Targeting Services in the Individual Customer Strategy: The Role of Profiling
A Review of Research Evidence

Targeting Services in the Individual Customer Strategy: The Role of Profiling A Review of Research Evidence

---

A report for Jobcentre Plus

Chris Hasluck

Warwick Institute for Employment Research
University of Warwick
Coventry CV4 7AL

024 765 23387
c.hasluck@warwick.ac.uk

Disclaimer

The views in this report are the authors' own and do not necessarily reflect those of Jobcentre Plus or the Department for Work and Pensions.

CONTENTS

LIST OF TABLES

Acknowledgements

A number of people have assisted with this project. These include Ruth Owen and Keith Walton of Strategy, Planning and Performance, Jobcentre Plus and Janet Allaker and Mark Langdon, also of Jobcentre Plus.

EXECUTIVE SUMMARY

Introduction

Jobcentre Plus Strategy, Planning and Performance Division (Business Strategy Directorate) is now in the process of devising an Individual Customer Strategy intended to provide a more targeted focus on individual customer need. As part of this process they commissioned Warwick Institute for Employment Research to review available evidence relating to the targeting of employment services for job seekers. The findings of this review, presented here, will help inform the development of the Individual Customer Strategy.

Aim of the literature review

The aim of the review was to address the following research questions:

- is there any evidence that individual allocation to services achieves preferable outcomes compared to broad group allocation?
- is there any evidence to indicate which method for individual allocation (e.g. advisor discretion, analytics, advisors plus automated tools, etc) provides the most effective method of targeting services?
- if evidence does not currently exist to support an individual customer strategy, how might such evidence be generated?

The central task of the review was to collate and synthesise the considerable body of evidence relating to employment service delivery and, specifically, to client profiling and targeting. The review did not collect any primary data or undertake analysis of secondary datasets. The methods used to collect evidence included:

- a web-search for relevant literature;
- a search of central government reports on delivery of employment services;
- a search of key journal articles and other published material.

The report begins by considering some basic issues relating to the role of a public employment service and it's need to allocate resources across clients. This is followed by an examination of profiling as a means of matching clients and provision, both in principle and in practice, and a review of evidence relating to profiling in the UK and elsewhere. Finally, the report presents the main findings of the review and sets out some further steps for enhancing knowledge of the potential benefits of profiling in the UK. An annex provides a brief account of the technical aspects of selected profiling models.

Main findings

The review of the research literature relating to the targeting of employment services noted that there was great diversity amongst people seeking employment. They differed greatly in terms of their personal characteristics, human capital, the context within which they are seeking work and the level and forms of barriers to obtaining work. Correspondingly, not all job seekers needed the same type or level of support to obtain work nor would they benefit equally from referral to any particular service provision or programme. For this reason most public employment services, such as Jobcentre Plus sought to target their provision. In the main they sought to provided most support for those in greatest need (in terms of facing the greatest difficulties in obtaining employment). Equally important, resources should be targeted in order to maximise the impact of such provision. By referring those who most

benefit from a particular service, and not referring those for whom the service has no impact, an increase in the overall impact of programmes can be achieved. These two goals – equity and efficiency – may involve trade-offs depending upon the social goals of the employment service.

Methods of targeting clients

A variety of methods have been used to allocate clients across employment services and programmes. The most commonly used methods have been administrative rules (using a small number of eligibility criteria) and adviser discretion (using the subjective judgement of advisers). The effectiveness of both methods has been called into question by recent evaluation evidence. Broad administrative rules can fail to differentiate sufficiently between individuals, with the result that some who require additional support do not receive it, while others who do not need such support are required to participate. Adviser discretion, on the other hand, while offering the prospects of more customised provision for individuals, can be open to challenge on the ground of its subjective and unsystematic nature leading to possible inconsistency, inaccuracy and potential for use to achieve ends other than those in the client's best interests. Indeed, there is a growing body of evidence to suggest that the matching of clients and provision achieved by advisers or caseworkers has been no more efficient than could have been achieved by randomly assigning clients to services.

Profiling

Statistical profiling represents a different method of allocating employment services to clients. Profiling is a systematic process that uses client characteristics to identify the most appropriate provision for any particular client. Profiling represents a position somewhere between broad administrative rules and the individualistic approach of advice. While profiling has not been used to any great extent in the UK, it is part of the mainstream operation of employment services in the USA and Australia and has been experimented with in a number of other countries. The only operational example of profiling in the UK has been the Client Progress Kit (CPK) introduced in 2000 for use on New Deal programmes. Statistical modelling of the risk of long-term unemployment has been attempted in the UK but such studies have generally concluded it was not possible to accurately predict which clients were at risk. A recent study of DWP clients has reopened the debate by demonstrating the feasibility of identifying clients at risk of long duration benefit claims with an acceptable level of accuracy. This improvement was the result of using better quality data than in previous studies, as well as a differentiation of client groups (with separate models for JSA clients, the disabled and lone mothers).

Evidence relating to profiling

To date, the evidence relating to statistical profiling in the UK has not provided support for the introduction of such systems of decision-making in practice. This situation is now changing. Not only is there persuasive new evidence from the UK, but there is also mounting evidence of the benefits of profiling systems from other countries, particularly the USA and Australia. The continuing commitment of these countries to develop and improve their profiling systems is implicit testament to a belief in the effectiveness of profiling. The research evidence demonstrates that it has been possible to construct statistical profiling instruments that produce predictions to an acceptable standard of accuracy and create gains in terms of outcomes. These profiling instruments work best when they make full use of available information (quality data with all the key variables represented in the predictive model). Practical experience with profiling in the USA has also shown that it is important to ensure that such systems are actually operated as intended by frontline staff and quality assured over time to maintain the relevance and effectiveness of the predictive models. While the evidence indicates that profiling can identify those in greatest need of additional

support, such support is likely to be most effective if profiling is used to take account of associations between identified need and the impact of provision.

The need for a stronger UK evidence base

Empirical evidence from the USA and elsewhere relates to different social and political contexts. Nonetheless, the evidence does suggest that there may be gains from some form of profiling system in the UK and it would be unwise to reject such a development out of hand. Further investigation of the scope for such gains in the UK context is required. To this end, two projects are proposed that would contribute additional knowledge of profiling in a UK context. Two projects might be considered and these are:

- a 'simulation' project to identify the extent to which there would have been efficiency gains from a profiling system had it operated in the UK in the past. If gains of this type can be demonstrated, then there would be a better case for thinking that the future performance of Jobcentre Plus could be improved by adopting profiling methods in the future. If the evidence were persuasive enough, there could be a case for embarking on a feasibility, or design, study and, eventually, to testing profiling by means of a pilot or prototype system.
- a profiling field experiment. This would require the selection of a Jobcentre plus programme and involve the use of different allocation mechanisms in a controlled experiment. The objective of the experiment would be to identify whether it was possible to realise any potential gains from profiling in practice, given the importance of issues relating to implementation highlighted in the research literature.

1 INTRODUCTION

1.1 Introduction

Jobcentre Plus is the main agency in the United Kingdom with responsibility for the provision of employment services. In November 2002 the Jobcentre Plus Board considered it's business strategy and agreed that there was an increasing discrepancy between the efforts being made on the demand side of their business (their employer strategy) and that invested in the supply side (customers or clients). The Jobcentre Plus Board agreed to review it's customer strategy, starting with the principle that the agency should seek to segment clients, based on an assessment of their skills (personal and technical) relative to the needs of employers.

Jobcentre Plus Strategy, Planning and Performance Division (Business Strategy Directorate) is now in the process of devising an Individual Customer Strategy intended to provide a more targeted focus on individual customer need. As part of this process they commissioned Warwick Institute for Employment Research to review available evidence relating to the targeting of employment services for job seekers. The findings of this review, presented here, will help inform the development of the Individual Customer Strategy.

1.2 Aim of the literature review

The aim of this review was to address the following research questions:

- is there any evidence that individual allocation to services achieves preferable outcomes compared to broad group allocation?
- is there any evidence to indicate which method for individual allocation (e.g. advisor discretion, analytics, advisors plus automated tools, etc) provides the most effective method of targeting services?
- if evidence does not currently exist to support an individual customer strategy, how might such evidence be generated?

The central task of the review was to collate and synthesise the considerable body of evidence relating to employment service delivery and, specifically, to client profiling and targeting. The review did not collect any primary data or undertake analysis of secondary datasets. The research process included:

- a web-search for relevant literature (including evidence from outside the UK);
- a search of central government reports on delivery of employment services (including reports on programme evaluations, departmental research series and 'in-house' technical reports);
- a search of key journals (mainly those with an employment and social policy orientation.

1.3 Who is the client?

Jobcentre Plus serves a wide range of client groups. The 'core business' of the agency is to provide employment services to unemployed people claiming Jobseekers Allowance (JSA) and to help them enter employment. This group of benefit recipients are required by JSA rules to be actively seeking a job and the support provided is predicated on that condition. However, Jobcentre Plus also provides services to other benefit recipients where those benefit recipients are willing to seek work. Examples of the latter group include lone parents claiming Income Support and disabled people claiming Incapacity Benefit.

The client base of Jobcentre Plus thus consists of JSA claimants plus other benefit claimants who voluntarily use Jobcentre Plus services and programmes[1]. Since the common characteristic of this client base is that they are seeking employment (actively or otherwise) this review uses the terms 'clients' and 'job seekers' interchangeably. It is important to note that the term job seeker is not used to denote JSA claimants alone but refers to all benefit recipients who use Jobcentre Plus services, voluntarily or otherwise, to help them find work.

1.4 Structure of report

The remainder of this report is organised as follows. Chapter 2 considers some basic issues relating to the role of a public employment service, the need to allocate resources in such a service and the growth of targeted delivery. Chapter 3 examines profiling as a means of matching clients and provision both in principle and in practice. Chapter 4 reviews the evidence relating to profiling in the UK and elsewhere. Finally, Chapter 5 summarises the main findings of the review and sets out some further steps that might be taken to enhance knowledge of the potential for profiling in the UK. An Annex provides summary details of the technical aspects of selected profiling models.

[1] Although some Jobcentre Plus services are available to anybody who wishes to use them, only people on benefit are considered 'clients' for the purposes of this review since only benefit recipients are eligible for mainstream services and programmes.

2 DELIVERING EMPLOYMENT SERVICES

2.1 The market for employment services

The market for jobs can be defined as the set of processes and institutions by which jobs in enterprises are matched with people seeking jobs. There is no single place or organisation through which the market operates. Instead, a highly complex set of information networks and organisational arrangements exist by which employers seek out suitable people to fill jobs and by which people seeking employment locate acceptable jobs.

Like many other markets (such as real estate and financial products) the market for jobs is partly operated by intermediaries who function as 'brokers' to arrange job matches. There is such variation across jobs and workers that it is often cheaper and more effective for an intermediary to collect and disseminate information about jobs than it is for individual job seekers to undertake job search in isolation. The fact that many private sector agencies and recruitment and selection consultants are paid to undertake job broking services on behalf of customers is testimony to the value of these potential gains. The argument for a public employment service offering free job-broking services is that most unemployed individuals and many firms cannot afford the fees that private agencies would charge, hence search and matching is at a sub-optimal level for the economy, and unemployment is higher and output lower than it would otherwise be without a free brokerage service.

