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Companies' Use of Psychometric Testing and the Changing Demand for Skills: A Review of the Literature

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Executive Summary

This paper reviews the literature on psychometric testing by employers, and considers whether information on psychometric testing can be used to make deductions about changes in the demand for skills in the economy.

The standard approach to measuring the demand for skills, and skill shortages, is to conduct a survey of employers. Among the main advantages of skill surveys are, firstly, that they are a direct and straightforward approach to answering questions about the extent of skill shortages and, secondly, that they can be designed to ensure that they give a representative picture of the economy as a whole. However, we argue that even the best of these surveys, which generally rely on the answers given by employers to a series of prompted questions, may contain flaws. It is then, important that other sources of information about changes in the demand for skills should be drawn on in order to supplement, confirm or challenge the findings from employer skill surveys. The psychometric tests which companies make use of when selecting among job applicants have the potential to provide us with information about the kind of skills which employers are really looking for. Because employers have to pay to use the tests, they may convey some reliable information about changes in the demand for skills. On the other hand, psychometric tests are not used by all companies or for all types of vacancy, which implies that information about skills derived from them may not be representative of the economy as a whole. Nonetheless, they do provide additional information to that available in skill surveys, and to date, this information has not been drawn on at all. Here we survey the evidence currently available on psychometric testing for selection.

In order to build up a picture of changes in the extent of test use over time, some 17 surveys of test use, published between the early 1970s and 2000 were reviewed. Most of the studies were cross-sectional, and there was much variation in methodology, sampling frame and sample size, making it difficult to get precise estimates of the proportion of organisations using tests at any particular time. Nonetheless, it is clear that test use has grown substantially since the 1980s, and is now widespread, especially among larger organisations. Large organisations are far more likely to use tests than smaller organisations, because large organisations have more vacancies over which to spread the fixed costs of using tests, and are more likely to have a specialised human resources department familiar with and trained in

testing practice. Tests are most likely to be used for managerial and graduate vacancies, and are seldom used for manual vacancies.

A wide range of tests are now available on the market. These include tests designed to measure general cognitive ability, tests of specific skills, personality questionnaires, and literacy and numeracy tests. There is currently very little information in published studies concerning which tests are most widely used, or details of the skills and attributes employers are attempting to measure when they make use of the tests.

The costs of tests are substantial. This implies that employers are unlikely to be using them merely in order to follow a management fad, but because they believe the tests are genuinely useful in searching out job applicants with the right skills and attributes. One major component of cost is the expense of training company staff to be able to obtain and utilise the tests properly. Some of the more widely used tests also require an annual licence fee. There is no quantitative data available on how much is spent in actually administering and scoring the tests by human resources departments.

Surveys of the reasons for test use suggest that the perceived objectivity of tests, their predictive abilities, as well as their ability to filter out unsuitable candidates were important reasons for test use in both the public and private sectors. Studies of the rise in test use over time point to changes in the labour market as a possible explanatory factor. It is suggested that formal qualifications may not be as effective for sorting as in the past, and the need for increasing numbers of recruits with technical, computing, or mathematics skills may also have encouraged investment in testing. However, there is a lack of firm evidence on the reasons for changes in test use. Other factors frequently cited include equal opportunities legislation which may have encouraged employers to use tests as part of a drive to fairer selection. There are also a number of studies, most of them rather speculative, linking increases in test use to the spread of greater professionalism in the human resource management function, and to multi-national companies imposing standard selection procedures throughout their constituent businesses.

There is strong evidence from the psychology literature that tests of cognitive ability are good predictors of performance across a broad range of jobs. The predictive validity of other kinds of tests, especially personality questionnaires is more controversial, but recent meta-analytic studies have found significant correlations between personality scales and measures of job performance.[1]

[1] Meta-analysis is a statistical technique for cumulating the results of a group of studies on a particular topic.

How useful is information on psychometric testing for assessing changes in the demand for skills? The implications of the literature review are that it has some advantages and some disadvantages in this respect compared to conventional skill surveys. It can certainly throw some light on the kind of skills that are in demand in the labour market. However, there is a serious lack of evidence on many aspects of test use at present. In particular, we know remarkably little about which tests are being used, and about the skills and attributes that the tests are being used to measured. This confirms that further research in this field is required.

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1. Introduction

This paper surveys the literature on the use of psychometric testing by employers, and considers whether information on psychometric testing can be used to make deductions about changes in the demand for skills in the economy. The standard approach to measuring the demand for skills, and skill shortages, is to conduct a survey of employers. Among the main advantages of skill surveys are, firstly, that they are a direct and straightforward approach to answering questions about the extent of skill shortages and, secondly, that they can be designed to ensure that they give a representative picture of the economy as a whole. We argue that even the best of these surveys, which generally rely on the answers given by employers to a series of prompted questions, contain flaws sufficient to raise doubts about their reliability. Given that this is the case, it is important to draw on other ways of measuring the demand for skills in order to confirm, or contradict, the results of employer skill surveys.

Psychometric tests provide one such alternative method. Since the 1980s, businesses in the UK have been making increasing use of psychometric tests as part of the selection process for job vacancies. The tests attempt to measure the abilities, attributes, personality traits and various skills of the candidates under consideration for particular vacancies. The main advantage of using these tests as a means of assessing skill demands in the UK economy is that employers have to pay money in order to use the tests: either the costs of training their staff to use and administer the tests plus whatever it may cost to buy in the test from a commercial test publisher, or the cost of employing external consultants to administer the tests.

Because of the costs involved, which are quite substantial, in principle the tests are more likely to measure the skills which employers really want rather than those which they report over the telephone in response to business surveys. On the other hand, compared to skill surveys, using information about psychometric tests is an indirect approach to the assessment of changing demands for skills. They are also less representative, because not all organisations use tests, nor are they used for all types of vacancy. Moreover, while survey results on skill shortages are plentiful, as far as we are aware, no work has been conducted to date which uses psychometric testing in this way. Most of the research literature on psychometric testing has been written by psychologists, and they have not focused on economic issues of skills and skills shortages. The purpose of surveying the literature is to

obtain a better idea of whether it is feasible to make use of information on psychometric tests to gain insights about the demand for skills.

In the next section, some background on surveys of skill demands in the UK economy is provided and we also set out the limitations of such surveys for estimating the true demand for skills. The rest of the paper considers the existing evidence on psychometric testing and examines its potential strengths and weaknesses for analysing skill demands. If analysis of psychometric test practice is to be a useful method of assessing skill demands, then it needs to satisfy certain criteria. This method would be of little use if only a small, limited group of employers were using psychometric tests since any results obtained would then be unrepresentative of the economy as a whole. In Section 3, we look at whether psychometric tests are in widespread use. We must also consider whether the tests are useful for measuring skills. To answer this, we need to consider the content of the tests and the range of tests available. Are the tests designed to measure skills? Do they only look at one particular kind of skill or are there many different tests covering a range of different skill types? These issues are addressed in Section 4. In Section 5, we review the evidence on why employers have chosen to make use of the tests, looking at the reasons for employers' use of tests, and for change in the extent of test usage over time. In Section 6 we turn to examine whether the tests are valid as predictors of the skills required to perform jobs successfully. If this were not the case, it would be difficult to explain why employers were using the tests, and doubt would also be cast on the reliability of any inferences that might be made about the skills which the tests claimed to be measuring. Finally, in Section 7, the main conclusions of the literature review are set out.

2. The Demand For Skills

Surveys are forever being published, whether by the CBI, Chambers of Commerce, government agencies, task forces or other organisations suggesting that the British economy is deficient in some skill or other and that urgent action is needed. How accurate and reliable are these surveys? Are skill shortages as serious as many of them suggest? Here we argue that there could be serious flaws in existing survey evidence. Measuring the demand for skills is beset with methodological problems and the approach adopted in many surveys is likely to be inaccurate and misleading. Moreover, obtaining realistic estimates of the demand

for skills is not an arcane academic exercise but a matter of pressing national importance. The results derived from surveys suggesting that there is a strongly rising demand for skills and evidence of serious skill shortages have added urgency to the policies of successive governments, including the present one, which are designed to tackle Britain's alleged problems of international competitiveness.

Before discussing the methodological problems with these surveys it is important to be aware of certain more general points about measuring skills shortages and skills gaps. The extent of skill shortages is a highly cyclical variable – when output is growing quickly the incidence of reported skill shortages also increases, and then falls away rapidly as the economy moves into recession. Robinson (1996) draws on data from the only skill survey to be available over a long period of time – the CBI survey – to show that the proportion of firms reporting skill shortages was much lower in the 1990s than in the 'Lawson boom' of the late eighties. Moreover, even at the peak of the 1980s boom, skill shortages were affecting a much lower proportion of employers than at earlier cyclical peaks in the 1960s and 1970s. This is hardly compelling evidence of an urgent skill shortage problem in the last few years (although it does not rule out the possibility of skill shortages in particular areas or occupations). Robinson also suggests that it is the rapid pace of output expansion that is the key to rising skill shortages in cyclical upturns, implying that if the economy could be kept on a more sedate expansionary path, then reported skill shortages would be much lower.

A further reason for scepticism about the results of skill surveys is that the concept of skill is ambiguous and slippery. In recent years, the term has expanded beyond its original meaning. As well as including formal qualifications, technical knowledge, and various kinds of manual and mechanical dexterity, it also now encompasses softer 'people skills' and psychological traits such as the ability to work well as part of a team, and to make a favourable impression on actual or potential customers (Keep and Mayhew, 1999; for more on the origins of and background to key skills see Green, 1998; Payne, 2000). Part of the reason for this change, of course, is the shift in the UK economy away from manufacturing and towards services.

Although there is a widespread belief that certain key skills are important for success in the labour market it is difficult to define precisely what these key skills should be. Over the last fifteen years there have been numerous attempts at definition by educational bodies and government agencies (Payne, 2000). Following on from work originally done by NCVQ it is common to list six key skills: communication, application of number, information technology, problem solving, working with others, improving own performance (see, for

example, National Skills Task Force, Second Report, 1999). Policy-makers have taken up the challenge of key skills energetically, so that they are now embedded in several qualifications, notably NVQs and GNVQs, as well as a new key skills qualification which was introduced in 2000.

But it is not clear that this is the right approach. Debate continues as to whether these attributes should be termed skills. Whether they can be taught, or can potentially be improved through workforce training has been questioned with some regarding them as largely innate or the product of childhood socialisation (Dench *et al*, 1998). There is controversy about whether key skills should be taught as subjects in their own right. The UK approach to key skills is unusual and other European countries have not developed the vocational aspects of the curriculum in this way (Green, 1998). The extent to which key skills are a problem for the UK economy is also in dispute. The Skills Task Force has reported that after technical/practical skills, a range of generic skills were among those which employers reporting skill shortages found most difficult to obtain with between a fifth and a third of such employers reporting skill shortages of communication, customer handling, team-working, and problem-solving (National Skills Task Force, Research Report, 2000, p. 93). But another recent survey found that employers were generally fairly satisfied at the levels of key skills amongst their workforces (Dench *et al*, 1998, pp 24-7).

