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**THE OVER-TRAINING OF APPRENTICES BY EMPLOYERS IN ADVANCED
MANUFACTURING: A THEORETICAL AND POLICY ANALYSIS**

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Abstract:

This paper reports the results of a study of the 'over-training' of apprentices by large manufacturers in the UK. The term 'over-training' was traditionally used to refer to the way in which nationalised industries trained more apprentices than they needed, with the 'surplus' being released at the end of their training to find another employer. In contrast, the evidence reported in this paper indicates that over-training now typically involves large employers helping to train apprentices who are employed and paid by other firms. The project examines: the extent and nature of over-training; the reasons why employers become involved in over-training; and policy implications. The evidence suggests that over-training can increase the number of high-quality apprenticeships. Large employers need to be made more aware of over-training. Government can help to promote over-training via its 'Catapult Centres'.

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THE OVER-TRAINING OF APPRENTICES BY EMPLOYERS IN ADVANCED MANUFACTURING: A THEORETICAL AND POLICY ANALYSIS

1. INTRODUCTION

Why should a manufacturer take responsibility for training workers employed by other firms? Both economic theory, and human resource management (HRM), suggest that such behaviour will be relatively rare. After all, if it is indeed the case – as both literatures suggest – that employers who pay for training will be preoccupied with ensuring that the workers in whose skills they invest remain with them for long enough that they gain a satisfactory return on their investment, then the chances of manufacturers helping to train workers employed by other firms seems at first glance to be rather slim.

However, as this paper will show, there exist several examples in the UK of large manufacturers taking responsibility for, and contributing extensively to, the training of workers employed by other firms. The examples centre on apprenticeship training and are commonly said to involve the manufacturers ‘over-training’ apprentices. Loosely speaking, ‘over-training’ involves large employers that currently offer high-quality apprenticeships playing a role in the training of more apprentices than they themselves require to meet their own anticipated needs, with the extra apprentices being employed by other firms in their sector and/or supply-chain (often SMEs).

However, the precise meaning of the term ‘over-training’ is unclear in the UK context. Different organisations use it to denote rather different degrees of involvement by large employers in the training of apprentices for other firms. In particular, the kinds of over-training found today contrast with approaches that bore that title in the past. Practices traditionally described as ‘over-training’ saw larger firms, most notably the nationalised industries, deliberately taking on more apprentices than they needed, employing and paying the apprentices themselves, and simply letting the surplus go at the end of their training to find an employer for themselves. In contrast, contemporary examples of over-training involve apprentices

being employed from the outset, not by the firm that is carrying out the over-training, but by the firm for which they are ultimately going to work. Moreover, just as the nature of over-training is unclear, so too is its extent, as there is no survey evidence on this issue.

The nature and extent of over-training is not merely of academic interest. Policy-makers are becoming increasingly interested in over-training as a means of harnessing the willingness of large manufacturers to train apprentices for other firms and thereby of increasing the number of high-quality apprenticeship places on offer, especially in SMEs (CBI 2011: 16-17; UKCES 2011: 3, 27-28). The background is provided by a widespread belief that increasing the number of apprentices, especially in STEM subjects, is essential for improving the performance of the UK economy (Department of Business, Innovation and Skills 2009; House of Commons Library 2011). However, difficulties are readily apparent: only 8% of British employers offer apprenticeships; and Britain trains far fewer apprentices per 1000 employees than countries such as Australia, Switzerland and Germany, so that the demand for places on apprenticeship training courses typically far exceeds supply. SMEs in particular tend to have little involvement in apprenticeship training (UKCES 2010: 57-58; Holt 2012: 4, 9).

The reasons for the low supply of apprentice training places in STEM subjects are complex. The proximate causes include the relatively high wages paid to apprentices, the product market strategies and approach to job design adopted by British firms, and the ready availability of alternative sources of skills (e.g. over-qualified graduates). Underlying structural causes centre on the institutional framework within which firms operate and decisions about apprenticeship training take place, a category which includes: the legal system, which determines whether the content of apprenticeships is placed on a statutory footing; the role of employee organisations such as trades unions, whose bargaining strategies affect the payroll costs incurred by apprentices' employers; the presence – or absence – of employer organisations with the capacity to deter poaching; and the framework of corporate governance under which firms operate (which shapes the time-horizon for their investment decisions) (Fuller and Unwin 2003: 9-10; Brockman *et al.* 2010; Ryan and Wolter 2010: 553-69). While acknowledging the profound importance of underpinning structural factors, and the potential limitations of policies that work within the existing institutional

framework (Keep and Mayhew 2010), this paper leaves aside such broader political-economic questions to consider whether over-training by large employers can help to increase the number of high-quality apprenticeship places on offer in the UK, as policy-makers hope.

It was against the background provided by this renewed interest in, but lack of clarity and knowledge about, over-training that the project reported here was carried out. The project's goals were threefold. The first was to investigate the extent to which over-training is already taking place and to examine the different approaches being developed. The second goal was to explore why employers become involved in over-training, whether as providers or, via their apprentices, as recipients. The third set of issues concerns implications for policy. To anticipate the argument to come, there does appear to be scope for over-training to increase the number of apprenticeships, especially in those geographical areas where there is a large manufacturer with a high-quality apprenticeship programme that can take the lead in over-training. Large employers need to be made more aware of what over-training involves and of the benefits it can bring. There may also be scope for government to help to develop such organisations, most notably via its 'Catapult Centres'. Over-training is also potentially important in sectors other than manufacturing, most notably energy and construction. However, if over-training's potential to raise skill levels and improve performance is to be realised, it may need to be augmented by policies design to improve the utilisation of skills in the firms who acquire apprentices through it.