Beyond the straightforward role of intermediary or broker, a public employment service also has a role to play in addressing some of the imperfections of the jobs market that limit or prevent job seekers from obtaining employment. The ability of the market to match individuals and jobs may be restricted where job seekers lack the qualities necessary to secure a job (lacking job seeking skills, having poor motivation or inappropriate attitudes) or face barriers to obtaining employment, such as work limiting disabilities, employer prejudice and discrimination or a lack of appropriate skills. There are potential benefits, both social and individual, from facilitating job matches by helping job seekers overcome barriers to employment.

There has been a public employment service in the UK since 1910 when the National Employment Service was founded. Since 1910, the public employment service has continued to operate as part of various government departments. Jobcentre Plus, as it is now known, undertakes a number of intermediary functions through its Jobcentre network. It delivers a variety of services to clients including advice and guidance on job search, help with job placements, provision of short job-focussed training, access to a range of initiatives and programmes (such as New Deal and Work Based Learning for Adults) and many other forms of support. Jobcentre Plus also works with employers, many of whom notify unfilled vacancies or provide job placements and work experience places for Jobcentre Plus clients.

2.2 Allocating mechanisms for employment services

While the role of Jobcentre Plus is to improve the operation of the job market, only a fraction of its activities can be defined as a ‘public good’ in the strict sense of that term (for instance job vacancy displays)[2]. In the main Jobcentre Plus services have the characteristics of other goods and services and there is an opportunity cost to providing them. An hour of adviser’s time spent in an interview

[2] Economists use the term public good to refer to goods or services that can be provided at zero opportunity cost, such as street lighting or public information.

is an hour not available to other job seekers. Just like any other business, Jobcentre Plus must allocate its resources in a manner that makes best use of finite resources.

In a private employment agency, the mechanism driving the allocation of services will be the ability of clients to pay. Jobcentre Plus, in contrast, provides employment services at no direct cost to clients for social reasons. This means that job seekers cannot demand services in the way that private sector clients would do. Consequently, the allocation of Jobcentre Plus resources will be determined by policy, management decisions and administrative rules.

There are three basic approaches to the provision of employment services that could be taken by Jobcentre Plus. These are:

- universal and unlimited provision;
- 'first come, first served';
- client differentiation.

Universal provision would see unrestricted access to Jobcentre Plus services by any person who wished to use them. This would be most appropriate for activities with the characteristics of a pure public good (such as display of vacancies or an internet website offering advice to job seekers). Where resources are finite, Jobcentre Plus would have to ration access to services. This could be done by means of a queuing system. While having the merit of treating all job seekers in an apparently equitable fashion, under a 'first come, first served' system take up of employment services will be largely under the control of individual clients. There is a risk, therefore, that those at the head of the queue will be those least in need of support while those in most need may not receive support if they are reluctant to use or unaware of Jobcentre Plus services.

In practice, most employment services provided by Jobcentre Plus are differentiated in the sense that access to those services differs across the population of job seekers. A number of different justifications might be made for such differentiation. Some justifications emphasise issues of equity while others emphasise differences between clients. Some differentiation may simply be for administrative convenience but in other cases may serve to make the provision of employment services more effective. Possible criterion for eligibility or administrative rules include:

- differences in contribution to the social insurance scheme funding the public employment service;
- differences in obligations (for instance those in receipt of JSA may be treated differently from those on other benefits);
- differences in personal circumstances and needs;
- differences in the barriers to employment;
- differences in the effectiveness of different services/provision.

In practice, any differentiation is likely to reflect all of these criteria, to some extent at least, since the implementation of policy is intrinsically a political process.

2.3 Targeting employment services

The notion of differentiating between clients on the basis of their needs has been evident in the delivery of employment services in Britain for many years and reflects a concern with equitable treatment. There are two elements to such an idea. These are:

- that individuals differ in their employability (that is, their ability to obtain and sustain employment). These differences reflect different personal circumstances and the barriers to employment each faces;
- employability varies over time and, in particular, tends to decline as any spell of benefit claim increase.

These two strands suggest a case for targeting employment services, first, on those with the least chance of obtaining employment (for instance people with no skills or members of ethnic minorities etc.) and, second, to provide additional support for those who have been out of work the longest.

A more recent notion is that targeting employment services is justified because of differences in the effectiveness of interventions. Some employment services may be more effective for some job seekers than others and by allocating resources to where they make most impact, the overall efficiency of the public employment service would be enhanced. While conceptually different, these two approaches are linked since it is not unreasonable to suppose that services are most effective if they meet the needs of job seekers.

If employment services are to be delivered that match client needs, a decision-making process has to be developed that achieves two things:

- identifies need;
- allocates clients to available services according to need.

Possible targeting mechanisms include:

- eligibility rules
- adviser discretion
- screening
- profiling

Each of these mechanisms are briefly considered below.

Eligibility and other administrative rules

The use of rules is the most common form of decision-making mechanism for allocating employment services. Clients are deemed eligible for a particular form of service if they meet set criteria. The consequence of eligibility may simply mean that those eligible can, if they wish, use the service on a voluntary basis but could also mean that eligible job seekers are required to use the service. Eligibility rules are usually defined in terms of a small number of criteria, such as type of benefit received, length of benefit claim and age.

Eligibility rules deal with the problem of identifying need by the simple expedient of assuming that all people who fall into the relevant group share the same broad needs. Allocation results from the application of the rules. For instance, all young people aged 18-24 years and who have been claiming Jobseekers Allowance (JSA) for 26 weeks will be referred to New Deal for Young People (NDYP).
Eligibility rules have a number of obvious advantages. Such decision-making rules are:

- simple to implement and operate;
- easy to understand and explain;
- very cheap to operate;
- equitable, as all clients are treated according to the same rules.

The disadvantages of such simple administrative rules arise from the variety of needs that exist within the client population. Consequently, the use of rules may mean that:

- some people who do not require the service may be referred to it;
- some who require the service may be excluded.

Eligibility rules are thus a rather blunt instrument and are likely to be fairly inefficient in terms of achieving a good match between individual client needs and provision of support. The obvious response to this is to define ever more precise eligibility groups based on a larger number of eligibility criterion. However, this makes allocation to services ever more complicated while the basis for such differentiation is often rather ad hoc.

Personal advisers and discretion

Alongside eligibility rules, the use of discretion by advisers is the other mainstream form of decision making in Jobcentre Plus. The use of advisers reflects a view that individuals differ so much in their needs that it requires the expertise and experience of a personal advisers to identify needs and to find the most suitable form of support for those needs. Through interviews and other techniques, advisers, in consultation with clients, identify barriers to work, motivate clients help them gain access to available provision.

The advantages of adviser discretion are that it:

- is a flexible, individualistic approach;
- can take account of wide range of data;
- can use qualitative data;
- provides a 'personal touch'

The disadvantages associated with adviser discretion are:

- the risk that clients treated in an inequitable manner;
- the quality of decisions depends on the expertise and experience of advisers;
- decisions are subjective and different advisers may arrive at different decisions;
- it is time consuming and expensive;
- PAs may have goals that differ from those of the client (meeting performance targets may lead to 'cherry picking' of clients with the best chances of job placement rather than those most in need but difficult to help [Heckman, Heinrich and Smith, 1997]).

Adviser discretion is thus the mirror image of administrative rules. It treats each individual as a separate case and seeks to provide an individually tailored service but, in so doing, it runs the risk of inconsistency and even perversity while being expensive to operate.

Adviser discretion is the predominant mechanism for targeting employment services in most public employment services. PLS (2001) find that the public employment service in every EU member state uses some system of advisers to allocate resources, often in conjunction with some other method such as group screening. In the main, however, even when screening is used, its role is subservient to that of the adviser who has the final decision on the actions to be taken.

Screening and profiling

Screening and profiling methods are less commonly used in Jobcentre Plus, although they are found in other countries such as the USA and Australia. Screening and profiling are similar in that they both attempt to formalise and, in the case of profiling, quantify the risks facing job seekers and identify their needs so that they can be referred to appropriate employment services.

Screening uses group characteristics to score the risks facing individual clients and to allocate them to programmes or other support. Although screening techniques vary, the list of risk factors is often derived from psychological models of unemployment (rather than economic models) and take the form of instruments consisting of checklists for advisers to use during interviews. Screening instruments tend to produce ordinal measures of risk, that is they provide a ranking of risk rather than quantifying it. While screening instruments sometimes provide weights for risk factors, these too tend to be ordinal in nature (such as "risk factor A is more important than risk factor B"). Screening may, thus, allow advisers to conclude that one client with three risk factors faces greater barriers to employment than another with just one risk factor but it cannot say how much greater is the risk.

Formal screening of clients in the UK was not attempted until 2000 when the Client Progress Kit (CPK) was introduced for use on the New Deal. CPK was not used to assess clients at the start of their period of unemployment but was used at a later date to help advisers assess the needs of

people who had already become long-term unemployed. The CPK not only helped advisers to assess risk and need on entry to New Deal but by means of repeat use of the instrument it provided an indication client progress. Similar screening instruments are used in France (Copilote Insertion), Germany (Placement Characteristics), Portugal (Forecast Guide to the Difficulties of Insertion) and Denmark.

Profiling, like screening, seeks to identify people at risk but uses statistical techniques to quantify the impact of individual risk factors of such risk. Based on such models of risk, profiling allows the employment service to calculate the risks faced by individual clients (using the risk factors and associated weights applied to the individual case) and then, by combining the risk scores with a decision-making rule, to allocate clients to services. The use of profiling systems for allocating employment services in the UK is controversial and is not used. Other countries, however, have experimented with such systems and profiling systems are in use in the United State and Australia. Profiling is discussed in greater detail in the following sections of this report.

2.4 The growth of targeting in the UK

The degree of differentiation in Jobcentre Plus services has increased sharply in recent years. While benefit status and length of claim has always been an important factor in determining eligibility for Jobcentre Plus support, there has been a marked tendency in recent years to focus provision on specific groups of clients. Groups singled out include young longer-term unemployed (NDYP), long-term unemployed adults (ND25plus), people with disabilities (NDfD), lone parents on Income Support and unemployed people living in specific areas (Employment Zones).

In addition to the increased number of targeted programmes, there has also been an increasing emphasis on adviser discretion and flexible provision within programmes (Griffiths, Irving and McKenna, 2003). Personal Advisers now play a central role in determining the form of participation undertaken by participants on many different programmes. Jobcentre Plus advisers also have discretion to refer clients for early entry to programmes if the job seeker is deemed to be at serious disadvantage in the job market. ND25plus advisers now have access to an Advisers Discretionary Fund that (although modest) allows them to offer flexible and innovative forms of support to clients. Some recent pilot programmes also emphasise adviser discretion, for instance, the recent 'Tailored Pathways' pilot that allowed advisers on NDYP to construct individually tailored Option provision for their clients. The ultimate expression of the adviser-led model is the ONE pilot. Under this pilot, Jobcentre Plus provided a 'single gateway' or 'one-stop shop' point of entry for all people signing on for any benefit. New claimants were required to attend an interview with an adviser whose role was to determine the most appropriate form of provision for the new claimant. This included referral to targeted programmes as well as referral to other agencies if appropriate.

