (where programme participants spend their newly earned money) and the fact that we do not make any assumptions regarding these markets make it difficult to separate those knock-on impacts that are genuine increases in surplus (that should be measured in CBA) from those that are simply a transfer of benefits and should be excluded from CBA. Therefore, to avoid double-counting we do not include multiplier effects.

2.3 Summary

This paper has described the correct measures of costs and benefits for the purposes of Social CBA and it has demonstrated how our CBA framework approximates these measures well. We have willingness to pay measures for most impacts and by using welfare weights we can get a good impression of the overall social welfare impacts of employment programmes.

We define welfare impacts in primary and secondary markets and based on a set of plausible assumptions, have determined which impacts to exclude from Social CBA to avoid double-counting.

The following chapters highlight the methodology used to derive monetary estimates of the wider impacts of employment programmes based on the assumptions set out here.

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21 There are also further possible implications for crime rates, indirect tax receipts and the welfare weight due to the reduction in benefit income for non-employment off-flows. The reader is referred to Appendix A for further analysis and discussion.

3 Impacts in the (primary) labour market

3.1 In-work costs in Cost-Benefit Analysis

3.1.1 Theoretical background

When someone moves into employment from unemployment/inactivity there are additional unavoidable costs they must incur. These costs include travel to and from work, and possible childcare costs for lone parents or families with second earners.

These costs must be borne by individuals moving into employment, as an **opportunity cost** – to meet these costs they use part of their income, and so forego alternatives that the income could have provided. This represents a loss in surplus for people that incur in-work cost. Placing a monetary value on these costs would enable Cost-Benefit Analysis (CBA) to more accurately capture the net benefit of employment to individuals.

3.1.2 How does this apply to employment programmes?

Department of Work and Pensions (DWP) employment programmes are designed to help move people from unemployment/inactivity into employment. Participants of these programmes who move into employment will incur these costs.

Policy Studies Institute (PSI) (2007) suggests that these costs should be incorporated in Cost-Benefit Analysis (CBA) by, for example, *'examining survey information on what low wage workers spend on travelling back and forth to work'* and that until then, CBAs *'should at least mention these costs exist and could be of some importance'*.

Everyone in employment must get to their place of work. Travel options involving a monetary cost are car, bus and rail. Capturing transport costs captures costs for these methods. Monetary childcare costs are faced only by participants with children without access to informal childcare (partner, friends or relatives).

3.1.3 Methodology

Using data from the Department for Education (DfE)[22] on the use and costs of formal childcare for children of different ages and for different family types, we calculate weekly costs of childcare for lone parents in work and couples with children. Taking into account variations in childcare during school holidays, and multiplying these figures by additional job years resulting from an employment programmes gives a total cost of additional childcare.

We take Labour Force Survey (LFS) data on usual methods of commuting for workers in the bottom earnings quintile. We apply this profile to the running costs of a car, tube and national rail fares, and average bus fares to calculate commuting costs, and use data on additional job years to calculate the total annual travel costs resulting from DWP employment programmes.

Appendices B and C provide more detail on methodology and data sources used to capture in-work childcare and travel costs.

[22] The report used for estimating in-work costs was conducted in 2009, and thus bears the former name of the DfE – the Department for Children, Schools and Families (DCSF).

3.1.4 Caveats and issues

Department of Social Security (1999) suggests start-up costs such as tools and equipment and purchasing suitable clothes for work, as well as continuous costs such as food and socialising may also be included in calculating in-work costs. However, data on start-up costs is sparse, and the other costs (food and socialising) are not additional costs necessary to entering employment.

There is a level of uncertainty arising from imperfect data being available. Central estimates of annual childcare and travel cost estimates are presented with lower and upper bounds incorporating a five per cent error margin for use in sensitivity analysis.

Childcare issues

Data on use of formal childcare by couples with children is not available disaggregated by work status. This could lead to an underestimation of childcare costs for couples moving into work.

We assume that where informal childcare is used, this is at zero cost. We, therefore, do not account for the opportunity costs of the time spent by the individuals actually providing the informal childcare.

Data and assumptions presented are for England as a whole. This ignores regional variations in both costs and consumption of childcare. Fees data is only available for selective types of formal childcare. These types are assumed to be representative of general formal childcare costs.

Data from DWP employment programmes most clearly captures clients with children aged up to 11. Childcare costs for children aged over 11 are assumed to be negligible. Evidence suggests sharp declines in take-up of formal childcare for children of secondary school age. Ignoring children aged over 11, analysis may have a slight bias towards underestimating childcare costs.

Family size is assumed not to affect take-up of formal childcare (i.e., families with more children do not spend more on childcare). DCSF (2009) suggests pre-school children with two or more siblings may be less likely to receive formal childcare; no link is present for school aged children. This assumption may lead the analysis to have a slight bias towards overestimating childcare costs.

During term time, three to four year olds are entitled, through Working Tax Credits (WTC), to 12.5 hours a week of free early education for 38 weeks a year, and DCSF (2009) data suggests that take up is high, with around three-quarters of three to four year olds receiving at least 12 hours of free early education. This reduces the additional costs faced by parents but a transfer payment from State to childcare providers is made. This transfer should be accounted for in the WTC payments in the DWP Taxben model so that parents receive the childcare element and we can deduct the full childcare costs from their wage. Steps are being made to improve the accuracy of the WTC childcare subsidy estimates and so it should be noted that we may be overstating the in-work childcare costs to parents to some extent.

Travel issues

We ignore regional differences in travel costs. This means that we are likely to overstate travel costs for programmes which have a disproportionate volume of participants in low-cost areas (e.g., cities) compared to high cost areas (e.g., rural areas).

In calculating number of days at work it has been assumed all clients move into jobs working five days a week, which will lead to an upward bias in estimating travel costs. Moreover, this assumption will lead to different amounts of bias across programmes. For example, some programmes are targeted towards lone parents. The clients who move into jobs from these programmes are relatively less likely to move into jobs working five days a week.

There may be client groups, for example, disabled people, for whom commuting trends and therefore, costs can be expected to differ from other groups. For programmes targeting specific groups, it should be noted travel costs are calculated for what is assumed to be the 'average' participant across all employment programmes.

We assume that a daily commuter in work, as a result of a DWP employment programme, travels around 12 miles per day. This is assumed to be fully additional travel expenditure that would not have been incurred in the programme absence. This is likely to be an upward biased estimate. When individuals are travelling to and from work, they tend to combine this necessary journey with tasks they would have made if they were not in employment (e.g., shopping)

3.1.5 Worked example

As an example, data on New Deal 25+ (ND25+) suggests the programme creates 10,324 additional jobs lasting an average of a year[23]. Using this and profile data on family types of programme participants, we calculate in-work costs resulting from ND25+.

Additional childcare costs result from applying evidenced assumptions to DfE data to calculate annual childcare costs, and multiplying by *'additional job years'* accounted for by lone parents and couples with children and consumption of formal childcare by these groups. Total childcare costs are estimated at around £1.67m.

To capture travel costs, we multiply *'additional job years'* by the combined annual car, National Rail, London Underground and bus commuting costs of an individual. This yields a figure of around £4.47 million.

Total in-work costs resulting from ND25+ are estimated as £4.47 million + £1.67 million, a total of £6.14 million[24]. This figure is then subtracted from total economic benefits in calculating net economic benefits.

Further detail on calculating these figures are presented in Appendices B and C.

3.1.6 Recommendations

Subject to noting the caveats above, it is recommended that monetary values for in-work costs are included in CBAs of DWP employment programmes.

23 Data is from 2005/06 and may not reflect current trends.

24 Figures may not sum due to rounding.

Recommendations for applying in-work costs in CBA

1. Childcare and travel costs should be accounted for in CBA of employment programmes, noting the limitations of these estimates.
2. To best capture gross annual childcare costs resulting from DWP employment programmes, multiply the number of additional job years for lone parents and couples by annual average spending on childcare and sum:
   a. **lone parent additional job years x £744**;
   b. **couples with children additional job years x £694**.

   Note that these are costs as of 2008 and should be uprated by inflation.
3. To best capture gross annual travel costs resulting from DWP employment programmes, multiply the additional job years by annual average commuting costs:
   a. **additional job years x £433**.
4. These costs are summed together and subtracted from total economic benefits as part of the net economic benefits calculation.

3.1.7 Summary

In-work costs are additional unavoidable costs resulting from entering employment, impacting on the gains from moving someone into work. Using methodology presented here, it is possible to monetise a figure for childcare and travel aspects of these costs for use as an estimate in CBA of DWP employment programmes.

3.2 Non-market time in Cost-Benefit Analysis

3.2.1 Theoretical background

When someone moves into employment from unemployment/inactivity they must substitute some of the amount of time spent on non-market activities for time spent at work. The loss of non-market time is considered an opportunity cost of moving into employment.

3.2.2 How does this apply to employment programmes?

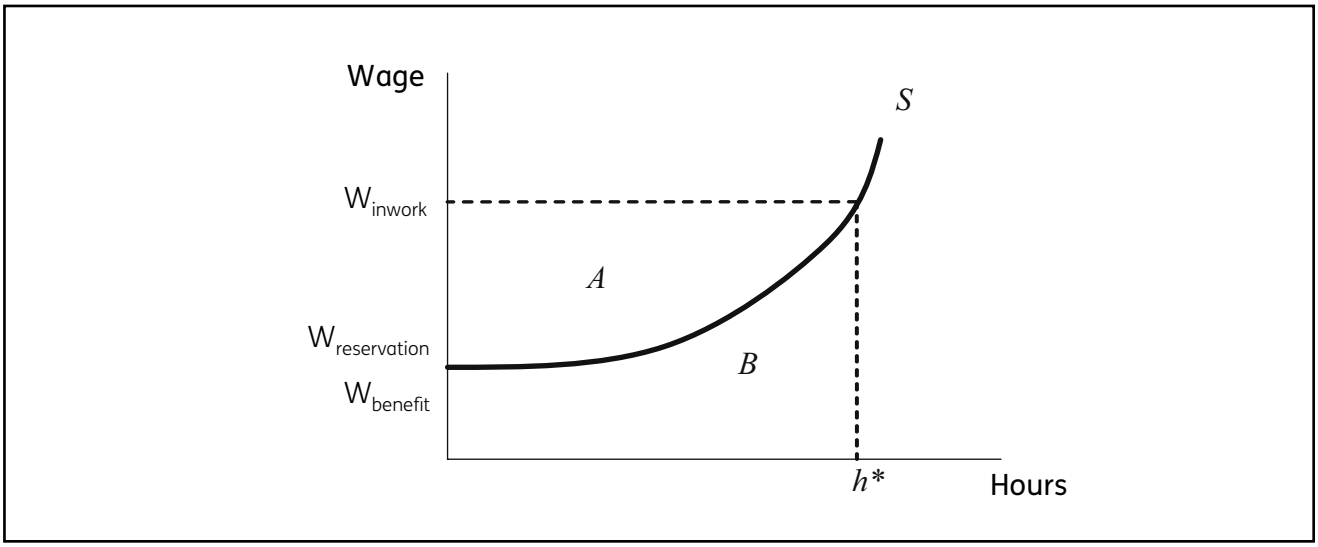
The '*appropriate measure of the impact of a government program on any group of individuals is the net change in their surplus (or economic rent), rather than their net change in income*' (Greenberg and Robins, 2008)[25]. As traditional CBAs tend to use total net change in income in calculating benefits, it is argued they are likely to overestimate the individual benefits resulting from employment programmes.

Area A + B in Figure 3.1 represents the net income increase for an individual moving off benefit and into work for h^* hours, earning wage W_{inwork}. Area B represents the loss in non-market time resulting from working h^* hours. Therefore, the true net surplus resulting to an individual from moving off benefit receipt into employment is argued to be the gain in income to an individual less the value of lost non-market time. In Figure 3.1, this is Area A, the area above the supply curve.

[25] Greenberg, D. and Robins, P. (2008).

Greenberg and Robins (2008) evaluate a number of employment programmes in Canada. They estimate that over a third of the net income gains resulting from the programme for participants are offset by losses in non-market time. This compares to earlier research suggesting that income gains should be offset by at least a quarter to account for losses in non-market time (e.g., Bell and Orr, 1994; Greenberg, 1997).

Figure 3.1 Change in net surplus and non-market time from entering employment



3.2.3 Methodology and caveats

The proposed methodology (Greenberg and Robins, 2008) uses data on net in and out of work income and increases in hours worked as a result of an employment programme, assumes a reservation wage between in and out of work income, and estimates a labour supply curve for individual participants in employment programmes. These data and assumptions allow for the calculation of Area A in Figure 3.1, which can be viewed as the value of the net income gains from entering employment in CBA.

There are two key problems associated with this approach: First, there is uncertainty in both estimates of a reservation wage and supply curve, and it should be noted that findings are sensitive to assumptions about the reservation wage and the shape of the labour supply curve[26].

Second, and more importantly, the literature assumes only a positive economic value to non-market time. But, in-work time may also have a positive value and if so, this would offset the loss in leisure time. People may value time at work due to a number of health and wellbeing benefits that work can confer. These non-pecuniary benefits are likely to derive from the latent benefits of work as first discussed by Jahoda (1982). Jahoda's Latent Deprivation Theory proposes that employment provides access to five categories of experience that are important to individual wellbeing. These are structured time use, activity, social contact, collective purpose and status.

These are benefits to being at work that are unlikely to be fully captured in the individual reservation wage due to information asymmetry. If these benefits were fully understood, the reservation wage would be lower pulling the individual labour supply curve down. From Figure 3.1 we can see that this would imply that the loss in non-market time has a smaller negative impact.

26 Greenberg and Robins (2008).

The recent economic and psychological literature using measures of subjective wellbeing has shown some evidence that the non-pecuniary benefits of employment are large and can be much larger than the wage (Clark and Oswald, 1994, 2002; Winkelmann and Winkelmann, 1998).

Ideally we would capture all of these wellbeing impacts elsewhere in the CBA – in a measure of the health impacts of employment. Due to lack of data and evidence on wellbeing and mental health that is amenable for use in CBA these benefits are not fully accounted for in our estimates of the health impacts of employment – that focuses only on National Health Service cost savings.

The positive value of time in work should thus be included in the analysis here. However, we do not have a robust estimate for the value of in-work time, but the best evidence suggests that it could be larger than the value of non-market time. Including only the negative aspect of leisure time forgone would, therefore, understate the benefits of employment in CBA.

Recommendations for applying non-market time in CBA

1. Estimates of the opportunity cost of time spent in work are subject to large uncertainties and are unlikely to adequately capture the positive value of in-work time for the individual.
2. Given these uncertainties and problems with the current literature, it is recommended that an estimate not be made in CBA.

3.3 Equilibrium effects in the labour market in Cost-Benefit Analysis

3.3.1 Theoretical background

Employment programmes may have effects on the wellbeing of those who are not enrolled in the programme and on the economy. The PSI has undertaken a comprehensive literature review of these general equilibrium effects and has highlighted the following main impacts.

Supply-side substitution effects. By increasing job skills or increasing the number of people seeking employment or their intensity of job search, employment programmes may increase competition for available jobs. Hence, programme participants may end up in jobs that would otherwise have been held by non-participants (Johnson, 1972; and Schiller, 1973). If workers who are substituted against become unemployed or accept lower-wage jobs, their earnings are less than they otherwise would be, then the benefits of employment programmes on society as a whole will be less than the benefits received by programme participants.

The magnitude of this impact depends on the number of jobs available. If labour markets are tight (i.e., the ratio of vacancies to job seekers is high), substitution effects will be low; but if they are, loose, then the cost of substitution to those affected could be substantial. Substitution effects are therefore, likely to be greater during an economic downturn. However, it should be noted that these substitution effects are only likely to matter in the short term. As the economy expands, substitution effects should diminish over time[27].

Demand-side substitution effects. Public employment programmes and programmes that pay subsidies to employers that hire members of specific disadvantaged target groups or programmes (wage subsidy programmes) may have similar substitution impacts. Targeted workers may be hired instead of those who are not targeted and who are, therefore, more expensive to employ.

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[27] Job vacancies can also increase in advance of recovery when employers hire people in expectation of a growth in demand. This will diminish substitution effects even more quickly.

Displacement effects. These effects occur where an employment programme subsidises certain companies, which can then expand at the expense of their competitors.

Equilibrium wage effects. Employment programmes that have large impacts on labour supply may put downward pressure on the equilibrium wag. There are two possible consequences: i) lower wages could increase labour demand and thus general employment; ii) workers who are employed in the same labour markets as programme participants could receive lower wages than otherwise would be the case.

3.3.2 Empirical evidence

Substitution effects have been estimated using three approaches: (i) surveys in which employers are asked whether the work performed by programme participants would have been performed in the absence of the programme; (ii) econometric macroeconomic-level studies that estimate relationships between employment and various measures of programme size; and (iii) general equilibrium modelling. Each of these methods is subject to important shortcomings (see Greenberg *et al.*, 2010)[28].

Greenberg *et al.* (2010) summarises the evidence from these approaches. Only three studies pertain to the UK and there is a great deal of variation in the estimates of substitution effects because the estimates come from different time periods and geographic locations and because the methods and data used differ. While a number of studies have suggested that there is no substantial substitution effect at all, others have concluded that the effect may be greater than 50 per cent (this would imply that the additionality assumption should be adjusted downwards by around a half).[29] The economic climate is not controlled for in any of the studies.

However, a pattern is discernable. Demand-side programmes (e.g., employer subsidies) tend to result in larger substitution effects than supply-side programmes. Based on existing studies, Greenberg *et al.* (2010) suggests that CBAs of such programmes should be subject to sensitivity tests in which a fairly large substitution effect of 45 per cent could be assumed[30]. This is a ratio of the programme's additional impact on employment.

With regards to supply-side programmes (e.g., programmes which facilitate job search or conditionality regimes), Greenberg *et al.* (2010) suggests a sensitivity analysis in which a moderate substitution effect of 20 per cent is assumed.

Substitution effects reduce the estimated level of additional jobs for a given employment programme. Those who are substituted out of a job as a result of a programme incur a surplus loss given that they were maximising utility in employment. Therefore, there will be a reduction in the overall surplus gain from the programme. Since these impacts are felt as changes in surplus they should be included in CBA.

These estimates are at a very general level and it should be noted that different programmes and programmes in different regional areas may have different substitution effects.

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28 Forthcoming report on CBA practice within the DWP.

29 For example, Blundell *et al.* (2004), Forslund and Lorgren and Wikstrom (see Greenberg *et al.*, 2010) found small or zero substitution effects, while Kangashaju & Venctoklis (2003) found substitution effects of over 100 per cent.

30 This is a midpoint of 30 to 60 per cent range proposed by Greenberg.

Separate empirical research does not appear to have been carried out into displacement effects. However, these effects will be mainly limited to wage subsidy programmes. It is also likely that displacement impacts are included in estimates of demand-side substitution effects, as the two would be very difficult to distinguish. Greenberg *et al.* (2010), therefore, recommends that no additional adjustments for displacement be made.

Evidence on equilibrium wage effects is mixed and many studies have not obtained statistically significant results.[31] Theoretically, employment programmes are unlikely to have a substantial impact on wages as: i) given that participants on average enter low paid work, the minimum wage is likely to constrain reductions in equilibrium wages; and ii) programme target groups tend to be narrow and usually account for only a fairly small proportion of the total supply population in any given labour market. Thus, Greenberg *et al (*2010) advises that CBAs should assume no effect on equilibrium wages.