The Learning and Skills Councils recently established at national and regional level also require reliable estimates of skill needs and skill shortages if they are to perform their tasks well. These examples serve to illustrate that information about changes in the demand for skills underpin many recent policy initiatives in the field of education and vocational training and underline how vital it is that such survey data should be accurate.

Regular surveys of skill demands in Britain include the CBI Industrial Trends Survey, which has been carried out since the late 1950s, and has for many years provided quarterly information on the manufacturing sector only, the Skill Needs in Britain survey, an annual survey of a sample of companies employing 25 or more people available from the early 1990s, which is conducted by independent researchers on behalf of the DfEE, and the British Chambers of Commerce Quarterly Economic Survey, which covers both manufacturing and service sectors.

If we look at the data provided by skill surveys we get can easily get a picture of growing skill shortages. For instance, the Skill Needs in Britain (1999) provides information on hard-to-fill vacancies and it seems that in 1998 some 42 per cent of vacancies were said by

employers to be hard-to-fill compared to 35 per cent in 1997, and only 16 per cent in 1992 and 1993.

However, hard-to-fill vacancies are not the same as skill shortages, and we cannot in general infer anything about skill shortages from evidence on hard-to-fill vacancies alone. It is now standard practice to distinguish between recruitment difficulties, skills gaps and skills shortages:

- Skills shortages are said to be present when there is a genuine lack of adequately skilled individuals available in the accessible labour market. This could arise from a basic lack of people (especially if aggregate unemployment is very low), significant geographical imbalances in supply (when there are sufficient skilled people in the labour market as a whole, but not easily accessible to the available jobs), or a genuine shortfall in the number of appropriately skilled individuals – either at new entrant level, or for higher level skilled occupations;
- Skills gaps occur where employers feel that their existing workforce have lower skill levels than necessary to meet their business objectives, or where new entrants to the labour market are apparently trained and qualified for occupations but still lack a variety of the skills required;
- 'Recruitment difficulties' is an umbrella term incorporating all other forms of employer recruitment problems, except for 'skill shortages' and 'skill gaps' as defined above. Such problems can be caused by poor recruitment practices, poor perceived image of the industry, low remuneration, or poor terms and conditions of employment, and can occur even when there are sufficient skilled individuals available and accessible for work.

These definitions are taken from the First Report of the National Skills Task Force, and on this basis we can see that many of the surveys reported in the media mix up skill shortages and skills gaps with other recruitment problems. Even relatively reputable surveys such as the Skill Needs in Britain survey, with its focus on hard-to-fill vacancies do not address directly the question of skill shortages, and there are similar difficulties with other surveys, even if we confine our attention to the more respectable ones; such as those produced by the CBI and the British Chambers of Commerce, rather than the weaker ones at the lower end of the market (Robinson, 1996).

However, recent work by the Skills Task Force has produced a much more thorough survey which makes a real effort to break down the categories accurately, and to make clear distinctions between skills shortages, skills gaps and other recruitment problems. What did the Task Force find and how reliable are its results? The Employers Survey was conducted for the Skills Task Force in 1999 and consisted of telephone interviews with over 23,000 employers and a face-to-face survey of nearly 4,000 establishments which, taken together, gives a nationally representative picture of all establishments in England with 5 or more employees.

A breakdown of vacancies, hard-to-fill vacancies, and skill shortage vacancies by occupational group is shown in Table 1. The Employer Skills Survey found, that some 255,000 (46 per cent) vacancies were characterised by employers as hard-to-fill and of these some 110,000 were skill-related (National Skills Task Force, Research Report, 2000, p. 90).

The figures in Table 1 suggest that clerical and secretarial, personal and protective service and sales occupations accounted for the highest proportions of vacancies and hard-to-fill vacancies. However, skill shortage vacancies were concentrated among craft occupations (which accounted for only 8 per cent of overall vacancies, but 14 per cent of hard-to-fill vacancies, and 22 per cent of skill shortage vacancies. Clerical and secretarial, and sales occupations, on the other hand, accounted for a much lower proportion of hard-to-fill vacancies and skill-shortage vacancies, compared with vacancies overall. On skills gaps, the Skills Task Force Employer Skills Survey found that some 20 per cent of establishments were suffering from skills gaps on its definition, namely a lack of full proficiency affecting a third of employees in at least one occupational area (National Skills Task Force, Research Report, 2000, p. 112).

Why skills shortages should apparently be concentrated amongst craft workers and other intermediate categories of occupation is something of a puzzle given that these are the jobs which have been in decline for some time. As a proportion of total employment, craft and related occupations have fallen from 17.7 per cent in 1984 to 12.2 per cent in 1998, according to data from the Labour Force Survey (see Robinson, 1999, p 162). All intermediate employment has fallen from about 34 per cent of total employment to around 27 per cent over the same period.

Nonetheless, the Skills Task Force Employer Skills Survey is in many ways an impressive piece of work and represents best practice in the construction of surveys of this type. But it suffers from a number of key weaknesses which mean that the results obtained may not be valid or reliable.

Firstly, it is generous in its measurement of skill shortages. The criteria for reporting that an employer is suffering from a skill shortage is that there should be *at least one of* the following:

Low number of applicants with the required skills
Lack of work experience the company demands
Lack of qualifications the company demands

This definition is generous in that it allows an employer to state that there is a skill shortage even if there are applicants with the required skills and qualifications, if they happen to lack, say, recent relevant work experience. A skill shortage may exist on this definition when several applicants have the required qualifications, if this is deemed to be too low a number of applicants, but it is not clear what too low is, or whether a skill shortage can occur when applicants with the skills are available, even in small numbers.

Secondly, there are concerns that the methodology used leads to potential inaccuracies. Employers are asked to report skill shortages. They do not volunteer these answers but are prompted by a series of questions asking whether they have recruitment difficulties, skill shortages, and skill gaps, and if so, are asked further questions about the particular occupations for which these deficiencies exist, the kind of skills which are lacking, and the extent of the shortfall. It is easy to see that the answers one gets are bound to depend on the nature of the prompts. One example is that when employers are prompted about so-called key skills such as communication skills, it is found that employers are suffering from these kinds of shortages, but these were not much mentioned by employers in surveys which do not specifically ask about them (Dench *et al*, 1998; Spilsbury, 2000).

It is also likely that employers will be either reluctant to report or unaware of many recruitment problems. How many will know or admit that they are having problems recruiting people because the wages on offer are too low, or that the overall employment package is unattractive? The essential distinction between recruitment difficulties and skill shortages will not be a watertight one if employers are apt to report in one category what should belong in another.

In many of the surveys, including the Employer Skills Survey, the focus is entirely on deficiencies of the workforce, whether skill shortages and skill gaps, or hard-to-fill vacancies and recruitment problems. No questions are asked about other kinds of problems that the employer is facing (the CBI survey is an exception here: it asks about financial and capacity

constraints as well as manpower shortages). This makes it very hard to tell whether skill shortages are really the key problem, or whether they are a minor worry outweighed by other problems and issues that the employer may be facing.

The assumption that it is 'the employer' – an individual exceptionally well-informed about all the recruitment activities and practices of their organisation – who picks up the phone when the survey interviewers make their calls can also be challenged. In most cases the survey questions will be answered by one person, probably from the human resources department even though many firms will decentralise recruitment to particular line managers or branch personnel. Many people who are active in identifying and filling vacancies will not have their knowledge included in the survey responses.

A further concern is that 'the employer' may not fully understand the questions which he or she is being asked, or the differences between, say, a recruitment difficulty, a hard-to-fill vacancy and a skill shortage vacancy. There is only limited information on this topic. The CBI has conducted occasional research on the answering practices of employers in response to its Industrial Trends survey. The main question in this survey is about the extent of skilled labour acting as a constraint on output in the following four months, and here it was found that 60 per cent of companies thought that skilled labour as a constraint on output reflected difficulties in recruiting skilled labour, while 45 per cent saw it as a problem with respect to their current workforce. There was also confusion as to the timescale involved, with some assuming that the question referred to the following four months compared to the previous four months, while others compared the next four months with the equivalent period in the previous year. For the Skill Needs in Britain survey, some research has also been done on answering practices. However, the data refer to a sample size of only nine employers, so it is debateable whether anything can be made of these results. For what they are worth, the results showed that most of the nine respondents believed they were well-informed about the recruitment needs of their own organisations, and most (but not all) were able to say what they meant by a hard-to-fill vacancy (Blake *et al*, 2000). In general, then, it is clear that surveys which state that employers have reported their skill shortages make the process sound much more reliable than it really is.

These methodological points make it very probable that even the Employers Skill Survey results on skills shortages are likely to produce upwardly biased estimates of the extent of such skills shortages in the economy as a whole, and that the inaccuracies in other, less comprehensive and carefully designed surveys are probably a good deal worse.

There are, of course, other ways of measuring skill demands apart from surveying employers. One conceptually simple approach is to look at wages. If a particular skill is in demand, people who possess that skill would experience rising relative wages and hence we should be able to make inferences about skill shortages from evidence on wage changes over time. But, although there is a large literature on returns to education, evidence on the value of particular skills is much sparser (McIntosh and Vignoles, 2000). Research on the returns to basic skills and mathematical ability is now beginning to accumulate, but there is little or nothing on other kinds of skills. Researchers have also conducted surveys in which people are asked to report their own skills (Felstead *et al*, 1999). Repeated sampling can then tell us something about changes in skill levels over time and provide a much more detailed picture than research on returns to education. However, it does not tell us about the *demand* for skills or skill shortages, and there are also some concerns about how accurate such self-reporting of skills is.

It is, then, not easy to obtain a clear view of the extent of changes in the demand for skills in recent years. The results of skill surveys generally tend to suggest that the demand for skills has been growing in recent years. The annual Skill Needs in Britain survey asks employers with 25 or more employees whether they felt the skills required in their average employee to ensure the effective operation of their business was increasing, decreasing or static. Just over two-thirds of employers reported that their skill requirements were increasing in 1998. This was a drop from the almost three-quarters of employers who indicated rising skill requirements in 1996 but it still appears to give unequivocal evidence of an increase in skill needs. Indeed, typically, in the surveys undertaken in the 1990s at least 60 per cent of employers stated that their skill needs were rising, while only three to 4 per cent said that they were decreasing (Skill Needs in Britain, 1999).