Several factors may explain why Jobcentre Plus services have increasingly been targeted on particular groups and even on specific individuals. First, it could reflect a better recognition that the needs and circumstances of individual job seekers are extremely varied and must be recognised in the form of support provided. It probably also reflects an awareness of the changes that have taken place in the composition of the unemployed population as general levels of unemployment have fallen. An increasing proportion of the unemployed are those who are often described as 'the hard to help'. This group faces serious barriers to employment and need a greater level of support than the average short-term unemployed client. Such support often has to focus on very specific barriers to employment (such as substance abuse or homelessness). Allied to both factors is an acknowledgement that broad eligibility rules and even targeted programmes may be very inefficient in resource terms. Some clients participating in programmes benefit enormously, but for others the programme was unnecessary while for others their needs were not fully met. While the resource costs of broad targeted programmes may be sustainable when general levels of

unemployment are low (or windfall tax gains are available to fund initiatives) such programmes may not be sustainable in the longer-term if unemployment levels were to rise.

The trend towards more and more individualised allocation to employment services raises an important but difficult to answer question. What is the most effective method of targeting Jobcentre Plus provision on clients? Are advisers able to achieve more effective outcomes than is achieved from simple eligibility criterion or more complex methods such as profiling?

3 PROFILING EMPLOYMENT SERVICE CLIENTS

3.1 Introduction

Statistical profiling is a method of assigning job seekers to employment services that is based on prediction. Decisions about the allocation of clients to services or programmes are informed by predictions of the outcomes that would occur in the absence of support or by predictions of the impact of a service or programme on a client if they were to participate in it.

The idea of using prediction as a basis for decision-making is not new, indeed it is as old as the insurance industry. Life insurance, fire, accident and many other types of insurance use actuarial assessments of risks (based on risk factors such as age, lifestyle, location, type of vehicle and so forth) based on large numbers of observations from the relevant insured population at risk. Other examples of the use of risk assessment and profiling can be found in relation to criminal profiling (people at risk of offending, or of re-offending on release from custody), financial profiling (risk of business failure) and health (risk of developing specific medical conditions).

Insofar as public employment services are a form of social insurance, it is surprising that the application of statistical profiling has not been more prominent. During the 1990s a number of countries experimented with profiling systems and two – Australia and the United States – have introduced fully operational profiling systems. This has prompted further interest in the potential of such systems to provide a basis for allocating employment services in the UK.

3.2 How profiling works

Manski (1999, 2001) has set out a framework for understanding and assessing various allocation mechanisms and Berger, Black and Smith (2000) utilised this framework to evaluate the profiling of employment services. As Berger, Black and Smith observed, statistical profiling:

> *"represents something of an intermediate case between deterministic rules and caseworker discretion. It attempts to finely differentiate among potential service recipients but in a deterministic way".*

Profiling systems seek to assess an individual's risk and allocate employment services on the basis of that risk assessment. The risk assessed relates to some profiling variable that could be an outcome (such as remaining unemployed) or an impact (such as helped to find a job). Targeting clients on the basis of outcomes emphasises equity objectives if those with the greatest risk of some adverse outcome (or least risk of some positive outcome) are given priority over other job seekers on the ground their need is greatest. Targeting clients on the basis of impacts emphasises efficiency if the resulting decisions allocate clients to services that will have the greatest impact upon them.

The factors associated with individual risk, and the weights to be attached to each risk factor, are determined by statistical analysis of data relating to previously observed behaviour. Once risk factors have been modelled, the results can then be applied to individual clients to assess their particular risk score. A decision rule is then applied (based on the risk score) to allocate the individual to employment services.

The potential advantages of profiling as an allocative mechanism for employment services include the following:

- it is objective method;
- it takes account of wider range of data than can eligibility rules;
- it considers each client individually;
- the process can be automated and can be cost effective.

The disadvantages of profiling include;

- the loss of idiosyncratic information;
- it may appear impersonal;
- there are likely to be high initial set-up costs.

For profiling to be used as an allocative mechanism, two key conditions must be satisfied. These are:

- it is possible to predict the profiling variable to an acceptable level of accuracy;
- there is a strong relationship between the profiling variable and the goal of employment services;

Statistical estimates of risk for individuals can only be made subject to some margin of error. The margin of error that is acceptable depends on the consequences of making a wrong estimate and is, ultimately, a matter of judgement. Moreover, since risk is a continuum (ranging from very probable to very unlikely), whereas the outcome or impact being predicted is often dichotomous (still unemployed or not, in a job or not), there will be some individuals for whom the prediction will be a close call. Setting a conservative standard for prediction will increase the accuracy of prediction amongst those who satisfied the criterion but may overlook many for whom the prediction was more marginal but, in the event, turned out to be at risk. Alternately, a more liberal criterion will reduce the predictive accuracy of the system but embrace more of those who actually experienced the outcome of interest.

Profiling uses variables such as the probability of remaining unemployed or the probability of being in a job to allocate clients to services. To use that probability as the basis for allocating employment services implicitly assumes that there is a strong relationship between the profiling variable (risk) and the benefits of targeting services on clients at risk (improved outcomes or improved impacts). For instance, to use the risk of becoming long-term unemployed as a basis for allocation to services implies that those at risk have a greater need of support and will benefit more from support than other job seekers. Should it be the case, for instance, that the needs of those at risk were no different to other clients or that the impact of a programme was the same no matter who participated, there would be little gain from profiling.

A further issue arises from the distinction between the effectiveness of profiling and the effectiveness of employment services. These two matter are different. Profiling is effective if it allocates clients closely according to their needs and/or the greatest impact. Programmes and services are effective if they attain the greatest possible impacts. Thus profiling might be effective at allocating clients to an ineffective service or, alternately, might be inefficiently allocating clients to a very effective service. Where profiling manages to efficiently allocate people to effective services the impact of services and programmes can be expected to be maximised.

3.3 Profiling in practice

The use of profiling systems in employment services is most highly developed in the USA and much of the empirical evidence relating to profiling is thus derived from that country. Australia has also developed a profiling system as part of its employment services, while other countries have experimented with profiling prototypes or pilots and these too provide evidence relating to profiling.

Worker profiling in the USA

Since 1993 each US state has been required by law to implement its own Worker Profiling and Reemployment Services (WPRS) system that would identify Unemployment Insurance (UI) claimants likely to exhaust their benefit entitlement[3]. By 1995 all states had operational WPRS systems in place. Although some states opted for a screening approach, most adopted a statistical profiling method (Eberts and O'Leary, 1996). Using historical data, each state developed models of UI benefit exhaustion, initially based on five sets of variables: education, job tenure, change in employment in previous industry, change in employment in previous occupation and local unemployment rates (Kelso, 1998). These models have been developed further since their introduction (Black, Plesca, Shannon and Smith, 2003). Application of the profiling model to new claimants provides estimates of client exhaustion probabilities by which clients are ranked, from high to low, to provide a basis for referral to reemployment services. The US Department of Labor (1994) has recommended that advisers work with referred clients to develop an individual service plan drawing on a comprehensive set of reemployment services. Thus, in the case of WPRS, profiling is used to identify clients for 'treatment' but the system still relies on the expertise of advisers to allocate clients to the right reemployment service.

In addition to the WPRS system, profiling has also been used in the context of a number of other programmes. Self-employment services are also targeted on UI clients identified by WPRS, although only a handful of states have developed such self-employment services and the number of clients taking up such services has been small (Messenger, Peterson-Vaccaro and Vroman, 2002)). Profiling has also been used in connection with Reemployment Bonuses (O'Leary, 1998: O'Leary, Decker and Wandner, 2002: O'Leary, Decker and Wandner, 2003). Reemployment Bonuses (a lump sum payment if a worker returns to work within a short period of time and remained in employment) were targeted on those UI claimants identified as most at risk of exhausting their benefit. Profiling was also used in an experimental way as part of the US Welfare–to-Work (WTW) programme. Based on a statistical model of employment entry and retention, the Work First Profiling Pilot used profiling to decide which welfare recipients (mainly lone parents) should receive particular WTW services (Eberts, 2002). In a similar application of profiling, the feasibility of targeting job retention services on welfare recipients was examined by Rangarajan, Schochet and Chu (1998).

Possibly the most ambitious profiling pilot in the US has been the development of the Frontline Decision Support System (FDSS). Under the 1998 Workforce Investment Act, states were obliged to establish one-stop careers centres by 2000. One-stop centres were to provide a single location for the providers of various employment services. Within the one-stop centres, normal programme eligibility rules were relaxed so that clients faced a wider range of possible services than would previously have been the case. This posed a major challenge for front-line staff who, with limited resources were now expected to make referral decisions for a large volume of clients across a wide range of provision. To assist frontline staff in this task, the FDSS was developed on a prototype basis in Washington and Georgia (Eberts and O'Leary, 2002, Eberts, O'Leary and DeRango, 2002)).

FDSS consisted of two modules. The first was a systematic job search module that provided labour market information in a systematic manner to help in the job search process. This included information on current job vacancies and the prospects for reemployment jobs and earnings. The second module was a service referral system. The purpose of this element of FDSS was to identify the sequence of activities that most often led to reemployment. The module was based on two elements. First, a model was developed to estimate employment probabilities. Second, a set of paths, or combinations of services, that led to successful outcomes for particular employability

[3] UI benefits are strictly limited to a 26 week period after which time they cease.

groups was identified. The profiling model was applied to each client and his or her probability of entering a job was estimated. Entry to any particular sequence of activities was then conditional on the estimated employability score. Significant differences were identified in the effective sequences for different employability groups. To ease the use of FDSS, the whole system was automated and administered at the start of any period of benefit, downloading data from administrative systems as well as using information provided by the client. Despite the considerable investment in FDSS, the Georgia pilot was terminated in early 2003 but the reasons for this are not yet clear.

Jobseeker classification in Australia

The Commonwealth Employment Service in Australia introduced a two stage profiling system in 1993. All new unemployment benefit claimants were initially screened using a Jobseeker Screening Instrument (JSI) and those identified as being at risk of long-term unemployment were then referred to caseworkers who used a Client Classification Levels Questionnaire (CCLQ) to identify the level of support required. A revised form of profiling called the Job Seeker Classification Instrument (JSCI) that combined the SCI and CCLQ was introduced in 1997, coinciding with major reforms in the responsibility and operation of employment services in Australia[4]. A further version of JSCI was introduced in 2003 to reflect the changes introduced into Australian employment services under the Active Participation Model (APM)[5].

One of the key features of the APM is a commitment that the level of assistance provided will be based on need. Need is seen as linked with unemployment duration and, consequently, the level of support increases with unemployment duration. Jobseekers can receive Intensive Support services after three months unemployment. The role of JSCI is to identify where each individual job seeker should start of the continuum of available services. Those identified by JSCI as being at 'a disadvantage' in the job market are referred to customised Intensive Support (the most intensive level of employment assistance). Job seekers identified as being 'highly disadvantaged' will receive customised Intensive Support immediately and may trigger a JSCI Supplementary Assessment designed to identify people with severe, multiple or non-vocational barriers to employment).