The structure of the paper is as follows. Section 2 outlines the theoretical frameworks that are used in the paper to analyse the behaviour of firms involved in over-training. Section 3 describes the approach adopted for the empirical part of the research. The results are presented in Section 4. Section 5 uses economic theory and HRM to analyse the decisions made by employers about whether to become involved in over-training. Section 6 considers the policy implications of the results, while Section 7 draws conclusions.

2. THEORETICAL PERSPECTIVES

An apprenticeship is a contract between an employer and a person that combines a structured programme of on-the-job training and productive work with part-time, formal technical education (Steedman *et al.* 1998; Lewis 2014). Apprenticeship training is usually formally certificated and equips people with intermediate (level 3-5) skills. Defined thus, apprenticeship (with a lower-case ‘a’) may be distinguished from ‘Apprenticeship’ (upper-case), which term denotes in the UK a set of governed-funded work-based learning programmes, some – though not all – of which may differ from ‘apprenticeships’ in offering training only to level 2 and in having no worthwhile off-the-job component (Ryan *et al.* 2006, 2007: 129; Lewis *et al.* 2008).

Two broad theoretical perspectives will be used to highlight factors shaping firms’ decisions about whether to over-train apprentices, namely economics and HRM. Contemporary economics tends to view employers’ decisions about the provision of apprenticeship training through the lens provided by human capital theory, which treats training as an investment requiring a sacrifice of current income in return for higher income in the future. Becker’s (1964) classic analysis focuses on skills that are completely general, in that they are just as valuable to many other employers as they are to the employer in which they were learned, and on perfectly competitive labour markets, in which workers’ real wages are equal to their marginal product. In that case, employers have no incentive to invest in training for general skills. The reason is that an employer which attempted to recoup its investment in such training by paying its workers less than their post-training marginal product would see those workers lured away to rival firms by offers of slightly higher wages. In order to retain workers whose training it financed, therefore, an employer has to pay them a wage equal to their post-training marginal product, thereby preventing the employer from earning a positive return on its investment in training and deterring it from making such an investment in the first place. Becker’s model predicts, therefore, that the entire cost of training in general skills will be borne by workers, for example through their being paid a training wage that is less than their marginal product. The higher wages commanded by skilled workers gives trainees

an incentive to make the requisite investment. Provided trainees can obtain the credit required to finance their investment, the volume of training will be socially optimal.

However, in the face of empirical evidence that employers do in fact incur significant costs in equipping their employees with skills that are useful to other firms, economists have begun to develop new models to explain why firms are willing to invest in something like general skills. More specifically, contemporary economics views decisions about the provision of training through the lens provided by the theory of human capital under imperfect competition. This approach portrays employers as inhabiting a labour market where – because workers' skills are only transferable, in the sense of being valuable to some but not to all firms, or because employers are uncertain about workers' skills, or because it is costly for workers to search for a new job - competition is insufficient to drive up wages until they are equal to workers' marginal product. Employers therefore enjoy a degree of market power and, as a result, are able to pay skilled workers a wage that is less than their marginal product without losing them to rival firms. This gives employers an incentive to bear some of the costs of training, because, although they have to pay newly trained workers more in order to retain them, the wage rise is smaller than the increase in the workers' marginal product, so that employers obtain a positive return. Moreover, in labour markets of this kind recruitment is costly, not only because employers have to pay higher wages to attract skilled workers from the external labour market but also because the higher wage must also be paid to current employees. Employers will minimise the costs of acquiring the skilled labour they need by relying on a combination of training and recruitment, with the role of training increasing as its marginal cost declines relative to that of recruitment (Stevens 1994).

However, the level of training generated is unlikely to be socially optimal. In particular, the prospect that its skilled workers will be poached by other firms implies that an employer will discount the return it expects to earn from its investment in training, reducing its willingness to finance such training in the first place. While the organisations that recruit those workers benefit from their skills, the employer making the initial investment will ignore those broader social benefits (positive externalities) when deciding how much to invest, focusing only on the truncated private returns that it expects to enjoy. In

this way, the prospect of poaching drives a wedge between the private and the social returns to training and therefore deters employers from investing as much as would be optimal from the point of view of society as a whole. In particular, too few apprentices will be trained. There may be scope for government to remedy this problem by granting subsidies to employers that train apprentices, either for themselves or – via some form of over-training – for other firms, thereby increasing the return they expect to earn from their investment in transferable skills and giving them an incentive to train more workers, as the socially optimal outcome requires (Stevens 1999; BIS 2010: vii, 35-36).