Some plausible reasons for rising demand for skills are not hard to find. The increasing use of new technology, including information technology in the workplace are among the more obvious factors. Work by Green (1999) has underlined the significance of this by showing that there are sizeable earnings premiums for those using computers in their jobs, even after controlling for a range of other variables. Other reasons include a shift to flexible work patterns, implying that workers require a broader range of skills. Corporate restructuring has involved the removal of layers of middle management implying a high demand for a broad set of managerial skills even among new entrants to the labour market such as graduates (National Skills Task Force, Research Report, 2000, pp. 45-6). These

trends have been further reinforced by growth in the numbers of small firms where workers are likely to be required to perform a broader set of roles than in large firms.

On the other hand, the significance of these changes should not be overstated, nor should we infer that skill shortages must therefore exist. Firstly, the workforce has become far better qualified since the early 1980s. The percentage of 16 and 17 year olds still in full-time education one year after the end of their compulsory schooling rose from about 50 per cent in 1979-85 to around 70 per cent by 1993-97 (Robinson, 1999). The proportion of young adults staying on in higher education also increased from around 15 per cent in the early 1980s to about a third during the second half of the 1990s (National Skills Task Force, Research Report, 2000, p. 62). As the more well-qualified younger cohorts have entered the labour market and less well-qualified older workers have left so the qualifications base of the working population has greatly strengthened. The proportion of the employed population with a degree qualification rose from 11 per cent in 1979 to 20 per cent in 1999; at the other end of the spectrum, those with no qualifications at all made up 45 per cent of those in employment but only 12 per cent by 1999 (National Skills Task Force, Research Report, 2000, p. 62). Although the demand for skills has increased, the supply of well-qualified people has also greatly improved.

The extent to which UK employers need highly skilled employees has also been questioned by some commentators. Keep and Mayhew (1999), for instance, have argued that the need for highly qualified workers is limited to certain segments of the British economy only. Many firms, they maintain, have remained committed to low value-added product market strategies, delivering relatively low-spec standardised products or services, rather than more sophisticated or customised high-spec strategies. This in turn dictates a labour market strategy of low wages and Taylorist production techniques, rather than a requirement for highly-skilled or well-qualified workers.

Some researchers have produced evidence that, even though there has been a large improvement in the qualifications held by the British workforce, this has not been reflected in an increase in skills contents of jobs. Rather, the existence of a better qualified workforce has enabled employers to indulge in 'credentialism', *i.e.* demanding higher levels of qualifications for what is essentially the same job. Robinson and Manacorda (1997) looked at changes in the occupational structure and the educational structure between 1984 and 1994. They found that changes in the occupational structure could only explain a very small amount of the increase in the holding of qualifications by the employed workforce. For Robinson and Manacorda, the fact that increased qualification levels had occurred across such broad

swathes of the occupational structure, suggested that it was unlikely to be explained by skill-biased changes in the demand for labour. However, other researchers have disputed these claims. It could be that the data used by Robinson and Manacorda was too aggregated to pick up changes in the demand for skill. Also, it has been pointed out that, say, the development of I.T in the workplace could lead to fairly broad segments of the working population requiring higher levels of skill in order to perform their jobs than before (Felstead *et al*, 1999).

There has also been a lively debate about the expansion of graduate numbers in the UK workforce and the extent to which this is economically necessary. Academic commentators such as Murphy (1993) have argued that many workers may well be too highly qualified for the kind of jobs which they are doing with, for example, graduates performing jobs for which a degree is unnecessary, and where, qualification to, say, 'A' level standard would suffice. Recent work has attempted to define the concept of over-education more carefully and also approached the quantification of over-education in a more rigorous way. Estimates of the extent of over-education vary quite widely with some studies finding that as many as 20 per cent of graduates may be 'overeducated' for their present job (Green *et al*, 1999), while defining over-education in a different way can reduce the figure to around 7 per cent (Chevalier, 2000). Of course, even if over-education is of substantial magnitude this does not necessarily rule out skill shortages in other areas, such as key skills. Some 'overeducated' graduates lack numerical skills (Green *et al*, 1999). Nonetheless, this strand of work on credentialism and over-education does imply that we need to be cautious about assuming from survey results that skill shortages are pervasive.

A number of key points emerge from this brief review of the literature on skill shortages and the demand for skills. Firstly, employer skill surveys suffer from a variety of methodological and definitional problems. Even the most thorough and carefully designed surveys have not avoided all of these pitfalls. Secondly, while surveys of this kind tend to show a strongly rising demand for skills, and often serious skill shortages, these are not self-evident and there is a continuing debate about the extent of change in the demand for skills in recent years. Although they provide much useful data, the results of surveys cannot therefore be taken on trust. They needed to be treated sceptically and evaluated against other sources of evidence. We turn now to assess one such alternative source of evidence which may have the potential to complement information from skill surveys: companies' use of psychometric tests.

3. Levels of Test Use

How widespread is the use of psychometric testing by employers? Is it confined to a narrow group of employers in one particular sector of the economy, or is the use of tests more pervasive? Apart from its intrinsic interest, this is an important question for a research program on the demand for skills, since in order to use tests as a measure of the demand for skills it would be best if they were sufficiently widespread to give representative results for the economy in general.

Since the 1980s there have been numerous studies investigating selection methods. Some 17 studies of the extent of test usage in the UK are listed in Table 2, which includes information on when each study was published, the methodology employed, the sample size, and the headline results from each survey.

On the basis of the many studies summarised in Table 2, it is likely that psychometric testing has grown considerably since the 1980s and is now widespread, at least among large and medium-sized firms.

The exact scale of change is very difficult to establish because most studies tend to be cross-sectional rather than longitudinal, and because there are often major differences in the categories used to collect and report findings, as well as in the sampling frames employed. Most studies are not representative of the economy as a whole, and sample sizes and response rates are often worryingly low. Table 2 shows that some studies focus on management selection, some on employee selection more generally. Some studies such as Mabey (1989) consider only large firms, others such as Bartram *et al* (1995) only small firms, and we can see that there are also major differences in sample size and response rate. Nonetheless, the sheer number of studies which have been conducted means that it is possible to build up a picture of occupational test use, and it seems pretty clear that test usage has grown substantially over time. For instance, the highly influential and widely-cited study conducted by Shackleton and Newell (1991) replicated the methods of an earlier survey by Robertson and Makin, and means that something can be said with reasonable confidence about trends between 1984 and 1989. Note, however, that sample sizes are small and that the sample consists only of large firms. As shown in Table 3, the proportion of companies in the *Times* 1000 list which stated that they never used cognitive tests for managerial recruitment fell sharply from 71 per cent in 1984 to 30 per cent in 1989; the proportion using tests about half of the time rose considerably from 3 per cent in 1984 to 17 per cent in 1989; the proportion of

companies claiming to use tests always for management selection also rose over the same period from 5 per cent to 12 per cent of the sample.

Similarly, the proportions never using personality tests also fell from 64 per cent in 1984 to 36 per cent in 1989: while the proportions claiming to use them more than half the time rose from 5 per cent to 12 per cent, and the proportion claiming always to use them from 4 to 10 per cent.

Williams' (1994) survey of local authorities also pointed to growing use of tests in that sector in the late 1980s and early 1990s. He found that 51 per cent of local authorities were using some form of psychological test in 1991, compared to 39 per cent in 1989 and 42 per cent in 1986.

There is evidence that test usage by companies continued to increase during the 1990s.

As shown in Table 4, Industrial Relations Services (1997) reported that, of a sample of 150 companies, some 76 per cent of employers were making use of ability/aptitude tests to select for at least some groups of staff in their survey conducted in 1996, a proportion which had increased from just under 50 per cent from an earlier survey conducted in 1991. The proportion reporting the use of personality tests, on the other hand, remained more or less constant over the same time period, according to the IRS: about 58 per cent were using them in the 1991 survey and 61 per cent in 1996.

A more recent survey by the IRS, albeit based on an extremely small sample (only 61 organisations) is also indicative of further growth in test use (IRS, 1999). This reported that of employers using testing, some 53 per cent had increased the level of testing undertaken within their organisation in the previous two years, while a further 45 percent have maintained their level of testing over the same period, leaving only one employer which had decreased their level of test use.

As can be seen in Table 2 there is one recent survey of recruitment and selection in the London labour market (Spilsbury and Lane, 2000) which found a very low level of psychometric test use. However, this survey used a very different methodology from those of other authors. Spilsbury and Lane asked each employer about a single specific vacancy which they had advertised in a newspaper; other surveys have asked whether employers use tests for at least some of their vacancies.[2] The sample was also unusual. Many of the jobs

[2] There is only limited evidence on how widely used tests are within organisations which report that they are using tests. Some surveys do distinguish between test users reporting that they use tests never, sometimes, half of the time, all vacancies. See the earlier discussion of the results of Shackleton and Newell and of IRS.

analysed by Spilsbury and Lane were single line adverts in local newspapers for which tests are perhaps not much used. It could also be that employers were confused by the term 'psychometric' and a long list of alternative kinds of tests: written, numeracy, job-related tests and so on. There are, then, several reasons why this study obtained such unusual results.

The major source of recent data on UK companies' practices across the whole labour force is the Chartered Institute of Personnel and Development (CIPD) which has instituted an annual series of recruitment surveys. These have now run for four years (1997-2000 inclusive): and involve between 260 and 290 telephone interviews with small, medium and large companies selected from a wide range of sectors. Because the format of the questionnaire in the CIPD surveys has changed, it is not possible to carry out direct comparisons of results over time.

Table 5 shows selected data from the CIPD surveys (CIPD, 1999; 2000). They indicate that well over half of respondents currently use ability/aptitude tests for selection purposes; more than a third use personality tests; and between 25 and 30 per cent use assessment centres.[3]

Assessment Centres

Psychometric testing sometimes takes place within the context of an assessment centre. Organisations use a range of selection methods, including interviews, group exercises and role playing, in-basket exercises and other methods, as well as psychometric testing in order to select from a pool of job applicants. Assessment centre selection methods can take one or two days to complete, and because of the cost and time taken they are sometimes referred to as the 'Rolls-Royce' of selection methods.