JSCI is used by Centrelink (the public employment service agency) at the time when job seekers first register for benefit. Clients answer a standard set of questions and an employability score is calculated from this information. The information required and the weights attached to each were derived from a statistical model of the likelihood of becoming long-term unemployed. The early version of JSCI used 18 factors, including unemployment duration, to determine the JSCI score. The 2003 version uses 14 factors, excluding unemployment duration from the instrument since the level of support for clients under APM is automatically based on unemployment duration. It should be noted that only seven of the risk factors were derived from statistical modelling. Some factors in the modelling with little impact on employability were excluded from JSCI while additional risk factors (not covered by the data from which the model was estimated) were added on the basis of subjective professional judgement. JSCI is thus a hybrid instrument based partly on statistical findings and partly on *a priori* judgement. Nevertheless, once set in operation, JSCI is applied systematically and is repeated at intervals in order to assess any change in job seekers circumstances.

---

4 These reforms placed overall responsibility for 'employment services' in a national agency, Centrelink, while much of the provision of such services was shifted to the Jon Network, a network of local private and voluntary sector organisations.

5 The Active Participation Model is a 'jobs first' type initiative somewhat akin to New Deal. It emphasises the obligation of job seekers to actively seek work in return for which Job Network provide a range of enhanced services.

Service allocation in Canada

The Service Outcome Measurement System (SOMS) operated in Canada between 1994 and 1999. SOMS offered a support system for advisers and other frontline staff. Frontline staff retained discretion over referral to services and were not obliged to use the SOMS system. SOMS was based on analysis of outcomes from different programmes. Using a range of client characteristics (such as personal and demographic characteristics, local labour market conditions) the probabilities of various outcomes in different programmes were modelled. This provided a profiling system by means of which advisers could identify the most likely outcomes from various programmes or services for a client with a particular set of characteristics.

The SOMS profiling model was derived from analysis of outcomes from a database covering all persons unemployed between 1987 and 1994. This database eventually proved the undoing of the system. Developed by merging 19 different data sources, the Longitudinal Labour Force File on which SOMS was based was ordered to be destroyed by the Privacy Commissioner in 2002 as being in violation of Canadian law on privacy. It was also the case that the system met resistance from advisers as it was introduced at the very time that the Canadian employment service was restructuring and announcing large-scale redundancies. An account of the Canadian experience can be found in Colpitts (2002).

Profiling the unemployed in other countries

A number of other countries have experimented with some form of profiling as a means to target employment services, although none has done so on the scale of Australia and the USA (PLS Ramboll,2001). In the Netherlands the public employment service use an instrument called the Kansmeter (the chance meter). This instrument is used in conjunction with adviser judgement. On registration, clients are classified by advisers into one of four categories reflecting employability. The Kansmeter was an instrument to assist advisers make this classification and was based on an econometric model of the probability of becoming long-term unemployed. Based on answers to questions at the initial interview, an adviser can score a client's probability of remaining unemployed and take that into account when making their assessment and referring to services.

A number of other countries have either tested or envisaged the use of profiling to target employment services. A European Commission funded pilot programme has recently operated in Germany (Rudolf and Muntnich, 2001). In Korea, a profiling instrument based on the probability of becoming long-term unemployed is used to provide information on clients to assist caseworkers. Denmark, Finland, France, Ireland, Mexico, New Zealand and Sweden are all reported to be considering statistical systems for allocating clients to services (Frolich, Lechner and Steiger, 2003).

4 HOW EFFECTIVE IS PROFILING?

4.1 Passing judgement on profiling

This chapter considers the empirical evidence relating to the effectiveness of profiling. Any such judgement must refer to the goals of an employment service (Berger, Black and Smith, 2000). Where those goal are merely to provide a basic minimum service (a safety net) available to all, then any method of targeting, including profiling, would be unnecessary. However, public employment services generally aspire to more than providing a common minimum service and most seek to supply employment services according to need. Some form of targeting of services is appropriate if:

- there are differences in the needs of clients, and;
- it is possible to accurately identify the needs of clients.

Efficiency (in terms of having an impact on clients) in the delivery of services is also an important goal. Efficiency can be increased by targeting services on clients if:

- different programmes have different impacts on clients, and;
- it is possible to accurately identify which services clients should receive for maximum impact on their chances of entering work.

These considerations provide a basis for assessing any form of targeting mechanism including statistical profiling. Nonetheless, positive evidence relating to these matters would not be sufficient on their own to demonstrate that a profiling system should be adopted. It would also be necessary to demonstrate that any matching of client to services could not be better achieved by some other method (such as adviser guidance). Reversing the argument, even if the evidence on profiling were to indicate that it was prone to error, this does not mean that profiling should be rejected out of hand since the alternatives could be even more error prone.

Practical issues must also be considered. Even if a good adviser outperforms a profiling system in an objective test, the realities at the frontline may prevent advisers from performing to their full potential. Profiling systems offer less scope for judgement and human error than does a system based on wholly on personal advisers. Both advisers and those operating a profiling system can 'cut corners' because of pressure on resources and staff time, but when this happens with profiling, it is more difficult to deny that such a failure is taking place.

4.2 Evidence from the UK

There is ample evidence from the UK that benefit recipients and job seekers vary greatly in terms of their needs, and that some clients gain more from some services and programmes than others. The policy response to this diversity has been to offer increased flexibility within programmes and to enhance the role of personal advisers who can provide an individualised service (Griffiths, Irving and McKenna, 2003). Evaluation of New Deal has highlighted the crucial role of advisers in the success of those programmes (Hasluck, 2000). In the light of this, it is important to distinguish those aspects of the adviser role that are 'diagnostic' and those that constitute a treatment in their own right. Much of the positive evidence relating to advisers on New Deal and other programmes relates to the high levels of contact, the continuity of contact and the levels of encouragement and motivational support provided by personal advisers. Indeed, the mere 'threat' of diagnosis and referral to services may form a treatment leading to job entry. For instance, exits from ND25plus increase shortly before clients are about to be referred to the Intensive Activity Period (Hasluck,

2002). This effect could be just as true of other forms of assessment and referral, such as profiling (Black, Smith, Berger and Noel, 2003). This creates a further difficulty for the evaluation of the effectiveness of advisers and profiling as an allocation mechanism.

Adviser discretion

Programme evaluations have raised concerns about the effectiveness of an advisory system. For instance there have been variations in adviser practice (such as needs assessments) across Employment Service/Jobcentre Plus offices (Molloy and Ritchie, 2000). In some cases advisory interviews were found to be short and very general in nature. Many clients on New Deal for Lone Parents felt that their interview was not the right time to discuss work or training. Often advisers felt that the interview was not successful because they had been unable to identify clients likely to need special support in advance of the interview (Coleman, Rousseau and Kennedy, 2002). While advisers were aware of the need to refer clients to more specialist advice, this often did not happen. Despite claiming to offer individualised advice and guidance, many advisers do, in reality, use 'ad hoc' classifications of clients. An example is the 'motorway' system used by some providers of Employment Zones where clients in the fast lane (the job ready) have weekly meetings, those in the middle lane have fortnightly meeting to improve their motivation while those in the slow lane (the hard to help) have minimum contact (Joyce and Pettigrew, 2002). Despite the use of such ad hoc classification systems, advisers admitted they often misjudged clients. Advisers also seem averse to using some of the tools available to them to help identify client needs. Generally advisers hold negative views of the CPK and many do not use it (Joyce and Pettigrew, 2002: Hasluck,2002). In part the reaction of advisers to the CPK is part of a general sense that advisers have that they do not have time to undertake their jobs properly, sometimes because of high caseloads and because of high administrative burdens associated with adviser work (Joyce and Pettigrew, 2002).

While there is evidence that the advisory system in the UK could be more effective, there is no direct evidence relating to the effectiveness of adviser decisions on the matching of clients and provisions. Some clue to adviser effectiveness may, however, be implicit in the e valuation of the ONE service. ONE brought together the Employment Service, local authorities and the Benefits Agency to offer advice on benefits and work in one location. To qualify to benefits, claimants were obliged to attend a work-focussed interview. The aim of ONE was to provide a single 'gateway' for all new benefit claimants who could then be assessed and directed to the services, programmes or benefits they required, unhindered by former departmental boundaries and programme eligibility rules. If adviser discretion was to be effective, the ONE pilot should demonstrate it. In fact, evaluation of ONE has failed to find any impact on the transition from welfare to work for any of the main client groups involved (Kirby and Riley, 2003).

Statistical profiling

In the light of mounting evidence that adviser discretion may not have been as effective as commonly believed, it is not surprising that interest in profiling as a means to achieve a more effective employment service has emerged again. However, until recently there was little official support for profiling. This was because the consensus view, based on a small but persuasive evidence base, was that profiling had 'fallen at the first hurdle' in the sense that serious doubts existed about the ability of econometric models to identify those clients who were at risk of long-term unemployment with sufficiently accuracy that employment services and clients could be matched on the basis of such predictions.

Payne, Casey, Payne and Connolly (1996) concluded that it was feasible, in principle, to predict which clients were at risk of long-term unemployment and the overall error rate was within acceptable bounds. Despite this they expressed concern about the distribution of errors in predictive models. Particular concern centred on the large proportion of errors that would involve clients who did not require additional support being referred for assistance. This would

unnecessarily increase the resource cost of employment services (usually referred to as 'deadweight').

In 1994 the Employment Service set up an Early Identification Pilot project in seven Jobcentre offices. At the outset of the pilot, the probabilities of clients remaining unemployed after 12 months were estimated. This model was then used to identify those at risk amongst a particular cohort of new benefit registrants. By tracking members of the cohort and comparing the predictions with actual outcomes at 12 months, the accuracy of the predictions were established. When the comparison was made, it was concluded that the degree of error was too great to justify prolonging the study (Gibbins, 1997). Wells (1998) reached similar conclusions.

More recently, the Department for Work and Pensions (DWP) undertook an evaluation of the Client Progress Kit. Using a sample of CPK cases obtained in 2001, it was concluded that there were significant differences in the outcomes of clients who scored 'high' on employability and the outcomes of those who scored low on the CPK. One of the more interesting findings was that clients with a low CPK score were less likely (as were those with a high score) than clients with intermediate scores to be offered support and other provision (James and Brennan, 2002).

Faced with this fairly negative picture, it might appear that there is little scope for profiling in the UK. Nonetheless, a recent study has opened up the debate again (Bryson and Kasparova, 2003). This study was commissioned by the Department for Work and Pensions in order to explore the potential of statistical profiling for allocate work-focussed interventions with its three main client groups: JSA claimants, the sick and disabled and lone parents. The study focussed on the issues of whether it was possible to accurately profile clients and examined a number of technical issues associated with that question. These issues included the data requirements of profiling, the selection of variables, the functional form of the predictive model and the sensitivity of the profiling instrument to changes in these factors. The study did not tackle the issue of how clients should be allocated to programmes.

The Bryson and Kasparova analysis used the ONE dataset[6] which is 'rich' in terms of the range of variables it contains. The models estimated the probabilities of three outcomes. These were: being out of work in 12 months time, claiming out-of-work benefits a year after first claiming and the percentage of time claiming out-of-work benefits over a period of 30 months. Unusually, the profiling exercise did not just cover job seekers but also considered lone parents (actually, lone mothers) and sick and disabled people. The study examined a range of profiling options, in terms of three different levels of detail in terms of explanatory variables, three different profiling variables and three different client groups. The study concluded that the accuracy of profiling models depended on a range of factors. These included the distribution of the outcome variable, the proportion of the client group eligible for 'treatment' and the range of variables available to predict outcomes. The functional form and estimation methods appeared less critical.

