

THE OVER-TRAINING OF APPRENTICES BY LARGE EMPLOYERS IN ADVANCED MANUFACTURING IN THE UK

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EXECUTIVE SUMMARY

INTRODUCTION

This research examines the various models of over-training currently being used by employers, and assesses whether these models could be adopted more widely to help increase the number of high-quality science, engineering and technology-related (SET) apprenticeships.

MODELS OF OVER-TRAINING

'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 business needs, with the extra apprentices being employed by other firms in their sector and/or supply chain (often, though not always, small and medium-sized enterprises). However, the precise meaning of the term 'over-training' is unclear, with different organisations using it to denote rather different degrees of involvement on the part of large employers in the training of apprentices for other firms.

The research uncovered various models of over-training that either are already being used or are soon to be used by a number of firms. The detail of how the firms run, or are planning to run, the over-training schemes differ, as do their motivations for engaging with over-training schemes. However, without exception, all the models of over-training involve both:

- a host employer (always a large employer)
- and*
- a home employer (typically an SME)

In almost all cases the home employer employs the apprentices and gives them a full-time role at the end of the apprenticeship. Typically, the apprentices spend the first year of their apprenticeship being trained by the host employer alongside the host employer's own apprentices, acquiring basic practical skills (an NVQ level 2 in Performing Engineering Operations) and a knowledge of workplace health and safety. Nearly all this training takes place at the host employers' own training workshops.

Training in years two and three of the apprenticeship varies between the different models. In a number of cases, the apprentices return to their home employer for their training in years two and three. However, the host employer continues to manage and oversee the training – carrying out the assessment of the NVQ level 3 and advising the home employer about the type of training the apprentices need in order to complete the apprenticeship. Some of the host employers also take back apprentices for two- to three-week blocks to give them additional technical training, and a small number of host employers also offer the opportunity to continue fully training the apprentices during the second and third years of their apprenticeship.

In one case, not yet underway at the time of the study, the host employer plans to employ the apprentices itself, and then second the apprentices out to a number of different SMEs in the apprentices' second year (the SMEs will also pay part of the apprentices' salaries in the second year). At the end of the second year the apprentices will then decide which SME they would like to complete their training with and, ultimately, work for full time once they complete their apprenticeship.

Importantly, the research did not find any examples of more traditional forms of over-training, in which an employer takes on more apprentices than it has jobs for and then releases the surplus apprentices, fully trained, into the labour market.

Implications for policymakers

- Whilst it is clear that the host employer is, to an extent, 'over-training', they are only doing so in partnership with, and at the behest of, a home employer. If policy-makers wish to expand the practice of over-training they need to consider the needs and motivations of both employer groups – what motivates both the host and the home employers to engage with over-training, and how to encourage more to do the same.

THE REASON HOST EMPLOYERS OVER-TRAIN

Apprentices accept that a lower wage during their apprenticeship is the price they pay for being trained. In normal circumstances this makes apprenticeship training financially viable for an employer: the wage of an apprentice is less than his/her marginal product and increases by less than the marginal product as the apprentice becomes more skilled. This ensures that the employer earns a return on its investment in training.

However, this theoretical model does not apply to over-training. The host employers are not paying the apprentices' wages and, in nearly all cases, the apprentices are only training with the host firms in year one, well before the apprentices are able to make a positive contribution to the business.

Why, therefore, do host employers choose to over-train apprentices? The study revealed two primary reasons:

1 Improve the skills and knowledge of technicians who work for partner firms

Host employers said that over-training is a good way to assure the quality of technicians working in their supply chains. Not only does this ensure they receive better quality products from their suppliers, but also helps to prevent skills shortages/gaps occurring in their supply chains.

In some cases host employers are over-training apprentices for firms who are responsible for selling products to the customer (known as 'downstream' firms). By over-training apprentices for downstream firms, the host employer expects the apprentices will be more familiar with, and more likely to promote, the host employer's product to the customer.

Although the host employers are not gaining directly from the marginal product of the apprentices, the costs of over-training to the host employer are outweighed by the benefits that accrue from ensuring that well-trained technicians, who are familiar with their own products/businesses, are working for firms in their value chains.

2 Sustain the financial viability of their own training schemes

All host employers in this category have their own apprenticeship training programmes, with specialist instructors and NVQ assessors who are employed by the firm to provide training for their own apprentices. Many also have their own dedicated training workshops. The reason why host employers in this category over-train is purely commercial; it helps to cover the fixed costs of running their in-house training programmes.