3.3.3 Recommendations

Recommendations for applying general equilibrium effects in CBA

1. Confirm that the programme evaluation from which the estimated additional impact of the programme was taken does not already take substitution effects into account.
2. The standard CBA should be supplemented by sensitivity analyses on the substitution effects.
3. Identify whether (components of the) programme in question are supply-side (increasing job search, skills, or in some other way increasing the effective supply of labour) or demand-side (increasing the incentives for employers to hire labour).
4. For purposes of sensitivity tests, the estimate for additional jobs in supply-side employment programmes should be reduced by 20 per cent. Net economic benefits should then be calculated given this new additionality assumption.
5. For purposes of sensitivity tests, the estimate for additional jobs in demand-side employment programmes should be reduced by 45 per cent. Net economic benefits should then be calculated given this new additionality assumption.
6. The results of this sensitivity analysis should be presented alongside the standard CBA results and caveated.

3.3.4 Caveats and issues

There is a large degree of uncertainty regarding the size of the substitution effect and very little evidence exists for the UK.

The literature provides few clues as to how the magnitude of the substitution effects differs by the economic climate and how persistent they may be.

The figures used in sensitivity analysis should be seen as an upper limit (i.e., a pessimistic scenario). It should also be noted that supply-side substitution effects are only likely to exist in the short term.

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[31] See, for example, the 1993 issue of *Employment Outlook* published by the Organisation for Economic Cooperation and Development (OECD).

3.4 Social Cost of Exchequer Finance[32] in Cost-Benefit Analysis

3.4.1 Theoretical background

SOCEF is the expected reduction in economic efficiency that arises from the transfer of resources from the private to public sector. There are a number of sources of this efficiency loss[33], principle among which is the distortionary effect of most forms of taxation[34]. Standard microeconomic theory states that people will purchase a good so long as the amount they value the good (known as their willingness to pay) is equal to or greater than its market price. Similarly, in decisions around work, people will be willing to work as long as the wage they receive is higher than or equal to how much they value the leisure time they would have to forego to work.

By increasing prices people pay and decreasing the wages they receive, taxation will adjust people's behaviour. In terms of the labour market, income tax reduces people's net pay and this can have a downward effect on the amount that they work[35]. This is because some people will value their leisure time highly and so would prefer to have more time in leisure than in work given the lower wages they receive due to the tax.

SOCEF is a measure of the surplus loss to society because had there been no income tax, these individuals would have decided to work more which would have increased output and their individual welfare. SOCEF is usually measured as a percentage of the tax revenue collected. For example, a SOCEF figure of 0.2 signifies that for every £1 collected in tax, there is a loss worth 20 pence from the loss of surplus due to distortions in people's behaviour.

Government programmes affect Government revenues in a wide variety of ways which will have an impact on the tax levels required to fund them. It can be assumed that typically a programme that is funded through additional taxes increases SOCEF[36]. Every pound spent on funding employment programmes will come from tax revenue and will cause a distortion to the market from which it was raised – be it a commodity market or the labour market. We make the assumption, in line with the literature, that most of the burden will fall on the tax on income[37].

Including an estimate for SOCEF gives a more complete assessment of the overall net economic benefits of a programme (Greenberg and Knight, 2007b, p.15).

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32 This is usually referred to as deadweight loss in the academic literature. Here we use Social Cost of Exchequer Finance (SOCEF) to avoid confusion with the term 'deadweight' which is the unrelated issue of whether the observed outcomes would have taken place anyway without the policy intervention.

33 Other sources of efficiency loss can derive from: i) the absence of competitive (profit-maximisation) pressure in the public sector; and ii) the inability of public sector programmes to target clients with the least barriers to work.

34 This does not apply to lump sum taxes.

35 It is recognised that taxation on income can, under certain circumstances, induce more work. In such cases the income effect of a fall in net income would be larger than the substitution effect.

36 Conversely, if a programme reduces benefit payments allowing taxes to fall, it would reduce SOCEF.

37 See, for example, Mankiw (2008); Boardman *et al.* (2001); Ruggeri (1999).

3.4.2 How does this apply to employment programmes?

DWP employment programmes are funded by the Exchequer. According to latest CBA figures, some of these programmes produce fiscal costs to the Government.

This means that additional tax revenue is required to run them and therefore, there will be behavioural distortions in labour markets. Some people who would be willing to work at equilibrium wages (and who would have, therefore, received surplus) will not because of the tax. Conversely, where a programme generates a positive net fiscal benefit, this will reduce the overall level of taxation, enhancing the efficiency of the economy.

3.4.3 Current application of SOCEF in CBA work

SOCEF has not been measured on a systematic basis in internal comparative CBAs of employment programmes. However, the need to include estimates of it in CBA work is acknowledged. The Cost Benefit Framework (2007) and the PSI (2007) report stipulate that SOCEF should be applied to the sum of all net fiscal flows.

The DWP commissioned PSI study on the New Deal for Disabled People (2007) uses a figure of 25 per cent for SOCEF in sensitivity analysis. The Impact Assessment of the Welfare Reform Bill 2009 uses this same figure for the increased deadweight cost of taxation as a result of increased Government expenditure. This figure was derived from a study by Melville (2002) which is discussed below.

These figures relate closely to the SOCEF estimates used by other countries. The New Zealand *Cost Benefit Analysis Primer* (2005) recommends using an estimate for SOCEF if fiscal costs (and implicitly savings) of a public programme are likely to be significant. The New Zealand Treasury recommends a value of 20 per cent for SOCEF. This means that the cost of public expenditure should be multiplied by 1.20 to give a true measure of the social cost.

The Australian government[38] recommends a value of 25 per cent for SOCEF to be applied to any public expenditures or gains on the assumption that tax revenues will be affected. It comes from a study by Campbell and Bond (1997) who estimate the SOCEF for income tax in Australia.

3.4.4 Methodology

The effects of a tax on income are depicted in Figure 3.2. Here, a utility maximising individual chooses to allocate their time between leisure and work which provides an income. They can forego leisure to increase time in work which increases their income. The budget constraint depends on the wage received in the labour market and the tax system. To keep the exposition simple we assume a non-progressive tax system so that the budget constraint is not kinked.

The Green Book (2003) does not include guidance on SOCEF. This note sets out considerations and methodology for how SOCEF would be included if general agreement were reached that it should be included in the DWP CBA framework.

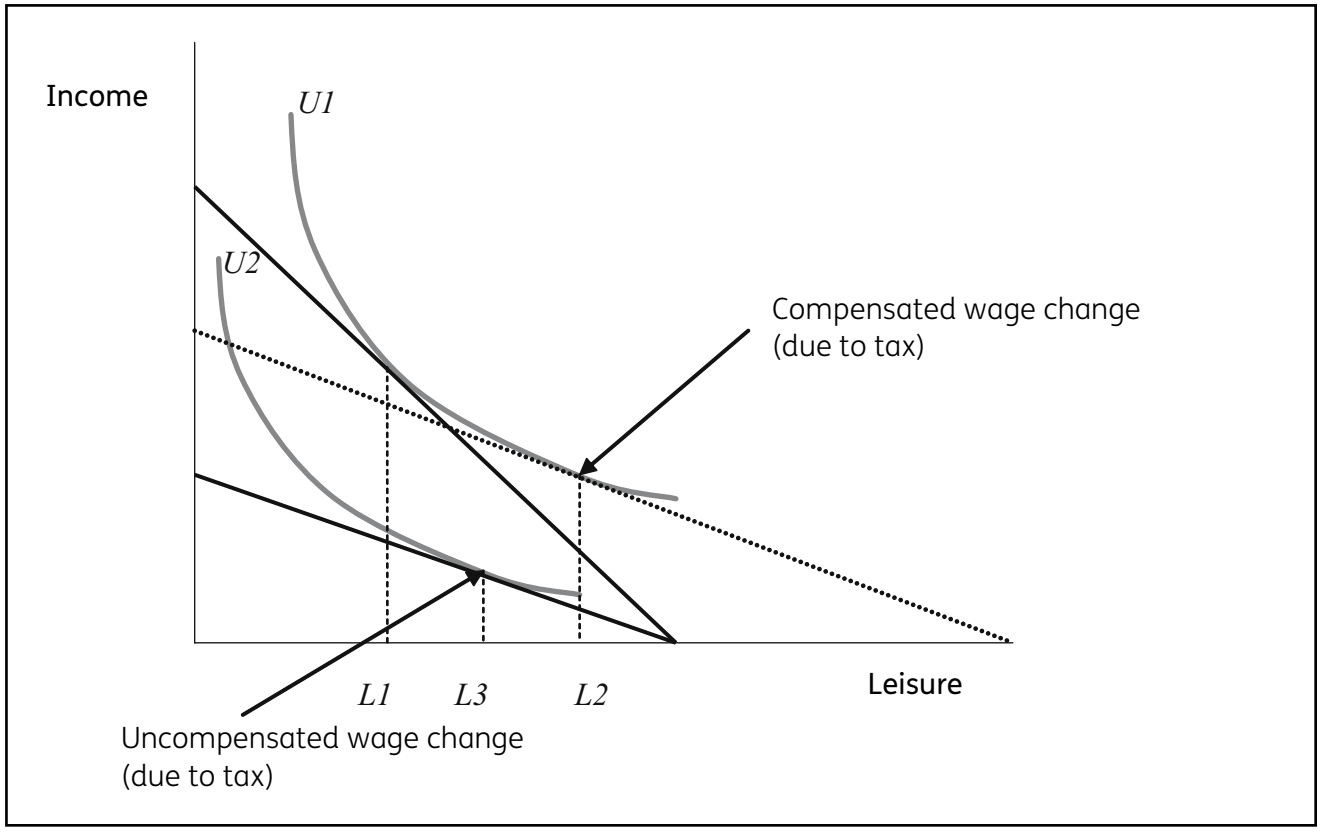
We assume that a tax has a Hicksian substitution effect and that initially before any tax is applied to income the individual spends $L1$ time in leisure and thus (1 - $L1$) time at work. The decrease in effective wage due to income tax has a substitution and income effect. Under the substitution effect (an increase in leisure time from $L1$ to $L2$) income is increased to compensate for the fall in wage so that the individual stays on the original level of utility (*U1*). The income effect (a decrease in leisure time from *L2* to *L3*) then accounts for the effect of the reduction in income that results from the fall in wage and the individual ends up consuming *L3* in leisure and is on a lower level of utility (*U2*).

38 Department of Finance and Administration, *Handbook of Cost-Benefit Analysis*. 2006, p.37.

The tax on wage creates a behavioural effect in that people increase their time spent in leisure and reduce hours worked. In calculating the SOCEF we attach a monetary value to the reduced time in work and depict it as a percentage of the tax collected.

When measuring the SOCEF, it is crucial to determine whether the substitution or full price effect (that combines the substitution and income effects) is relevant. Some of the literature on the SOCEF measures the substitution effect by using **compensated** elasticities for labour supply (Browning 1976, 1987; Thirsk and Moore, 1991). Here, a fall in the wage is compensated by an exogenous increase in income in order to hold the individual's level of utility constant at *U1*. In our example, this would imply that the individual supplies (1 - *L2*) time in work. The change in hours spent working is thus purely due to the change in the relative prices of work and leisure. Alternatively, other studies look at the **full** effect of a tax on income by using the **uncompensated** labour supply elasticities (Dahlby, 1994; Ballard *et al.* 1985; Fullerton and Henderson, 1989). In our example this would imply that the individual would supply (1 - *L3*) time in work.

Figure 3.2 SOCEF in the labour market[39]



It is clear from Figure 3.2 that using the uncompensated elasticity of labour supply will derive a lower estimate of the SOCEF as the fall in hours worked (as depicted by the increase in leisure time) is greater for a compensated elasticity. In other words (*L2*-*L1*) > (*L3*-*L1*).

A compensating elasticity can be derived by analysing the effect of a tax on income, which is then used as a lump-sum transfer to return the tax money back to the taxpayers. Here income is essentially held constant. This method is appropriate for comparing the efficiency of different types

[39] Without any loss of generalisation, we assume a linear budget constraint. With out-of-work benefits, the budget constraint is piece-wise linear.

of taxation regime. However, on many occasions it is not suitable for deriving an estimate of the SOCEF for the purposes of CBA. Using a compensated elasticity of labour supply is inappropriate if the policy being evaluated does not directly benefit the taxpayer (Ruggeri, 1999). This is essentially the case for employment programmes that cost the taxpayer and generally benefit the unemployed. **Thus, for the purposes of CBA of employment programmes, it is crucial that we only use estimates of the SOCEF based on the uncompensated change in labour supply.**

Ruggeri (1999) undertook a major review of the literature on the SOCEF. This study heavily informed HM Treasury's initial estimate for SOCEF of 30 per cent (as an upper limit) as set out in Melville (2002). Melville (2002) determined this estimate by looking at the range of SOCEF estimates in the literature. This estimate was based on both compensated and uncompensated elasticities of labour supply and therefore, cannot be used to inform our CBA framework.

We review the literature that derives SOCEF estimates only from uncompensated labour supply elasticities. Most of the estimates are derived from general equilibrium models. The typical starting point is to maximise a utility function dependent on consumption, hours worked and exogenous tastes subject to a budget constraint that depends on after-tax work income and non-work income. This yields a utility maximising solution for a labour supply function that includes the after-tax wage as an argument and this can be used to derive the uncompensated impacts of an income tax on people's work behaviour (Kumar, 2004).

Table 3.1 Estimates of SOCEF as a percentage of tax revenue from studies that use uncompensated labour supply elasticities

Study	Country	SOCEF as a percentage of tax revenue (mid-point estimate)
Dahlby (1994)	Canada	9% – 38% **(23.5%)**
Stuart (1984)	USA	43% **(43%)**
Fullerton and Henderson (1989)	USA	6% – 17% **(11.5%)**
		16% – 31% **(23.5%)***
Ballard *et al.* (1985)	USA	12% – 23% **(17.5%)**
		14% – 25% **(19.5%)***
Campbell and Bond (1997)	Australia	19%[1]

Note: All estimates are for labour incomes tax except for those highlighted*. * Indicates estimates for the SOCEF related to personal income tax (i.e., tax on the total income of the individual.)

[1] This figure differs from the one mentioned for Australia in the main text. This is because the Australian government derives its estimate of SOCEF from Campbell and Bond's (1997) estimate that uses compensated labour supply elasticities. Nineteen per cent is the authors' estimate of SOCEF using uncompensated labour supply elasticities.

3.4.5 Recommendations

There is a clear consensus emanating from the PSI recommendations and CBA manuals from other OECD countries that SOCEF estimates should be applied to fiscal costs (and savings). Doing so will provide better estimates of the economic impacts of a policy.

We have looked at the SOCEF estimates obtained from studies that are relevant for CBA. The studies employ differing assumptions regarding the magnitude of the uncompensated labour supply elasticities and marginal tax rates, and we provide a core estimate as well as range estimate for the SOCEF value to account for some of the uncertainty around these assumptions.

It should be noted that evidence from the UK is scarce but estimates from other countries have relevance for the UK. We feel that the labour supply functions and tax regimes are likely to be similar enough across these countries that these estimates are relevant to the UK, Indeed, work so far by the PSI and in the CBA framework use international estimates of SOCEF as the basis for the UK. We use the results available from the country studies to form an estimate of SOCEF for the UK, but recommend that this issue is caveated in the CBA.

Our estimate for the core value of the SOCEF is an average of the mid-point estimates from Table 3.1. On this basis the point estimate for SOCEF is 20 per cent.

We estimate a range by taking the averages of the low and high estimates from the above studies[40]. On this basis we estimate a range for the SOCEF of 17-27 per cent.

These figures are comparable to those suggested in the DWP CBA framework and the CBA manuals from Australia and New Zealand. The CBA framework states that DWP economists estimate SOCEF of raising tax revenue to be approximately 25 per cent in the UK. This is actually the mid-point value taken from Melville's (2002) estimates. Our estimate is significantly lower than the PSI's (Greenberg and Knight, 2007b) upper limit SOCEF estimate of 40 per cent, which is based on a suggestion made by Boardman *et al.* (2001) who refer to two studies from the US that use compensated elasticities.

We believe that our estimate is more appropriate for the purposes of our CBA framework as we have derived an estimate solely from studies that use uncompensated labour supply elasticities. Melville's (2002) and Boardman *et al.*'s (2001) estimates are larger as they include estimates that use compensated labour supply elasticities. Analysts should refer to the following procedure in CBA.

Procedure for using SOCEF estimates in CBA

1. SOCEF was not mentioned in the Green Book (2003), but following consultation with HM Treasury, due to its particular significance in the case of labour market policy, SOCEF has been included in a **sensitivity exercise** here.
2. SOCEF is not generally included in core CBA results.
3. For sensitivity analysis: Calculate total net fiscal benefits from additional jobs and multiply this figure by 0.20 to get a SOCEF estimate.
4. Note that where the net fiscal benefits of a programme are positive, this will result in a SOCEF that is positive.
5. The analysis should be supplemented by a discussion of the caveats.

3.4.6 Caveats and issues

The wide range of assumptions used in the above studies suggests that we need to apply some caution when using these figures:

The studies differ in their assumptions of taxation rates and labour supply elasticities. We have derived our estimate from the range of studies to acknowledge this.

[40] Note: Dahlby's (1994) and Campbell and Bond's (1997) point estimates are derived from a labour supply of elasticity equal to the elasticity used in the lower estimate in the other studies and are thus included in the lower point estimate for these calculations.

The labour supply elasticity estimates have not been disaggregated for gender. Kumar (2004) suggests that the elasticity of labour supply for women may be higher than for men. Since there are more men in the UK labour force who subsequently pay income taxes, this suggests that our SOCEF estimate may be overstated.

3.4.7 Example

If we take the ND25+ programme as an example here, total net fiscal benefits from additional jobs is approximately -£48,500,000. This implies that extra revenue from taxation is required to fund the programme which incurs a social cost.

Table 3.2 Estimates of SOCEF of ND25+ under differing assumptions

	Core estimate	Sensitivity range
Current CBF assumptions	£12,125,000	£12,125,00 – £19,400,000
Recommended new assumptions	£9,700,000	£8,245,000 – £13,095,000

Note: Current CBF assumptions are taken from the Tax Ben model. The core estimate for SOCEF is 25 per cent and the range is 25–40 per cent.

3.4.8 Summary

Including estimates for SOCEF in CBA will result in more comprehensive estimates of the economic impacts of employment programmes.

There are a number of studies that use a similar theoretical basis with differing assumptions to estimate SOCEF. Based on these findings, we have produced a core estimate and a range of SOCEF estimates for use in CBA that reflect the uncertainty regarding the assumptions.

When reporting SOCEF estimates in CBA analysts should make readers aware of the data and methodology used and important caveats. Reference to this guide should be made as needed.

4 Impacts in secondary markets

4.1 The impacts of work and employment programmes on health

4.1.1 Theoretical background

There is evidence showing that people in employment are on average healthier than people not in employment. Traditionally there has been less certainty in the medical and social sciences literature regarding the direction of causation, i.e., does work cause an improvement in health or are healthy people more likely to be employed?

Recent improvements in data and the development of innovative empirical studies have greatly clarified the direction of causation and they provide a sound framework within which the Department for Work and Pensions (DWP) can evaluate the likely impacts of employment programmes on the health of programme participants.