The Bryson and Kasparova study concluded that it was possible to produce acceptably performing predictive models of client outcomes (although the definition of what is acceptable is necessarily arbitrary). Their models performed well because they were based on good quality data and covered a wide range of relevant explanatory variables. Separate models for different client groups performed better than when all clients were merged into one group.

Bryson and Kasparova concluded that their predictions of benefit status and benefit claiming based on profiling were more accurate than would have been achieved by randomly guessing at client outcomes. They admit this was a weak conclusion, since the study can say nothing about whether a

[6] ONE was a pilot programme in which brought together the Employment Service, Local Authorities and the Benefits Agency to offer advice on benefits and work in one place. People of working age had to participate in a work-focussed interview to qualify for benefit payments.

better than random, and possibly better than profiling, set of predictions could have been arrived at in some other way, for instance by adviser judgements or even with the CPK. Moreover, despite the overall good performance of the predictive models, the errors in prediction were not trivial and deadweight (treating those who had no need of it) and failing to treat some who did need support, could be significant in any operational profiling system. It is important to recall that all methods of allocating employment services to clients carry the risk of misdiagnosis. The relevant issue is whether the errors are any greater under profiling than under adviser discretion or broad eligibility rules.

4.3 Evidence from other countries

The previous chapter described the use of statistical profiling systems in other countries. What evidence does such experience provide about the effectiveness of profiling? The two leading users of statistical profiling systems are Australia and the USA. While not conclusive, it is indicative that both countries have consolidated their profiling systems since introduction and not retreated from them. The implication is that they have concluded that profiling systems work and are effective. For instance, the Australian Department of Employment, Workplace Relations and Small Business conducted a post-implementation review of JSCI in 1999 and concluded:

> *"JSCI was successful in identifying the relative disadvantage of job seekers and identifying job seekers for placement in employment services".*

In 2002 the Australian Productivity Commission conducted a review of the Job Network and recommended the continued use of an evidence-based profiling instrument such as JSCI. Canada, of course, provides a counter example, in that the SOMS system was abandoned after a short period of operation. In this case, however, the reasons for abandonment appear less related to the accuracy or effectiveness of the system but to serious problems of implementation and the legality of access to the necessary data.

Profiling to identify those at risk

The long history of profiling in the USA means that there is considerable evidence relating to such systems in practice. As early as the 1980s, Elwood explored the possibility of using statistical instruments to identify people at risk of being long-term welfare recipients (Elwood, 1986, cited in Eberts, 2002). Using claimant characteristics and their previous employment and welfare histories as predictors, he concluded that the effectiveness of welfare programmes would be improved if welfare services were targeted on claimants with particular characteristics. Gueron and Pauly (1991) concluded, after looking at a range of programmes, that impacts not only differed across participants but were greatest for the most disadvantaged. This implied that if services or programmes could be focussed on the most disadvantaged, there would be net gains to the employment service.

Evaluation of the WPRS system in the US Department of Labor indicated that the system of profiling worked well in terms of identifying those in greatest need of reemployment services. Evaluation of WPRS in New Jersey and Kentucky found that those who were profiled and referred to services spent less time on unemployment insurance, had lower rates of benefit exhaustion, enjoyed increased earnings and increased the amount of reemployment services received (U.S. Department of Labor, 1997, Dickinson. Decker and Kreutzer, 2002). Some implementation problems have been reported and Dickinson, Decker and Kreutzer noted that in some states frontline staff were not carrying out the profiling processes as intended (either through errors or ignorance of the goals of WPRS) while other states had failed to update their profiling models. They also noted that the range of reemployment services available in some states was limited. This made any customisation of service provision to client need more difficult (compared to states where there was a wide range of provision). As the result, Dickinson et al recommended that states engage in continuing quality assurance and monitoring as well as regular updating of models in order to maintain the effectiveness of the system.

Berger, Black and Smith (2000) offer a less positive assessment of WPRS, concluded that many state WPRS profiling systems were very poor at predicting the profiling variable. In most cases this was attributable to a lack of covariates in the profiling model and where adequate models had been developed, such as in Kentucky, statistical profiling gave good predictions of employability. Nonetheless, when Berger, Black and Smith re-examined the evidence from Kentucky they concluded that even when predicted employability was accurate, there was no evidence that employability scores and programme effects were related. In this case profiling had accurately identified needs but had failed to lead on to an efficient allocation to services. This was possibly because advisers allocated those at risk to services and employability scores formed little part in that allocation process. In a later paper, Black, Smith, Berger and Noel (2003) repeat the finding that there was little relationship between employability scores and estimated programme impacts. They attribute the gains from profiling on WPRS as the result of the 'threat' of referral to reemployment services rather than to the reemployment services themselves.

A somewhat more positive assessment comes from the evaluation of the Targeted Reemployment Bonus pilots. Under this pilot a bonus payment was made to an unemployment insurance claimant if they returned to employment within some stipulated time and remained in work for a further period. The problem is that such a bonus would contain a large deadweight element if offered to all claimants since many would have left unemployment quickly in any event. Such deadweight could be reduced by targeting the bonus on those who were predicted to exhaust their benefit and, thus, were unlikely to have left unemployment at an earlier stage in the absence of the bonus payment. O'Leary, Decker and Wandner (2003) provide evidence that targeting the reemployment bonus in this way improves the cost-effectiveness of the programme. They also examined the interaction between targeting thresholds and the level of bonus. They concluded that the most cost effective bonus was a low bonus with a long qualification period, targeted on the half of profiled clients most likely to exhaust their benefits. The effectiveness of this example of profiling may well reflect the fact that the profiling process leads only to a simple decision of eligibility (for the bonus) or non-eligibility.

Profiling and the allocation of services

Where profiling has been allied to allocation to programmes and services, more positive findings have emerged. Eberts (2002) found efficiency gains from profiling in the Work First Profiling Pilot programme. In this pilot (which ran between January 1998 and March 2000) a statistical assessment and referral system was used to assist local welfare-to-work programme staff target services more effectively to help welfare recipients find work. At the start of the Work First programme an employability score was estimated (referring to the ability of the client to find and retain a job) and this score used to refer clients to service providers offering services that best matched the need of the client as indicated by the employability score.

The pilot was evaluated using a random assignment model. The control group was randomly assigned to service providers without regard to their employability score. Members of the treatment group were allocated to service providers on the basis of a prior determination of which provider and service was most beneficial for different levels of employability. The evaluation found that when clients were referred to service providers in accordance with their employability scores, the overall effectiveness (in terms of job outcomes) of the Work First programme was increased (relative to the randomly assigned control group). Ebert concluded that when the optimal referral rates were based on the statistical assessment instrument, job retention rates were raised by 25 per cent compared to the randomly assigned group. The overall conclusion of the Work First Profiling Pilot was that it had demonstrated that statistical assessment could be effective when integrated with an existing system of programme delivery.

Plesca and Smith (2003) also examined the use of profiling to allocate clients to services and participation in programmes. They point out that profiling for allocation to services can be carried out at different times for different reasons. If the goal is to treat all of a population who would

benefit, then profiling should take place at the start of a period of unemployment or welfare claim to identify that population. Alternately, if the goal is to fill a programme to some resource determined capacity then profiling could be used to identify those who would benefit at the point at which they become eligible. The study used experimental data collected as part of the evaluation of the National Job Training and Partnership programme (NJTP) to profile individuals and forecast their potential gains from participation in the NJTP programme. Based on those estimates, individuals were then allocated to participation or non-participation in NJTP and the impacts reassessed on the basis of this hypothetical allocation. The study concluded that allocation to the NJTP programme would have been more effective had allocation been on the basis of the profiling procedures developed. This improvement in performance would have arisen because more of those who would benefit from the programme would have been allocated to it. Plesca and Smith recognised that some of their results, while economically significant, were not statistically significant. They attribute this to the small samples involved in the estimations and argue that this is a common problem facing most evaluations and should not detract from their general conclusions.

A similar conclusion was reached by Frolich, Lechner and Steiger (2003) who looked at the potential for profiling job seekers in Switzerland. Their approach did not involve the estimation of individual risk or employability but, instead, examined historical data on employment service clients, services/programmes and outcomes in order to identify hypothetical or 'best' outcomes on an individual basis. A hypothetical outcome can be defined as the best outcome that could have been achieved for a client having specific characteristics and given the available set of services/programmes. Using the predicted 'best' outcome as a decision rule for allocating clients, all individuals in the dataset were reallocated to the service/programme that was predicted to achieve the best outcome (irrespective of how they were actually allocated). Comparison of actual outcomes (from the actual allocation to services) with hypothetical outcomes from a targeted allocation (and a random allocation) proved a measure of the potential efficiency gains from profile based targeting of clients.

The Frolich, Lechner and Steiger study concluded that if job seekers had been allocated according to predicted outcomes, their reemployment rate after 12 months could have been 57.5 per cent rather than the 49.8 per cent actually observed. Intriguingly, there was little difference between the reemployment rates hypothesised from a random assignment of clients to programmes and the actual reemployment rate observed. Since the actual reemployment rate was the product of an almost exclusively adviser-based system of allocation to programmes, it is tempting to conclude that these finding indicate that the performance of advisers was no better than a random assignment to programmes. If so, the study provides, perhaps for the first time, direct evidence that statistical profiling could outperform advisers in practice.

Lechner and Smith (2003) agree that Swiss caseworkers were not very effective at allocating their clients to services, achieving no better outcomes than would have been achieved by a random allocation of clients across available services. They suggest this could be because caseworkers lacked the skills or knowledge to achieve an efficient allocation, because caseworkers had different goals than efficiency (such as allocating the most expensive services to the least well-off clients) or due to administrative. They argue that if clients had been allocated to the service giving the greatest impact, the post-programme employment rate would increase by 14 percentage points. The Swiss evidence is consistent with other evidence relating to caseworker and adviser decisions. Frolich, 2001) applied targeting rules to data from Sweden and found large impact gains relative to caseworkers. Bell and Orr (2002) cite a study in which caseworkers were asked to make prior assessments of mothers on welfare and predict who would benefit most from the Homemaker-Home Health Aide programme. These welfare mothers were then randomly assigned to the programme. Subsequent analysis of outcomes indicated that the caseworker prior assessments bore little relation to the actual outcomes on programmes.

5 CONCLUSION AND NEXT STEPS

5.1 Main conclusions

The review of research literature relating to the targeting of employment services indicates that there is great diversity amongst people seeking employment. They differ greatly in terms of their personal characteristics, their human capital, the context within which they are seeking work and the level and form of barriers to entering a job. Correspondingly, not all job seekers need the same type or level of support to obtain work nor will they benefit equally from referral to any particular employment service provision or programme. For this reason most public employment services seek to target their provision. In the main they seek to provide the most support for those who have the greatest need (in terms of facing the greatest difficulties in obtaining employment). Equally important, resources need to be targeted in order to maximise the impact of provision. By referring those who benefit most from a particular service, the overall impact of programmes can be increased. There may be trade-offs between the two goals of equity and efficiency, depending upon the social goals of the employment service.