HRM focuses on the compatibility of training with the employer's broader HR practices. Many large employers operate customized HR practices designed to maximise the motivation, loyalty and productivity of their workforce. The HRM perspective suggests that employers select their approach to training with the aim of maximising the mutual consistency or 'fit' that obtains between the kind of training they offer, the content of the jobs in their organisations, and their approach to pay and promotion. Evidence indicates that the degree to which an employer adopts specific HR practices, including training, is positively associated with organisational performance, including labour turnover, productivity and profitability. In particular, HRM suggests that, far from increasing labour turnover, apprenticeship training might make skilled workers less likely to leave the firm that trained them. For if such training is coupled with opportunities for promotion, then it can be a way of demonstrating to (ex-)apprentices that they are valued by the firm, that their employer is willing to invest in them, and that they will be able to develop their career without moving away. Hence, apprenticeship training might promote loyalty and commitment, reducing turnover and increasing the return that firms enjoy on investments in training, further encouraging firms to train workers in-house. On this view, apprenticeship training is more likely to benefit the employer who provides it integrated or 'bundled' with a variety of complementary practices (Guest *et al.* 2003; Boxall and Macky 2009).

3. SCOPE AND METHOD

In the absence of a large dataset detailing aspects of employers' involvement in over-training, a qualitative approach was adopted. The goal was to shed light on the nature of, and the rationale for, over-training by interviewing of employers with well-established apprenticeship training schemes in STEM disciplines who had seriously considered training more apprentices than they needed for their own purposes.

Data on over-training was collected via two sets of semi-structured interviews. The first involved 10 interviews with sector-level organisations, including government departments, sector skills councils, trade bodies, and National Skills Academies. The goal was to obtain background information on the rationale for, and different models of, over-training, and also to gain contacts in firms.

The second set of interviews involved employers. Twenty-four organisations were invited to participate in the project, of which twenty-one agreed to be interviewed. The employers were drawn from the aerospace, automotive, chemicals, (general) engineering, energy, and ICT industries. Table 1 describes the organisations, which are given pseudonyms to ensure confidentiality.

[INSERT TABLE 1 ABOUT HERE]

All but two of the organisations were located in England, with the other two based elsewhere in the United Kingdom.

Information was collected from the employers via 23 semi-structured interviews with 24 interviewees, who included HR, training, and learning and development managers, using an interview schedule piloted in the early cases. In addition to being used to ascertain basic factual data - about the numbers of technicians employed by each organisation, the frameworks in which apprentices were trained, the number of apprentices being trained and over-trained, and the way in which over-training was organised - the interview questions also explored various influences on firms' decisions about whether to become involved in over-training. Interviewees were invited to reflect on how, if at all, the factors that

economic theory and HRM indicate are likely to shape employers' decisions about whether to train technicians in-house – such as the wages paid to apprentices, the amount of productive work they do, and the impact of training on their values – had influenced their decisions about over-training. Firms providing over-training were also asked why other employers want them to be involved in training their apprentices. The interviews were carried out between July 2012 and January 2013 and averaged a little over forty-five minutes in length.

4. RESULTS

Of the twenty-one organisations considered here, seven currently participate in some form of over-training, while five plan to do so. Hereafter, the twelve organisations in question will be described as 'over-training firms'. The organisations that make use of such services will be referred to as the apprentices' 'home' firms.

(4.1) Organisations that currently over-train

Table 2 summarises key aspects of the seven organisations that currently over-train.

[INSERT TABLE 2 ABOUT HERE]

All seven organisations have well-established apprenticeship schemes. Six have their own training workshops in which apprentices receive initial hands-skills training.

The total number of apprentices being over-trained averages around 25 across the seven cases, with the absolute number ranging between 3 and 100. On average, apprentices from other firms account for about 13% of all apprentices being trained. All seven firms would like to increase the number of apprentices they train for other employers.

The organisation of over-training is similar, though not identical, across the seven cases (Table 2). All seven organisations currently run over-training schemes whereby apprentices are employed and paid by their home company. In all cases, the apprentices being over-trained aim for the same qualifications as the over-training firm's own apprentices. In each case the apprentices spend their first year being trained alongside the over-training firms' own apprentices, either in the over-training firm's own training workshops, in the six organisations that have them, or – in the case of AM2 – on block release in the local college deals with the organisation's own apprentices. During this period, apprentices acquire basic practical skills, certificated via an NVQ2 in Performing Engineering Operations (PEO2), and a knowledge of workplace health and safety.¹

There is a little more variety in how the seven firms approach the second and third years of the apprenticeship. In the case of the three aerospace companies (Aero2, Aero5 and Aero6) and the steel-maker (Steel1), the apprentices who are being over-trained return to their home firms after the first year of their training, so it is the home company that provides the on-the-job training for the final two years of the apprenticeship. However, the three aerospace firms continue to manage that training, by advising the home company about what the apprentices must do to satisfy the requirements of the competence-based part of the apprenticeship framework and by assessing apprentices' practical skills (as required for the award of an NVQ3).

A slightly different approach is adopted by the remaining three organisations, namely InfEng1, AM2 and Chem2. In addition to providing advice and assessment for apprentices who have returned 'home', these organisations are also willing to host other firms' apprentices at their own facilities for the second and even – in the case of AM2 in particular - the third year of their apprenticeship. In such cases, the over-training firm provides the on-the-job training as well as the assessment required for some or all of the NVQ3.

¹ In addition to over-training apprentices along the lines just described, one aerospace firm (Aero2) also runs a second over-training scheme (programme P2 in Table 2). This involves the firm employing and paying apprentices for one year while they do PEO2, after which it 'places' them with local engineering firms, where they will be employed and work towards their level 3 qualification.