Employment, health and Cost-Benefit Analysis

A key issue for the purposes of Social Cost-Benefit Analysis (CBA) is to evaluate whether health improvements due to moving into work on balance lead to increased utility and welfare for individuals. The workhorse in economics for framing dynamic health decisions and changes in health states for individuals is the Grossman (1972a) model of the demand for health. In this model individuals determine their optimal level of health based on their decisions around consumption and leisure. It is usually assumed that there are no market failures which implies that individuals' health states are optimal (see, for example, Grossman, 1972a; Nozal *et al*., 2004; Sickles, 1998). In this case any change from this equilibrium situation, for example, due to a change in employment status, would thus have a detrimental effect on the individual's utility (even if their health state may have improved).

A key assumption that we make is that decisions around work for the individual are not optimal due to information asymmetries and thus, the consequent health and welfare states of the unemployed are sub-optimal. We, therefore, show that moving into work increases an individual's health status and that this is a surplus (utility) gain for the individual that should be accounted for in CBA.

Grossman (1972a) assumes that individuals maximise the following type of inter-temporal utility function[41]:

$$\max_{c,l} \sum_{t} \beta^{t} u_{t}(c_{t}, l_{t}, h_{t}) \qquad (1)$$

subject to a budget constraint and where health is a state variable and the law of motion for health or the **health production function** is:

[41] We adapt Grossman's (1972) model formulation to the language and format of a dynamic programming problem which has become the standard tool for dynamic optimisation.

$$h_{t+1} = f_t(\delta_t, h_t, I_t)$$ [42]

where c_t = consumption in time t; l_t = leisure time (here$(1 - l_t)$ is time in work); h_t = health state; δ_t = depreciation of health; I_t = investment in health. Individuals allocate income between consumption and investment.

Health is assumed to be a durable capital good that depreciates over time. In Grossman's model, individuals can invest time and resources in increasing their level of health. Solving this problem recursively would find that at the optimum the marginal benefits of investing in health are equal across all time periods.

In the Grossman model it is not standard practice to assume that employment is a determinant of health, i.e., employment or work does not enter the production function for health. Given the findings highlighted in this paper below – that employment has a positive impact on health – we develop the Grossman model by assuming that people can also 'invest' time in work to increase health outcomes. The law of motion for health in the Bellman equation then becomes:

$$h_{t+1} = f_t(\delta_t, I_t, h_t, (1 - l_t)), \text{ where } \partial h_{t+1} / \partial(1 - l_t) > 0$$

Now, an optimal condition under this formulation of the Grossman model can of course only be attained if individuals have perfect information of the positive health impacts of work. We assume that individuals are unaware of the health benefits of employment. This implies that their decisions on time spent in work will be sub-optimal and so will their level of health.

To prove this, without any loss of generality we solve the Grossman model in one period[43].
We assume the law of motion governing health to be:

$$h_{t+1} = I_t - \delta_t h_t + h_t + \phi(1 - l_t) \quad (2)$$

where ϕ is a function that captures the health impacts of work. We assume $\phi_{(1-l)}(1 - l_t) > 0$ and that there is no depreciation in health and so $\delta = 0$. Then from (2) we get:

$$h_t = I_t - h_{t+1} + \phi(1 - l_t) \quad (3)$$

Substituting (3) into (1) for period t we get the following optimisation problem for a one period example:

$$\max_{c,l} \quad u_t\{c_t, l_t, [I_t - h_{t+1} + \phi(1 - l_t)\} \quad (4)$$

I assume a very simple budget constraint: $w \cdot L_t = c_t$ where w is the market wage, c is consumption in general which can be allocated to consuming goods or investing in health and $L_t = (1 - l_t)$ (i.e., time in work).

In this formulation of the Grossman model an individual with perfect information on the health benefits of work will make decisions regarding time spent allocated to leisure that will impact on their utility **and** health state.

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42 For details of the dynamic programming methodology refer to Bergman (2005) and Ljungqvist and Sargent (2004).

43 The full dynamic model would require that all t periods be solved simultaneously – usually through the use of a Bellman equation. A simple one period example is used here for ease of exposition without any loss in generality (Bergman, 2005).

The optimal conditions for consumption, the amount of leisure undertaken by a perfectly informed individual and the shadow price of the constraint are[44]:

$$\frac{\partial u}{\partial c} = u_1 = -\lambda \tag{5}$$

$$\frac{\partial u}{\partial l} = u_2 + u_3 \cdot \phi_l(1 - l_t) = \lambda \cdot w \text{ [45]} \tag{6}$$

$$\frac{\partial u}{\partial \lambda} = w \cdot L - c = 0 \tag{7}$$

This implies that:

$$u_2 + u_3 \cdot \phi_l(1 - l_t) = \lambda \cdot \frac{c}{L} \tag{8}$$

And the optimal level of work undertaken by the individual with perfect information ($L_{P.I.}$*) is as follows:

$$\Rightarrow L_{P.I}* = \frac{\lambda \cdot c}{u_2 + u_3 \cdot \phi_l(1 - l_t)} \tag{9}$$

Let us compare this solution with the case when individuals are not aware of the health benefits of work. In this case is $\phi(1 - l_t)$ essentially set to zero in (2) and we get:

$$\frac{\partial u}{\partial c} = u_1 = -\lambda \tag{10}$$

$$\frac{\partial u}{\partial l} = u_2 = \lambda \cdot w \tag{11}$$

$$\frac{\partial u}{\partial \lambda} = w \cdot L - c = 0 \tag{12}$$

Here the optimal level of work undertaken by the individual with imperfect information ($L_{N.I.}$*) is as follows:

$$\Rightarrow L_{N.I.}* = \frac{\lambda \cdot c}{u_2} \tag{13}$$

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44 Where u_2 refers to the derivative of u with respect to the second argument and so on for u_3.

45 $\phi_l(1 - l_t) = \partial h_{t+1} / \partial l$

Since we assume that health has a positive impact on utility, then $u_3 > 0$. Increasing leisure time has a negative impact on health because people substitute away from time in work which has a greater health benefit and therefore, $\phi_l(1-l_t) < 0$.[46] If $u_3 > 0$ and $\phi_l(1-l_t) < 0$, then $\phi_l(1-l_t) < 0$ and we can conclude that:

$$u_2 > u_2 + u_3 \cdot \phi_l(1-l_t)^{47} \tag{14}$$

And this implies that $L_{P.I.}{}^* > L_{N.I.}{}^*$

This shows that when people are unaware of the health benefits of work, the marginal utility of leisure time is greater than it would be if they understood the impacts of employment on health. At the optimum, this will result in people consuming more leisure and working less compared to the case where they are aware of the health benefits of work ($L_{P.I.}{}^* > L_{N.I.}{}^*$). Rational individuals with perfect information of the health benefits of work will allocate more time to work in the optimisation process and thus ($1 - l_t$) would be larger.

Since we assume that $\partial h_{t+1} / \partial(1-l_t) > 0$ we can conclude that individuals with perfect information on the health benefits of work would be healthier (because they work more). As we have assumed a market failure in the form of an information asymmetry, moving an individual into work and consequently improving their health is, therefore, a gain in surplus for the individual and thus should be included in CBA[48].

We can also deduce that given the budget constrain $w \cdot L_t = c_t$ where wages (w) stay constant, the amount of money available for general consumption will be greater for individuals with full information as they work more. Since investment in health is a positive function of the amount of money available for general consumption, the increase in work will also improve health status through an increase in income.

The assumption of imperfect information is crucial to this paper and for valuing health in CBA of employment programmes. If individuals had perfect information, unemployed persons could be maximising utility by actually not working and therefore, moving them into work would lead to the perverse result that it would have detrimental impacts on their utility[49].

We have shown that given the information asymmetries and the assumption that work is good for your health, moving someone into work will increase their health and utility. We now turn to examine the kind of positive health impacts an individual can expect to experience if he moves into work and we monetise these impacts to inform CBA.

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46 Note this is derived from the assumption that $\phi_{(1-l)}(1-l_t) > 0$

47 Since hours worked cannot be negative, the following constraint is assumed: $u_2 \geq u_3 \cdot \phi_l(1-l_t)$.

48 Note that there is of course the option of improving people's knowledge of the health benefits of work, which as our model predicts would lead to an increase in employment. Either way, we increase people's time spent in work which leads to a surplus gain.

49 This would be the case if there are no imperfections in the labour market.

Employment and health

Work by Jahoda (1982) and Fryer (1986) provides the foundations for empirical studies of employment and health. Jahoda's (1982) *Latent Deprivation Theory* proposes that employment provides access to five categories of experience that are important to individual health and wellbeing. These are structured time use, activity, social contact, collective purpose and status. Deprivation of these latent functions of employment leads to psychological distress.

Fryer's (1986) *Agency Restriction Model* argues that it is the loss of the income that accounts for the deterioration in wellbeing of the unemployed. This is termed as **Economic Deprivation** in the literature. Increased income may lead to a better lifestyle and diet, fewer monetary worries and better access to medical services.

The latent and economic health benefits of employment are of course picked up in our reformulation of the Grossman model and thus it represents a sound framework thinking about the health benefits of work.

It should be noted that although both the latent and economic benefits should be considered in empirical analysis, the issue is complicated slightly for the purposes of CBA. It has been argued that the latent and economic benefits are surplus gains that should be measured in CBA. However, health improvements deriving from the economic benefits of work will be accounted for in the wage outcomes of employment programme participants and this is acknowledged elsewhere in the CBA framework. To avoid double-counting we should ideally focus only on estimating the health gains due to the latent benefits of work.

Improvements in health due to the latent benefits of employment could lead to the following types of benefits:[50]

- reduction in public healthcare expenditure;
- reduction in privately-borne healthcare costs (for example, medication purchased by patients or the cost of private healthcare);
- intangible benefits from improved physical and mental wellbeing.

Although not perfect, these would provide some measure of the surplus gains accrued due to health improvements by individuals who move into employment.

Problems encountered in empirical studies

The two main problems relevant to our work on estimating the impacts of employment on health are: i) reverse causality; and ii) measuring and valuing the health impacts.

Much of the early research on employment and health relied on cross-sectional findings. As such it was difficult to control for the problem of reverse causality and these results should be ignored. To solve for this, we rely solely on results from research that uses longitudinal data or from studies that use natural experiments to divest themselves of reverse causality problems.

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50 The literature highlights a fourth potential benefit: increased productivity due less illness and absenteeism. We assume that employers take this implicit benefit into consideration in the wage bargaining process. An individual's wage outcome then includes the value of increased productivity due to being in work and does not need to be counted separately for the purposes of CBA.

The impacts of employment have been studied using survey data from employees who experienced redundancy through factory closure. Factory closures have been examined in the UK and Scandinavia. Factory closure studies solve for reverse causality as people experience unemployment regardless of their initial health status. Any change in health after the closure is attributed to the effect of unemployment.

The economic benefits of employment for health have been estimated by measuring the impact of exogenous changes in income on health. The two most highly cited natural experiments look at the impact of lottery winnings on health (Lindahl, 2005) and the impact on East Germans' health due to increased income after German unification in 1990 (Frijters, 2003). In both of these cases income variation is independent of health status.

As is demonstrated below, research using longitudinal data and natural experiments has uncovered a statistically significant positive impact of employment on health.

Health impacts have been measured using a wide variety of subjective survey data or administrative data on medical consultations and costs. This makes it difficult to compare results and to attach monetary values to health outcomes which is problematic for the purposes of CBA. Our recommendations have been taken from a set of studies that are representative of the general findings in the literature and that are amenable to our current cost-benefit framework.

4.1.2 Empirical evidence

Longitudinal studies

Latent benefits of employment

Graetz (1993) uses four waves of the Australian Longitudinal Survey and the General Health Questionnaire that assesses psychiatric health. He uses one-way analysis of variance (ANOVA) to test for statistically significant differences in health across groups at each wave of the survey. Controlling for initial health status, Graetz (1993) finds that unemployed people who subsequently found employment reported substantial improvements in mental health. An important caveat in the findings is that health outcomes also depend on job type. The author states that the '*health consequences of finding a job are contingent on the quality of work obtained*'.

These results are echoed by Roy *et al.* (1987) who find that being unemployed increases the severity of mental illness and by Thomas *et al.* (2005) who use the same General Health Questionnaire scale and British Household Panel Survey data from 1991-1999. They find that becoming employed was associated with a reduced risk of mental illness.

Gerdtham and Johannesson (2002) undertake a more comprehensive study that evaluates the impact of both the latent and economic benefits of employment. They test whether unemployment and income are correlated with mortality rates using individual level data from 20-64 year olds in Sweden. The authors follow a set of 30,000 individuals for up to 17 years. They control for demographic and geographic factors. They find that unemployment increases the risk of death from 5.36 per cent to 7.33 per cent. Income is also highly significant and has a small negative effect on mortality. Very similar correlations between unemployment and mortality have been found by Iverson *et al.* (1987) in Denmark[51] and Martikainen and Volkonen (1996) in Finland[52].

51 Iverson *et al.* (1987).

52 Martikainen and Volkonen (1996).

Economic benefits of employment

Benezal and Judge (2001) carry out a full literature review of studies on income and health. They review 14 longitudinal studies on the US, Germany, Canada and Sweden. Approximately half of the studies measure mortality rates. Nearly all the remaining studies use measures of subjective psychological wellbeing. All studies control for reverse causality and other determinants of health. All of the studies find that income has a relatively small but statistically significant positive impact on health. Some studies suggest that long-term (permanent) income is a more important factor than short-term income.

Work using measures of subjective wellbeing have also unearthed a positive impact of income on health. However, the common finding is that the impact on wellbeing is very small (see, for example, Easterlin, 1974; Ferriera and Moro, 2009; Groot *et al*., 2006). Indeed Winkelmann and Winkelmann (1998) derive larger estimates for the latent benefits of work and Clark and Oswald (1994; 2002) estimate the latent benefits of work to be nearly ten times greater than the economic benefits.

Studies that use natural experiments

Latent and economic benefits of employment

Factory closures have been widely used as natural experiments of the impacts of employment on health. This is because estimates based on factory closures are unlikely to suffer from reverse causality.

However, there are some problems associated with these studies. Sample sizes tend to be small and the short duration of the follow-up surveys restricts detection of longer-term effects on health. They also use a number of different health outcome variables which makes it difficult to compare results.

These studies generally find a significant negative effect of unemployment on physical and mental health for both clinically examined and self-reported illnesses. Iversen and Sabroe (1989) find rising hospital admissions in a sample of Danish workers after a large shipyard closure and Keefe *et al.* (2002) report excess risk of self-harm leading to hospitalisation or death in a sample of workers displaced after bankruptcy of a meat-processing plant. Similar evidence was found for a large furniture plant closure in Austria (Studnicka *et al*., 1991). The authors conclude that subjective health indicators and medical service usage increased with unemployment. Sullivan and von Wachter (2006), using administrative data from two US states, estimate a 15-20 per cent excess risk of death in the 20 years following a job loss.

Beale and Nethercott (1985) (Wiltshire, England) and Iverson and Sabroe (1989) (Nordhavn, Denmark) found that after factory closure, general practitioner (GP) consultation rates increased by around 50 per cent. These results are consistent with Mathers' (1994) more recent findings for Australia. These studies use a closely related set of control groups which help to account for other factors that determine health status.

Burgard *et al.* (2005) find that involuntary job loss has significant negative effects on subjective levels of health. Their study uses a large longitudinal US dataset which demonstrates that the conclusions of the negative impacts of job loss derived from the factory closure studies, that focus on concentrated geographical areas or industries, can be extended to the general working population.

There is also some evidence that job loss does not always lead to significant changes in medical service usage and expenditures. Kuhn *et al.* (2009) find that this is the case for a large sample of workers who lose jobs due to factory closure in Austria. However, sickness benefit payments drastically increased for these people as they were made redundant. The fact that these payments are based on a medical assessment by a GP would suggest that job loss has an adverse impact on health.

Economic benefits of employment

Natural experiments that may not be directly related to the issue of employment and health can still shed light on the impacts on health status of increases in income (that would come from employment)[53].

Lindhal (2005) uses the Swedish Level of Living Survey which reports income, lottery wins and health indices and finds that lottery prize wins lead to improvements in a wide range of physical and mental health indicators. As lottery wins are taken as exogenous this suggests that income has a positive effect on health.

This finding is supported by Frijters *et al.* (2005) who use exogenous increases in income in East Germany after unification. They find that income has a positive effect on self-assessed health indicators. Again, however, this impact is relatively small.

Studies that have used longitudinal data or natural experiments to control for reverse causality have demonstrated that employment has a positive effect on physical and mental health. This finding is consistent across a broad range of actual and self-reported health indicators which further increases its robustness. This impact comes from both the latent and economic (income) benefits of employment although the evidence suggests that latent factors are likely to be much more important. Some studies have shown that permanent income may be more important than temporary income in determining health and that better quality jobs have an even greater positive impact, but job quality has not been well defined in this context. Therefore, it can be concluded that employment programmes, by helping people into work, can be expected to produce positive impacts on individual health.

In addition, there is some recent evidence in the literature to suggest that participation in employment programmes themselves has health benefits. Training programmes and contact with job advisers can provide some of the latent benefits associated with work[54]. This research is still at an initial stage and thus is not utilised here, but we can assume that there are likely to be health benefits from our employment programmes over and above the effects of getting an individual into work.

4.1.3 Recommendations

The evidence suggests that employment has a positive effect on the health of the individual – as predicted by our version of the Grossman model. However, measuring these health effects in monetary terms for the purposes of CBA is problematic.

Subjective self-reported health indicators, such as the General Health Questionnaire which has been regularly employed in the above studies, do not have consistent monetary conversion scales. The best subjective health indicator available for the purposes of CBA is the quality adjusted life year (QALY). The Department of Health and the National Institute for Clinical Excellence (NICE) provide some guidelines on valuing QALYs. However, we know of no studies that estimate the impact of employment on QALYs.

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53 It should be noted that the health impact of a change in income is not necessarily the same as the impact from a change in income due to a change in employment status. However, these studies help to show that income is an important determinant of health.

54 For a full discussion see Coutts (2009).

Another regularly used health indicator is mortality. There are again difficulties applying a monetary measure to this outcome. There are controversies surrounding the value of life and increased mortality rates actually translate as National Health Service (NHS) savings over the long term. Also, mortality rates do not pick up subtle changes in health with employment.

Medical service usage rates lend themselves better to monetisation. Use of medical services can be matched to medical costs to determine monetary values for health outcomes. Mathers (1994) and Studnicka *et al.* (1991) find that subjective measures of health status largely account for differentials in health service usage. Therefore, we can be confident that medical service usage adequately picks up changes in health.

This is, therefore, our preferred method for estimating the impacts of work on health. We use GP consultation rates and assume that they proxy for overall medical service usage rates. This is because we find strong correlations between GP consultation rates and usage rates of secondary care services and between GP consultation rates and NHS average costs[55].

This simple analysis of course does not account for any factors that may be having simultaneous impacts on GP consultation rates and NHS costs. Also, the data relate to the population in general. The link between GP consultation rates and NHS costs for the unemployed may be less highly correlated. This is because the opportunity costs of visiting the doctor are much lower for the unemployed and thus, some unemployed people could see the GP for conditions that do not require further treatment.