A variety of methods have been used to allocate clients to services and programmes. The most commonly used are administrative rules (using a small number of eligibility criteria) and adviser discretion (using the subjective judgement of advisers to assess client need). The effectiveness of both methods has been called into question by recent evaluation evidence. Administrative rules can fail to differentiate sufficiently between clients, while adviser discretion is open to challenge on the grounds of inconsistency and lack of accuracy. Indeed, there is a growing body of evidence to suggest that advisers or caseworkers have been no more effective at placing clients into the most suitable provision than a random assignment of clients to services. Statistical profiling represents a different method of allocating employment services to clients. Profiling is a systematic process that uses client characteristics to identify the most appropriate provision for any particular client. Profiling represents a position somewhere between broad administrative eligibility rules and the individualistic approach of adviser judgement.

Profiling has not been used to any great extent in the UK but is part of the mainstream operation of employment services in the USA and Australia and has been experimented with in a number of other countries. The only operational example of profiling in the UK is the Client Progress Kit (CPK) that was introduced in 2000 for use on New Deal programmes. Statistical modelling of the risk of long-term unemployment has been attempted in the UK but such studies have generally concluded it was not possible to accurately predict which clients were at risk. A recent study of DWP clients has reopened the debate by demonstrating the feasibility of identifying clients at risk of long duration benefit claims with an acceptable level of accuracy. This improvement resulted primarily from the quality of the data used in the profiling exercise, as well as the differentiation of client groups (with separate models for JSA clients, the disabled and lone mothers).

To date, the evidence relating to statistical profiling in the UK has not provided strong enough support to justify introducing systems of decision-making in practice. This situation is now changing. Not only is the new UK evidence persuasive, but there is mounting evidence of the potential benefits of profiling systems from other countries, particularly the USA and Australia, both of which now have operated such systems for several years. The continuing commitment in these countries to develop and improve their profiling systems is implicit testament to a belief in their effectiveness. Moreover, research evidence from these countries strongly suggests that it has been possible to construct statistical profiling instruments that produce predictions to an acceptable standard of accuracy and create gains in terms of outcomes. These profiling instruments work best

when they make full use of available information (good quality data with all the key variables represented in the predictive model). US experience in the practical implementation of such profiling systems is also important. This experience points to the need to ensure that frontline staff actually operate such systems as intended. This experience also suggests that it is necessary to take steps to assure the quality of the profiling models over time in order to maintain their relevance and effectiveness. Profiling models also work best when they are used to target services based on evidence of impacts rather than just the identification of need.

Having said all of this, it must be borne in mind that the empirical evidence from the USA and elsewhere relates to different social and political contexts. Even if the evidence in favour of adopting a statistical profiling system in the UK were overwhelming, which it is not, the task of designing and implementing such a system in Jobcentre Plus would be a substantial one going far beyond the technical issues of designing a profiling model. Nonetheless, the accumulating evidence does suggest that there are potential gains from some form of profiling system and it would be unwise to reject such a development out of hand. Further investigation in the UK context is required. To this end, two projects are proposed that would add to the knowledge of the gains from profiling in the UK context. It should be noted that there is no evidence relating to the use of profiling as a mechanism for allocating clients to programmes or services in the UK; all previous studies have focussed on identification of need (time spent on benefit, likelihood of leaving unemployment etc.) The first proposal involves a re-examination of historical data. The second would involve a field test of profiling-led allocation for efficiency.

5.2 Gathering more evidence

In order to advance knowledge of profiling in the UK context, two projects could be considered. These are:

- a 'simulation' project to identify the extent to which there would have been efficiency gains from a profiling system had it operated in the past. If gains of this type can be demonstrated, then there would be a better case for thinking that the future performance of Jobcentre Plus could be improved by adopting profiling methods. If the evidence were persuasive enough, there might be a case for embarking on a feasibility, or design study and, eventually, to testing profiling by means of a pilot or prototype system.
- a profiling field experiment. This would involve the selection of a Jobcentre Plus programme and the use of different allocation mechanisms in a controlled experiment.

These possible next steps are described in more detail below.

A simulation exercise

The approach suggested follows that of Frolich, Lechner and Steiger (2003) and provides an examination of the potential outcome gains from a targeted allocation of clients to services. The exercise requires an examination of historical data on clients, services/programmes and outcomes. Such data would be used to identify hypothetical 'best' outcomes for individual clients. A hypothetical outcome can be defined as the best outcome that could have been achieved for a client having specific characteristics and given the available set of services/programmes (and historical evidence of programme outcomes).

Hypothetical outcomes can be estimated from a set of predictive models estimated from data for each service/programme, covering client characteristics, employment services used and labour market status. For each client with a set of specific attributes there will be a corresponding set of potential outcomes (or programme impacts). On the assumption that any targeting system should allocate clients so as to achieve the 'best' outcome, all individuals in the dataset can be reallocated to the service/programme that is predicted to achieve their best outcome (irrespective of how they were actually allocated). This then provides three sets of outcomes as follows:

(1) actual outcomes from an actual allocation;

(2) hypothetical outcomes from a (hypothetical) targeted allocation;

(3) actual outcomes from a (hypothetical) targeted allocation.

Comparison of these outcome sets provides evidence of how successfully the targeting process would have operated. Thus, comparison of (2) and (3) provides a measure of the accuracy with which the profiling system has predicted outcomes; comparison of (1) and (2) measures the extent to which clients were not allocated (in actuality) in a manner that reflected their best chances of a successful outcome; comparison of (1) and (3) measures the gains from allocating clients according to their chance of a best outcome, i.e. the gains from targeting services/programmes. Other reallocations could be undertaken, for instance, clients could be randomly reallocated to services/programmes. In this case a set of outcomes would be described that would have occurred had no effort been made to allocate clients to the best or most appropriate services/programmes. The benchmark for comparison could thus be, either, targeting versus no targeting, or targeting versus the prevailing adviser discretion/rules mix.

The project would have to address a number of methodological and practical issues. First, all statistical profiling models require large volumes of good quality data. A suitable dataset would be required and it should be noted that such a dataset requires not only information on client characteristics (age, sex, marital status, educational level/qualifications, occupation and industry of last job, unemployment history etc.) and benefit status (at some time, say 12 months after the start of a claim) but also requires data on the services/programmes received by each client in order to identify the outcomes for each client on each service/programme. A further factor to consider is whether the simulation should use the very best available data even if such data would not be available in practice for a future profiling and targeting system. Insofar as the model is seeking to estimate the potential gains from targeting, it seems most appropriate to use the best available data possible, since if no evidence of gains is visible even using the best data, then the case for a practical system using a more limited set of data is non-existent.

There are also definitional issues, such as what constitutes a recognisable employment service or programme. Allied to this issue is the fact that Jobcentre Plus clients often receive 'bundles' of services rather than a single form of provision. Some method will need to be used to cope with this, for instance identifying common but distinct bundles of services used by clients. Outcomes also need to be defined. On the assumption that the prime aim is to place clients into a job, a successful outcome or impact can be defined in terms of job entry. However, this must be further refined in terms of the time period concerned (in a job 12 months after signing on, in a job 6 months after completing the last employment service etc). Other successful outcomes might also be considered although some may be difficult to measure. For instance, a successful outcome could be defined not just in terms of job entry but also in terms of sustainability (remaining off benefit for at least 13 weeks). A more conservative definition of a successful outcome could simply be (the inverse of) time spent on benefit.

A simulation exercise of the type outlined will present some challenging estimation issues. The definition of a successful outcome will largely determine the nature of the dependent variable in the analyses. 'In a job at 12 months' would require a binary dependent variable (and associated estimation techniques such as probit or logit). However, evaluation of profiling indicates that models can predict more accurately when the dependent variable is a continuous one, such as time on benefit or weeks of JSA claim in a 12 month period (Black, Smith, Plesca and Shannon, 2003). The choice of dependent variable will be important. By far the most challenging estimation issue arises from the fact that the actual composition of clients on services/programmes was not the result of a random process but was the result of a combination of eligibility rules and adviser guidance. It will be necessary to correct for this selection bias in participation in services. There

are a number of econometric techniques that may be employed to deal with this issue. As this simulation project is essentially a 'desk-based' study it could be started immediately.

A field experiment

The second step is a longer-term prospect. It would involve a test of profiling in the field. This would not be a pilot, in the sense that the exercise would fall short of designing a profiling system with all that such a system would entail. What is proposed is an experiment that would require the co-operation of operational and programme staff to test profiling in the field against existing allocation mechanisms.

The approach taken could be similar to that taken by Eberts (2002) for the Work first Profiling Pilot. This approach would first identify a programme offering a number of different services or provision to participants. With the co-operation of all concerned with the programme, an element of profiling would be used to allocate participants to these services. This profiling method would be applied to a 'test'group' while a randomly selected control group would be allocated in some other way (a random allocation to services or individual adviser-led). Such an experiment could form part of the evaluation strategy of a new initiative. Alternately, an existing programme that has already been evaluated using a random assignment design could be used. Profiling and other allocation mechanisms would then be applied to that programme. The original (random assignment) evaluation results would provide a baseline measure of impact on clients while the results from profiling or adviser-based allocations would test the 'value added' by targeting.

To profile the test group it would be necessary to develop a profiling instrument based on past outcomes from similar client groups and services. This might be statistically based, draw on the CPK or even use prior assessment. However, once the profiling criterion are determined, they must be applied strictly to allocate programme participants to different services in a manner intended to allocate individuals to those services that would have most impact.

This field experiment would achieve several objectives. It would provide robust evidence of the effectiveness of targeting services for impact. If a statistical profiling instrument were developed, this will provide further evidence relating to that type of allocation mechanism. By undertaking the experiment in the field, some appreciation of the operational issues involved would also be generated.

A field experiment of the type outlined above would be demanding. First, it would be necessary to secure the co-operation of staff involved in the programme and to impart an understanding of the purpose of the exercise. There are also ethical issues relating to participants. However, since participants will not be denied some form of assistance, these ethical issues are not insurmountable. Many of the practical difficulties can be addresses most readily if the experiment takes place in a new programme rather than attempting to introduce an experiment into an existing programme where operational custom and practice already exist and where participants may have prior expectations of the type of support they would receive. These concerns would not arise in the case of a new programme or an existing programme subject only to random assignment in the past.

6 REFERENCES

Bell S and L Orr (2002), ' Screening (and Creaming?) Applications to Job Training Programs: The AFDC Homemaker Home Health Aide Demonstrations', *Labour Economics*, 9(2).

Berger M D, Black J, and J Smith (2000), *Evaluating Profiling as a Means of Allocating Government Services*, mimeo.

Black D A, Smith J A, Berger M C, and B J Noel (2003), *Is the Threat of Reemployment Services More Effective than the Services Themselves? Evidence from Random Assignment in the UI system*, (Mimeo)

Black D A, Smith J A, M Plesca and S Shannon (2003), *Profiling UI Claimants to Allocate Reemployment Services: Evidence and Recommendations for States*, (Mimeo)

Bryson A. and D. Kasparova (2003), *Profiling benefit claimants in Britain: A feasibility study,* Department for Work and Pensions Research Report 196, November.