There has also been a remarkable growth in the use of assessment centres since the 1980s. It is important to note that not all employers may mean the same thing by this term, and there is also some variation in the definitions used by social scientists (see Table 6). Nonetheless, in very crude terms we can see in Table 6 growth from less than 5 per cent apparently using assessment centres in the 1970s through to estimates above 40 per cent in many of the surveys conducted in the 1990s. Again comparing the similar surveys conducted by Robertson and Makin (1986) and by Shackleton and Newell (1991) we observe that the

[3] There is a small but consistent fall in test use between 1999 and 2000. The reason(s) for this are unclear. It may be random variation, or the result of changes in question format/coding, or may reflect a real change in HR practice, or labour market conditions.

proportion of respondents never using assessment centres fell from 79 per cent to 41 per cent between 1984 and 1989; the number utilising them about half of the time increased from 5 per cent to 12 per cent during the period; and those always using assessment centres for managerial selection swelled from negligible proportions in 1984 to a little over 4 per cent by 1989. It must be noted that both of these surveys were based on fairly small samples of predominantly large firms. Moreover, it is plausible to suppose that those companies using an assessment centre were more likely to respond to the survey than those which were not using assessment centres. For these reasons, it is unlikely that the figures quoted in these reports can be taken as reflecting accurately usage of assessment centres in the economy generally but, nevertheless, comparison of the two surveys does strongly suggest an upward trend in the proportion of firms making use of ACs for selection.

Two surveys of graduate recruitment (one of the areas where ACs are probably most widely used) in the early 1990s both reported AC usage above 40 per cent. Keenan's (1995) study of graduate recruitment found that some 44 per cent of employers in the sample were using assessment centres. Hodgkinson and Payne (1998) reported that some 57 per cent of their sample (which was similar to Keenan's in origin and size) never used assessment centres, 17 per cent sometimes used them, and 26 per cent always used them.

A large-scale survey of AC usage was conducted by Boyle, Fullerton and Yapp (1993). Their survey was of organisations with more than 1,000 employees, and they found that, of this group, some 45.5 per cent of respondents to their questionnaire were using assessment centres. AC usage was more likely among larger organisations, and was somewhat more prevalent in the private sector than in the public sector.

Boyle, Fullerton and Yapp also examined the growth of assessment centres over time. In the early 1990s, then, almost 48 per cent of the organisations in the sample had been using an assessment centre for less than four years (Table 7). Growth had been particularly rapid in the public sector, where nearly 70 per cent had been using their assessment centre for less than four years, compared to 40 per cent in the private sector.

The IRS (1997) survey reported that out of 68 users of assessment centres over 40 per cent had been using ACs for less than two years. The earlier IRS (1991) survey reported usage of assessment centres of around 30 per cent, with about a third having introduced them in the previous two years. Most of the growth of assessment centre use in the 1997 survey had occurred amongst medium-sized firms (those employing 500-999 people, and 200-499 people), although the numbers in each size category were fairly small. IRS (1997) concluded

that it was likely that assessment centre usage amongst very large firms was already close to saturation level.

Variation in Test Use by Size of Firms

As already noted, most published studies tend to focus on samples of large firms. This is partly because these companies are more likely to use formal selection methods, partly because they are easier to research, and partly because they are seen as trend-setters. Such firms do account for a large proportion of total employment, especially in the non-service/traded goods sector. Nonetheless, it is important to note that small enterprises often utilise different recruitment practices than their larger counterparts.

Large firms are more likely to use formal selection methods such as psychometric tests and assessment centres. This is clear if we compare some of the results from the various surveys. For example, on psychometric tests, surveys such as Shackleton and Newell (1991) or Mabey (1989) which focus entirely on large firms report very high incidences of test usage, often over 60 per cent.

Small firms are much less likely to use psychometric tests, partly because of the costs involved (see the discussion of costs below), and partly because they have few vacancies. There have been relatively few studies which concentrate on the selection practices of smaller firms. Those that do so have included Bartram *et al* (1995), which looked only at firms employing less than 25 employees, and Campbell *et al* (1997) in which about three-quarters of respondents were employing less than 100 people and almost 90 per cent less than 200 people. The study by Bartram *et al* found that 15 per cent of very small firms were using aptitude or ability tests, 18 per cent were testing literacy and/or numeracy, and only 4 per cent made use of personality questionnaires. Campbell *et al* reported that 17 per cent of respondents to their survey were using personality tests, and 13 per cent were using psychometric ability tests. Although these findings provide strong confirmation that small firms are less likely to use psychometric tests than large firms, there have not been enough studies to reach any robust conclusions about trends in test use over time by small firms.

Assessment centres are used mainly by large firms. This method is too costly to be considered by small firms. Most of the studies on assessment centres are of large firms. According to Boyle, Fullerton and Yapp (1993) very large firms were also more likely than large firms to utilise ACs, although as mentioned earlier, the IRS (1997) survey suggested that medium-sized firms may be catching up.

Small firms are much more likely to use informal means of obtaining new recruits (Bartram *et al*, 1995; Scholarios and Lockyer, 1999). A study which looked specifically at the recruitment of young people by small firms showed that such organisations placed a good deal of emphasis on the motivation of recruits and less on academic qualifications; honesty and integrity were also particularly important to the small firms (Bartram *et al*, 1995).

Variation by Occupational Group

The extent to which assessment centres and psychometric testing are utilised depends heavily on the type of worker being recruited. Assessment centres are used mainly to select for managerial vacancies and as part of the process of recruiting graduate entrants to the firm. The same is true for psychometric tests on their own, which are far less likely to be used for non-graduate/non-managerial recruitment. In general, and predictably enough, the time devoted to testing during recruitment, and to recruitment generally, is greater (on a per person basis) the more highly paid the employee. As Schmidt and Hunter (1998) point out, using more valid selection methods – as companies believe they are doing when they use formal testing – is more worthwhile the more valuable the employee's output.

Companies' behaviour (as manifested in how and what they pay as well as how they recruit) is consistent with the belief that managerial and graduate recruits score high on this count compared to other less highly paid workers. The latest CIPD survey of recruitment practices reported that, for selecting managers, 22 per cent of respondents made use of assessment centres but only 2 per cent did so for the selection of skilled manual workers. Differences in the extent of psychometric test use across occupational groups were also pronounced: 39 per cent of organisations used ability/aptitude tests in the selection of managers and 35 per cent utilised personality tests; for skilled manuals the figures were 24 per cent using ability/aptitude tests and only 7 per cent using personality questionnaires (CIPD, 2000).

Weighing all the evidence from the literature reviewed here, there is every reason to suppose that, at the broad aggregate level, there has been a substantial increase in test usage in recent years and in the use of assessment centres. This means that test use is not confined to a narrow group of companies, as might have been the case twenty years ago, and hence is now more useful as an indicator of skill demands than in the past. However, test use is more common amongst large firms than small firms, and in non-manual rather than manual

occupations. Considerable caution would therefore be needed in generalising results on the demand for skills obtained from looking at test use to the economy as a whole.

4. What Kinds of Tests Are Being Used?

To be able to draw conclusions about the demand for skills and changes in that demand over time, it is necessary to have lots of information about which tests are being used, what the tests are measuring, and changes in the use of tests, and about new tests being brought onto the market. At present, the amount of information on which tests are actually used is very limited. Since most tests used are commercially developed, sales information is sensitive and difficult to obtain at levels of detail which make such comparisons possible. Most published surveys group tests together under general headings: usually cognitive, ability/aptitude, personality. This makes it impossible to tell exactly what traits or skills are being measured at any given time, or whether there has been any general trend towards or away from particular content. One quite recent survey, by Industrial Relations Services (IRS, 1997) does provide more detail about specific tests in use, and the results from that survey are reported in Table 8. The table reports instances where at least two organisations in the IRS sample stated that they were using a particular test.

The data suggest that a few companies, especially SHL Group, account for many of the most popular tests used by British companies. Some further information on the size of companies in Table 9, shows that SHL is much the largest of the UK test companies, followed by ASE, Oxford Psychologists Press and the Test Agency. The Appendix lists testing products supplied by various companies.

Cognitive Tests

Underlying the use of cognitive tests is the view that mental ability can be generalised across a range of different jobs, so that if an individual is good at solving a certain kind of problem, they are likely to be good at solving other types of problems. These tests may measure verbal and numerical reasoning, critical reasoning, or the ability to follow a series of logical steps at an abstract level.

Tests of Specific Abilities

Many of the test companies offer ability tests which assess the specific tasks necessary in particular jobs. For example, there are tests for clerical jobs which assess verbal and numerical checking skills, comprehension of office vocabulary, and the ability to plan and organise. Similarly, there are tests for technical jobs such as technical checking and fault-finding, knowledge of electronics, and the ability to comprehend diagrams. Other job-specific tests exist for call centre staff, computer programmers, sales staff, and managers.

Personality Tests

Underlying this group of tests is the idea that there are certain personality traits which are capable of being measured, and that these traits influence job performance and/or individuals suitability for particular kinds of jobs. In assessing personality, psychologists often refer to the 'big five' personality traits: extroversion, agreeableness, conscientiousness, openness to experience, and emotional stability. Many commercially available tests sub-divide further than these broad traits, perhaps having as many as 16 or 32 categories. Test publishers supply tests which are applicable to general business settings and also more occupationally-specific personality questionnaires, for example for customer contact/customer service, sales jobs, and manual/operative workers.

Testing for Literacy and Numeracy

A good number of the tests marketed by the test companies, as well as tests created by companies for their own use, are actually tests of literacy/written English, numeracy and/or mathematics. We know that employers often express dissatisfaction with the basic educational standards of new recruits into their organisations, although the most vocal complaints are usually reserved for entrants below graduate/management level.

One response to this might be to screen applicants by testing them for literacy and numeracy before job offers are made. For manual/non-management recruitment, CIPD data indicate that the overall scale of formal testing is lower than for managers/graduate recruitment: but do show about a quarter of companies using "ability/aptitude" tests for skilled manual recruitment. We do not know how many of these are effectively literacy or numeracy tests – nor do we know the equivalent figures for recruitment to higher grade jobs.

QCA report informal evidence that employers are decreasingly willing to accept GCSEs as evidence of adequate attainment: while the Army's unwillingness to rely on Mathematics GCSE has led to the development, by DERA, of a new mathematics test for technician recruitment.

Some systematic evidence on use of tests of this kind is available in the United States. American Management Association (AMA) surveys have shown that in 1999 about 34 per cent of AMA members were testing at least some of their job applicants for literacy and 37 per cent for numeracy skills. These are very high proportions, although it should be noted that AMA members are drawn disproportionately from larger firms. Also, the figures seems to have remained more or less constant during the 1990s: some form of basic skills (*i.e.* literacy or maths) testing was used by 38 per cent of respondents in 1991, 44 per cent in 1993, and 39 per cent in 1999 (AMA, 2000).