However, we have found no evidence that attempts to correlate GP consultation rates and general medical service usage rates for unemployed people. We thus assume that changes in GP consultation rates for unemployed people who move into work can be translated as changes in average NHS costs. This is similar to the approach taken by Oxford Economics in its CBA of employment programmes, which is the only study we have found that attempts to monetise the impacts of employment on health[56].

As we will use NHS service usage rates, this captures the benefits from improved health as set out in the first bullet in the section *Employment and health*. Since we do not estimate the benefits associated with reduced private healthcare costs and improved physical and mental wellbeing, it should be noted that our estimates of the impact on health are likely to be understated.

Oxford Economics assumes that National Health Service (NHS) expenditure on unemployed persons is double the average NHS expenditure. This estimate was derived from estimates on ratios of employed and unemployed people reporting poor health. Our research suggests that this is likely to be misleading as this approach does not control for reverse causality.

Mathers (1994), Beale and Nethercott (1985) and Jacobsen (1972)[57] find that unemployment leads to an increase in GP consultation rates, but that this rate differs considerably across gender. The difference between GP consultations rates between the employed and unemployed are greater for men than women. Mathers (1994) found that unemployed men aged 25-64 in Australia were 50 per cent more likely to make doctor visits. For women in this age category the figure was around 10 per cent. It is not clear whether this study adequately controlled for reverse causality.

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55 Using data from the ONS (*Living in Britain General Household Survey* (2002))and Department of Health (http://www.publications.parliament.uk/pa/cm200809/cmhansrd/cm090909/text/90909w0022.htm)

56 Oxford Economics (2004).

57 Jacobsen (1972).

One of the most highly cited papers in the literature by Beale and Nethercott (1985) uses a factory closure study in the UK to account for the problem of reverse causality and found that consultation rates increased by 57 per cent per year when men move from employment to unemployment (compared to a control group). This is comparable to the figure estimated by Jacobsen (1972) for a factory closure in Denmark. He estimates that consultation rates for men aged 41-60 increased by 48 per cent after factory closure. Estimates for women are rare in the factory closure literature but there is some evidence and discussion that suggests that the impact for women may be less pronounced (Morris and Cook, 1991), (Carr-Hill *et al.,* 1996), (Beale and Nethercott, 1985).

However, there is no discussion or evidence to suggest that such divergences in impacts are due purely to gender itself. We thus make the assumption that such differences are due to the fact that women have different jobs and work patterns compared to men. Women are more likely to work part-time and thus may not be accruing the maximum health benefits from their work before redundancy. Alternatively, working part-time would allow women to see the doctor more often. For these reasons factory closure studies may find differential impacts on women and men of job loss. Therefore, we can expect to find that the health impacts of moving from employment into unemployment (and vice versa) are the same for men and women if the job is identical.

We use a conservative estimate and assume that as people move from employment to unemployment they incur 50 per cent more in medical costs than employed people. The evidence suggests that we can be confident that this estimate does not suffer from reverse causality issues and thus, we can assume that this increase in medical costs is due to being unemployed.

An important issue to note is that this impact on medical service usage comes from the impact of moving from employment to unemployment, but for the purposes of our employment programmes, we are interested in the impact on health of moving from unemployment to employment. Carr-Hill *et al.* (1996) suggest that the impacts are not symmetrical. In absolute terms the impact on health is greater as one moves from employment to unemployment than from unemployment to employment. This may be because the loss of a job has a large negative health shock (Burgard *et al.,* 2005). Carr-Hill *et al.* (1996) find that on average the impact is about 1.5 times as large for the movement from employment to unemployment

We apply this to our estimate of medical costs. We assume that the movement from unemployment to employment reduces GP consultation rates and medical costs by 33 per cent. (50 per cent/1.5)

We use Hajioff's (2008) estimate of the average NHS cost per person of working age per annum, which is £1,220 in 2008 and we apply the impact of employment on medical costs. However, we acknowledge that the initial level of costs differ for healthy people compared to those with disabilities who would participate in Employment and Support Allowance (ESA) programmes. The average NHS costs per disabled person is £2,440. This would cover those claiming Incapacity Benefit (IB)/ESA (Hajioff 2008).

Applying the above figures we estimate that when an unemployed person moves into work they incur £508 less in NHS costs per annum. (See Appendix D for the estimation methodology.)

This figure is likely to be different for those people with initially poorer health status. There is some qualitative evidence to suggest that the marginal impact of work on health is greater for those who start off in worse health states (Waddell, 2006) but there are no robust quantitative estimates that we can draw upon. We, therefore, assume that the impact on health of moving into a given job is the same regardless of initial health status. However, there are still larger gains from getting

a person with a worse health status into work – this is because people with health problems incur greater initial NHS costs on average. Moving someone off ESA and into employment will have a larger monetary impact than for a healthier person on Jobseeker's Allowance (JSA)[58].

We estimate that when an unemployed person with a disability moves into work they incur £1,016 less in NHS costs per annum. (See Appendix D for the estimation methodology.)

As Mathers (1994), Beale and Nethercott (1985) and Jacobsen (1972) do not explicitly control for income, the impacts on health expenditure could include both the latent and economic benefit effects of employment. To avoid double-counting health benefits, we should exclude the economic benefits of employment from CBA. Although at this stage we cannot separate the latent and economic impacts, we can assume that our evidence only captures the latent benefits of work. This is because of the strong evidence that income has a relatively small effect on health and because the subjects of the factory closure studies are likely to have received unemployment benefit after job loss, thus reducing losses in income.

We use these estimates as a monetary proxy for the surplus gains accrued by individuals who move into work and experience better health as a result.

Recommendations for applying health impacts in CBA

1. Estimate the number of additional job years resulting from an employment programme. This can be found in the Progress Check workbooks.
2. For non-ESA programmes, multiply the number of additional job years by £508. This will provide an estimate of the expenditure savings accrued from the programme.
3. For ESA programmes, multiply the number of additional job years by £1,016. This will provide an estimate of the expenditure savings accrued from the programme.
4. These estimates are derived from 2008 figures and therefore, should be uprated by inflation where relevant.
5. The analysis should be supplemented by a description of the caveats.

4.1.4 Caveats and issues

We are unable to say anything about the impacts of the specific type of jobs that programme participants find. It has been shown that more long-term/permanent, good quality jobs will have a larger impact on health.

We have disaggregated the health impacts for programme participants with and without some initial health problems. Health impacts and initial costs may differ by age and other demographic variables but due to a lack of evidence this has not been evaluated here.

It should be noted that there is a possibility that some employed people do not visit the doctor because of the opportunity cost of doing so rather than because they are not ill. Thus, it may be that some people are ill in employment but they do not have an impact on medical costs. In this case,

[58] The health gains to employment are likely to be more dependent on job type for those with initial health problems. For instance, poorly adapted work environments may have detrimental effects on the health (especially mental health) of people with health conditions. However, Bewley *et al.* (2007) find significant improvements in health for participants in Pathways to Work.

by using GP consultation rates and NHS costs we could be overstating the health benefits of work. However, we have discussed evidence that GP consultation rates can proxy to a good extent for health status and that they are correlated with average NHS costs.

There are a number of problems highlighted with the factory closure literature. It is difficult to assess just how well the control groups control for other determinants of health, which leaves some uncertainty about the proportion of the difference in health status between employed and unemployed persons that can be directly attributed to employment. Also, for the purposes of CBA it is not possible to identify only the latent benefits of work.

However, factory closure studies are especially relevant for our analysis as they evaluate the impacts of employment on health for mainly low-skilled, low-paid jobs which resemble the average type of job found by our employment programme participants. We can assume that these studies mainly pick up the latent benefits of employment. Due to the ability to control for reverse causality factory closure studies have been regularly cited in the health economics and epidemiology literatures.

Our estimate of the health benefits to society of our employment programmes is likely to be understated because we have not accounted for intangible health benefits, reductions in private healthcare costs and the possibility that participation in employment programmes itself can have positive health impacts (see Coutts (2009) for a discussion). Unfortunately no quantitative estimates for the health impacts of participation in employment programmes exist.

We, therefore, do not fully capture in monetary terms an individual's gains in surplus due to the health improvements experienced from moving into work. For this reason the health benefits of an employment programme will be understated.

We have assumed that the marginal health impact of getting into work is the same regardless of initial health status.

In addition, there is growing evidence that society values health gains differently according to initial health status (e.g., Dolan *et al*., 2008; Dolan and Tsuchiya, 2009; Maestad and Norheim, 2009). The evidence suggests that overall social welfare improves more for a given gain in health for a bad health group than for the same gain for a healthy group. This would imply that we should weight higher the gains to groups in initially poorer health. This has not been done here which implies that our health impacts are likely to be further understated.

4.1.5 Summary

We have shown strong evidence to suggest that employment has a positive impact on health. These impacts result from the latent and economic benefits that the individual experiences in employment.

Assuming that people are not fully aware of these impacts, we show that moving into work leads to a surplus gain to the individual that should be acknowledged in CBA.

We capture some of this surplus gain by deriving a monetary estimate for the reduction in health-related costs using medical service usage rates. We do not find any evidence that impacts differ across gender. There are larger impacts from getting people with poorer initial health into work due to the fact they incur greater average medical costs. There will also be other benefits to the economy due to the intangible benefits of health to people and due to reductions in privately borne health costs that have not been accounted for here.

4.2 The impacts of work and employment programmes on crime rates

4.2.1 Theoretical background

While there is no clear empirical evidence that unemployment rates themselves are positively related to crime,[59] there appears to be a firm relationship between income and crime (and there is an obvious link between employment and income). The vast majority of work in this area has focused on the relationship between crime and unemployment. While there is evidence of a link between income and acquisitive crime, we have not seen firm evidence of a link between income and violent crime (Levitt, 2004).

The reason behind this is that we now understand that there are numerous complex relationships between the labour market and crime rates. Unemployment, per se, is an aggregation of these labour market and also macroeconomic factors. To understand how employment programmes impact on crime, it is important to disaggregate the impacts of unemployment. To do so, we think about these relationships in the context of different academic approaches.

Standard economic theory places decisions around committing a crime in the utility-maximisation framework[60]. Under expected utility theory a rational individual will commit a crime if the **expected** reward of that crime is greater than the **expected** reward from not committing that crime (and remaining dependent on legal activities, whether in the form of paid employment or benefit receipt)[61].

In making the decision around committing a crime, the individual will take into account:

- the likelihood of getting caught;
- the severity of the punishment;
- the monetary reward from the crime;
- the monetary reward from legal activities.

} Factors that determine the expected reward of crime

An increase in the likelihood of getting caught, an increase in the severity of the punishment and a decrease in the monetary reward from crime will all reduce an individual's propensity to commit a crime by reducing the expected reward from crime.

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59 Early statistical work demonstrated a positive relationship between unemployment and crime. This statistical relationship broke down in research in the 1980s as better measures of criminal activity became available and theory in this area developed. There is some consensus among economists currently working in this field that there is no conclusive evidence that unemployment rates are positively related to crime (e.g., Hansen and Machin, 2002, p.678; Gould *et al*., 1998 p.1; Wilson and Cook, 1985, p.4). The common finding is that unemployment can proxy for a poor state of the economy. High unemployment may increase the propensity to commit crime but at the same time there are less things of value in the economy to steal. Many papers have consequently found a negative impact of unemployment on crime.

60 Becker (1968); Ehrlich (1973).

61 Potential offenders may consider the fact that criminal activity now may reduce pay-offs from legitimate work in the future. However, we ignore this dynamic expectational impact by assuming that those on the margins of committing crime (i.e., low-skilled and low-paid) are likely to heavily discount the future.

An increase in income from legal sources, i.e., employment income or benefit receipt will also reduce an individual's propensity to commit a crime.

Within this theoretical framework, the impact that employment has on crime is through a wage effect. Employment will increase income received by the individual, which in turn will make work more appealing than crime, all else being equal. This will reduce the crime rate[62].

In the CBA framework we have made the standard assumption of excluding any socially unacceptable preferences such as crim. A reduction in the crime rate is, therefore, not a transfer from potential criminals (who lose income from crime) to potential victims and is thus counted as a surplus gain in CBA[63].

There is evidence that this relationship is applicable mainly to low income groups who as a consequence are seen to be on the margins of crime (Doyle *et al.*, 1999; Hansen and Machin, 2002). This implies that the relationship between crime and income may not be linear and that marginal impacts are greatest at lower levels of initial income.

Consequently, statistical work in this area is concentrated on the relationship between crime and the low wage labour market. The wage rate is included as the main explanatory variable and models are usually supplemented to account for other explanatory factors such as level of education, geographic location and the reward from crime.

Sociologists such as Felson (1998) and Hirischi (1969) state that less structured routine activities and increased time in idleness and frustration that unemployment can bring may expose individuals to criminogenic settings (Regea, p.6).

4.2.2 Empirical evidence

Whereas evidence on the links between unemployment and crime is inconclusive, there is strong evidence to suggest that income and crime are negatively correlated[64]. Machin and Meghir (2000); Gould *et al.* (1998); Hansen and Machin (2002); Doyle *et al.* (1999) and Grogger (1997) find that increases in wages lead to lower rates of crime.

Machin and Meghir (2000) examine the extent to which property crime is related to the labour market position of less skilled workers in England and Wales from the mid-1970s to the mid-1990s. They find that increasing the hourly wage of the poorest quarter of people in society has a highly significant negative effect on crime rates. This is illustrated in Figure 4.1:

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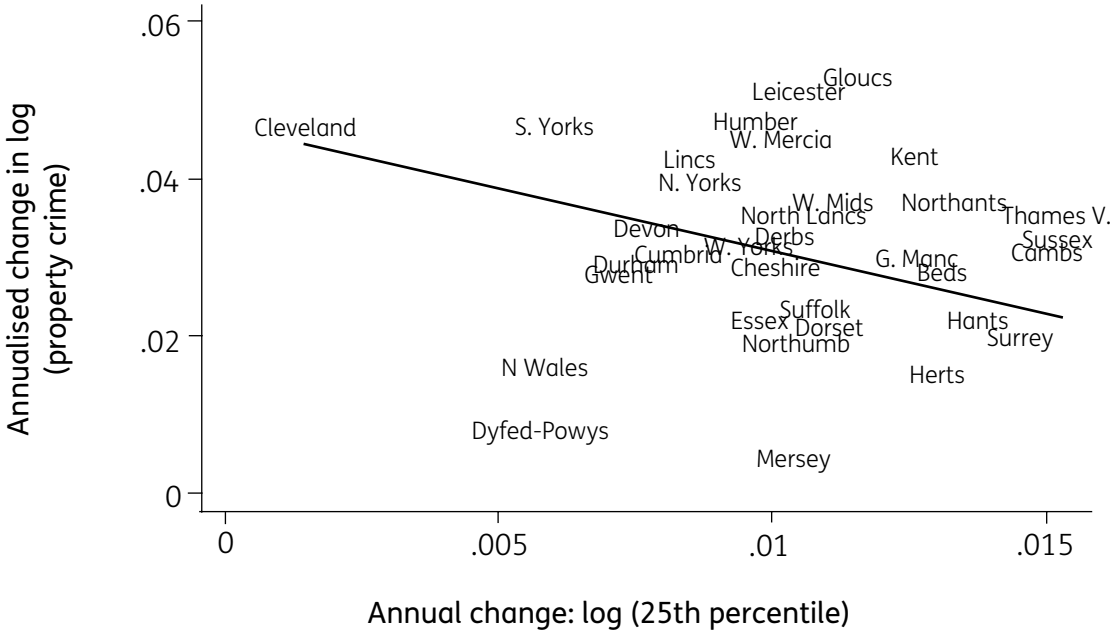
62 This is in line with the Home Office's crime forecasting model (Field, 1999). The Home Office uses consumption which proxies for the opportunity cost of committing a crime and which is closely correlated with income. They include conviction rates and the growth in the police force to proxy for the likelihood of getting caught. These variables capture the trade-offs between the expected rewards to work and crime.

63 Some CBAs offset gains to society from a reduction in crime by the lost monetary returns for criminals (Boardman *et al.*, 2001).

64 This evidence pertains to both the level of income and changes in income.

Figure 4.1 Changes in property crime rates and 25th percentile wages across the Police force areas of England and Wales, 1975-1996



Note: This figure has been adapted from Machin and Meghir (2000).

Hansen and Machin (2002) examine the impacts of the introduction of the minimum wage on crime rates in England and Wales. This legislation benefited a sizable number of workers in the low wage labour market.

They find that for all forms of crime, crime rates fell more in areas that initially had a high number of low-wage workers. The introduction of the minimum wage increased their income, altering the incentives to participate in crime. This led to a fall in the number of crimes committed. This finding remained robust to controlling for other relevant determinants of crime.

Grogger (1997) studies the links between wages and male youth property crime in the US. He uses an individual level probit model and finds that a ten per cent increase in wages reduces participation in crime by 1.8 percentage points. Again, this result remains robust to controlling for other relevant determinants of crime. Given the estimated initial propensities to commit a crime for the group Grogger studies, a ten per cent increase in wage translates in to a six per cent decrease in crime at the individual level.

Gould *et al.* (1998) examine the degree to which changes in crime rates can be explained by changes in the labour market opportunities for those most likely to commit crimes, i.e., young unskilled male workers in the low wage labour market. Gould *et al.* use aggregate country level panel data over a period of 17 years. They control for country fixed effects, general level of wealth in the economy and demographic factors.

Their results are consistent with Grogger's probit model output. They find that wages are theoretically and empirically a better measure for the opportunity cost of crime than the unemployment rate, which can help explain why previous studies have found mixed results for explaining crime rates with labour market variables.

These studies suggest that the most important factor in determining crime rates among low wage earners is the level of income. The unemployment rate, per se, has no independent impact on the level of property crime

In light of this we use the incentive-based economic framework. Due to the lack of evidence on violent crime, we omit it from the analysis.

4.2.3 Recommendations

The evidence demonstrates that income is negatively correlated with crime rates for low income groups. By definition, employment programmes target low income groups and thus, the studies discussed above can be used to estimate the likely impact on crime of getting people into work.

We use the study by Grogger (1997) on the US to motivate our recommendations. This is a highly cited paper in the literature. This study was chosen because it uses a limited dependent variable model which is amenable to the data on employment programme outcomes that we have. Grogger's model provides an estimate of the impact of income on the propensity to commit a crime by an individual. Other studies look at average wages and the proportion of people in low wage employment as explanatory factors which are less amenable to our CBA results.

Grogger (1997) models the decision around crime using the incentive based approach that we prefer. He uses data from the National Longitudinal Survey of Youth (NLSY) which asks respondents about crimes they committed in the previous year.

The observations are restricted to young males (17-23 years of age) who have permanently left school and whose primary alternative to leisure would be work or crime. This is a relatively uneducated and low income segment of society. He estimates the impact of wage income on the propensity to commit property crime[65] for this sample.

The model controls for geographic and demographic effects and a number of factors that affect the expected reward from crime. The average partial derivative of the probability of committing crime with respect to the log wage is -0.18. This indicates that a ten per cent increase in wages would reduce the propensity for an individual to participate in property crime by 1.8 percentage points which is approximately equivalent to a six per cent fall. We use this figure in our estimates of the impact of finding employment on crime in the UK. A discussion of the issues involved in doing so is presented below.

It should be noted that the estimated six per cent fall in crime due to a ten per cent increase in income is likely to be an understatement for the UK. This is because there is some evidence to suggest that the initial probabilities of committing crime are lower in the UK (Soothill *et al*., 2006). A 1.8 percentage point fall would then represent a larger percentage change in crime rates for the UK. Our estimates are thus based on a cautious estimate, which is suitable given some of the uncertainties that are inherent in modelling the relationship between crime and income.