(4.2) Organisations that are currently *developing* over-training schemes

The second group contains 5 organisations that intend to over-train and are currently devising their programmes (Table 3).

[INSERT TABLE 3 AROUND HERE]

Only two of the firms are certain about how many apprentices they will over-train (AM4, Aero3). In those cases, an average of 40 apprentices will be over-trained, accounting for around 4-5% of the total number of apprentices in training at those organisations.

The most straightforward cases are provided by two aerospace firms (Aero3, Aero4), a vehicle manufacturer (Auto2), and by an advanced manufacturer (AM1), all of which have long-standing, highly successful apprenticeship programmes. The aerospace firms and vehicle manufacturer plan to over-train along the same lines as the aerospace firms described earlier: apprentices will be employed and paid by their home firms; they will do PEO2 alongside the over-training firm's own apprentices either in the latter's own training school or at a local college; and, with the possible exception of some brief stints in the over-training firm learning about specialist equipment, they will return to their home firms for the final two years of their apprenticeship, working under the guidance of their over-training firm's assessors towards the same NVQ3 as the over-training firm's own apprentices. At the time of writing, the advanced manufacturer (AM1) had just opened discussions with two SMEs in its supply-chain about helping to train their apprentices. The initial plan was for apprentices employed by the SMEs to spend the first year of their training on block release in the same college as AM1's own apprentices, with their training being managed by its HR team, before returning to their home company for the remainder for their on-the-job training. It was unclear whether AM1's own NVQ assessors will support the apprentices for their NVQ3.

A different approach is taken by AM4, which intends to employ the apprentices itself for the first two years of the programme. In year one, the apprentices will work towards PEO2 in AM4's dedicated training facilities, during which period it will pay their wage. Year two will see apprentices undertake 2-3 placements at SMEs that deal with the advanced manufacturer, either as part of its supply-chain or because they buy its products for use in their own manufacturing facilities. The SMEs will pay the apprentices' salaries during the placements. At the end of their second year, the apprentices will become an employee of one of the SMEs, where they will do an NVQ3 and complete the third year of their apprenticeship. AM4 will continue to provide NVQ assessment during that period. The goal is for around 30 apprentices to be trained. AM4's apprenticeship scheme, like that of many of those considered here, is highly over-subscribed. The firm hopes to divert some of the many good candidates it cannot take on itself to its partner SMEs, and then to help train them. The same is true of firm Aero3.

(4.3) Reasons why 'home' firms take apprentices via 'over-training' schemes

Eleven of the twelve firms involved in over-training indicated why, in their view, home firms send apprentices to them. The most oft-cited reason, mentioned by eight organisations, was that home firms lacked the training infrastructure – human resource managers conversant with apprenticeships, NVQ assessors, and instructors - to deliver apprenticeships in-house. Moreover, the number of apprentices each home firm wanted to train was insufficient to justify the investment required to develop the requisite infrastructure themselves. Recognising this, the home firms sought outside assistance, in the form of over-training.

Why did the home firms select another employer, rather than a college or private training provider, to provide this help? The answer lies in the quality of the assistance offered by over-training firms, especially those with their own training school. Interviewees from several over-training firms reported that other firms were keen to send their apprentices to their in-house training school because the training available at such facilities involved the use of up-to-date materials and equipment and saw

apprentices taught current best practice techniques (Aero2, Aero5, Aero6, Auto2, Chem2, InfEng1, Steel1). All of these were qualities that home firms had struggled to obtain from other local training providers.

The third reason why home firms become involved in over-training is to help them to acquire better-quality apprentices. Several interviewees mentioned that the home firms with whom they dealt often struggled to attract acceptable applicants for apprenticeship training. In contrast, the apprenticeship training programmes of the over-training firms were invariably over-subscribed, largely on account of their high profile and excellent reputation, and good candidates were being turned away. The possibility arose, therefore, of the over-training firms acting as a clearing house, diverting some of their own high-quality but surplus applicants towards the under-subscribed firms, so the latter could benefit from higher-calibre apprentices (albeit not necessarily quite as good as those taken by the over-training firm for itself) (AM4, Aero2, Aero3, Auto2, Steel1).

5 ANALYSIS OF EMPLOYERS' DECISIONS ABOUT OVER-TRAINING

This section considers the pattern of participation in over-training described above in the light of human capital theory and HRM. The aim is to analyse the costs incurred, and benefits received, by firms involved in over-training in order to explain the rationale for their decision.

(5.1) The costs of over-training

In eleven of the twelve cases of over-training, apprentices are employed and paid by their home firm, so the over-training firm does not incur their wage costs. In most cases, therefore, the over-training firm is spared the biggest cost of training apprentices, namely their pay.

Over-training firms do incur costs in providing basic hand-skills training. Where over-training firms take apprentices into their own training workshops, they will incur the cost of equipping, staffing and running those facilities (e.g., the wages of the instructors and assessors, administration costs, and the

costs of the raw materials used in training) (9 cases: AM4, Aero2, Aero3, Aero5, Aero6, Auto2, Chem2, InfEng1, Steel1). Where the over-training firm sends apprentices to college for an initial period of block release, it will have to pay the relevant fees (AM1 and AM2). Over-training firms typically (intend to) recoup those costs by: claiming the government grant awarded for delivering and assessing the PEO2 (AM4, Aero2, Aero3, Aero5, Aero6, Auto2, Chem2, InfEng1, Steel1); charging a fee to cover the cost of the materials used in training the home firms' apprentices (AM2, Aero2, Aero3, Aero5, Aero6, Auto2, Steel1) and also the cost of the instructors' time (Aero 3, InfEng1, Steel1). Three organisations also receive additional government funding to cover the administrative costs of establishing and running their over-training programmes (AM4, Aero2 and Aero3). In most cases, therefore, the net marginal cost incurred by the over-training firms when they take on an apprentice from outside is very low, verging in some instances upon zero.