Coleman N, Rousseau N and L Kennedy (2002), *Early Findings from Lone Parent Personal Adviser Meetings: Quantitative Survey of Clients*, Department for Work and Pensions Report WAE140, November.

Colpitts T (2002), 'Targeting Reemployment Services in Canada', in R W Eberts, C J O'Leary and S A Wandner (Eds), *Targeting Employment Services*, W E Upjohn Institute for Employment Research, Kalamazoo, Michigan.

Dickinson K P, Decker P T, and S D Kreutzer (2002), 'Evaluation of WPRS Systems', in R W Eberts, C J O'Leary and S A Wandner (Eds), *Targeting Employment Services*, W E Upjohn Institute for Employment Research, Kalamazoo, Michigan.

Eberts R W and C J O'Leary (1996), 'Profiling Unemployment Insurance Beneficiaries', *Employment Research*, Upjohn Institute for Employment Research, Kalamazoo, Michigan, Fall.

Eberts R W (2002), *Design, Implementation and Evaluation of the Work First Profiling Pilot Project*, Report to Employment and Training Administration, U.S. Department of Labor, Upjohn Institute, Kalamazoo, Michigan, March (Mimeo).

Eberts R W, and C J O'Leary (2002), *A Frontline Decision Support System for Georgia Careers Centres*, Upjohn Institute Staff Working Paper No.02-84, July.

Eberts R W, O'Leary C J, and K J DeRango (2002), 'A Frontline Decision Support System for One-Stop Centres', in R W Eberts, C J O'Leary and S A Wandner (Eds), *Targeting Employment Services*, W E Upjohn Institute for Employment Research, Kalamazoo, Michigan.

Frolich M. Lechner M. and H. Steiger, *Statistically Assisted Programme Selection – International Experience and Potential Benefits for Switzerland*, Swiss Institute for International Economics and Applied Economic Research, University of St Gallen, May2003 (Mimeo).

Gibbins C (1997), *Early Identification Pilots: Results at 12 months*, Employment Service, REB113, August.

Griffiths R, Irving P and K McKenna (2003), *Synthesising the evidence on Flexible Delivery*, Department for Work and Pensions Research Report W171, October.

Gueron J and E Pauly (1991), *From Welfare to Work*, New York, Russell Sage Foundation.

Hasluck C. (2000). 'Early lessons from the evaluation of New Deal programmes', *Labour Market Trends*, London, HMSO, August.

Hasluck C. (2002), *The Re-Engineered New Deal 25 Plus: A Summary of Recent Evidence*, Department for Work and Pensions, Research Report WAE137, September.

Heckman J, Heinrich C, and J Smith (1997), 'Assessing the Performance of Performance Standards in Public Bureaucracies', *American Economic Review*, 87 (2).

James R, and D Brennan (2002), *The Client Progress Kit: development, research base, and use within Work Focussed Interviews*, Department for Work and Pensions, OP3, January.

Joyce L and N Pettigrew (2002), *Personal Advisers in New Deal 25+ and Employment Zones*, Department for Work and Pensions research Report WAE139, August.

Kelso M L (1998), *Worker Profiling and Reemployment Services Profiling Methods: Lessons Learned*, UI Occasional Paper 99-5, Washington DC, US Department of Labor.

Kirby S and R Riley (2003), 'The employment effects of full participation in ONE' in *Final Effects of ONE: Part Three*, Department for Work and Pensions Research Report RR183, January.

Kracker K and L Ljiljana-Petrovic (2002), Description of the Automated Database Implemented by Kalamazoo/St Joseph's Work First Profiling Pilot Project, Annex to Eberts, *Design, Implementation and Evaluation of the Work First Profiling Pilot Project*, Report to Employment and Training Administration, U.S. Department of Labor, Upjohn Institute, Kalamazoo, Michigan, March (Mimeo).

Lechner M and J Smith (2003), *What is the Value Added by Caseworkers?*, Discussion Paper No 2003-05, Department of Economics, University of St Gallen, Bonn.

Manski C F, *Statistical Treatment Rules for Hetrogeneous Populations With Application to Randomized Experiments*, Unpublished manuscript, Chicago, Northwestern University, (cited in Berger, Black and Smith, 2000).

Manski C F, 'Identification Problems and Decisions Under Ambiguity: Empirical Analysis of Treatment Response and Normative Analysis of treatment Choice', *Journal of Econometrics*, 95 (2).

Messenger JC, Peterson-Vaccaro C and W Vroman (2003), 'Profiling in Self-Employment Assistance Programmes, in R W Eberts, C J O'Leary and S A Wandner (Eds), *Targeting Employment Services*, W E Upjohn Institute for Employment Research, Kalamazoo, Michigan.

Molloy D and J Ritchie (2000), *New Deal for Long-Term Unemployed People: Findings from a qualitative study amongst participants*, Employment Service Report ESR60.

O'Leary C (1998), 'Profiling for Reemployment Bonus Offers', *Employment Research*, Upjohn Institute for Employment Research, Kalamazoo, Michigan, Spring.

O'Leary C, Decker P T, and S A Wandner (2002), 'Targeting Reemployment Bonuses',. in R W Eberts, C J O'Leary and S A Wandner (Eds), *Targeting Employment Services*, W E Upjohn Institute for Employment Research, Kalamazoo, Michigan.

O'Leary C, Decker P T, and S A Wandner (2003), *Cost-Effectiveness of Targeted Reemployment Bonuses*, Staff Working Paper No. 03-51, Upjohn Institute, Kalamazoo, Michigan, January.

PLS Ramboll (2001), *Study on Early Identification of High Risk Unemployed: Final Report*, http://www.pls.dk/homepage/uk/publications/index.html.

Plesca M and J Smith (2002), *Rules Versus Discretion in Social Programmes: Empirical Evidence on Profiling in Employment and Training Programmes* (Extremely Preliminary Draft) Mimeo.

Rangarajan A, Schochet P Z, and D Chu (1998), *Employment Experiences of Welfare Recipients Who Find Jobs: Is Targeting Possible?*, Mathematica Policy Research, Princeton, New Jersey.

Rudolf H, and H Muntnich (2001), 'Profiling zur Vermeidung von Langzeitararbeitslosigkeit: Erste Ergebnisse aus einem Modellprojekt', *MittAB* 4/2001.

U.S. Department of Labor (1994), *The Worker Profiling and Reemployment Services System: Legislation, Implementation and Research Findings*. Washington D.C., USDOL UI Occasional Paper No. 94-4.

U.S. Department of Labor (1997), *Evaluation of Workers Profiling and Reemployment Services System*, Washington D.C., Employment and Training Administration.

Wells B (1998), 'Early Identification/Profiling in the United Kingdom' in *Early Identification of Jobseekers at Risk of Long-term Unemployment, The Role of Profiling*, OECD, Paris.

Annex A

Technical aspects of selected profiling models

TECHNICAL ASPECTS OF SELECTED PROFILING MODELS

A1 General aspects of profiling models

This annex provides summary information on the technical aspects of some of the main profiling models discussed in this (where such information is known). Before doing so, it is useful to briefly consider the key aspects of a profiling model.

Profiling models used in practice have varied considerably in the way that they were specified, estimated and implemented as a decision-making tool for matching clients and employment services. In particular, these differences have related to:

- the target or dependent variable,
- the data set from which the relationship between target and explanatory variables is estimated,
- the independent or explanatory variables used, and,
- the statistical method(s) used to estimate the impact of explanatory variables on the target.

The target variable

A variety of different target variables have been used. Black, Berger and Smith (2001) argue that the optimal profiling variable is one that maximises the attainment of the goals of the allocation mechanism. If the goal is to direct help to those unemployed the longest, the target variable may relate to the risk of being unemployed at a future date. If the goal is to minimise benefit payments then the target variable may be exits from benefits, job entry or time spent on benefit.

Black, Smith, Plesca and Shannon (2003) argue that it is better to use continuous variables than binary or discrete variables as profiling targets. This is because binary variables are inefficient in their use of information. For instance, in a binary model of unemployment at (say) 12 months, any client who leaves benefit before 12 months is treated as equivalent (that is given the same value of 0). This is despite the fact that those leaving benefit at 11 months may resemble to a greater extent those remaining unemployed at 12 months than they do those who left benefits after just two or three months. Continuous variables such as months of unemployment or proportion of benefit entitlement claimed may introduce greater variation and more information into the model and thus increase its predictive accuracy.

Data sources

Statistical profiling models require a set of data from which the relationship between the target variable and explanatory variables can be estimated. Data may be derived from administrative records (such as those of unemployment benefit payments), survey data or other sources (including professional judgements). Such datasets must include the variables required for the profiling exercise, including the target variable(s) and explanatory variables. It may be necessary to link and combine data from different sources in order to create the necessary dataset. Thus, for instance, administrative data relating to benefit claims may be linked to survey data on outcomes (such as employment) or attitudinal variables. While administrative data has the merit of complete coverage (in principle, if not practice) where such data does not cover all the variables (or factors) needed to predict the target variable it will be necessary to supplement the administrative data from other sources.

Independent or explanatory variables

The choice of explanatory variables to enter into a profiling model will depend on the target variable chosen and prevailing knowledge of the factors that are associated with that variable. There may, or may not be a causal link between the independent variables and the target variable since a strong association is all that is required for predictive purposes. The choice of independent variables will also be influenced by what data is available. In some instances there may be a large volume of data from which variables can be selected. In other cases, key information may be unavailable or restricted. In the USA, equal rights legislation prohibit the use of age, gender and ethnicity as profiling variables.

Similar issues of definition and form arise in connection with explanatory variables as with target variables. Some variables may enter the model as 'dummy' variables, or indicators, taking the value 1 if the characteristic is present (for instance, 'has claimed benefit in the previous 12 months'). In other cases categorical variables are used. This is commonly the case with educational attainment where there may be several categories ranging from no qualifications through various levels of attainment up to (say) degree and post graduate attainment. Other variables will be measured in continuous terms. Examples include previous wage, number of months of benefit in some past period and so on. To a great extent the form of explanatory variables is determined by the source of the data and the level of detail recorded by that source.

As a general rule, adding more explanatory variables to a model will increase it's explanatory power (as measured by the value of R2) but this will not always be associated with a corresponding improvement in the ability of the model to predict outcomes. Black, Smith, Plesca and Shannon (2003) point out that variables measuring local unemployment or employment growth – variables commonly used in profiling models – add little to the predictive content of models since all clients in a local area will face the same labour market conditions. The inclusion of such variables will increase R2 but not change the ranking of clients because any ranking of clients will be driven by differences in other factors.

While there is a need to guard against the 'false accuracy' of a high R2, there is now ample evidence that models that control for a large number of covariates will outperform models with fewer covariates. This suggests that there may be a trade-off between the benefits from additional predictive accuracy and the cost of obtaining data on additional explanatory variables. Many profiling systems appear to embrace the principle of seeking the smallest number of explanatory factors consistent with an acceptably accurate and consistent prediction of the target variable. Implementation of profiling systems will be much easier if the staff involved only have to deal with a small number of factors on which data is readily available.