This figure is very similar to the estimation made by Doyle *et al.* (1999) who look at the relationship between wages in the low-skilled labour market and property crime rates at the aggregate level in the US. They find that a ten per cent increase in wages leads to a 5.8 per cent decrease in crime. Gould *et al.* (1998) use country level data and find that a ten per cent increase in low level wages reduces the overall rate of crime by 3.1 per cent. The lower estimate by Gould *et al.* (1998) can be partly explained by the fact that they include impacts of wages on violent crime – for which the link is much less documented.

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65 Grogger describes this as crimes from which the perpetrator may acquire income.

Doyle *et al.* (1999) is an important study in terms of supporting the evidence used in our work. They use panel data taken from 48 US states over 1984-1993. The sample is not restricted to a particular age group or gender and the average sample wage of $22,337 represents the lower segment of the labour market. The variations in wages used in their model are large. There are changes in income of over 100 per cent for some sectors in the sample.

The authors find that young men on average commit more crimes than other age groups (although the income-crime relationship may be similar to other groups)[66]. As detailed below, we control for this by using different average initial crime costs for different demographic groups based on age and gender breakdowns of criminal conviction data.

Doyle *et al.*'s (1999) study provides strong support for our use of Grogger's estimate of income on crime. We can be reasonably confident that the income-crime relationship does not differ greatly across different demographic groups in low wage sectors and that the relationship holds for relatively large changes in income as seen in some of our employment programmes.

These figures can be related to the cost of property crime in the UK, for which we have figures from the Home Office. In *The Economic and Social Costs of Crime*[67] the Home Office states that in 1999/2000 the annual cost of property crime was £15.5 billion[68]. Uprating this by inflation for 2009[69], one obtains a figure of £17.8 billion. To apply this figure here, we estimate the proportion of this cost that can be attributed to people out of work/on benefits.

The Home Office Statistical Bulletin on arrestee rates (2006) estimates that 51 per cent of crime is committed by unemployed and economically inactive[70] people of working age. There is little evidence on the profiles of unemployed persons who commit crime in the UK[71]. To proxy for this we use a Home Office report (2006) that states that 86 per cent of arrestees in 2004 were men[72]. We attribute 86 per cent of total property crime costs to males.

66 The same conclusion is reached by Fields (1999).

67 Brand and Price (2000).

68 This includes: Burglary in a dwelling and not in a dwelling; vehicle and non-vehicle theft; theft from a shop and robbery of commercial premises. (Please see Brand and Price, 2000) for a full description.) This approximates well the definitions of property crime by Grogger (1997) and Doyle *et al.* (1999). Approximately 19 per cent of this figure is made up by fiscal costs. We have been informed by the Home Office that this figure requires updating due to uncertainties regarding the commercial crime cost estimate. However, the Home Office does not currently have any more recent figures for the cost of property crime. If and when they become available the cost figures in this paper will be updated.

69 This paper was written in 2009, and thus the figures are uprated to 2009 prices.

70 This includes both property and violent crime. This figure is not broken down for benefit claimants only. This figure comes from 2004 data and is similar to that found in Dickinson (1980), who estimates that 56 per cent of total property crime in the UK in 1980 was committed by unemployed people. We assume that the types of crime committed are the same across employed and unemployed and thus, we can evenly proportion the total costs according the percentage of crime committed by the groups.

71 Previous internal DWP paper.

72 This figure includes both property and non-acquisitive crime. We do not have a breakdown for crime type.

In 2004 there were approximately 4.5 million people on working age benefits. Using NOMIS figures we divide this figure between men and women. In 2003/04 around 52 per cent of claimants were men (of this figure 13 per cent were aged 17-24 and 39 per cent were aged 25+) and 48 per cent were women (of this figure nine per cent were aged 17-24 and 39 per cent were aged 25+). For both genders approximately 40 per cent of crime is committed by 17-24 year olds, 30 per cent by people aged 25-34 and 30 per cent by people aged 35 or over[73]. We use these figures to derive the following estimates for our analysis[74].

Table 4.1 Costs of property crime

Annual cost of property crime[1]	£17.8 billion
Proportion of property crime committed by unemployed/inactive	51%
Cost of property crime applicable to unemployed	£9.1 billion
Cost of property crime applicable to unemployed men[2]	£7.8 billion
Cost of property crime applicable to unemployed women	£1.3 billion
Cost of property crime applicable to unemployed men aged 17-24	£3.1 billion
Cost of property crime applicable to unemployed men aged 25+	£4.7 billion
Cost of property crime applicable to unemployed women aged 17-24	£0.5 billion
Cost of property crime applicable to unemployed women aged 25+	£0.8 billion
Number of men aged 17-24 on working age benefits	0.6 million
Number of men aged 25+ on working age benefits	1.8 million
Number of women aged 17-24 on working age benefits	0.4 million
Number of women aged 25+ on working age benefits	1.8 million
Cost of crime per male employment programme participant aged 17-24	£5,170
Cost of crime per male employment programme participant aged 25+	£2,610
Cost of crime per female employment programme participant aged 17-24	£1,250
Cost of crime per female employment programme participant aged 25+	£444

1 Uprated by the Retail Price Index.

2 This figure is derived by assuming that 86 per cent of £9.1 billion property crime costs are attributable to men. This cost figure for property crime includes estimates for the costs of commercial crime. The Home Office has informed us that commercial crime costs are less reliable and are excluded in their current crime cost estimates. The evidence we use from Grogger (1997) applies to all types of property crime and thus we do not discard commercial property crime here.

To derive estimates for the impacts on the cost of crime from these figures we make the following assumptions:

- We have uprated the Home Office crime costs from 2000 by adjusting for inflation to provide an estimate for 2009.
- We assume the behavioural relationship between the propensity to commit property crime and income is the same for men and women. However, we assume that the initial likelihood of committing a crime differs between genders. Consequently, employment programmes will have a bigger beneficial impact for young men due to the fact that they are more likely to commit crime.

73 Ideally we would like to break down programme participants by these three age ranges to demonstrate the large proportion of crimes committed by the 17-24 age group. However, we do not have these figures and so will use a 17-24 and 25+ breakdown.

74 For the purposes of this analysis we assume that an increase in the propensity to commit crime of 1.8 per cent would translate into a proportionate increase in the cost of crime.

- Figures used to derive estimates for unemployed people committing crime were taken from 2004. We are, therefore, assuming that these figures are applicable now.

Recommendations for applying crime impacts in CBA

1. Estimate the **percentage increase in income** achieved by programme participants who find work. This is the amount of income gained from moving off benefits and into work as a proportion of initial benefit receipts. This can be found in the Progress Check workbooks.
2. Multiply this by 0.6. This will provide an estimate for the percentage decrease in the probability of committing a crime by the individual who finds work.
3. For men aged 17-24, multiply this percentage decrease by the cost of property crime per 17-24 year old male claimant, £5,170. For men aged 25+, multiply this percentage decrease by the cost of property crime per male claimant aged 25+, £2,610. This is an estimate of the reduction in crime-related costs we would expect from getting an individual male into work dependent on his age.
4. Multiply this individual cost saving by the number of additional jobs that accrue to men in the two age groups (this is the proportion of men in the two age groups on the programme x additional job numbers).
5. The same procedure should then be carried out for women.
6. To find the overall annual crime cost savings for the programme, add figures from points 4 and 5.
7. This estimate should be included as a benefit to society in the core CBA but the analysis should be supplemented by a description of the caveats.

4.2.4 Caveats and issues

There are a large number of assumptions that have been made to provide an estimate of the impact of employment on crime.

Due to a lack of studies on the UK which can provide evidence of the direct link between wage levels and crime rates, the most suitable study has been taken from the US. Although the justice system is different in the US implying that the expected rewards from crime are likely to differ from the UK, these factors have been controlled for in Grogger's analysis. The estimate for the impacts of wage on crime is, therefore, purely an estimate of the incentive effects of increased legal income on the propensity to commit crime. We focus on a similar socio-economic group as Grogger does, and we have seen no evidence to suggest that incentive effects would be different across countries. Doyle *et al.'s* (1999) study provides strong support for Grogger's estimates.

The relationship between income and the propensity to commit a crime estimated by Grogger applies to young males. This is a crime-prolific group of the population. As we estimate the impacts of employment on crime for people outside this group, our crime reduction estimates could be overstated. However, the evidence from Doyle *et al.* (1999) demonstrates a similar behavioural relationship in a sample that is not restricted for gender or age.

Doyle *et al.* (1999) find that young men, on average, commit more crimes than other age groups (although the income-crime relationship may be similar to other groups). We control for this by using different average initial crime costs for different demographic groups based on age and gender breakdowns of criminal conviction data.

We have only evaluated property crime. We should note that because of this omission, our crime cost reduction estimate may be understated.

We include cost estimates for commercial crime that may be less reliable than cost estimates for other types of property crime.

Crime rates in the UK and USA peaked in the mid-1990s and have been falling since. This would suggest that structurally the determinants of crime pre- and post- the mid-1990s could have changed. This may have implications for our estimated relationship between income and crime given that the data used in the studies come mainly from before the peak. However, we do not know of any recent studies that would shed light on the implications of this change in crime rates to inform our analysis.

Grogger has made a number of simplifying assumptions in his model. The main ones being that individuals experience no greater disutility from an hour of crime than from an hour of work and that he has controlled for the expected rewards to crime.

In this paper we have been concerned with the effects of employment on the probability of an individual of committing property crime. We do not estimate the impacts on the volume of crime committed per person. The results from the Grogger (1997) study suggest that a proportion of people in employment will still commit crime. But employment could reduce the volume of crime they commit, but we do not pick this up due to a lack of empirical evidence. It implies that our crime reduction estimates are likely to be understated.

The calculations and estimates made here may not effectively represent the impact of certain employment programmes. In particular this will include programmes targeted at ex-offenders, and drug users. Oxford Economics (2004) assumes that getting an ex-offender into work reduces their crime rates by 33 to 50 per cent. This is a significantly larger figure than our estimate for non-ex-offenders and due to uncertainties of the source for the figure we do not employ it here.

4.2.5 Example

In this example we look at initial estimates for the Young Person's Guarantee (YPG) programme. We estimate that participants on this programme benefit from an increase in their income of 30 per cent as they move into work. Using the methodology highlighted in the box, the average crime cost saving for males and females due to this programme is £580.

We have found three studies which estimate the impact of an employment programme on crime costs, which we can use to compare. McConnell and Glazerman (2001) and Long *et al.* (1981) both estimate the reduction in crime costs due to employment programmes targeted at young people in the US (the Jobs Corp programme). Their respective estimates are $1,200 and $2,000 per participant per year. These estimates are not differentiated between genders. Given an exchange rate of between £1=$1.5-$2, this is strikingly similar to our estimate for the YPG which is a comparable programme. Oxford Economics derives a much larger estimate but their estimate is for the impacts of getting ex-offenders into work.

4.2.6 Summary

We propose that evaluations of the impact of employment on crime be based on an incentive-based approach, in which higher income reduces the propensity to commit crime. Studies to date have consistently shown a strong negative relationship between income and crime rates. There is no conclusive evidence that unemployment is independently linked to crime rates once other factors have been controlled for.

4.3 Multiplier effects in Cost-Benefit Analysis

4.3.1 Theoretical background

The impacts of Government policies such as employment programmes can spread to other sectors of the economy. These indirect impacts are known as multiplier effects and there are two forms of multipliers that are relevant to employment programmes.

The **economic multiplier** is the impact that expenditures made by newly employed programme participants have on the rest of the economy. These expenditures are received as revenue by firms and this may raise employment and incomes in other sectors of the economy and so on in a chain reaction.

The second multiplier is termed the **Keynesian multiplier** by economists. The knock-on effects are identical to those described for the economic multiplier. The difference lies in the source of the original increase in expenditure. The Keynesian multiplier is the impact that accrues from operating the employment programmes. In other words, it is the multiplier effect that comes from employees of the DWP and Jobcentre Plus and private contractors spending the income they receive for operating the programmes. This is an additional impact to the economic multiplier.

Wages received by participants who find work will understate the true impact on the economy if these multiplier effects exist.

4.3.2 How does this apply to employment programmes?

It is possible to make arguments for including both multiplier effects in the evaluation of DWP employment programmes. A significant proportion of programme participants find work because of the programme and the DWP employs a large number of people who work directly on designing and operating employment programmes.

The HM Treasury Green Book (Annex, p.54) refers to guidance from the English Partnerships and the Regional Development Agencies regarding the magnitude of the multiplier. The English Partnerships *Additionality Guide* (2008, p.24) provides a set of ready-reckoner values for multiplier effects. Their estimates are derived from a number of evaluation reports concerning linkages in property-related industries. The multiplier is estimated to lie between 1.3 to 1.7 at the regional level, depending on what assumptions are made about the strength of linkages in the economy. This implies that to account for multiplier effects we should multiply earnings of programme participants who find jobs by a factor of 1.3 to 1.7.

This would have a substantial positive impact on the benefit-cost ratios of all employment programmes. Given the size and policy implications of the suggested multiplier range we examine the potential issues and problems concerning the estimates.

4.3.3 Caveats and issues

The *Additionality Guide* does not provide clear reference regarding how the multiplier estimates are derived but we believe there are strong arguments to suggest that the 1.3 to 1.7 range is likely to be overstated and thus inappropriate for our purposes.

Firstly, the English Partnerships guidance does not clarify the extent to which these multiplier effects reflect additional impacts. It can be reasonably argued that any such multiplier effect could also be achieved by alternative uses of programme/project resources[75]. The English Partnerships multiplier

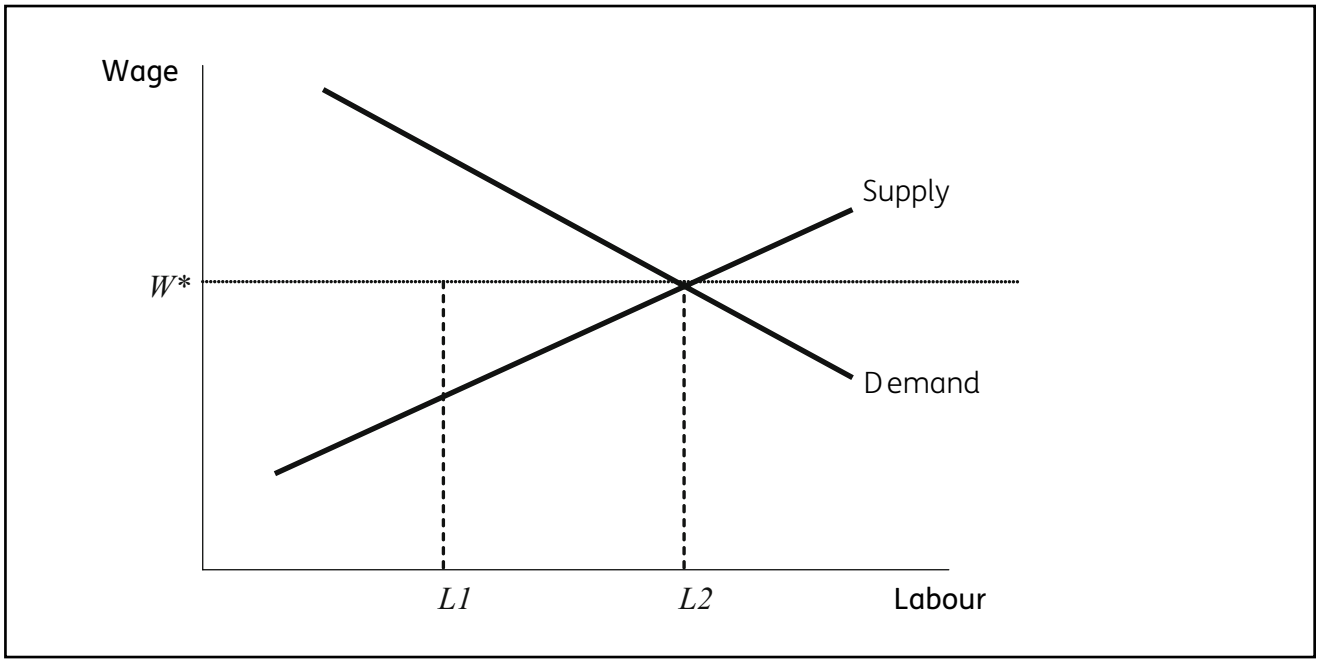
[75] Department of Finance and Administration, Australia (2006). *Handbook of Cost Benefit Analysis*. P.43.

estimates include the economic and Keynesian multiplier effects. Given that all Government policy and expenditure will have a Keynesian multiplier effect at the very least, we can ignore these multiplier effects.

The second argument relates to the fact that economic multiplier effects occur in **secondary markets** and that under standard neo-classical assumptions, we can assume away these effects in secondary markets. This is because effects that occur in secondary markets do not engender net benefits of applicable magnitude unless these markets are distorted and policy impacts are large.

To clarify this point we look at the theoretical impact of employment programmes. For the purposes of CBA, the **primary market** is the labour market. We can assume that the Government intervenes in the labour market because there is a market failure, for example, an information asymmetry. As depicted in Figure 4.2 the labour market is, therefore, out of equilibrium and the level of employment is below the equilibrium level at *L1*. Here there are *L2* - *L1* people who would work if they could find a job given the going wage (*W**). For these people the marginal benefits of working are greater than the marginal costs and thus the increase in labour supply to *L2* (due to the programme) will create a gain in surplus for those who find work – equivalent to the area under the market wage line and above the labour supply curve. There is, therefore, a gain/benefit in the primary market and we pick this up through the increases in wages.

Figure 4.2 Structure of the labour market



The additional people in work (*L2* - *L1*), will spend a proportion of their newly acquired income on products and services[76]. This will be felt in secondary markets. There are two scenarios that we examine.

[76] This analysis could be applied to demand-side employment programmes. This has not been included here as the impacts will be the same as in the supply-side model. Demand-side programmes, such as subsidies, will increase labour demand and given a labour supply schedule will increase employment in a similar manner to the *L1* to *L2* impact depicted in the diagram.

First, if there are no distortions in the secondary market (i.e., it is perfectly competitive), then all additional surplus (benefits to society in CBA terms) is accounted for in the primary market (the labour market). As the secondary market is perfect, firms respond instantly and price stays equal to marginal cost[77]. Therefore, there is no producer surplus gain that needs to be accounted for. Any money spent by programme participants is in effect just a transfer to other areas of the economy.

Second, a more realistic view would be that secondary markets may not be perfect. One reason for a distortion is if monopoly power exists in secondary markets. Here there will be producer surplus gains due to the increase in effective demand, which would not be accounted for in surplus gains in the labour market. Another possible distortion in secondary markets might occur if there exist large amounts of unused resources due to, say, a recession. In this case, an increase in spending could result in surplus gains in the secondary market.

However, there may instead be some negative impacts on surplus in the secondary market. For example, this would be the case if the goods purchased by newly employed programme participants result in a negative externality[78]. By definition a negative externality implies that marginal social costs are greater than marginal private costs. Here an increase in demand in a secondary market incurs a social surplus loss. Also, a percentage of spending in secondary markets will be on imports, which we should not be included in a domestic-level CBA.

Overall, in some distorted markets, there could be surplus gains, whereas in others there could be surplus losses but this is hard to ascertain without accurate information on the spending patterns of programme participants.