For the UK it is unclear how widespread literacy and numeracy testing by employers is. It could well be somewhat lower in the UK than in the US because, in spite of possible employer doubts about educational standards, British employers have available, and make use of, data from nationally administered and standardised examinations. US employers have no equivalent to our GCSE and 'A' level (or Standard Grade and Highers) results. Only very limited survey evidence is available in the UK. The IRS (1991, 1997) reported that 57 per cent of respondents in 1991 and 50 per cent in 1996 claimed to be using literacy and/or numeracy tests as part of their selection process. This suggests a high level of literacy and numeracy testing, although it does not give any indication of growth in use during the 1990s. The recent study of recruitment practices in central London (Spilsbury and Lane, 2000) found that written tests were used for 4 per cent of the job vacancies surveyed and numeracy tests for 2 per cent. As mentioned earlier, the methodology used in this study was different from that of other surveys, and likely to produce lower figures on test use. However, it is difficult to know what to make of such contradictory evidence in the absence of any data on this issue from other surveys. Clearly, there is a need for more research in this area.

The Costs of Using Tests

In the introduction to this paper it was suggested that an advantage of examining the demand for skills through the lens of psychometric test use, was that employers had to pay to use psychometric tests and they therefore give a better indication of skill demands since

employers were unlikely to waste money on measuring skills for which they had no need. How much, then, does it cost to use tests?

The sums involved in test use are quite substantial, according to a recent survey by Incomes Data Services (IDS, 2000). Assuming that employers prefer to administer and interpret the tests themselves, rather than employing external consultants, then the costs will include initial training in test use, since it is necessary to be qualified in order to use tests. Further costs will include start-up kits such as manuals or computer software, and consumables such as question-and-answer booklets for test candidates. The major cost is likely to be training. To use tests, it is necessary to obtain certificates of competence issued by the British Psychological Society. The BPS Level A covers the use and interpretation of ability tests, while BPS Level B covers the use and interpretation of personality tests. Most of the test companies provide courses leading to these qualifications. These courses generally take about five days for each of Level A and Level B. The costs per trainee of attending such courses offered by seven UK test companies are reported in Table 10 (these figures are just the fees for the course and exclude accommodation costs, if the course is residential, and any costs to the employer incurred because the employee is away and attending a course). The average cost per trainee is about £1,500 for Level A, and about £1,700 for Level B. So to train, for example, five employees to be Level A and B certified test users would cost at least £10,000 and possibly more than £20,000. It is possible to train some employees to be test administrators, rather than test users, although at least one person in the organisation must be a qualified test user if the company is to be permitted to buy tests. Test administrators can brief candidates prior to testing, and hand out and collect test papers, but cannot score tests, except under supervision, nor interpret the results. Training to become a test administrator is cheaper than becoming a test user, and a fee of perhaps £500 would be charged for a test administrator course. However, it is likely that larger companies would want to have several people qualified to test user standard, as well as more employees qualified to administer the tests.

Further training costs will be incurred if the employer wishes to utilise the products of more than one company. Attending a training course to level A or B standard with test company X only entitles the user to make use of test company X's products. If the employer wishes to use company Y's products then they must attend a training course with company Y. Generally, there are substantial discounts and shorter courses available for those already qualified as a certified test user, but the fees will still run to several hundred pounds. In addition, there is sometimes an annual licence fee to use some of the more popular products

on the market, such as SHL's OPQ series. The other costs involved in test use include start-up kits and consumables. Many companies charge less than £200 for a start-up kit for a particular test, although start-up kits for test batteries from some of the larger companies cost over £1,000. The cost of consumables such as additional packs of questionnaires are usually low; £50 for a pack of ten tests would be typical (IDS, 2000).

There are – then, a wide range of tests on the market designed for different occupational groups. The tests cover various skills, aptitudes, abilities and attributes. The costs of using the tests are substantial, with the main element being the cost of training to become an accredited test user.

5. Why are Tests Used?

If psychometric tests are to be useful as indicators of shifts in the demand for skills, then it is important that organisations' use of tests is linked to their wish to measure the skills of prospective employees. If tests are in use for other reasons, then this would undermine their usefulness as indicators of skill demands. Do organisations in the UK make use of tests in order to measure work force skills, or have they adopted tests for some other reason, or set of reasons? Here we look at the rather limited evidence available on this question. There are a few surveys which have asked organisations why they make use of tests, and there is a more speculative literature dealing with change in test use over time. We take each of these in turn.

The surveys by Bevan and Fryatt (1988) and by Williams (1994) contain some information about the reasons for test use by organisations and this is assembled in Table 11. Note that the survey by Williams was of local authorities in England and Wales while that of Bevan and Fryatt was across a range of private sector organisations.[4]

These results suggest that the perceived objectivity of tests, their predictive abilities, as well as their ability to filter out unsuitable candidates were important reasons for test use by companies and local authorities. Some quite similar results were obtained in the IRS (1997) survey and are shown in Table 12. The data show that companies believe the tests are valid measures of something useful, although it gives us no insight into what exactly the

[4] Of course, at least some of the doubts raised about the validity of surveys of skill shortages in Section 2 may also apply to surveys of testing. For example, how well-informed about test use is the person answering the survey questions, and do they fully understand the meaning of psychometric testing?

companies are, or think they are, measuring through the tests. It also does not explain why there have been such sizeable changes in test use since the 1980s.

In what follows we divide the current literature on changes in test use into those which concentrate on changes in the labour market, and those which focus on other possible reasons for changes in the use of tests, or indeed changes in recruitment and selection practices more generally.

Changes in the Labour Market

Alpin and Shackleton (1997) suggest that there have been several key trends. Young labour market entrants across the EU (and, indeed, North America and the Pacific Rim) now have much higher educational attainments than in the past, which means that, at the top end of the achievement range, formal qualifications do not provide as clear a sorting and discriminating mechanism as in the past. This may lead employers to screen applicants for graduate posts much more carefully. There is also a declining pool of young people in Europe which means that employers need to target other groups of workers: mature workers, women returners and others (who will not have recent formal qualifications, and so may need testing instead).

These possible explanations of rising test use relate to changes in the overall pool of applicants: but other suggestions invoke changes in the skill mix required by business, and in particular the need to obtain increasing numbers of recruits with technical or computing skills. The existence of a pay premium for mathematics qualifications (implying a skill shortage) has been documented by Dolton and Vignoles in particular (2000), using NCDS data. Similarly, work by Green (1999) for the Skills Task Force indicated a clear wage premium for jobs using computing, which in turn were closely related to maths skills. Alpin and Shackleton argue that such trends have encouraged employers to devote more attention to selection methods and to test for literacy, numeracy and other attributes. In addition, it has been claimed that there has been a growth in the demand for 'soft', or interpersonal skills (see National Skills Task Force, Second Report, 1999 for a discussion). This might persuade firms of the need to test applicants systematically for certain personality traits.

However, there is as yet no real evidence that trends in test use and in skill demands are related. Alpin and Shackleton's article is a broad overview of trends in selection which does not provide detailed empirical data and we have not located any research which demonstrates a clear link between any of these trends and changes in test use by UK private companies. At present only anecdotal evidence is available. For example, the Army maths

test referred to earlier *was* developed in part as a response to increasing difficulty in using GCSE maths scores as a discriminator among applicants for technician training. Changes in armed forces selection techniques tend to be both well documented over time and related to reviews of skill needs. A study of changes at the Admiralty's assessment centre implied that the changes were made in order to improve the identification of certain skills, notably leadership potential (Jones *et al*, 1991). More recently, additional personality tests were introduced in an attempt to reduce levels of voluntary withdrawal from the Navy. DERA, which develops and evaluates recruitment tests for all three services, has altered the Army recruitment batteries to focus more on aspects of trainability/potential rather than just verbal/mathematical/scientific attainment.

In the absence of more general and systematic evidence on how firms' selection decisions are actually made, it is difficult to be sure how far the labour market is the key factor – not least because one can make out a case, *a priori*, for quite different, opposing effects arising from the same situation. For example, there is some evidence that, in the early 1980s, recession in the UK was associated with an increase in the use of cheap and informal methods of recruitment (Shackleton and Newell, 1991). But unemployment levels were again historically very high across much of Europe during the 1990s. One might expect this (by making recruitment easier rather than more difficult) to have produced a corresponding decline in test use.[5] In fact, test use increased. Alternatively, one might expect that test use (and changes therein) would be related to labour market flexibility (rather than, or in addition to, unemployment), and specifically to the ease with which employers could shed "mistakes". In that case, expenditure on tests for recruitment would be higher in countries with high labour costs and employment security and lower in countries such as the UK which had been making their labour market increasingly flexible. No such pattern is apparent.[6]

Equal Opportunities

In the US, it is clear that test use is related to factors other than simply the desire to hire the most productive workforce. In particular, equal opportunity legislation means that any apparent discriminatory effects of hiring practices - most commonly in terms of the

[5] However, high levels of unemployment could, in principle, also have atendency to increase test use. For example, if more unemployment means more variability in applicants leading to firms using tests to sift applicants more effectively.

[6] For discussion of European trends in selection practices, see the papers by Newell and Shackleton (1994, 2000), Hodgkinson and Payne (1998), and Alpin and Shackleton (1997).

proportions of different ethnic groups hired - leave employers open to prosecution and damages unless they can demonstrate that decisions are based on valid selection procedures (which can include formal tests). This has had a significant effect on recruitment procedures, although it is hard to quantify: in some cases, the effect has been a displacement of one test by another, in others a net increase in formal test use, and in yet others a decrease. Researchers in Australia and New Zealand (Dakin *et al*, 1994) have also noted that a response to legislative change requiring justifiable selection practices has been an important factor in explaining the growth of test use (along with increased marketing activity by test companies, and a growth in awareness of the potential benefits of test use by business users). In the UK it is less obvious that legislation has been a driving force behind the growth of test use in that there have been very few court cases, and the relevant legislation is far less prescriptive about acceptable practice (Gifford (ed.), 1989; Kleiman and Faley, 1985). However, it seems at least possible that some of the changes in recruitment practice that are documented are a direct or a prudential response to legislative change.

The Business Environment and Business Strategy

Another very general explanation is that the business environment, and specifically trends towards globalisation, could be an important influence on recruitment and selection. Large multinationals may well impose their preferred human resource practices onto subsidiary firms. Increasing numbers of human resource managers may have been trained in internationally-oriented business schools, possibly in other parts of the European Union and will then impart the latest HR techniques to the firms which they work for (Eleftheriou and Robertson, 1999; EIRR, 2000). The increasing professionalisation of the personnel function might have a similar impact. Boyle, Fullerton and Yapp (1993) speculated that the rapid growth of assessment centres could be explained, at least in part, through the higher profile given to the HR function, and greater awareness among HR professionals of alternatives to traditional practices. Others have been more sceptical about the extent to which HR theory has fed through into practice (Scholarios and Lockyer, 1996).