Over-training firms are unlikely to receive one of the main benefits enjoyed by organisations who train their own apprentices, namely the positive net contribution that apprentices make to output towards the end of their training. The reason is that, in most of cases considered here, the apprentices being over-trained return to their home firms before they are able to make such a contribution. The only exception to this finding is AM2, which provides the final two years of on-the-job training for the home firm with which it deals and which reported that it does enjoy a positive net contribution from that firm's apprentices during their final year.

Given that apprentices do not make a positive net contribution to output in most over-training firms, why do those firms over-train? As we shall see, two kinds of benefit arise, differing according to whether the over-training firm is dealing with apprentices drawn from firms inside or outside its own value-chain of business activities.

(5.2) Organisations that over-train, or are planning to do so, as a means of benefitting their manufacturing business

The first group consists of seven organisations: two currently over-train (Aero2, InfEng1); five plan to do so (AM1, AM4, Aero3, Aero4 and Auto2). They all view over-training as a vehicle for improving the fortunes of their core manufacturing business. They all expect over-training to benefit their core manufacturing business through its impact on their supply-chain, while one also expects it to pay dividends through its impact on firms that buy its products (AM4).

Firms reported that they expect to enjoy two main benefits from over-training for their supply chain. First, they expect more reliable input supplies, because the supply-chain firms are less likely to have problems producing the quantity of inputs required due to shortages of skilled workers. As Aero3 noted, its business 'is being held back' because firms in its supply-chain lack skilled labour and so cannot reliably produce all the inputs it needs. Over-training apprentices is a way of ameliorating that problem. Second, firms also believe that over-training will improve the quality of their inputs, because workers in their supply-chain whom they have trained are more likely to understand, and therefore more able to satisfy, their requirements. In the words of one interviewee from an aerospace firm, over-training enables workers in supply-chain firms to 'gain front line experience of what we do with the components', the result of which is that they 'get more understanding of our business so we get a better product from our supply-chain' (Aero4). Such arrangements illustrate the point, made by Streeck (1989: 101), that:

If one firm's skills cannot be adequately utilised without other firms commanding the same kinds of skills, then firms become strongly interested in the technical capabilities of other firms ... Where the lack of skills of others becomes a bottleneck to one's own growth, the uneven development endemic in market-led training systems becomes suboptimal even from the perspective of the individual firm ... [Consequently] individual enterprises may become self-interested in collective, equal development, and economic interests may arise in collective behavioural regulation that the market as such cannot provide.

As another interviewee put it, there is a ‘mutual interest’ in over-training because the supply-chain firms obtain more skilled workers than they could if they operated alone, while the over-training firms obtain a more reliable, higher-quality supply of inputs (Aero3).

AM4 also expects over-training to yield benefits through its impact on companies lying downstream from it in the value-chain. In particular, the firm believes that over-training will enable it to increase its sales. The firm manufactures electronic devices that other, downstream manufacturers use to operate their production lines. It believes that having technicians whom it has helped to train in those downstream firms will benefit it for two reasons: such technicians will be more familiar with its products and so more likely to buy them, directly increasing its sales; and those technicians will be able to use its products to better effect than they otherwise could, increasing their home firms’ sales and thereby increasing still further their demand for the over-training firm’s product.

These benefits compensate over-training firms for any net costs incurred through over-training, thereby providing a rationale for their involvement in over-training. As the training manager of Aero2 put it, the firms’s involvement in over-training ‘is driven by self-interest ... It’s why we do it and how I justify it [to the board]’.

(5.3) Organisations that train on a semi-commercial basis

The members of the second group of organisations over-train, not because their manufacturing business gains from having technicians they have trained working for firms in their value-chain,² but because doing so helps them to maintain the financial viability of their in-house training facilities. This second group comprises five firms (AM2, Aero5, Aero6, Chem2, Steel1). All have well-established apprenticeship programmes that they use primarily as a means of meeting their own skills needs.

In all five cases, the over-training firms employ specialist instructors and NVQ assessors to train their own apprentices, whilst four also have their own training workshops. Since the firms must incur the costs of running those facilities, and employing the staff, in order to train their own apprentices, and given

² The home firms with which this second set of over-training firms deal typically lie outside their own supply chain.

also that they have the capacity to train additional apprentices, they can benefit from over-training because doing so: (i) adds little if anything to their costs (most of which will have been incurred anyway); and (ii) enables them to access the SFA funding for delivering and assessing the NVQ2, which they use in its entirety to offset the fixed costs of running their training school.³ As the manager of one training facility put it, ‘The more people who get into it [i.e., sending their apprentices for over-training] the lower the costs to myself ... It’s in our own interests [to over-train]’ (Steel1). Again, over-training is viewed as being in the interests of the organisation providing it.