In principle effects that occur in distorted secondary markets should be valued separately and included in CBA. However, in practice it is very difficult to do so. We are rarely confident of predictions of demand shifts in secondary markets and whether demand shifts are for goods that result in positive or negative surplus changes. In addition, impacts on demand in secondary markets may be small for our employment programmes. This is because the increase in effective demand from employment programmes may be low because: i) most people move into low wage employment and ii) additional job outcomes are small relative to the size of the working population[79].

The current major source of evidence on multiplier effects, which comes from English Partnerships, is likely to overstate the size of these effects. In addition, their estimate is confined to property-related industries and is thus not generalisable. At a minimum, the English Partnerships estimate requires further clarification. We have shown that there are also strong theoretical arguments for ignoring multiplier effects. Boardman *et al.* (2001) advise against including multiplier effects in CBAs on this basis and the Canadian and Australian Treasuries[80] implicitly disregard economic multiplier effects for these reasons.

We, therefore, recommend excluding multiplier effects from CBA.

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77 We assume that in perfect competition all firms are the same and have the same cost curves. This argument also applies to normal profits – the minimum level of profit required to keep the industry running in the long run. If average costs are covered then **normal profits** are being made. In perfect competition average costs = marginal costs = price received and so there are no surplus gains in any sense.

78 An example of this is tobacco or a product that produces pollution.

79 See Boardman *et al.* (2001) and Harberger (1971) for a detailed discussion.

80 *Canadian Cost-Benefit Analysis Guide* (2007), Treasury Board of Canada; *Handook of Cost-Benefit Analysis* (2006) Australian government publication.

4.3.4 Recommendations

Given the problems highlighted above, we advise against including multiplier effects in the CBA framework. However, the reasons for this should be explained.

Recommendations for applying multiplier effects in CBA

1. CBA results should be supplemented with the caveat that under certain assumptions there can be further benefits from employment programmes in secondary markets that have not been measured.
2. It should be stated that multiplier effects are ignored because we assume there are no additional Keynesian multiplier effects. And in terms of the economic multiplier, we cannot be sure of the impact employment programmes have on secondary markets.

4.4 Product market corrector in Cost-Benefit Analysis

4.4.1 Theoretical background

The value of what workers produce (their marginal product) can be greater than the value of the wage they receive. The Policy Studies Institute (PSI) (2007) states that this would be true if monopoly power existed in the economy. Here workers would generate monopoly rents and surplus that accrue to the owners of the firms because the value of their marginal product exceeds their wage rate. If this were the case, estimates of programme impacts which rely on solely on earnings outcomes will **understate** the overall economic benefits from participants who move into work[81].

CBA should capture the full productive value of movements into work and to do so a product market corrector (PMC) can be used. This is a factor by which a participant's wage (when they find work) can be multiplied to account for the additional surplus they provide to society.

There is no guidance regarding the PMC in the Green Book, but the DWP Cost Benefit Framework (2006) provides an initial estimation of the PMC.

The DWP estimated the PMC by taking the reciprocal of labour's share of UK factor income (which is about 0.8). This produced a PMC of 1.26 which can then be applied to programme participant earnings. This implies that for each pound of earnings in the economy, a total of 26 pence is returned to other factors of production (i.e., entrepreneurship, land and capital). There are, however, strong arguments to suggest that this figure is inappropriate for use as a PMC.

4.4.2 Caveats and issues

A proportion of the productive value of labour over and above the wage is received by foreign owners of UK firms. While returns to factors of production that accrue to UK citizens should be counted as benefits from employment programmes, those that are received by non-citizens typically are not counted in CBAs of social programmes (PSI, 2007). The DWP PMC estimate is not adjusted downwards for this.

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81 Greenberg and Knight (2007b). It should be noted that any non-supernormal profits made by firms should not be included in CBA. The impacts of these profits on the economy are accounted for in the wage outcomes for individuals and thus would lead to double-counting.

More importantly, the reciprocal of labour's share of factor income does not appropriately correct for monopoly power in the economy. The 1.26 figure mentioned in Section 4.4.1 corrects for returns to all factors of production. There is no reason to think that all, or even most, of these returns result from monopoly rents (PSI, 2007) and thus, we feel that this further biases the PMC estimate upwards.

In addition, it is possible that due to information asymmetries and trade union power some participants may end up being paid more than their marginal product. An employer with poor information about a new worker's productivity may overestimate the value of their output, but there is little evidence on this issue to form a consensus. Layard (2006)[82] finds that strong trade union pressure can force local pay levels into line with pay in other parts of the country where productivity is higher.

A more appropriate corrector would be the share of national income that consists of monopoly rents, and even this figure should be multiplied by the proportion of monopoly rents that are received by UK citizens (PSI, 2007)[83]. The PSI's review of the CBA literature did not find any studies that provided an estimate of this value.

In light of these issues and the fact that the PSI Review (2007) concludes that the current PMC estimate is inappropriate for CBA purposes, we recommend that it be excluded from CBA.

However, it should be noted that since there is likely to be some monopoly power in the economy, wages are likely to be an understatement of the impacts of our employment programmes on the economy but that we require further evidence to derive a robust estimate.

4.4.3 Recommendations

Recommendations for applying PMC in CBA

1. We recommend that the PMC be excluded from CBA.
2. It should be explained that this may lead to an understatement of the economic impacts of an employment programme using the arguments presented in this paper.

82 Layard (2006).

83 Other non-wage payments made by employers such as pension contributions can also reflect the value to the firm of the product of labour. Estimating the value of these non-wage benefits would provide an alternative measure of the economic impact of an individual's employment.

5 Weighting monetary outcomes

5.1 Welfare weights in Cost-Benefit Analysis

5.1.1 Theoretical background

In a Social Cost-Benefit Analysis (CBA) framework we must be aware of how the costs and benefits of a policy are distributed across different groups in society in order to understand the full welfare impacts of the policy. Given the generic social welfare function (SWF) introduced in Chapter 1:

$$W = f\,[U_1(y_1),\, U_2(y_2)] \tag{1}$$

where W = social welfare; U_i = welfare or utility of group i and y_i = income of group i. Group 1 is the programme participants and Group 2 is the taxpayers and others in society. In general the benefits of employment programmes accrue to Group 1 whilst the costs are borne by Group 2.

The full welfare impacts of a policy intervention (assuming a Utilitarian SWF) can be described by:

$$\Delta W = U_1(\Delta y_1) + U_2(\Delta y_2) \tag{2}$$

Since we are interested in changes in welfare in society the monetary estimates of the impacts of employment programmes (as set out in the previous papers), where possible, have been estimated as willingness to pay (WTP) measures (where WTP is negative for costs).

WTP is a monetary representation of the amount of welfare gained or lost through the consumption of a good or service. It is the amount individuals would pay for a good or service. To derive the **actual** welfare change (or the value of consuming the good/service) we need to understand the **value of money** to people, i.e., the form of the utility function $U_i(y_i)$. This is clear if we redefine the mathematical representation of the welfare impact of a policy intervention. Using (1), (2) can be rewritten as:

$$\Delta W = \sum_i \left(\frac{\partial W}{\partial u_i} \cdot \frac{\partial u_i}{\partial y_i} \right) \tag{3}$$

Since we assume a Utilitarian SWF and therefore, (3) is reduced to:

$$\Delta W = \sum_i \left(\frac{\partial u_i}{\partial y_i} \right) \tag{4}$$

(4) simply states that a policy's overall impact on social welfare is the sum of the welfare changes experienced by each group in society due to the monetary changes that result from the policy.

Government policies and programmes typically affect individuals differently and employment programmes are no exception. Typically, the main benefactors are the unemployed programme participants and the costs are borne by in-work taxpayers. These two groups have different income levels and due to diminishing marginal utility of income this implies that the monetary impacts of employment programmes will be felt very differently across different groups. The value individuals put on each additional pound they receive or lose is higher for people with low incomes relative to people with higher incomes.

5.1.2 Methodology

To understand the overall social welfare impact of a policy intervention for the purposes of CBA, we need to get a handle on the individual utility function $U_i(y_i)$. To estimate the social welfare impact as set out in (4) it is not necessary to assume cardinality in the utility function (i.e., the exact welfare value of money) as we can derive a relative measure of the overall welfare impact by using a **welfare weight**[84] – based on the valuation of the marginal pound to lower income groups relative to higher income groups.

This is the approach suggested by the HM Treasury Green Book (2003). In the derivation of a distributional weight the Green Book assumes the standard isoelastic utility function:

$$U = \begin{cases} \dfrac{y^{1-\eta}-1}{1-\eta}; & \eta \neq 1 \\ \log y; & \eta = 1 \end{cases} \tag{5}$$

and sets the elasticity of the marginal utility of income $(\eta) = 1$.

A welfare weight for group i relative to group j is derived by comparing the relative changes in welfare for a marginal change in income:

$$WW_{i,j} = \frac{\dfrac{\partial W}{\partial u_i}\cdot\dfrac{\partial u_i}{\partial y_i}}{\dfrac{\partial W}{\partial u_j}\cdot\dfrac{\partial u_j}{\partial y_j}} \tag{6}$$

And under the Utilitarian assumption the weight becomes:

$$WW_{i,j} = \frac{\dfrac{\partial u_i}{\partial y_i}}{\dfrac{\partial u_j}{\partial y_j}} \tag{7}$$

[84] We follow Cowell's (1999) terminology here. **Welfare weights** are also often termed **distributional weights**. Our preference for the term **welfare weight** will become clear later in this paper.

Green Book methodology for estimating welfare/distributional weights

- Weights are derived by assuming a utility function of the form: $U = \log y$ (note: the Green Book actually uses consumption instead of income in the utility function but we can assume these are interchangeable)
- This implies that the marginal utility of income $\partial U_i / \partial y_i = 1 / y_i$ and the welfare weight is:

$$WW_{i,j} = \frac{\frac{1}{y_i}}{\frac{1}{\partial y_j}}$$

- Marginal utilities for a particular quintile in the income distribution are derived by dividing 1 by the median level of income in each quintile. And weights are then derived by expressing the marginal utility of each quintile as a percentage of the marginal utility for the median earner as set out in (7).
- This produces the Green Book's illustrative weighting figure of two to one for lower income groups (the marginal utility of the bottom quintile as a percentage of the average).

However, there is an issue with this methodology which need to be addressed in order to apply welfare weights with confidence in the CBA framework. This relates to the fact that methodology in the Green Book uses a utility function that does not reflect findings in the current literature concerning the marginal utility of income.

The Green Book states that despite the uncertainty surrounding estimating weights *'it is important that appraisers, where deemed appropriate, attempt to adjust explicitly for distributional implications. The assumptions underpinning the chosen distributional weights should be fully explained'*.

The importance of including weights is well understood in other Organisation for Economic Cooperation and Development (OECD) countries too. New Zealand and Australia have detailed CBA manuals that recommend that, at the least, distributional effects be discussed clearly and preferably be quantified.

This paper produces a framework for the Department of Work and Pensions (DWP) to estimate welfare weights in order to derive a complete assessment of the social welfare impact of employment programmes for the purposes of CBA.

5.1.3 Recommendations

The form of the utility function used in the Green Book was derived from work by Cowell and Gardiner (1999), Blundell *et al.* (1994) and Peace and Ulph (1995. The function assumes the elasticity of marginal utility to be equal to 1. Studies using more recent datasets and a number of different assumptions consistently produce different estimates for the elasticity of marginal utility.

Our reading of the literature – that uses survey techniques, indirect behavioural evidence, revealed social values and subjective wellbeing studies – indicates that a value of greater than one for the elasticity of marginal utility is defensible. David Evans, Frank Cowell and Karen Gardiner have been prominent in surveying the results in the literature. We find from their analyses that there is little consistency in the results obtained from experimental survey evidence given the large variation in experimental design (e.g., Amiel *et al*., 1999; Barsky *et al*., 1995). In addition, we are not confident

that these survey techniques adequately estimate the elasticity of marginal utility, but rather that they measure individual inequality aversion[85] and thus would dismiss their findings.

Our preferred evidence is from studies that directly measure the elasticity of marginal utility. An estimate for the elasticity of marginal utility can be elicited from consumer demand analysis (Blundell *et al*., 1994; Evans and Sezer, 2002), revealed social values embodied in the taxation system (Cowell and Gardiner, 1999; Evans and Sezer, 2004; Evans, 2005) and subjective wellbeing studies of the relationship between utility and income (Layard *et al*., 2008). These studies consistently find the elasticity of marginal utility to be greater than one for the UK and that this is comparable to international evidence[86]. The tables in Appendix E provide a synopsis of the main evidence on the elasticity of marginal utility from these studies.

Layard *et al.* (2008) estimate a utility function which directly correlates individual utility to income using results from a large number of surveys from over 50 countries and time periods. This is the latest research we have found and we feel that the methodology provides the most direct measure of the elasticity of marginal utility in that it does not rely on stringent assumptions of preference-independent goods (in the consumer demand approach)[87] and the principle of absolute equal sacrifice of satisfaction (in the taxation analysis approach)[88]. Layard *et al.* (2008) suggest that the relationship between reported happiness and income from the surveys is more concave than that implied by the log function used in the Green Book (i.e., $\eta > 1$). This implies that the utility function in (5) takes the following form:

$$U = \frac{y^{1-\eta} - 1}{1 - \eta} \tag{8}$$

and the marginal utility of income is:

$$\frac{\partial u}{\partial y_i} = \frac{1}{y_i{}^{\eta}} \tag{9}$$

85 Individual inequality aversion relates to an individual's preferences regarding the distribution of income in society. The term is unrelated to the marginal utility of income. For a detailed discussion see, for example, Carlsson *et al.* (2005).

86 For international evidence see Layard *et al.* (2008).

87 Preference independence refers to Arrow's (1963) assumption of independence from irrelevant alternatives (IIA) in choice theory – that the choices between two goods is not affected by the quantity or value of a third good. In the absence of preference independence, 'η *has no meaning: for each monotonic transformation of the underlying preference function, a different value of e would emerge*'. There seem to be very few goods that fit this assumption and thus estimating η from consumption behaviour can be problematic (Evans, 2005).

88 The principle of absolute equal sacrifice of satisfaction is the assumption that the progressivity of income tax systems are a pure indication of the elasticity of marginal utility. However, as Evans (2005) states from a government's viewpoint, the rationale for taxing income is often completely different from 'thoughts' concerning the optimum structure of income tax rates.

If $\eta > 1$, then this implies that marginal utility falls at a faster rate with respect to income than assumed by the Green Book. The value of η is crucial for policy analysis and understanding the impacts of changes on the welfare of different income groups.

Layard *et al.* (2008) estimate η through measurements of subjective wellbeing taken from six major surveys conducted in the UK (British Household Planning Survey) and other OECD countries. The measure of subjective wellbeing the authors use has been shown to be a robust proxy for utility[89] and the surveys are regularly used in academic work on the impact of income on happiness. They control for other variables affecting utility, including hours of work.

The authors find striking uniformity in the estimates of η obtained from the different surveys. The overall average estimate of 1.26 falls within the 95 per cent confidence intervals of each of the individual country surveys. For the UK, they estimate η to be 1.3 with a 95 per cent confidence interval of 0.97 to 1.62. This implies the following marginal utility of income:

$$\frac{\partial U}{\partial y} = \frac{1}{y^{1.3}} \tag{10}$$

Layard *et al.* (2008) suggest that CBA practioners use this estimate for calculating welfare weights.

The current literature consistently provides strong support for the utility function estimated by Layard *et al.* (2008). Although we have discussed some of the problems associated with other approaches it is useful to know that Layard *et al.*'s estimate is comparable to the average estimate of the elasticity of marginal utility derived from the consumer demand approach (Blundell *et al.,* 1994; Evans and Sezer, 2002) and the taxation approach (Cowell and Gardiner, 1999; Evans and Sezer, 2004; Evans, 2005). These studies provide an average estimate for the elasticity of marginal utility of $\eta = 1.29$. The authors of these studies believe that that the Treasury assumption of unit elasticity ($\eta = 1$) should be revised upwards.

We propose to set the elasticity of marginal utility at 1.3. We estimate the weights for programme participants vis-à-vis taxpayers using equation (7) and the methodology suggested in the Green Book (2003).

The distributional weights estimated in the Green Book relate the marginal utility of each income quintile to the average (i.e., median) level of income. Therefore, following Green Book guidelines the welfare weight will be an expression of the marginal utility of income for the programme participants that find jobs as a percentage of the marginal utility of the average taxpayer using equation:

$$WW_{p,t} = \frac{1/y_p^{1.3}}{1/y_t^{1.3}}$$

89 There is strong evidence to support the notion that subjective measures of wellbeing represent actual levels and changes in welfare. Respondents who report being satisfied with their lives are also rated as satisfied by family, friends and experts. SWB scores correlate well with objective measures of wellbeing such as smiling, probability of committing suicide and changes in brain activity (Dolan and Peasgood, 2006; Frey *et al.*, 2004). SWB is fairly stable and sensitive to changing life circumstances (Frey and Stutzer, 2002).

$$\Rightarrow \quad \left(\frac{y_t}{y_p} \right)^{1.3} \tag{11}$$

where y_p is the average income of the participant that finds work and y_t is the average income of the taxpayer. To measure the full welfare impact of a policy intervention as set out in (2) using the weight in (11) we get[90]:

$$\Delta W = \left(\frac{y_t}{y_p} \right)^{1.3} \cdot (\Delta y_p) + \Delta y_i \tag{12}$$

The studies cited above use both individual and aggregated household of income measures. Layard *et al.* (2008) use household income. We use aggregated income variables to reflect this. We use net (net of tax but inclusive of benefit payments) household income of the bottom quintile and average household income to proxy for y_p and y_t respectively. We do not use estimates for actual income of programme participants who find work. This is because benefit income levels are not an accurate measure of real disposable income, but rather a reflection of the costs borne by the programme participant. Also, as the programme participant moves into work each extra pound they earn will have a different marginal impact given equation (10). This is a difficult issue to deal with and could be solved by using a mid-point between on-benefit and in-work incomes. We take the median income of the bottom quintile group. This is the income bracket in which most programme participants and those who get jobs find themselves. As this income quintile includes the incomes of those on benefits and in work, we are essentially using a mid-point estimate of on-benefit and in-work incomes.

It is clear that the welfare weight estimated in (11) does not incorporate any social preferences or beliefs regarding income distribution as the weight is derived purely on the basis of the marginal utility of income. It is possible to jump from a value of the marginal utility of income to a social preference for income distribution by motivating a situation in which individuals are asked to choose between hypothetical societies with different income distributions under a Rawlsian 'veil of ignorance'. In this situation, individuals know the expected average income and the distribution of income in each society but do not know where they will be placed in that income distribution. Individuals with a higher elasticity of marginal utility will subsequently be more risk averse and would, therefore, be willing to trade off more in terms of expected income in order to achieve a more equal income distribution when designing a social contract. In this sense the elasticity of marginal utility has been seen as a measure of social inequality aversion by some commentators (Carlsson *et al.*, 2005).

However, it should be noted that such a preference is merely a preference for a social contract for a hypothetical society and this does not say anything about how people feel about the current distribution of income. In this sense calculating the weight as set out in (11) does not embody any normative judgements; it is purely an exercise in positive economics. For this reason we prefer the term 'welfare weight' to 'distributional weight'.