Some research exists relating to practices in multinational companies. A survey of the Irish labour market in the mid-1990s found that US and EC-owned companies were much more likely to use psychometric tests than Irish-owned companies (Gunnigle *et al*, 1994) One recent study of a range of large international companies operating in Europe found a mixed picture on this question (EIRR, 2000). Some companies, including BMW, PowerGen and

IBM, possessed international strategies for selection and recruitment while other companies, including GKN, Marconi and Elf Aquitaine were content to adopt more decentralised approaches towards selection and recruitment. On the other hand, an in-depth study which looked specifically at international companies operating in UK greenfield sites found no evidence that foreign ownership had any impact on HR policy, practice and outcomes (Guest and Hoque, 1996).

Several authors have argued that the form of strategy adopted by the firm will have a major impact on the recruitment and selection methods which it adopts. By implication, changes in strategic direction, perhaps caused by underlying shifts in the business environment, will feed through into changes and adjustments in the firms' recruitment and selection methods.

Williams and Dobson (1997) suggest that the strategies followed by firms can be broadly divided into three groups, with a central focus on either innovation, quality enhancement or cost reduction. Each of these strategies will have differing implications for the extent to which people are crucial to the success of the business and so will affect the kind of HRM policies chosen. Williams and Dobson conjecture that as the business environment becomes more competitive, with a switch towards continuous product innovation, then companies will increasingly need to select for characteristics such as creativity and the ability to function well as part of innovative teams.

Arguing on similar lines, Olian and Rynes (1984) use a standard typology of strategic behaviour distinguishing three kinds of company strategy: defender, firms which carve out a niche in narrow, relatively stable markets; prospectors which concentrate on finding and exploiting new product and market opportunities; and analysers which operate like defenders in some markets, but in other markets watch competitors closely in order to rapidly implement new ideas. Olian and Rynes then develop a number of speculative propositions about the likely recruitment and selection behaviour of each type of firm. For example, individuals with certain personality traits such as independence and creative thinking ability might be more likely to succeed in, say, prospector firms than defender firms. They also assert that effective defender organisations are likely to use selection devices that assess applicants' future aptitudes and potential promotability. Prospectors are more likely to rely on techniques that emphasise the applicant's work history. They further state that defender organisations are more likely to use formal standardised screening devices than are other organisational types, while prospectors will rely more on informal exchanges between applicants and organisational representatives.

Johns (1993) develops a model of change in selection practices as a form of organisational innovation. He argues that change may well occur as a result of environmental threats or exogenous shocks to the organisation rather than because of "rational" evaluation of selection methods and their effectiveness. For example, handwriting analysis (graphology) was popular in some European companies (which is why it was included in the comparative surveys described above) without there ever having been any empirical evidence to support its effectiveness as a selection technique.

Building on previous work in this field (much of it discussed above), Lockyer and Scholarios (1999) and Campbell *et al* (2000) argue that the selection methods adopted by firms depend on three broad types of influence: firstly, the selector (their training/experience, power and influence relative to others in the organisation, access to networks of contacts); the organisational context (the strategy and structure of the organisation, patterns of employment and turnover, the size and resources of the organisation) and finally, the external environment (the local labour market, sector-specific skills, the product market, as well as general factors such as employee legislation and the national culture). Using a combination of survey and case study methods on a sample of Scottish firms they provide some empirical support for this framework. For example, there was a relationship between the adoption of more formal selection techniques and whether the selector worked in personnel full-time or combined personnel work with other functions. The state of the labour market had an impact on recruitment practices. In some sectors tight labour supply enabled selectors to react to incoming enquiries while in tight labour markets, unsurprisingly, more active recruitment drives were necessary. Remoteness of the local labour market also had a significant effect for some of the Scottish employers.

As for change in selection procedures over time, a range of influences was found including new employees bringing with them practices from their previous employer, the influence of outside consultants, the effects of re-organisation and rationalisation, and realisation of the need for change. Because of this diverse range of influences, different selection procedures could be found even across firms of similar size in the same industry. Psychometric testing had sometimes been introduced by selectors themselves and sometimes had been recommended by outside consultants. Established traditions in some industries, such as for work trials in hotels and construction, and for assessment of quality of work and client base in architecture, surveying and accountancy, may have made it less likely that psychometric tests would be used in these particular industries (Lockyer and Scholarios, 1999).

However, there are a number of serious problems with the business literature, and its approach to this question. Some of it is purely speculative. The work of Olian and Rynes (1984), Williams and Dobson (1997), and Johns (1993) discussed above contains no empirical work in support of their theoretical propositions at all. Secondly, much of this literature, is concerned with recruitment and selection practices generally, rather than considering psychometric testing as such, and it is not readily apparent how much of it can be applied to the use of tests. In addition, we need to distinguish between the methods by which information on tests is disseminated and the underlying reasons for using tests. For instance, an organisation may increase its use of tests following the arrival of a new director of Human Resources, say, or a change in policy by its parent company, but there may still be an underlying rationale for the use of tests, to explain why the new HR director, or the head office of the parent company is in favour of increasing their use.

Overall, it seems that there is no clear consensus in the existing literature with respect to how companies choose or change their selection methods. Equally, perceptions (more or less empirically based) regarding skill needs and changes in skill needs do play a part. They may do so directly, by triggering changes from one method to another by companies or public sector organisations; or indirectly, because test companies develop new products in response to change. However, very little of the literature on selection has looked directly at this relationship and further new research and secondary analysis therefore seems desirable.

6. The Validity of Tests

While the immediate causes of test use may include a variety of factors internal and external to the company, the adoption of formal tests for selection rests on the belief that they provide reliable and valid information about a variety of relevant characteristics. Do the tests predict job performance *i.e.* do those who score well in psychometric tests go on to do well in the job? There is compelling evidence from the research literature that cognitive ability tests are successful in predicting performance. There is a long history of investigation of this topic amongst psychologists and a great deal of evidence had accumulated on the predictive power of measures of general intelligence, for example in Ghiselli's (1966) well-known study. However, until about twenty-five or thirty years ago there was an apparent tendency for different measures to vary enormously in their predictive power, implying that the validity of

a given measure was highly sector and indeed firm specific. This perception has now changed due largely to the work of Schmidt and Hunter (1998) who conducted meta-analytic studies which demonstrated the underlying consistency in this set of work. Schmidt and Hunter showed that the apparent variability was in fact largely the result of sampling error (deriving from small sample sizes) along with a number of other measurement artefacts. Cognitive tests were confirmed as good predictors of performance across a very broad range of jobs.

The predictive validity of personality testing is more controversial. There has been a good deal of debate about whether personality measures are valid predictors, with some commentators suggesting that reported correlations in this field could be of little value, or even entirely spurious (Blinkhorn and Johnson, 1990). Meta-analysis has given some support to the use of personality tests in recruitment and selection. Tett *et al* (1991) conducted a meta-analytic review of 494 studies in this field, and found significant correlations between personality scales and measures of job performance. Unlike the case of cognitive ability measures, however, there is no unifying 'g' factor for personality measures, so that careful attention has to be paid to the relevant characteristics for each type of job. Indeed Tett *et al* found that studies which were 'confirmatory' *i.e.* had clear prior hypotheses about the traits likely to be relevant for particular occupations obtained much higher validities than studies which were 'exploratory' or data-driven. Studies that made use of job analysis so as to be clear about which characteristics were required for the job also obtained higher validities than those which made no use of job analysis.

A major sub-set of the selection literature is explicitly concerned with assessment centres, and especially the ability of assessment centres to measure management 'potential' and predict later success. Assessment centres typically collect a large amount of information about people, using a wide variety of simulations, tests, *etc*, and therefore make formal multi-variate analysis a possibility. However, it is also general practice for the people running the centre to arrive, after discussion among themselves, at an overall 'judgement' or composite score based on more informal aggregation.

The literature on assessment centres is dominated by US studies, focusing in particular on centres for managers such as those run by IBM, ATT, and Standard Oil. However, there is also published literature, most of it now rather old, using longitudinal data sets on the career success of individuals who had gone through the 'Extended Interview' approach typical of the civil service, police and armed forces in the U.K (Anstey, 1977; Gardner and Williams, 1973). Overall 'scores' from the assessment centres are generally

quite strongly correlated with later success within the organisation, as measured by promotion, salaries *etc*, and with peer and subordinate ratings of management performance.

On the other hand, assessment centres are a very expensive way of conducting the selection process, and the cost-effectiveness of centres is unclear. Critics of assessment centres in the US argue strongly that the increase in predictive validity obtained from centre assessments compared to general cognitive tests do not begin to justify the extra costs.

In addition, while the predictive validity of assessment centres is well-established, it is not very clear why they are successful (Klimoski and Brickner, 1987). There is a possibility that there could be an element of 'contamination' or self-fulfilling prophesy here: the predictive validity could occur because the scores from the assessment centre are used in subsequent promotion decisions.

7. Conclusion

Our review of the literature provides strong confirmation that companies' use of psychological tests has been growing over time. Up to the mid-1980s surveys of test usage, and indeed of recruitment and selection methods more generally, were apt to point to little change. Sneath *et al*, reporting in 1976, concluded that there was no indication that test usage had increased since the 1960s or early 1970s, 'and possibly test usage may even have declined'. Gill, writing in 1980 on management selection, reported 'a high degree of satisfaction, at times bordering on complacency, with traditional methods of recruitment and selection which, as the research indicates, have not changed in any significant way in the past 10 years'. Bevan and Fryatt (1988) noted that testing was not widely practised by UK employers and that there was scope for greater penetration of tests. Employers were not unaware of tests, but were unclear about what the tests could do or how useful they actually were.

Growth in test use seems to have taken off at some point in the 1980s. By the late 1980s and early 1990s, researchers were beginning to discern substantial shifts in companies' selection techniques. Shackleton and Newell (1991), comparing their survey results with those of Mabey five years previously, reported what they felt was an encouraging trend towards higher proportions of companies making use of more reliable and valid methods of selection. Since then surveys have continued to suggest that more organisations have adopted

psychological testing. In the main, it is large organisations which have chosen to use tests. Psychometric testing is not unknown in smaller organisations, but they tend to be deterred by the costs of the tests and the low numbers of vacancies which they have.

There are now a wide range of tests on the market, and new products are being introduced all the time. These may be completely new products, or up-dates of well-established tests. Some tests measure broad skills while others are more narrowly focused on particular occupations, whether managerial, technical, or manual. There are tests of cognitive ability, literacy and numeracy skills, as well as personality questionnaires designed to assess softer, people-oriented competencies.

The costs of tests are quite substantial, and suggest that employers which use them are likely to be drawing on them for a clear purpose, rather than just responding to some passing management fad. The rather limited survey evidence available on why tests are used does show that prediction of job performance is an important factor, as well as the perceived objectivity of the tests.