(5.4) Organisations that are not, and do not intend to become, involved in over-training

The nine employers that do not over-train offer a variety of reasons for not doing so. The most common, mentioned by six organisations, is that the nature and location of their businesses means that there are few if any local supply-chain firms for whom they might train. This militates against over-training because it implies that the skills taught by the large firm are largely irrelevant to local employers, and because the large firm would not benefit, in terms of improved input quality, from over-training. Nor does the benefit mentioned by the second category of over-training firm, namely that over-training helps to ensure the financial viability of their training schools, arise in these cases: only two of the six have their own training workshops; and both workshops are full, leaving little scope/need to take on external trainees to help cover the fixed costs of running the facilities (Aero1 and Energy1). Ultimately, therefore, none of the six organisations believes that it makes financial sense to over-train.

Four non-participants also associated over-training with the traditional practice of large organisations training more apprentices than they need and then simply leaving the surplus apprentices to fend for themselves – by finding a job elsewhere – at the end of their training (Aero1, Auto1, Auto3 and Energy1). The four employers argued that such an approach is irresponsible and is therefore not something with which they wanted to become involved.

³ No government funding is passed onto the home firms. Moreover, the over-training organisations in this category typically seek to recoup any additional costs they incur by over-training, with 4 of the 5 charging home firms a fee to cover the cost of the materials apprentices use during their training (AM2, Aero5, Aero6, Steel1).

Two non-participants added that their reluctance to over-training was increased by the way that – as HRM suggests – their apprenticeship programmes inculcate in young people certain values and attitudes (AM3, Energy1). Both employers thought that this aspect of the apprenticeship might cause difficulties in the case of over-training, both because the values and attitudes in question might not be the ones desired by the ‘home’ firms, and also because one such value is loyalty to the firm providing the training. This might cause problems if apprentices feel more loyal to the over-training firm than to their ‘home’ employer and so decide they would rather remain with it rather than returning ‘home’ at the end of their training (and if the over-training firm finds itself wishing to retain those apprentices). The latter is, of course, a possibility, given both that the over-training firms might well have better facilities, and pay higher wages, than the home firms, and also that the opportunity to screen workers and to assess their potential as future employees is one of the benefits of apprenticeship. While such issues were not the primary reason why these two employers were reluctant to over-train, it reinforced their belief that over-training was not a worthwhile option for them.

The potential for such problems has not gone unnoticed by the firms involved in over-training. Those firms are acutely conscious of the need to differentiate apprentices who are being over-trained from their own apprentices, so that the former do not begin to identify with the over-training firm more than with their ‘home’ employer. Over-training firms attempt to distinguish explicitly between the two groups in a number of ways: by ensuring that apprentices who are being over-trained have inductions at their home firm as well as at the over-training firm (Aero3); by having them wear different overalls and caps (AM2, Aero3, Steel1); by putting up posters from home firms in the over-training firms’ workshops ‘to remind apprentices from other firms where they come from’ (Steel1); and by having informal agreements with home firms not to poach the latter’s apprentices (AM2, Steel1). Given that most of the over-training schemes considered here have only recently been established, the success of these measures in averting the danger that apprentices will wish to remain with the over-training firm remains unclear.

6. POLICY IMPLICATIONS

The first policy implication that follows from the analysis presented above reflects the fact that at least some employers have inaccurate views about what over-training involves. As noted earlier, some firms are reluctant to over-train because they believe it would require them to release apprentices at the end of their training, a practice they view as irresponsible. However, the evidence collected here implies that over-training need not involve such behaviour, because the apprentices may be employed by other (home) firms from the outset of their training. One recommendation that flows from this research is that large employers with established apprenticeship programmes should be made aware of what over-training actually involves, so that they can make better-informed decisions about whether to become involved.

Raising awareness of over-training in this way is especially timely in the current context. The government is currently seeking ways to support the supply-chains that service major manufacturers in several of the sectors from which the organisations considered here are drawn, most notably aerospace and automotive. Given the prevalence of SMEs in those supply-chains, policies are required to encourage supply-chain firms to take apprentices if growth in those sectors is not to be hampered. The evidence presented above suggests that over-training is one way of addressing this issue and it is important that large employers understand what it involves and the role it can play in assisting their own business.

Second, one might go further and argue that, in addition to informing employers of the existence of non-traditional forms of over-training, policy-makers should actively try to disabuse firms of the view that the traditional model of over-training is 'irresponsible'. The training programmes of the organisations considered are high quality (with impressive completion rates, good OFSTED grades, and significant off-the-job training). Consequently, apprentices who complete such programmes are likely to possess skills and knowledge that prepare them well for the relevant occupational labour market. They are, therefore, likely to be highly employable, not least because studies suggest that many firms in manufacturing are struggling to find high-quality technician recruits at a time when their age profile of their technician workforce is making succession planning an increasingly pressing issue (Lewis 2012a, 2012b, 2013).

Viewed in this light, the older form of over-training does not seem as ‘irresponsible’ as some non-participating firms suggested.