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90 It should be noted that the form of the SWF in (12) does not imply that we have moved away from the assumption of the Utilitarian SWF. (12) states that social welfare is concave with respect to income but this does not change the assumption that social welfare is still linear with respect to utilities and is thus Utilitarian.

5.1.4 Estimation

Latest figures from the Office for National Statistics (ONS)[91] show that household income in the bottom quintile in 2008 is £14,297. Median household income is £28,854.

Using equation (11), this gives an estimate for the welfare weight of 2.5 $(28{,}854/14{,}297)^{1.3}$. We compare this figure to the range of illustrative weights set out in the Green Book.

5.1.5 Example of welfare weights

Table 5.1 Welfare weights

	Weight
Our methodology	2.5
Green Book methodology	1.9 – 2

Note: The weight for the bottom quintile from the Green Book has been used in this comparison.

The differences in weightings come from the fact that we use a larger estimate for η in line with current research and evidence. The rate at which marginal utility falls with respect to income is faster the greater the value of η. This implies that the value of the marginal pound for low income groups vis-à-vis higher income groups will be greater the higher the value of η we employ. For this reason our welfare weights are larger than the Green Book example.

Recommendation for applying welfare weights

1. For each programme the value for **net economic benefit per individual** should be multiplied by a weight of 2.5. This will adjust for any extra benefit to participant surplus that is ignored in the current CBA framework. Equation (4) normalises the marginal utilities with respect to the average taxpayer and thus, there is no need to uprate net benefits to other individuals.
2. The analysis should be supplemented by discussion of the caveats as set out in this paper.

5.1.6 Caveats and issues

We have assumed here, as Greenberg and Knight (2007b) recommend, that as programme participants[92] have similar levels of income (i.e., relatively low), we can ignore distributional effects among programme participants and use the same welfare weight for all programmes.

Unemployed programme participants still pay taxes and thus will in part fund employment programmes themselves. This has not been taken into account here due to the complications it would raise for estimating welfare weights.

The survey results from Layard *et al.* (2008) were confined to people aged 30-55 for whom income tends to be well correlated with permanent income.

Layard *et al.* (2008) believe that the robustness of their analysis implies that the values they have estimated for marginal utility '*can be used to inform welfare weights in Cost-Benefit Analysis*'.

91 Office for National Statistics (2008b).

92 We acknowledge that there is some variation in income across programmes participants. Different weights could be estimated for different income groups. However, we assume that the initial differences are due to differences in living costs for these groups and thus assume that the marginal utility of income is equal across all programme participants.

5.1.7 Summary

Applying a welfare weight to all costs and benefits provides an estimate of the overall social welfare impact of a policy which is the correct measure for CBA. Recent work using a number of methodologies seems to suggest there is some consensus on the functional form of the utility function that is used to derive the weights.

This paper provides a framework to account for welfare impacts across different groups by developing a methodology for calculating the welfare weights based on recent empirical evidence.

Appendix A
Measuring non-employment off-flows in Cost-Benefit Analysis

Introduction

In employment programmes there may be a proportion of participants that flow off benefits but not into work. Additional non-employment off-flows offer the same benefits to the Exchequer as employment off-flows in terms of a reduction in welfare payments, but they can also involve additional individual, Exchequer and social costs which alter their effect on society.

We approach this issue by invoking two of the main assumptions that underpin Social Cost-Benefit Analysis (CBA): i) individuals are rational, utility-maximisers; and ii) the impact of a policy change or programme is assessed under the *ceteris paribus* assumption, i.e., whilst holding everything else constant. There are a variety of factors which may cause an increase in non-employment off-flows, such as an increase in a partner's income, but which are unrelated to the policy change under consideration. These effects should be disregarded in CBA.

Under these assumptions, we can conclude that any increase in non-employment off-flows is the result of an increase in the costs (both financial and non-financial) associated with collecting benefits. This could be, for example, due to a strengthening of the mandatory requirements of a programme. Following the introduction of additional requirements, some participants may see benefit payments as insufficient to compensate for their loss of leisure time and choose to drop out of the programme rather than meet these conditions[93].

The costs and benefits of non-employment off-flows

These assumptions and conclusions permit us to deduce the social impact associated with non-employment off-flows. If an employment programme increases the number of non-employment off-flows there will clearly be a reduction in welfare payments which is a benefit to the taxpayer. However, it also follows that there is an individual cost. This can be illustrated with an example. Programme A, the status quo/counterfactual, is compared to Programme B, which is identical to Programme A in all aspects except that it entails stricter mandation criteria and therefore, a greater proportion of non-employment off-flows. In both programmes the individual faces two options, **participate in the programme** or **drop out**. It is important to note that given the ceteris paribus assumption the benefits and costs associated with the option drop-out are identical, regardless of the programme on offer.

If an individual initially chooses to participate in Programme A, this implies (under the rational utility-maximising assumption) that participating in Programme A is better for them than the option **drop out**. If subsequently when entered into Programme B instead they choose to drop out, we can assume that there is a reduction in utility or welfare under Programme B **for those that drop out**. This is because:

93 Manning (2008) develops a formal model describing this effect.

As Programme A $\succ$ drop out[94] and drop out $\succ$ Programme B

it follows from the transitivity axiom (which is assumed in our model of the rational individual) that:

Programme A $\succ$ Programme B.

Programme B can be assumed to be worse than Programme A for any participant exhibiting these choices.

Estimating the extent to which Programme B is worse for individuals than Programme A is problematic – we need to know people's willingness to pay to avoid the drop-out option and stay in Programme A. The loss in benefit income is the only viable measure of willingness to pay, but this is an overestimate. It fails to take into account the costs previously associated with collecting benefit payments. **The proper measure of surplus lost due to a loss in benefits is equal to the value participants place on their benefit income minus the costs associated with receiving benefits.**

There is some evidence that participation in employment programmes generates intangible wellbeing and health benefits[95] but the causality issue has not been properly addressed and thus, this work is insufficiently robust to employ here. We can, therefore, conclude that the value of benefits lost is likely to overstate the surplus loss incurred by individuals who flow off benefits and not into work.

There are also several social costs that are relevant here:

- As income accruing to lower income groups is weighted higher in social CBA (see Chapter 5 on welfare weights), the benefits lost by non-employment off-flows will outweigh the gains to the Exchequer from reduced benefit payments if welfare weights are used.
- Indirect tax receipts will be lower due to the drop in income for those who move off benefits and not into work. This is an additional cost to the Exchequer.
- There may also be an effect on crime rates. As moving off benefits and not into employment has a negative effect on the income of individuals, we would expect crime rates to increase as discussed in Section 4.2.

These social costs should be included in Social CBA. However, our approach already leads to an overestimate of the individual costs of non-employment off-flows and therefore, we refrain from including these additional social costs as they would further bias the cost estimates in the wrong direction[96].

Therefore, the changes in benefit payments associated with non-employment off-flows are accounted for as a simple transfer between welfare recipients and the Exchequer in the Social CBA framework. Our estimate of individual costs will cancel out the Exchequer benefits, leaving no net effect on society.

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94 Programme A is **strictly preferred** to the drop-out option.

95 See, for example, Coutts (2009).

96 For instance, we would normally apply welfare weights to individual costs, but if weights were used in calculating the impact of non-employment off-flows, they would multiply out the initial bias of our estimate creating further overestimation.

Recommendations for applying non-employment off-flows in CBA

1. Estimate the number of non-employment off-flow years resulting from an employment programme and multiply this estimate by the level of annual programme benefit payments.
2. This figure should be included as a fiscal benefit and as an individual cost (with no net impact) in the Social CBA.
3. If necessary, the arguments in this paper should be used to justify this calculation when undertaking CBA.

Caveats and issues

We have not addressed the issue of whether all programme participants (i.e., including those that still stay on the programme) are worse off under a programme with greater mandation costs. This is partly because we do not observe behaviour from which we can deduce welfare changes for this group of people. The costs associated with increased conditionality will vary from person to person and some may not even see increased conditionality as a cost. Instead, they may value it as a commitment device. We, therefore, assume that the welfare of participants who stay in the programme remains constant.

Appendix B Methodology for taking account of childcare costs

The Department for Education (DfE) collects data on the use of formal childcare by family type, presented in Table B.1. Data is for a term-time reference week covering children of all ages. Use of formal childcare for school aged children during school holidays is also provided.

Table B.1 Use of formal childcare, by family type

	Proportion who use formal childcare
Lone parents in work	49% (28% during school holidays)
All couples with children	46% (23% during school holidays)

Data source: *Childcare and Early Years Survey of Parents 2008*, (2009) DCSF.

Table B.2 illustrates the median hours of formal childcare used by age of child. This relates to a term time reference week, and does not account for family type. During school holidays, it is assumed where childcare is needed that the median for both pre-school and school age children is 16.9 hours.

Table B.2 Median hours of formal childcare per week and proportion of children aged under 11, by age of child

Age of child	Median hours of formal childcare[a]	Proportion of children in age group[b]
0-4	16.9 hours	44% (32% excluding 3-4 year olds entitled to free early education)
5-11	3.7 hours	56%

Data sources: [a] *Childcare and Early Years Survey of Parents 2008*, (2009) DCSF. Data for children aged 5-11 is a weighted average of the 5-7 and 8-11 age groups; [b] *Family Resources Survey 2007-08*.

When a parent in employment takes annual leave, it is assumed no childcare is needed. All employees are entitled to a minimum 5.6 weeks annual leave (including eight days of bank holidays), a total of 20 + 8 days a year for someone working five days a week. Parents tend to correlate taking annual leave with school holidays. It is assumed there are 12 weeks of school holidays a year, six of which at least one parent is assumed to not be working, and six weeks where childcare is needed.

Data on childcare costs is taken from DfE data on childcare providers.

Table B.3 Hourly fees for childcare providers

Type of formal childcare provision	Hourly fee
Childminders	£3.60
Full day care providers	£3.50
After school club	£2.60
Holiday club	£2.20

Data source: *Childcare and Early Years Providers Survey 2008*, (2009) DCSF. Data on after school clubs and holiday clubs are taken from the previous edition of the survey.

Pre-school children are assumed to have an hourly childcare fee of £3.60. School aged children are assumed to have an hourly childcare fee of £2.60 during term-time and £2.20 in school holidays.

The total childcare cost for all additional jobs over one year can be expressed as the sum of:

lone parent additional job years x lone parent annual average childcare spend

couples with children additional job years x couples with children annual average childcare spend

Data on additional job years is collected for the Department for Work and Pensions (DWP) employment programmes. Multiplying this figure by the proportion of lone parent clients and client couples with children give the additional job years accruing to each group.

Using data presented above, annual average childcare costs can be calculated for each group:

Lone parents, pre-school age children and school age children:

0.49 x [(0.44 x (16.9 hours x £3.60)) x 46 weeks]
0.49 x [(0.56 x (3.7 hours x £2.60)) x 40 weeks] + 0.28 x [(0.56 x (16.9 hours x £2.20)) x 6 weeks]

Couples with children, pre-school age children and school age children:

0.46 x [(0.44 x (16.9 hours x £3.60)) x 46 weeks]
0.46 x [(0.56 x (3.7 hours x £2.60)) x 40 weeks] + 0.23 x [(0.56 x (16.9 hours x £2.20)) x 6 weeks]

These annual average childcare costs are presented in Table B.4.

Table B.4 Central estimate of annual average childcare expenditure per client, by client group

Group	Average annual expenditure on childcare (2008)
Lone parent	£744
Couple	£694

For use in sensitivity analysis, a five per cent error margin is applied to give upper and lower bounds presented in Table B.5.

Table B.5 Upper and lower bounds for use in sensitivity analysis

Group	Lower bound	Upper bound
Lone parent	£707	£781
Couple	£660	£729

Appendix C Methodology for taking account of travel costs

We assume clients moving into work spend 232 days a year in work. This accounts for someone working five days a week, and excludes weekends, minimum statutory annual leave and public holidays.

Department for Transport (DfT) publish data on the main mode of transport to work for people in Great Britain. We modify and update DfT data to focus on people in the lowest quintile of the hourly pay distribution, and use latest data from Labour Force Survey Q4 2008. This moves data closer to the expected client profile and accounts for earnings influencing commuting habits – a suggested 60 per cent[97] of people in the lowest earnings quintile are without access to a car.

People in urban areas are likely to have shorter commutes with better and more frequent public transport links, whilst transport choices may be more limited in rural areas. However, analysis by region reveals only London and Scotland exhibit substantial variation from 'core' findings. Table C.1 provides data on commuting habits of bottom quintile earners.

Table C.1 Usual method of travel to work, bottom quintile earners

	Automobile %	Bus %	National rail %	Other rail/Tram %	Bicycle %	Walk %	Other %
UK	61	14	2	1	3	17	1

Data source: Labour Force Survey Q4 2008. Data is rounded to nearest 1% and excludes part time workers as a standard procedure in analysis by wages.

DfT[98] data from 2005 finds the average length of a commuting trip is 8.7 miles. This masks differences by earnings, with people in the lowest earnings quintile travelling an average of 5.8 miles. We, therefore, assume a daily commuter in work as the result of a Department for Work and Pensions (DWP) employment programme travels around 12 miles a day[99], as opposed to the average commuter travelling around 18 miles a day.

Table C.2 gives details of estimated daily travel costs per person by mode of transport.

97 http://www.statistics.gov.uk/CCI/nugget.asp?ID=1006&Pos=1&ColRank=2&Rank=672

98 http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/factsheets/traveltowork.pdf

99 This figure is used in calculating car commuting costs. As those in the bottom earnings quintile have a greater propensity to walk and so reduce average commuting distance, this figure may underestimate distance travelled by car commuters.

Table C.2 – Daily travel cost by mode of transport

Mode of transport	Estimated daily cost	Notes
Car[1]	£2.16	Estimated using AA estimated running costs of a car valued under £12,000 – 18p per mile – multiplied by daily commute of 12 miles.
Bus	£3	Daily bus fares estimated between £2-4 in urban areas, we take the mid-point for use in CBA.
National Rail[2]	£4.13	We apply data suggesting 48 per cent of rail journeys are made using season tickets with a median daily fare of £3.19 and the remainder face a median return fare of £5.
London Underground[2]	£4.50	Approximation of daily return fare using an Oyster card between Zones 1 and 2.

1 http://www.theaa.com/allaboutcars/advice/advice_rcosts_petrol_table.jsp

2 *Regional commuter fares and ticketing comparisons in Great Britain* (2009), Passenger Focus.

3 As Underground commuters account for around one per cent of national commuters, national estimates will not be particularly sensitive to varying assumptions for Underground commutes.

Cars are treated as a normal good – as income increases people increase the quantity and/or quality of car consumption. We focus on running costs presented for lower value cars (valued under £12,000).

We assume clients of DWP employment programmes have shorter commutes than the average commuter. Data for bus, tube and national rail fares is either explicitly or is assumed to focus primarily on urban commuters on shorter journeys, and we assume return bus fares/season tickets and London Underground Travelcards will exert downward pressure on travel costs.

Additional travel costs resulting from DWP employment programmes can be expressed as *'additional job years x annual average commuting cost'*.

Annual average commuting costs apply cost data to Labour Force Survey commuting trends data presented above and are calculated as:

232 days x [(0.61 x £2.16) + (0.14 x £3) + (0.01 x £4.50) + (0.02 x £4.13)

This gives an estimated annual average commuting cost of £433. For use in sensitivity analysis, Table C.3 presents the corresponding upper and lower bounds that apply to this central estimate

Table C.3 Sensitivity analysis of transport costs

	Lower bound £	Upper bound £	Core value £
Average annual travel cost	411	455	433

Appendix D
Calculating the health impacts of employment

We have assumed that average National Health Service (NHS) costs per person are £1,220 per annum. Here we assume that this figure is the same for men and women. Since this figure is an average it will include NHS costs for employed and unemployed persons. We, therefore, need to filter out NHS costs for unemployed men and women.

The total average cost of £1,220 will be a weighted average of the average NHS cost for an unemployed man (*U*) and employed man (*E*), where α = proportion of unemployed to employed people.

$$1{,}220 = \alpha U_{men} + (1-\alpha)E_{men}$$
$$where\ U_{men} = 1.33\,E_{men}$$

In 2008 the number of unemployed people claiming benefits was 4.5 million[100]. The number of employed people was 27.9 million[101]. Thus, $\alpha = 0.161$.

$$1{,}220 = 0.161U_{men} + 0.839E_{men}$$
$$\frac{U_{men}}{1.33} = E_{men}$$
$$\Rightarrow 1{,}220 = (0.161)U_{men} + \frac{0.839}{1.33}U_{men}$$
$$\Rightarrow 1{,}220 = U_{men}(0.161 + 0.631)$$
$$\Rightarrow 1{,}540 = U_{men}$$

Thus, the average NHS cost per year for an unemployed person is £1,540.

This implies that getting a person into work will reduce NHS costs by £508 p.a. (0.33 x £1,540).

To calculate the average NHS costs for people with a disability on Employment and Support Allowance (ESA) we use the same methodology as above but apply the average costs for disabled people. The average NHS costs as estimated by Haijoff (2008) are double for disabled people compared to non-disabled people. The cost estimates are, therefore, simply twice the estimate for non-disabled people.

Thus, the average NHS cost per year for a disabled unemployed person is £3,080.

This implies that getting a person into work will reduce NHS costs by £1,016 p.a. (0.33 x £3080).

100 Office for National Statistics (ONS) Labour market statistics 2008.

101 Ibid.

Appendix E
Main evidence on the elasticity of marginal utility

Table E.1 Summary of the estimates of the elasticity of marginal utility from different studies

		Estimates of e
Survey methods		
Amiel *et al*., 1999	Student surveys; inequality aversion	02–08
Barsky *et al*., 1995	US middle-aged; risk aversion	Approximately 4.0
Indirect behavioural evidence		
Blundell *et al*., 1994	1970-86 FES data (UK); lifetime consumption behaviour	1.201.40[a] 0.35–1.05[b]
Evans and Sezer, 2002	1967-97 (UK), FFF model; demand for food	1.60
Revealed social values		
Cowell and Gardiner, 1999	UK income tax 1999-2000:	
	Income tax only	1.41
	Tax ÷ NICs	1.28
Evans and Sezer, 2004	UK income tax 2001/02	1.50

[a] Basic model of the Euler equation for consumption.

[b] A dummy variable is added to the basic model in order to capture the effect of high real interest rates in the 1980s.

Source: Evans (2005).

Table E.2 Estimates of the elasticity of marginal utility using subjective wellbeing datasets

Survey	Standard estimate	Ordered logit estimate
General Social Survey	1.20 (0.91-1.48)	1.26 (0.96-1.55)
World Values Survey	1.25 (1.05-1.45)	1.26 (1.06-1.46)
European Social Survey	1.34 (1.12-1.55)	1.25 (1.02-1.49)
European Quality of Life Survey	1.19 (0.87-1.52)	1.05 (0.71-1.38)
German Socio-Economic Panel	1.26 (0.90-1.63)	1.15 (0.81-1.49)
British Household Panel Survey	1.30 (0.97-1.62)	1.32 (0.99-1.65)
Combined estimate	1.26 (1.16-1.37)	1.23 (1.12-1.34)

Source: Layard *et al.* (2008).

References

Adda, J., Banks, J. and von Gaudecker, H. (2006). *The Impact of Income Shocks on Health: Evidence From Cohort Data*. The Institute For Fiscal Studies.