Because most surveys are relatively small-scale, and only make very broad distinctions between different kinds of tests (typically aptitude and ability, personality), we know very little about which tests are most widely used, or about the details of which new tests have become available recently and proved successful. But it is this kind of detail which is necessary if we are to make sensible inferences about changing patterns of skill demand.

There is plenty of evidence of the validity of tests and assessment centres. Work in this area has been dominated by studies of US origin using US datasets and it would be valuable if more validation studies were available which used datasets from European and other non-American countries. However, the evidence available does point quite strongly to the conclusion that psychometric tests are able to make valid predictions about job performance, across a broad range of different jobs.

Overall, the implications of this review of the literature are that information about psychometric tests has the potential to make a useful contribution to our knowledge of the demand for skills. It has some disadvantages compared to skill surveys. It is less representative of the economy as a whole because tests are not used by all firms or for all types of vacancies. For example, small firms are under-represented amongst those organisations which make use of tests. The principal advantage of studying psychometric test use is that it may be able to provide realistic indications of the demand for skills among test users because employers are having to pay sizeable amounts of money in order to use the tests. The main problems at the moment are the lack of previous work in the field and the

absence of detailed data on psychometric testing practices. In particular, there is almost no evidence of the specific skills which employers are aiming to assess when they make use of psychometric tests and hence we cannot as yet make inferences from test use as to which skills are in demand. Much further research and data-collection is needed.

Table 1: Vacancies, Hard-to-Fill Vacancies and Skill Shortage Vacancies, by Occupational Group			
	Vacancies	Hard to fill vacancies	Skill Shortage Vacancies
Managers & Admin	7	5	7
Professionals	6	5	8
Associate Professionals & Technical	11	12	17
Clerical & Secretarial	16	9	9
Craft & Related	8	14	22
Personal & Protective Service	15	17	11
Sales	19	16	13
Production & Process Operatives	11	13	9
Other	7	7	3
TOTAL	100	100	100
Source: National Skills Task Force, Employers Skill Survey, Statistical Report, 2000, pp. 35-9.			

Table 2: A Summary of Surveys of Test Use in Recruitment and Selection

1	Author(s)	Focus	Method	Sample	Size of Response (Response rate)	Main results
2	Sneath et al (1976)	Test Usage	Postal questionnaire	495 organisations from Dun & Bradstreet Directory 1975	N = 281 (57 per cent)	69 per cent sometimes used tests for selection. However, this was mainly clerical tests; only 26 per cent used tests at least some of the time in management selection; use of cognitive and personality tests below 10 per cent.
3	Gill (1980)	Management selection	Postal questionnaire	1,200 companies drawn mainly from Dun & Bradstreet business directory.	N = 335 (28 per cent)	Intelligence tests were used between 7-10 per cent depending on type of vacancy; aptitude tests 5-15 per cent; personality tests by 4-9 per cent
4	Robertson and Makin (1986)	Management selection	Postal questionnaire	304 organisations from the *Times 1000*, 1983.	N = 108 (36 per cent)	36 per cent of respondents used personality tests at least some of the time; 29 per cent used cognitive tests.
5	Bevan and Fryatt (1988)	Employee selection	Postal questionnaire	750 organisations from a national business directory	N = 320 (43 per cent)	16 per cent used cognitive tests for at least some vacancies; 22 per cent used personality tests.
6	Mabey (1989)	Test Usage	Telephone survey, 1988	973 large organisations from Dun & Bradstreet business directory	N = 300 (31 per cent)	66 per cent of respondents were using cognitive tests and 47 per cent were using personality tests.
7	Shackleton and Newell (1991)	Management selection	Postal questionnaire	120 organisations from the *Times 1000*, 1988	N = 73 (61 per cent)	64 per cent of respondents used personality tests; 70 per cent used cognitive tests.
8	IRS (1991)	Selection methods	Postal questionnaire	800 employers who were IRS subscribers	N = 173 (22 per cent)	Personality tests were used by 58 per cent of employers who responded, ability and aptitude tests were used by 48 per cent.
9	Mabey (1992)	Test Usage	Telephone surveys in (a) 1990 (b) 1991	(a) earlier sample of 973 organisations (b) 1,162 organisations from Dun & Bradstreet database	(a) N = 200 (b) N = 361	56 per cent of respondents were using personality questionnaires in 1990 and 57 per cent in 1991; 68 per cent tests of aptitude, ability or general intelligence in the 1990 survey, 63 per cent in 1991.

10	Williams (1994)	Test Usage	Postal questionnaires (a) 1986 (b) 1989 (c) 1991	All local authorities in England and Wales	(a) N = 191 (43 per cent); (b) N = 289 (64.5 per cent (c) N = 276 (61 per cent)	51 per cent of responding local authorities were using some form of test in 1991, compared to 39 per cent in 1989 and 42 per cent in 1986.
11	Baker and Cooper (1995)	Ethics of test use	Postal questionnaire	National sample of 1,200 organisations employing more than 200 people	N = 217 (18 per cent)	47 per cent of respondents were using occupational tests.
12	Bartram et al (1995)	Selection of young people by small firms	Face-to-face interviews	Approaches to 1420 businesses employing 25 or less people	N = 307 (22 per cent)	15 per cent used aptitude/ability tests, 4 per cent used personality questionnaires, 18 per cent used literacy or numeracy tests.
13	Hodgkinson and Payne (1998)	Graduate selection	Postal questionnaire	400 organisations drawn from an employers' directory, 1993	N = 176 (44 per cent)	78 per cent of respondents were using ability tests for graduate selection; 61 per cent were using personality tests.
14	Campbell, Lockyer and Scholarios (1997)	Selection methods of Scottish companies	Postal questionnaire	3,600 firms drawn from Scottish Chambers of Commerce Quarterly Business Survey (June 1994)	N = 848 (24 per cent)	17 per cent of respondents were using personality tests, 13 per cent were using psychological tests of ability, 13 per cent were using tests of interest/motivation.
15	IRS (1997)	Employee selection	Postal questionnaire	A sample of IRS subscribers, sample size not specified	N = 157 (na)	76 per cent of respondents used ability/aptitude tests, 61 per cent used personality tests.
16	CIPD (2000)	Employee selection	Telephone interviews	A sample of firms employing 50 + employees, sample size not specified	N = 262	54 per cent of respondents were using aptitude and ability tests in selection; 36 per cent were using personality tests.
17	Spilsbury and Lane (2000)	Recruitment and selection in central London	Telephone interviews	Unspecified sample of employers drawn from newspaper job advertisements	N = 2,000 (na)	4 per cent of respondents used psychometric tests; 5 per cent used technical tests; 4 per cent written tests, 3 per cent word processing/typing tests, 2 per cent numeracy tests.

Table 3: Use of Psychological Tests by British Companies, 1984 and 1989.				
	Personality Tests		Cognitive Tests	
	1984	1989	1984	1989
Never	64.4	35.6	70.8	30.1
Less than half	23.8	27.4	19.8	28.8
About half	3.0	15.1	3.1	16.5
More than half	5.0	12.3	1.0	12.3
Always	4.0	9.6	5.2	12.3
Sources: Robertson and Makin (1986); Shackleton and Newell (1991).				

Table 4: Proportions Using Various Selection Methods in Two IRS Surveys		
Percentage using	1991	1996
Personality tests	58	61
Ability/aptitude tests	48	76
Literacy/numeracy tests	57	50
Assessment centres	30	45
N	173	157
Source: IRS, 1991 and 1997.		

Table 5. Selection Methods Used: 1999 and 2000		
Selection method	1999	2000
	%	%
Interviewing	100	99.6
Application forms	82.1	80.9
CVs	77.6	74
Covering letter	58.2	63.4
Ability/aptitude test	60.8	54.2
Personality questionnaires	42.5	36.3
Assessment centres	30.2	26
Telephone screening	18.3	17.6
Biodata	4.1	6.9
Graphology	1.1	1.9
Source: CIPD (2000).		

Table 6: Surveys of the Use of Assessment Centres

	Author	Focus	Definition of AC	Method	Sample	Response	Main Results
1	Gill, Ungerson and Thakur (1973)	Performance appraisal	'Simultaneous assessment of several individuals by a group of trained evaluators using a variety of group and individual exercises'.	Postal questionnaire	649 organisations drawn from Times 1,000 and Dun & Bradstreet business directory	N = 360 (55 per cent)	4.7 per cent of companies which responded were using assessment centres
2	Gill (1980)	Management selection	'Group selection methods: Simultaneous assessment of several individuals by a group of trained evaluators using a variety of selection methods'.	Postal questionnaire	1,200 companies drawn mainly from Dun & Bradstreet business directory.	N = 335 (28 per cent)	3 to 5 per cent of respondents were using group selection methods according to the type of vacancy. Most widely used for graduate recruitment.
3	Bridges (1984)	Use of ACs	Not defined	Postal questionnaire	600 companies drawn from the FT 1000 list.	N = 207 (35 per cent)	19 per cent of respondents were using assessment centres.
4	Robertson and Makin (1986)	Management selection	Use of any AC type exercise	Postal questionnaire	304 organisations from the *Times 1000*, 1983.	N = 108 (36 per cent)	21 per cent were using assessment centre exercises.
5	Shackleton and Newell (1991)	Management selection	AC type exercises	Postal questionnaire	120 organisations from the *Times 1000*, 1988	N = 73 (61 per cent)	59 per cent of respondents were using assessment centres for at least some managerial vacancies.
6	Boyle et al (1993)	Use of ACs	From Task Force on AC Guidelines	Postal questionnaire	2,528 organisations with over 1,000 employees from Personnel Manager's Yearbook	N = 907 (36 per cent)	AC usage reported by 45.5 per cent of respondents.
7	Keenan (1995)	Graduate selection	Not stated	Postal questionnaire	1,500 organisations drawn from a graduate recruitment guide	N = 536 (36 per cent)	44 per cent of respondents were using ACs.
8	Hodgkinson and Payne (1998)	Graduate selection	Not stated	Postal questionnaire	400 organisations drawn from an employers' directory, 1993	N = 176 (44 per cent)	43 per cent were using ACs at least sometimes.
9	IRS (1997)	Employee selection	Not stated	Postal questionnaire	A sample of IRS subscribers, sample size not specified	N = 157 (na)	45 per cent AC usage.
10	CIPD (2000)	Employee selection	Not stated	Telephone interviews	A sample of firms employing 50 + employees, sample size not specified	N = 262	30 per cent were using assessment centres in the 1999 survey; 26 per cent in the 2000 survey.