A third policy-related issue concerns the scope for publicly-sector organisations – rather than just private-sector employers – to become involved in over-training. One example is provided by Catapult Centres, which are publicly-funded technology centres where universities, businesses, and government work to bring ideas about new technologies in the later stages of research and development to market. The Centres are typically located in areas where there is already a concentration of firms using the technologies in question. Some of the Centres are developing facilities to train apprentices for their own needs, but this provision could be opened up for other local firms, giving their apprentices – as well as the Catapult’s own trainees - the opportunity to learn the latest techniques in state-of-the-art facilities. If the Catapults over-train in this way, then the scope for excellent training can be extended to a broader swathe of firms in the emerging cluster surrounding the catapult (Lewis 2013: 54). More generally, where there is a clustering of firms with similar technologies and similar needs for intermediate skills, whether or not they are involved with a Catapult Centre, then in addition to trying to foster high-level collaborative research and development, policy-makers should explore the scope for over-training as a means of skills development.

This discussion of innovative production methods leads on to a fourth, broader, policy-related issue. If over-training is a potentially useful aspect of skills policy, then – especially in cases where apprentices are being taught relatively new skills - policy-makers and employers should consider whether the increase in skills needs to be augmented by other changes in home firms. HRM suggests that the potential benefits of training on performance will be fully exploited only if that training is bundled with other HR policies. However, it is unwise simply to assume that home firms will make the requisite changes automatically. On the contrary, the full benefits of the higher level of skills produced by over-training are likely to be realised only if home firms are given assistance – either by government agencies or, especially where over-training is targeted on supply chain firms, by the over-training firms themselves – to implement complementary changes to job design, the organisation of work, and the structure of

incentives in their organisations so as to ensure that the new skills are fully utilised and their impact on performance maximised (Froy 2013). **KEEP REF**

Fifth, and finally, it is worth considering the potential significance of the findings presented above for other sectors. Those findings are based on interviews with organisations found largely in advanced manufacturing. A little reflection suggests, however, that there exist other sectors in the UK economy that resemble advanced manufacturing in the key respects that make over-training a potentially useful approach for dealing with skills shortages (namely, the high fixed costs of setting up good training facilities, which in the absence of large numbers of potential trainees deters FE colleges from establishing the relevant training programmes, and the presence of some large organisations that already have such facilities and that might have an interest in opening them up to apprentices from other firms). The energy and utilities sector is one example. For instance, organisations in the nuclear industry have a long history of providing excellent apprenticeship training in engineering and laboratory science. Opening up their programmes to trainees from other organisations, in particular SMEs who manufacture parts and provide maintenance services for nuclear power stations, would increase the industry's training capability at a time when, with the advent of nuclear new-build, the need for skilled workers is likely to increase very significantly. This may also benefit the firms carrying out the over-training because it makes it more likely that their supply-chain will be able to work to the extremely high standards required by nuclear power plants. Another example is provided by the renewable energy industry. One of the firms interviewed for this study, which was planning to use over-training for its electronics manufacturing business, also has a substantial interest in manufacturing, installing, and commissioning machinery used for the wind power industry. One can readily imagine that organisation also being willing to open up its excellent training facilities for other firms in the business of providing maintenance for wind turbines (a service which the over-training company does not provide). Another sector for which the over-training

model might be relevant is construction, where larger firms might be well willing – indeed, in at least one case, are willing – to open their training facilities to apprentices from firms in their supply-chain.⁴

7. CONCLUSIONS

The research reported above indicates that over-training does take place in advanced manufacturing in the UK. Typically, apprentices are employed, and have their wages paid, by a ‘home’ employer; but some of their training is provided and/or managed by a larger, more established firm. The precise degree of involvement varies between cases. The most common approach involves over-training firms providing basic hand-skills and workplace health and safety training during the first year of the apprenticeship and managing the apprenticeship and providing NVQ assessment during the subsequent two years.

Firms that over-train can be divided into two groups. The first consists of large employer-providers who are concerned about the skills available to firms in their supply-chain and view over-training as a means of bolstering their ability to obtain high-quality inputs. The second group consists of manufacturers who are established providers of high-quality apprenticeships, whose training schools have spare capacity, and who open up those facilities to apprentices from other firms in order to help sustain the financial viability of those schools. In both cases, home firms benefit from over-training because it offers them access to higher-quality training and advice, and also to better candidates for apprenticeships, than they would otherwise enjoy.

The evidence suggests that over-training can contribute to increasing the supply of places on high-quality apprenticeship training programmes in STEM subjects. In doing so, over-training can help to overcome the problems posed by the fact that too few employers, especially SMEs, offer apprenticeship in the UK. By relieving SMEs of much of the responsibility of managing the training and assessment of their apprentices, and by providing them with access to high-quality training that other kinds of training

⁴ See <http://www.llakes.org/wp-content/uploads/2012/05/GTA-written-evidence-1.pdf>

provider all-too-often fail to offer, over-training can encourage SMEs to take on apprentices. This is potentially important not only in manufacturing but also in the energy and construction sectors. Large employers need to be better informed about its potential.

Over-training is not, however, a panacea. Contrary to any attempt to implement a highly-centralised, universally-applied ('one-size-fits-all') approach to skills and training problems, the position taken here is that over-training is only one of a number of approaches that might be used to overcome the 'tyranny of small numbers' that so often bedevils attempts to provide high-quality training. Where large, established employer-providers are unavailable, alternative ways of improving the availability of high-quality training must be examined. Other potentially important parts of policy-makers' 'training portfolio' would include GTAs and, potentially, the use of government catapult centres to help develop the skills of workers at all levels for new, high-tech industries. Given the variety of different sectors in the UK economy, no one approach will work for all. But as one possible way of expanding the provision of high-quality apprenticeships, over-training has its place, especially in decentralised approaches to skills policy that attempt to build on and leverage local training capacity. If its potential to raise skill levels and improve performance is to be fulfilled, however, over-training may need to be augmented by policies design to improve skills-utilisation in home firms.