Amiel, Y., Creedy, J. and Hurn, D. (1999). 'Measuring Attitudes Towards Inequality'. *Scandinavian Journal of Economics*, vol. 101, pp. 83-96.

Arrow, K. (1963). *Social Choice and Individual Values*. Second Edition. John Wiley & Sons, Inc., New York, London, Sydney.

Ballard, C.L. (1990). 'Marginal Welfare Cost Calculations: Differential Analysis vs. Balanced-Budget Analysis'. *Journal of Public Economics*, vol. 41, pp. 263-76.

Barsky, R.B., Kimball, M.S., Juster, F.T. and Shapiro, M.D. (1995). *Preference Parameters and Behavioural Heterogeneity: An Experimental Approach In The Health and Retirement Survey*. National Bureau for Economic Research, Working Paper no. 5213.

Beale, N. and Nethercott, S. (1987). 'The Health of Industrial Employees Four Years After Compulsory Redundancy'. *Journal of the Royal College of General Practitioners*, vol. 37 (302), pp. 390-394.

Becker, G. (1968) 'Crime and Punishment: An Economic Approach'. *Journal of Political Economy*, vol. 76 (2), pp.169-217.

Bell, S. and Orr, L. (1994). 'Is Subsidized Employment Cost-Effective for Welfare Recipients? Experimental Evidence from Seven State Demonstrations'. *Journal of Human Resources*, vol. 19 (1), pp. 42-61.

Benzevala, M., Judge, K. (2001). 'Income and Health: The Time Dimension'. *Social Science & Medicine*, vol. 52 (9), pp.1371-1390.

Bergman, M. (2005). Lecture Note: Dynamic Programming and the Bellman Equation. http://www.econ.ku.dk/okombe/IME2006/Bellmanequation.pdf

Bewley, H., Dorsett, R. and Haile, G. (2007). The impact of Pathways to Work: Quantitative evidence The Policy Studies Institute presentation to WPEG conference, University of Manchester, July 2007.

Blundell, R., Browning, M. and Meghir, C. (1994). 'Consumer Demand and the Life-Cycle Allocation of Household Expenditures'. *Review of Economic Studies*, vol. 61 (1), pp. 57-80.

Blundell, R., Dias, M.C., Meghir, C. and Van Reenen, J. (2004). 'Evaluating the Employment Impact of a Mandatory Job Search Program'. *Journal of the European Economic Association*, vol. 2 (4), 569-606.

Boardman, A., Greenberg, D., Vining, A., Weimar, D. (2001). *Cost Benefit Analysis: Concepts and Practice*. Third Edition. Prentice Hall.

Boreham, R., Fuller, E., Hills, A. and Steve Pudney, S. (2006). *The Arrestee Survey Annual Report: October 2003 – September 2004 England and Wales*. The Home Office Statistical Bulletin.

Brand, S. and Price, R. (2000). *The Economic and Social Costs of Crime*. Home Office Research Study 217.

Brent, R. (2006). *Applied Cost-Benefit Analysis*. Second Edition. Edward Elgar: UK.

Browning, E. (1987). 'On The Marginal Welfare Cost of Taxation', *American Economic Review*, vol. 77, pp. 11-23.

Browning, E. (1976). 'The Marginal Cost of Public Funds'. *Journal of Political Economy*, vol. 84, pp. 283-98.

Burgard, S.A., Brand, J.E. and House, J.S. (2005). *Causation and Selection in the Relationship of Job Loss to Health in the United States*. Mimeo, University of Michigan.

Campbell, H. and Bond, K. (1997). 'The Cost of Public Funds in Australia'. *The Economic Record*, vol. 73, pp.22-34.

Carlsson, F., Daruvala, D. and Johansson-Stenman, O. (2005). 'Are people inequality-averse, or just risk-averse?' *Economica*, vol. 72, pp. 375-396.

Carr-Hill, R., Rice, N. and Roland, M. (1996). 'Socioeconomic Determinants of Rates of Consultation in General Practice Based on Fourth National Morbidity Survey of General Practices'. *British Medical Journal*, vol. 312, pp. 1008-1012.

Clark, A. and Oswald, A. (1994). 'Unhappiness and Unemployment'. *Economic Journal*, vol. 104, pp. 648-659.

Clark, A. and Oswald, A. (2002). 'A Simple Statistical Method for Measuring How Life Events Affect Happiness'. *International Journal of Epidemiology*, vol. 31, pp. 1139-1144.

Cook, P. and Wilson, J. (1985). 'Unemployment and Crime - What Is The Connection?' *The Public Interest*. vol. 79, pp. 3-8.

Coutts, A. (2009). *Active Labour Market Programmes (Almps) and Health: An Evidence-Base*. Review prepared for the Strategic Review of Health Inequalities in England Post 2010 (Marmot Review).

Cowell F. and Gardiner K. (1999). *Welfare Weights*. London School of Economics, STICERD, Economics Research Paper no. 20.

Dahlby, B. (1994). The Distortionary Effect of Rising Taxes, in W. Robson and W. Scarth (Eds.). *Deficit Reduction: What Pain, What Gain*. Toronto: C. D. Howe Institute.

Department for Children Schools and Families (DCSF) (2009). *Childcare and Early Years Survey of Parents 2008*.

Department of Finance and Administration, Australia (2006). *Handbook of Cost-Benefit Analysis*.

Dickinson (1980) Crime and Unemployment.

Dodu, N. (2005). 'Is employment good for well-being? A literature review'. *Journal of Occupational Psychology, Employment and Disability*, vol. 7 (1), pp.17-33.

Dolan, P. and Tsuhiya, A. (2009). 'The Social Welfare Function and Individual Responsibility: Some Theoretical Issues and Empirical Evidence'. *Journal of Health Economics*, vol. 28 (1), pp. 210-220.

Dolan, P., Edlin, R. and Tsuchiya, A. (2008). *The Relative Societal Value of Health Gains to Difference Beneficiaries*. ScHARR Discussion Paper.

Dolan, P. and Peasgood, T. (2006). *Valuing Non-Market Goods: Does Subjective Well-Being offer a Viable Alternative to Contingent Valuation?* Imperial College Working Paper.

Dolan. P, and Kahneman, D. (2008). 'Interpretations of Utility And Their Implications For The Valuation Of Health'. *The Economic Journal*, vol. 118, pp. 215-234.

Doyle, M., Ahmed, E. and Horn, R. (1999). 'The Effects of Labour Markets and Income Inequality on Crime: Evidence from Panel Data'. *Southern Economic Journal*, vol. 65 (4), pp. 717-738.

Easterlin, R. (1974). Does Economic Growth Improve The Human Lot? Some Empirical Evidence. In David, R. and Reder, R. (Eds.). *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*. New York: Academic Press.

Ehrlich, I. (1973). 'Participation in Illegitimate Activities: A Theoretical and Empirical Investigation'. *Journal of Political Economy*, vol. 81 (3), pp. 521-565.

Evans, D. (2005). 'The Elasticity of Marginal Utility of Consumption: Estimates For 20 OECD Countries'. *Fiscal Studies*, vol. 26 (2), pp. 197-224.

Evans, D., Kula, E. and Sezer, H. (2005). 'Regional Welfare Weights for the UK: England, Scotland, Wales and Northern Ireland'. *Regional Studies*, vol. 39 (7), pp. 923-937.

Evans, D. (2004). 'The Elevated Status of the Elasticity of Marginal Utility of Consumption'. *Applied Economics Letters*, vol. 11, pp. 443-447.

Evans, D. and Sezer, H. (2002). 'A Time Preference Measure of the Social Discount Rate For The UK'. *Applied Economics*, vol. 34, pp. 1925-34.

Ferreira, S. and Moro, M. (2009). *On the Use of Subjective Well-Being Data for Environmental Valuation*. University of Stirling Economics Discussion Paper 2009.

Field, S. (1999). *Trends in Crime Revisited*. Home Office Research Study 195.

Frey, B.S., Luechinger, S. and Stutzer, A. (2004). *Valuing Public Goods: The Life Satisfaction Approach*. Institute for Empirical Research in Economics University of Zurich Working Paper Series 184.

Frey, Bruno, S. and Stutzer, A. (2002). 'What Can Economists Learn from Happiness Research?' *Journal of Economic Literature*, vol. 40 (2), pp. 402-435.

Fullerton, D. and Henderson, Y.K. (1989). 'The Marginal Excess Burden Of Different Capital Tax Instruments'. *Review of Economics and Statistics*, vol. 71, pp. 435-42.

Gould, E., Weinberg, B. and Mustard, D. (1998). 'Crime Rates and Local Labor Market Opportunities in the United States: 1979 – 1997'. *Review of Economics and Statistics*, vol. 84 (1), pp. 45-61.

Graetz, B. (1993). *Health Consequences of Employment and Unemployment: Longitudinal Evidence for Young Men And Women*. Department of Sociology, La Trobe University, Bundoora, VIC 3083, Australia.

Greenberg, D., Knight, G., Speckesser, S. and Hevenstone, D. (2010). *Improving DWP assessment of the relative costs and benefits of employment programmes*. Forthcoming Department for Work and Pensions Working Paper.

Greenberg, D. and Knight, G. (2007a). *Evaluation of the New Deal for Disabled People: The cost and cost-benefit analyses*. Department for Work and Pensions Research Report No. 431.

Greenberg, D. and Knight, G. (2007b). *Review of the DWP Cost Benefit Framework and how it has been applied*. Department for Work and Pensions Working Paper No 40.

Greenberg, D. (1997). 'The Leisure Bias in Cost-Benefit Analyses of Employment and Training Programmes'. *Journal of Human Resources*, vol. 32 (2), pp. 413-439.

Greenberg, D. and Robins, P. (2008). Incorporating Non Market Time into Benefit Cost Analyses of Social Programs: An Application to the Self Sufficiency Project. *Journal of Public Economics*, vol. 92, pp. 766-794.

Grogger, J. (1997). *Market Wages and Youth Crime*, NBER Working Paper 5983.

Groot, W. and van den Brink, H. (2006). 'The Compensating Income Variation of Cardiovascular Disease.' *Health Economics Letters*, vol. 15 (10), pp. 1143-1148.

Grossman, M. (1972a). 'On The Concept of Health Capital and the Demand for Health'. *Journal of Political Economy*, vol. 80 (2), pp. 223-255.

Grossman, M. (1972b). *The Demand for Health: A Theoretical and Empirical Investigation*. National Bureau of Economic Research, Occasional Paper 119. Columbia University Press, New York.

Gunasekara, F., Carter K., Blakely, T. and Liu, I. (2009). *Determining the Effect of Change in Income on Self-Rated Health using Regression Models – Ordered, Linear, Fixed or Random?* Working Paper presented at the British Household Survey Conference, University of Essex.

H.M. Treasury (2003). *Green Book: Appraisal and Evaluation in Central Government*. HMSO London.

Hajioff, S. (2008). *Health of the Working Age Population*. Public Health Action Support Team.

Hansen, K. and Machin, S. (2002). 'Spatial Crime Patterns and the Introduction of the UK Minimum Wage'. *Oxford Bulletin of Economics and Statistics*, vol. 64, pp. 677-697.

Harberger, A. (1971). 'Three Basic Postulates for Applied Welfare Economics: An Interpretive Essay'. *Journal of Economic Literature*, Vol. 9 (3), pp. 785-797.

Home Office (2006) *Statistical Bulletin*.

Iversen, L., Sabroe, S., and Damsgaard, M.T. (1989). 'Hospital Admissions Before and after Shipyard Closure'. *British Medical Journal*, vol. 299, pp.1073-1076.

Iverson, L., Anderson, O., Anderson, P., Christofferson, K. and Keiding, N. (1987). 'Unemployment and Mortality in Denmark, 1970-80'. *British Medical Journal*, vol. 295, pp. 879-884.

Jacobsen (1972). *Dismissal and Morbidity*. Ugeskr Laeger, Vol. 134, pp. 352-4.

Jahoda, M. (1982). *Employment and Unemployment: A Social-Psychological Analysis*. Cambridge University Press.

Johnson, G. E. (1972). *Does Public Service Employment Pay Off?* Unpublished paper, University of Michigan.

Jones, R. and Rowlinson, A. (2009). 'Incorporating Equality Considerations Into Measures Of Public Service Output'. *Office for National Statistics Economic & Labour Market Review*, vol. 3, pp. 44-47.

Kangasharju, A. and Venetoklis, T. (2003). Do Wage Subsidies Increase Employment in Firms? *VATT Discussion Paper 304*, Helsinki.

Keefe, V., Reid, P., Ormsby, C., Robson, B., Purdie, G., Baxter, J. and Incorporated, N.K.I. (2002). 'Serious Health Events Following Involuntary Job Loss in New Zealand Meat Processing Workers'. *International Journal of Epidemiology*, vol. 31, pp. 1155-1161.

Kuhn, A., Lalive, R. and Zweimüller, J. (2009). 'The Public Health Costs of Job Loss'. *Journal of Health Economics*, vol. 28 (6), pp. 1099-1115.

Kumar, A. (2004). *Taxes, Deadweight Loss and Intertemporal Female Labour Supply*. Syracuse University, Centre for Policy Research, Working Paper 61.

Layard R., Mayraz, G. and Nickell, S. (2008). 'The Marginal Utility of Income'. *Journal of Public Economics*, vol. 92, pp. 1846-1857.

Layard, R. (2006). *Happiness: Lessons from a New Science*. Allen Lane.

Layard, R. and Glaister, S. (1994). *Cost-Benefit Analysis*. Second Edition. Cambridge University Press.

Layard, R. and Walters, A.A. (1978). *Income Distribution: Allowing for Income Distribution In Cost-Benefit Analysis*. Second Edition. Eds. Layard, R. and Glaister, S.

Levitt, S. (2004). 'Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and six that do not'. *The Journal of Economic Perspectives*, vol. 18 (1), pp. 163-190.

Ljungqvist, L. and Sargent, T. (2004). *Recursive Macroeconomic Theory*. MIT Press, USA.

Machin, S. and Meghir, C. (2000). Crime and Economic Incentives. IFS Working Paper 00/17.

Maestad, O. and Norheim, O. (2009). 'Eliciting People's Preferences for the Distribution of Health: A Procedure for a More Precise Estimation of Distributional Weights'. *Journal of Health Economics*, vol. 28, pp. 570-577.

Mankiw (2008). *Principles of Microeconomics*. South-Western College.

Manning, A. (2009). 'You can't always get what you want: The impact of the UK Jobseeker's Allowance'. *Labour Economics*, vol.16 (3), pp. 239-50.

Martikainen, P. and Volkonen, T. (1996). 'Excess Mortality of Unemployed Men and Women during a Period of Rapidly Increasing Unemployment'. *The Lancet*, vol. 348, pp. 909-912.

Mathers, C. (1994). *Health Differentials Among Adult Australians Aged 25-64 Years*. Canberra: Australian Institute of Health and Welfare.

Melville, D. (2002). *Cost Effectiveness of Labour Market Policies*. Labour Market Policy, HM Treasury.

Morris, J. and Cook, D. (1991). 'A Critical Review Of The Effect of Factory Closures on Health'. *British Journal of Industrial Medicine*, vol. 48, pp.1-8.

New Zealand Treasury (2005). *Cost Benefit Analysis Primer*.

Nozal, A., Lindeboom, M. and Portrait, F. (2004). 'The Effect Of Work on Mental Health: Does Occupation Matter?' *Health Economics*, vol.13 (10), pp.1045-1062.

Pearce, D. and Ulph, D. (1995). *A Social Discount Rate for The United Kingdom*, CSERGE Working Paper No. 95-01, School of Environmental Studies, University of East Anglia.

Office for National Statistics (2008a). *Labour Market Statistics*.

Office for National Statistics (2008b). *The Effects of Taxes and Benefits on Household Income*.

Oxford Economics (2004). *Twenty-Year Evaluation of Tomorrow's People Trust Limited*.

Raphael, D., Macdonald, J., Colman, R., Labonte, R., Hayward, K. and Torgerson, R. (2004). 'Researching Income and Income Distribution as Determinants of Health in Canada: Gaps Between Theoretical Knowledge, Practice, and Policy Implementation'. *Health Policy*, vol. 72 (2), pp. 217-232.

Regea, M., Skardhamarb, T., Telleb, M. and Votrubac, M. (2009). *The Effect of Job Loss on Crime: Evidence from Plant Closure Events*. Working Paper

Rosen, H. (2005). *Public Finance*, 7th Edition. McGraw Hill.

Roy, P., Emond, A., Pineault, R., Mayer, F. and Bodson, P. (1987). La Relation Chômage Santé : Une Etude Prospective. Infante-Rivard, Marie-Josée Legault et Louise Boileau Santé mentale au Québec, vol. 12 (2).

Ruggeri, G. (1999). 'The Marginal Cost of Public Funds in Closed and Small Open Economies'. *Fiscal Studies*, vol. 20 (1), pp. 41-60.

Sainsbury, R. (DSS), (1999). *Costs of being in work: A review of Literature and Research*.

Schiller, Bradley R. (1973). 'Empirical Studies of Welfare Dependency: A Survey'. *Journal of Human Resources*, vol. 8, pp.19-32.

Sickles, R. and Yazbeck, A. (1998). 'On The Dynamics of Demand for Leisure and the Production of Health'. *Journal of Business and Economic Statistics*, vol. 16 (2), pp.187-197.

Soothill, K., Ackerley, E. and Francis, B. (2006). *Participation in Crime among Children and Young Adults: Changes over time*. Lancaster University Working Paper.

Studnicka, M., Studnicka-Benke, A., Wögerbauer, G., Rastetter, D., Wenda, R., Gathmann, P. and Ringel, E. (1991). *Psychological Health, Self-Reported Physical Health and Health Service Use*. Social Psychiatry and Psychiatric Epidemiology.

Sullivan, D.G. and von Wachter, T. (2006). *Mortality, Mass Lay-offs, and Career Outcomes: An Analysis Using Administrative Data*. FRB of Chicago Working Paper.

Thirsk, W. and Moore, J. (1991). 'The Social Cost of Canadian Labour Taxes'. *Canadian Tax Journal*, vol. 39, pp. 554-66.

Treasury Board of Canada Secretariat (2007). *Canadian Cost-Benefit Analysis Guide*. Regulatory Proposals.

Van Reenen, J. (2001). *No More Skivvy Schemes? Active Labour Market Policies and the British New Deal for the Young Unemployed in Context*. IFS working paper 01/09.

Voss, M., Nylen, L., Floderus, B., Diderichsen, F. and Terry, P.D. (2004). 'Unemployment and Early Cause Specific Mortality: A Study Based on the Swedish Twin Registry'. *American Journal of Public Health*, vol. 94 (12), pp. 2155-2161.

Wildman, J. (2003). 'Income Related Inequalities in Mental Health in Great Britain: Analysing the Causes of Health Inequality over Time'. *Journal of Health Economics*, vol. 22 (2), pp. 295-312

Winkelmann, L. and Winkelmann, R. (1998). 'Why are the Unemployed so Unhappy? Evidence from Panel Data'. *Economica*, vol. 65 (257), pp.1-15.

Assisting people into work has a wide range of benefits and knock-on effects for the economy and society as a whole. Recognising these effects is key for appraisals and evaluations of employment programmes.

This report presents a framework incorporating the economic and social impacts of work into cost-benefit analysis of employment programmes.

The report takes forward the recommendations on developing the cost-benefit analysis framework set out in the Department for Work and Pensions Working Paper No. 40.

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