Table 7: Length of Use of Assessment Centres in a 1993 survey			
Years using ACs	Total (%)	Sector (%)	
		Private	Public
	N = 376	N = 275	N = 99
Less than 2	14.4	12.4	19.2
2 up to 4	33.5	28.0	49.5
4 up to 10	36.2	41.5	22.2
10 or more	16.0	18.2	9.1
Source: Boyle *et al* (1993).			

Table 8: Tests Commonly used by Employers		
Name of Test	**Test Publisher**	No of Employers Using
Personality		
Occupational Personality Questionnaire (OPQ)	***SHL Group***	25
16 Personality Factor Questionnaire (16PF)	ASE	18
Personal Profile Analysis (PPA)		9
Belbin		3
Fundamental Interpersonal Relations Orientation – Behaviour – (FIRO-B)	Oxford Psychologists Press	2
Myers-Briggs Type Indicator (MBTI)	Oxford Psychologists Press	2
Perception and Preference Inventory (PAPI)		2
Aptitude		
Management and Graduate Item Bank (MGIB)	SHL Group	10
Critical Reasoning Test Battery (CRTB)	Psytech and SHL Group	8
Personnel Test Battery (PTB)	SHL Group	8
Graduate and Managerial Assessment (GMA)	ASE	5
Technical Test Battery	SHL Group	5
Advanced Managerial Tests (AMT)	SHL Group	4
Watson-Glaser Critical Thinking Appraisal		4
Automated Office Battery	SHL Group	3
General Ability Test	ASE	3
Information Technology Test Series	SHL Group	3
Applied Technology Test Series	SHL Group	2
Modern Occupational Skills Test (MOST)	ASE	2
AH4	ASE	2
AH6	ASE	2
Source: IRS, 1997; details of test publishers from IDS, 2000. These results indicate whether two or more organisations in the sample were using a particular test.		

Table 9: Information on Psychological Testing Companies

Company	Date Founded	Number of Full-time staff	Number of chartered psychologists among full-time staff	Turnover	Number of Corporate Clients
ASE	1981	140*	8		
Business Minds	1995	9	9		Over 100
Criterion Partnership	1991	7	4		
Development Strategy and Assessment	1989				
Knight Chapman Psychological	1988	3	1		200
The Morrisby Organisation	1967	20		Approx £2 million	60
Oxford Psychologists Press		70	20		Over 1,000
Psytech International	1990	7	5		Over 150
SHL Group	1977	300	60	£65 million worldwide	2,500
Selby Millsmith	1985	15	10		Over 100
The Test Agency	1970	20	4		Over 500

Source: IDS, Psychological Tests (2000)
* ASE is the occupational psychology wing of NFER-Nelson. The employment figures are for NFER Nelson.

Table 10: Financial Costs per Trainee of Training to be a Psychometric Test User		
Company	Level A £	Level B £
A	1,750	1,900
B	995	1,195
C	1,400	1,400
D	950	950
E	1,700	2,050
F	2,145	2,445
G	1,450	1,850
Source: IDS (2000).		

Table 11: Reasons for Test Use in Two Surveys (percentages)				
Reason	Personality Tests		Cognitive Tests	
	Bevan and Fryatt (1988)	Williams (1994)	Bevan and Fryatt (1988)	Williams (1994)
Predicts subsequent job performance	24	55	40	66
Predicts work group compatibility	58	81	35	3
Tradition: have always used them	3	4	2	3
Cost-effective	12	36	9	41
Filters out unsuitable candidates	42	45	37	54
Objective and unbiased	24	69	47	72
Speed and ease of use	9	38	5	49
N	43	128	59	90

Table 12: Reasons for Using Selection Tests		
Reason	% citing as a reason	% citing as the main reason
To predict job performance	76.1	39.4
To provide additional information before interview	73.5	27.9
To assess ability of candidates to "fit in" to organisational culture	67.3	25.0
To screen people for emotional stability	20.4	1.0
Other reason	12.4	6.7
N	113	104
Source: IRS (1997).		

Appendix:
Psychometric Test Products of the Main UK Test Publishers

This list of commercially available tests has been drawn from the Incomes Data Services report on psychological tests (IDS, 2000). Brief descriptions of some of the more widely-used tests are included.

ASE

This company provides a range of ability and aptitude tests,

General Ability Tests 2
Modern Occupational Test Series
Graduate and Managerial Assessment
First Graduate Assessment
Skillscape
Critical Reasoning Tests
ACER tests
New Technology Tests
Computer Programmer Ability Battery
The AH Series of Tests

Their personality products include:

16PF – the Sixteen Personality Factor Questionnaire
The fifth edition was launched in 1994. The questionnaire is designed for professional and technical staff, as well as sales staff and graduates. The 16 personality factors are: warmth, reasoning, emotional stability, dominance, social boldness, liveliness, role consciousness, sensitivity, vigilance, abstractedness, privateness, apprehension, openness to change, self-reliance, perfectionism and tension. Norms are available for the British population in

general, males and females, manual and non-manual occupations. The questionnaire has 185 items and takes 45 minutes to complete.

PIN-POINT
Global Gordon's Personal Profile Inventory
Emotional Intelligence Questionnaire

Business Minds UK Ltd

Personality assessment products offered by this company are:
PSYGNA Personality Questionnaire
Management Style Indicator

Criterion Partnership

Ability and Aptitude tests include:
The Utopia Series
Criterion Workforce Series
Business Administration Series

For personality testing they offer
Criterion Attribute Library

Development Strategy and Assessment

This company provides personality assessment products:

PRISM
Team Preferences Questionnaire

Knight Chapman Psychological

Their range of aptitude and ability tests includes

Short Numerical Test
Graduate and Management Problem Solving Series
Advanced Problem Solving Tests

For personality testing, they have:

Managerial and Professional Profiler
Customer Service Inventory
Roberts Personality and Motivation Questionnaire

The Morrisby Organisation

For aptitude and ability testing this company has the following products
Compound Series Test
General Ability Tests
Shapes Test
Mechanical Ability Test
Office Skills Profile

Oxford Psychologists Press

The Able Series
This was first published in 1996, and consists of tests combining work simulation exercises and psychometric testing. They aim to relate to candidates skills and abilities in a working environment and assess the potential to learn tasks, to quickly become successful in a job, and to adapt to changes in the working environment. The eleven tests in the series comprise business decision analysis, commercial reasoning, fault identification, critical business planning, critical information analysis, legal interpretation, financial appraisal, product

inspection, performance programming, vetting applications and helpline. The tests take between 30 and 45 minutes to complete.

Raven's Progressive Matrices
This is a very old test, first developed in 1938. It is a test of general cognitive ability, and consists of a series of progressively more difficult problems. It is a measure of general ability.

Destiny Series
Critical Reasoning Skills Series

For personality assessment, they have

Myers-Briggs Type Indicator
This test was first released in the UK market in 1991/2 and revised in 1998. It is based on Jung's theory of personality with an individual's preferences categorised on four separate dimensions allowing the identification of 16 different 'types'. The test is not timed but usually takes 20 to 30 minutes to complete.
California Psychological Inventory
Fundamental Interpersonal Relations Orientation - Behaviour (FIRO- B)
Innovation Potential Indicator

Psytech International
This company's products include

Graduate Reasoning Tests
General Reasoning Tests
Critical Reasoning Test Battery
Technical Test Battery
Clerical Test Battery

For personality assessment they provide

15FQ
Occupational Personality Profile
Jung Type Indicator
16PF industrial
Values and Motives Inventory

SHL Group

Among SHL's tests for measuring ability are the following.
Advanced Management Tests (AMT)
Four tests for middle/senior managers, professionals and graduates. These tests are at a higher level of difficulty than the MGIB (listed below).
Management and Graduate Item Bank (MGIB)
MGIB consists of tests which assess critical reasoning abilities at graduate or middle to senior management level. Eight versions are available, four verbal and four numerical tests. The verbal tests take 25 minutes and the numerical tests 35 minutes to complete.
Critical Reasoning Test Battery (CRTB)
CRTB comprises tests of reasoning skills at administrative, supervisory and junior management level.
Information Technology Test Series
Customer Contact Aptitude Series (CCAS)
CCAS consists of aptitude tests aimed at sales and customer service staff and assessing verbal and numerical reasoning skills.
Personnel Test Battery
Automated Office Battery
The Automated Office Battery (AOB) includes a numerical estimation test which assesses the ability to estimate the correct answer to a calculation; computer checking test which measures the ability to check machine input against the resulting output; another test assesses the ability to comprehend written instructions when a form of coded language is used. The battery aims to indicate whether a candidate has the skills necessary to work in an automated office environment.

Technical Test Battery

The Technical Test Battery is designed to select for a range of technical occupations. Specific tests include a test of verbal comprehension of vocabulary from a technical environment; numerical computation; numerical reasoning; spatial recognition of shapes in two dimensions; mechanical comprehension, covering basic mechanical principles and application to levers, pulleys *etc*; technical understanding, testing based on written passages from technical literature; and fault diagnosis.

Applied Technology Series

Work Skills Series Transport

Work Skills Series Manual Dexterity

SHL also produces a range of personality assessment products including:

OPQ 32

OPQ32 is the latest version of the Occupational Personality Questionnaire, launched in April 1999. The OPQ32 assesses personality using 32 characteristics which are grouped under three main headings: relationships with people; thinking styles; feelings and emotions. 'Relationships with people' is sub-divided into influence, sociability and empathy. Thinking styles is broken down into analysis, creativity and change, and structure. Feelings and emotions is split into emotion and dynamism. There are further sub-divisions within each of the categories.

OPQ32 is available in ipsative format and in normative format. The ipsative format (OPQ32I) consists of 100 blocks of 4 statements, and the respondent is asked to state which of each set of statements is most and least true of them. This takes about 45 minutes to complete. The normative version (OPQ32N) gives a list of statements and asks respondents

OPQ32 is part of a family of tests: others in the series include the customer contact styles questionnaire, Work Styles Questionnaire, Images and Factor Models.

OPQ Factor 4.2 and 5.2

Customer Contact Styles Questionnaire

Work Styles Questionnaire

Images 1

The Test Agency

This companies ability and aptitude tests include:

Call Centre Battery

Electrical and Electronics Test

Employee Attitude Survey

English Language Understanding Test

IPI Aptitude Series

MD5 Mental Ability Test

Organising Skills Battery/Office Systems Battery

Power and Performance Measures

Fine Dexterity Test

Pegboard

Their personality assessment tests include

Manchester Personality Questionnaire

NEO PIR

PASAT 2000

This questionnaire assesses whether individuals have a 'sales personality'. It has eight main scales: social adjustment, motivational adjustment, adaptability, conscientiousness, social control, emotional stability, and self-assurance. In total, there are 153 items and it takes some 25 minutes to complete.

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