The evidence gathered here is, of course, partial. It would be helpful for efforts to gain a better understanding of over-training, especially for the purposes of policy-making, if questions about the nature and extent of employers' involvement in training apprentices for other firms were included in the National Employer Skills Survey. Another important line of future research would involve studying how successful over-training firms are in deterring apprentices who are being over-trained from developing more loyalty to the over-training firm than to their home employer. Third, the need to supplement over-training with targeted assistance to improve other aspects of home firms' HR policies should also be considered.

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Table 1: Attributes of the organisations interviewed

Company	Sector	Total employment	Number of technicians employed	Total number of apprentices currently in training	Apprenticeship Training Frameworks	Own Training school?	Involvement in over-training
AM1	Advanced manufacturing	2700	500	40	Electrical/electronic, mechanical engineering	No	Planning to
AM2	Advanced manufacturing	1100	275	18	Electrical/electronic, mechanical engineering	No	Yes
AM3	Advanced manufacturing	3000	1500	60	Electrical/electronic, mechanical engineering	No	None
AM4	Advanced manufacturing	13,000	6000	700	Engineering and Manufacturing	Yes	Planning to
Aero1	Aerospace	5000	2830	150	Aerospace engineering	Yes	None
Aero2	Aerospace	16,000	7000	850	Electrical/electronic, mechanical engineering	Yes	Yes

Aero3	Aerospace	30,000	Unknown	1000	Aeronautical, mechanical engineering	Yes	Planning to
Aero4	MRO	39,000	1500	220	Aerospace engineering	No	Planning to
Aero5	MRO	2000	750	42	Aeronautical engineering	Yes	Yes
Aero6	MRO	3200	420	36	Aeronautical engineering	Yes	Yes
Auto1	Car manufacturer	6900	Unknown	150	Manufacturing, maintenance engineering	No	No
Auto2	Car manufacturer	3300	300	100	Engineering Technology, Engineering Maintenance	Yes	Planning to
Auto3	Car manufacturer	3000	550	85	Electrical, mechanical engineering	No	No
Chem1	Chemicals	1400	890	43	Mechanical, electrical/instrumentation engineering	No	No
Chem2	Chemicals	1250	300	60	Mechanical, electrical/instrumentation	Yes	Yes

					engineering		
Chem3	Chemicals	12,000	1500	35	Mechanical, electrical, manufacturing engineering	No	No
InfEng1	Infrastructure engineering	35,000	7000	630	Railway engineering	Yes	Yes
ICT1	ICT sector	90,000	Unknown	450	Telecoms engineering	No	No
ICT2	ICT sector	3000	Unknown	1000	ICT technical support	No	No
Energy1	Power	10,000	3000	120	Electrical engineering	Yes	None
Steel1	Steel-maker	2200	550	56	Mechanical, electrical engineering	Yes	Yes

Table 2: Employers currently involved in over-training

Name	Apprentice employed/ paid by?	Apprentices currently being over-trained		Involvement in provision and assessment of on-the-job training			
		Absolute number	Share of total number of apprentices	1 st year on-the-job training	Assessment for NVQ2	2 nd and/or 3 rd year on-the-job training	Assessment for NVQ3 (i.e. years 2-3)
AM2	Home firm	3	11%	No	Yes	Yes, if 'home' firm wishes	Yes
Aero2 ^a	P1: Home firm P2: Over-training firm	P1: 50 P2: 50	P1: 5.5% P2: 5.5%	P1: Yes P1: Yes	P1: Yes P1: Yes	P1: No P1: No	P1: Yes P1: No
Aero5	Home firm	5	10%	Yes	Yes	No	Yes

Aero6	Home firm	6	17%	Yes	Yes	No	Yes
Chem2	Home firm	12	20%	Yes	Yes	Yes, if 'home' firm wishes	Yes
InfEng1	Home firm	40	6%	Yes	Yes	Some	Yes
Steel1	Home firm	8	14%	Yes	Yes	No	No

Notes

a: In Aero2, 100 apprentices are being over-trained, divided between two different programmes (P1 and P2). See footnote 1 for details.

Table 3: Employers planning to over-train

Name	Apprentice employed and paid by?	Apprentices currently being over-trained		Involvement in provision and assessment of on-the-job training			
		Absolute number	Share of total number of apprentices	1 st year on-the-job training	Assessment for NVQ2 (i.e. year 1)	2 nd and/or 3 rd year on-the-job training	Assessment for NVQ3 (i.e. years 2 and/or 3)
AM1	Home firm	Undecided	Undecided	Yes	Yes	No	Unknown
AM4	Year 1: Over-training firm Year 2: Mixed (see main	30	4%	Yes	Yes	Year 2: Yes Year 3: No	Yes

	text) Year 3: home firm						
Aero3	Home firm	50	5%	Yes	Yes	Some, possibly	Yes
Aero4	Year 1: student (not employed status) Year 2-3: Home firm	Undecided	Undecided	No	No	Yes	Yes
Auto2	Home firm	Undecided	Undecided	Yes	Yes	Some	Yes