Estimation method

The choice of estimation method will be determined, to an extent by the nature of the profiling variable. Where the target variable is a binary variable it would be conventional to use tobit, probit or logit analysis. Nonetheless, Black, Smith, Plesca and Shannon argue that models estimated using simple Ordinary Least Squares regression techniques perform equally well as the more advanced techniques. They also argue that profiling models need to be re-estimated periodically since the estimated coefficients are strongly cyclical and reflect the level of economic activity prevailing at the time when the data was collected.

A2 JSCI: Job Seeker Classification Instrument (Australia)

The JSCI is an instrument that seeks to identify job seekers at risk of becoming long-term unemployed. The JSCI was developed in 1996 and introduced in 1997, replacing earlier profiling instruments. A revised version of JSCI was introduced in April 2003.

JSCI is a statistically based profiling instrument but it also contains variables introduced on the basis of expert judgement. The model on which JSCI was based was estimated from administrative data on all new job seekers registering in the period late-1995 to early-1996 and a follow-up postal survey to determine their labour market status 12-15 months after first registering. Details of the statistical model itself have never been published but the variables derived from the analysis and used in the profiling of clients are known. These are listed in Table A1.

Table A1
JSCI risk factors

Variable
Age
Gender
Language and literacy
Disability/Medical condition
Recency of work experience
Stability of residence
Educational attainment
Disclosed ex-offender
Personal characteristics requiring professional or specialist judgement
Indigenous/Australian born South Sea Islander status
Country of birth
Geographic location
Vocational qualifications
Family status/living arrangements
Contactability (available use of telephone)

The factors listed in Table A3 refer to the 2003 version of JSCI. The 1997 version also included factors relating to transport, proximity to large urban centres, a small community variable and duration of unemployment. The duration of unemployment was removed from JISC in 2003 because under the Active Participation Model, clients were automatically referred to services on the basis of their unemployment duration. The other factors were removed because they had proved to have minimal impact on the prediction of the likelihood of long-term unemployment.

A3 WPRS: Worker Profiling and Reemployment Services (USA)

There is no single WPRS profiling model since each state was responsible for the development of its own profiling system. Consequently there is considerable variation across states in terms of in the richness of data sources and the variables included in each WPRS profiling model. The common feature of WPRS models is that they seek to predict benefit exhaustion as this is required of them by the relevant legislation. Even here there is a degree of variation. While most states use a binary profiling variable (exhausted benefit or did not exhaust benefit), some used slightly different target variables. For instance, in Washington the profiling variable was a binary variable taking the value of 1 if the claimant collected at least 90 per cent of benefit entitlement while in

Idaho the target variable was a continuous variable measuring the number of weeks that the claimant collected benefits (Kelso, 1998).

US Department of Labor (DoL) guidelines on the development of state WPRS profiling models originally recommended that states use just five categories of variables in their profiling models (Kelso, 1998). These were the first five variables listed in Table A2. Many states went much further and, depending upon data availability, included additional variables in their state WPRS profiling models. These variables are also listed in Table A2 (at least one state has used each of the variables mentioned).

Black, Smith, Plesca and Shannon (2003) evaluated a wide range of versions of the WPRS profiling model. These versions (40 in total) used different definitions of the target variable, different estimation techniques and different combinations of explanatory variables and were estimated using a comprehensive dataset for Kentucky. Their conclusions were that the WPRS profiling models performed best if the dependent variable was a continuous one – the fraction of benefits drawn – and it made little difference to the predictive accuracy of the models if linear estimation techniques (OLS) were used rather than non-linear methods (tobit, probit and logit). Black et al also found that local unemployment rates and employment changed added little to the performance of the profiling models but many other variables did make a difference. The model that performed best contained the variables listed in Table A3. They argued that their findings can be generalised to all states.

Table A2
Variables used in WPRS profiling models

Profiling variable
Original WPRS model
Education variables
Job tenure
Industry of last job (% employment change)
Occupation of last job
Other variables used by individual states
Weekly benefit amount
Wage replacement rate
Base year wage
Separation and claim file dates
Ratio high quarter wage to base year wage
Number of base year employers
Month benefits began
Transfer payment recipiency
Pension recipiency
Claimant has phone
School enrolment
Separation from merger
Separation from plant closure
Worker has previous UI claim in recent past
Worker exhausted recent UI claim

Source: Black, Smith, Plesca and Shannon (2003)

Table A3
'Best performing' WPRS model

Profiling variable
Education variables
Job tenure (squared)
Occupation of last job
UI benefit exhausted last year
Indicator of previous UI benefit claims
Welfare recipient
Food stamp recipient
JTPA eligibility
Public transport for travel to work
Quarterly real wages within the last year
Enrolled at school at time of claim
Employed at time of claim
Type of working shift
Local Office

Source: Black, Smith, Plesca and Shannon (2003)

A4 FDSS: The Frontline Decision Support System (USA)

FDSS is a complex and highly developed pilot system to support decision by frontline staff working in one-stop Careers centres. Advisers in such Careers offices have access to a number of automated support systems including job search support and service referral. The service referral process begins by profiling job seekers and estimating their likelihood of employment (referred to as employability).

The profiling model was estimated using logit analysis of data collected prior to the pilot. The variables entering into the profiling model are listed in Table A4. The employability score is then used as the basis on which to allocate clients to various service provision or to training. The basis for this was a further logit analysis of data relating to employment status in the quarter after leaving programmes. This status was related to variables such as client personal characteristics, the services used and the employability score. Using this model, advisers can see which services best suit clients with different employability scores.

Table A4
FDSS employability profiling variables

Profiling variable
Prior work/unemployment history
Prior wage (last four quarters)
Educational attainment
Willingness to re-locate for a job
Minimum required wage
Receipt of Food Stamps
Benefit recipiency
Language (English/Spanish)

A5 WFPP: Work First Profiling Pilot (USA)

The target variable in this pilot was employment retention, defined as when a client retains a qualified job for 90 consecutive days. A qualified job is one that offers at least 20 hours work per week and pays at least the Minimum Wage. The profiling model was derived from data on Welfare to Work participants (largely but not exclusively lone parents) relating to a period (1996) prior to the operation of the pilot. Administrative data from two agencies was combined to provide data on client characteristics, benefit receipt and other information such as health problems and training received.

The profiling model sought to predict the probability of entering and retaining a job (as defined above). A number of variables were used to predict this probability using a logit model. The variables used are listed in Table A5. The resultant model enables the probability of employment retention to be estimated for different client groups using different service providers. It was recognised that the services provided by the three sub-contractors were somewhat different and suited some clients more than others. The profiling model enabled advisers to identify more precisely the impact of such differences on employment retention.

Table A5
Profiling variables used in WFPP

Profiling variable
Age
Parental status
Educational attainment
AFDC history
Target group (1= long-term welfare recipient with older children and little or no work experience)
Prior employment history
Compliance history in previous Welfare to Work enrolments
Service provider (three different organisations)

A6 SOMS: Service Outcome Measurement System (Canada)

SOMS was developed by Human Resources Development Canada to help frontline staff advise clients on the best strategies for gaining employment. Data for SOMS was collated from 19 different administrative sources and took the form of a longitudinal dataset covering all clients over the period 1987 to 1995. The original dataset contained more than 2000 variables grouped into four: individual, interventions, providers and outcomes but by 1997 this had been refined to around 250 of the most important variables covering almost 10 million clients.

The target variables used in the predictive element of SOMS were the amount of unemployment benefit paid, the probability of employment, earnings and weeks of employment. By relating these targets to client characteristics, it was hoped that advisers could target services on clients in a manner that reduced benefits paid and increased job entry as well as leading to higher future earnings and job retention.

The variables entered into the SOMS predictive model were:

- unemployment benefits paid over the previous three years'
- the number of weeks since the last intervention with the client'
- a range of demographic and environmental variables'
- a set of variables representing the 25 different services/interventions received by a client'
- the time elapsed between the earliest recorded intervention and a base date'
- variable interaction terms.

Four versions of the SOMS predictive model were estimated relating to each of the four target variables in 1995. As benefits paid, weeks employed and wages were continuous variables, the profiling model was estimated using OLS estimation methods in those cases. A logistic regression was used in the case of the modelling of the probability of employment in 1995. When the models were first estimated all variables except the interaction terms were entered. Subsequently, interaction terms were entered and accepted or rejected on the basis of a test of significance. As the models contained variables for different interventions with clients, it was possible to use the estimated parameters of the models to predict the impact of particular interventions on a client with particular characteristics in terms of each of the four target variables.

A7 Early Identification Pilot (UK)

The Early Identification Pilot study was a pilot intended to test the feasibility of undertaking the early identification of those at risk of long-term unemployment. The pilot applied a predictive model to a cohort of unemployed people whose labour market status was then tracked over time to test the predictions.

The predictive model was estimated using survival analysis (Cox regression). The target variables were the risk of remaining unemployed at 12 months and the length of unemployment spell. The model was then used to devise a scoring instrument using the variable types listed in Table A6.

Table A6
Scoring factors in Early Identification Pilot

Factor
Age
Gender
Marital status
Health problems affecting work
Qualifications
Type of accommodation
Dependents
Industry of usual type of work
Experience of looking for work
Knowledge of local labour market
Assertiveness
Job search skills (including literacy, contactability and interview skills)
Availability for work
Previous work history

Much of the data used in the predictive modelling involved 'soft information' based on the professional judgement of advisers (for instance, assessments of 'assertiveness' or ability to make speculative approaches to employers). During the modelling process the effects of interactions between factors were examined but held to make little difference to the results.

A8 Profiling Department for Work and Pensions' clients (UK)

This represents the most recent attempt to apply profiling methods to benefit claimants in the UK (Bryson and Kasparova, 2003). The study sought to establish the feasibility of profiling and the data requirements for accurate profiling. The study undertook the profiling exercise for three groups of DWP clients: the sick and disabled, lone parents and JSA claimants. The target variables were the probability of being out-of-work after 12 months and the percentage of time claiming out-of-work benefits over a 30-month period.

The study utilised a particularly rich source of data derived from the ONE pilot programme. Within each of 24 pilot areas, ONE provided a single location for all people registering to claim benefits. The data related to individuals registering for benefit in those areas in the spring and summer of 2000. The ONE data provides considerable detail about clients, including not just benefit records and personal characteristics but also data on heath and numeracy problems as well as information on attitudes.

The feasibility study examines the sensitivity of the predictions to model specification by estimating a variety of different models for each target variable and client group. A 'parsimonious' specification consisting of a minimum number of independent variables was first estimated. This was followed by two further specification consisting of the first model plus additional variable ('middling' and 'full' models). The full list of variables is too long to reproduce here (see Bryson and Kasparova, 2003). Broadly speaking, the profiling models for each of the three client groups contained the types of variable listed in Table A7. Many of these variable types in turn consisted of a number of separate variables. This was particularly the case with benefit history and work history variables.

Table A7
Variables used in models profiling DWP clients

Profiling variable
Gender
Age
Qualifications
Numeracy problems
Literacy problems
Housing tenure
Marital status
Number of children
Benefit history in previous 2 years
Work history in previous 2 years pre-ONE
Area
TTWA benefit stocks/flows for unemployment, lone parents, sick and disabled
Dummies for ONE/comparison areas, OR 24 benefit area dummies
General health
Long-standing illness
Mental disability
Care responsibilities
Driving license
Number of household workers
Attitudes to working