In such cases, the home employers are not part of the host employers' value chain – the benefit of over-training to the host employers comes solely from the funding they receive for training extra apprentices, which contributes to covering the costs of their own apprenticeship training programmes.

The study also suggests that some firms are not engaging with over-training because they are unaware of, or have misconceptions about, over-training. In particular, some large employers with established apprenticeship programmes only know about traditional forms of over-training (employing and training more apprentices than they need and then releasing the excess into the labour market) – a model they believe is socially and financially irresponsible.

Implications for policy-makers

- More large employers need to be made aware of how contemporary models of over-training work.
- More large employers need to be alerted to the potential commercial advantages that their businesses could gain from over-training.
- Funding models could be designed to create financial incentives for large employers to over-train.

THE REASON HOME EMPLOYERS CHOOSE TO USE OVER-TRAINING

Perhaps the most obvious benefits of over-training for the home employer are that their apprentices receive high-quality training from good instructors and using the latest equipment. Indeed, the research suggests that often home employers have not been able to find sufficiently good apprenticeship courses with a local provider. Host employers – with state of the art facilities – are a much more attractive option than inadequate, sometimes non-existent, local provision.

However, most commonly, it is only in year one of the apprenticeship that host employers actually train home employers' apprentices, providing the basic hand skills and workplace health and safety training. In years two and three the apprentices return to their home employers and the host employers take on more of a management role, checking that the apprentices are being trained in the right areas and providing assessment for the NVQ.

This suggests that, perhaps more than the training itself, the benefits to the home employer of over-training derive from the host employers' abilities and experience in managing an apprenticeship programme. This finding is supported by evidence from the host employers who said that most home employers lack the training infrastructure – the human resource managers who understand apprenticeships, NVQ assessors, and experienced instructors – to be able to manage and provide for apprentices in the standard way.

The research also reveals that some home employers are using their host employers as 'clearing houses' for the recruitment of their own apprentices. Home employers – typically small firms, unheard of amongst young people – sometimes struggle to attract good quality applicants to their apprenticeship programmes. The opposite is true of host employers, who are often household names and have to turn away good candidates because their programmes are

over-subscribed. In some cases, host employers pass on applications to their home employers, giving the home employers a more capable pool of applicants from which to choose their apprentices.

Implications for policy-makers

- Small employers are using over-training models because they cannot find adequate/available support from training providers. This suggests that employers in certain sectors/areas are unable to offer apprenticeship places because they are poorly served by apprenticeship training providers.
- Over-training practices show that it is the administrative burdens and assessment processes, as much as a lack of capacity to train, which may be putting small employers off apprenticeships.

FUNDING

Employers', especially SMEs', fear of losing apprentices who they have recently trained can stop them from investing in the amount and type of training that is best for the individual, wider society and, should the apprentice stay with the employer long-term, the employer as well. Government policy is intended to correct this by subsidising the costs of apprenticeship training, and thereby limiting the financial risks to employers that are associated with training apprentices with broad transferable skills.

According to this model, it would appear that host employers who over-train apprentices face no additional disadvantages from the over-training process. Indeed, as noted above, they only choose to over-train in the first place because of the benefits it brings to their businesses. There is, therefore, no reason why host employers should require additional funding incentives from government to over-train.

In respect of home employers, however, there may be a case for additional government subsidy. An apprentice who has been over-trained may have experienced better working conditions with their host employer, and may have seen the opportunities – higher wages and career progression – that working for a large employer will often provide. This will mean that over-trained apprentices may be more likely to leave their home employer when they have finished their training to find work at a 'better' firm. Moreover, most over-trained apprentices will have undertaken some of their training with a prestigious host employer, which will make them more attractive to other employers than if they had done all their training with their home employer.

The increased likelihood that an apprentice who has been over-trained will subsequently leave their home employer makes over-training more risky for the home employers than conventional forms of apprenticeship training.

Implications for policy-makers

- Whilst increasing the subsidy for host employers may encourage them to over-train more apprentices, this may also create deadweight – the research shows that the financial incentives (both long and short term) that are already in place are the primary reason host firms choose to over-train.

- Additional government funding for participating in over-training may be better targeted at encouraging more home employers to participate. Whilst over-training offers benefits to home employers, it also carries significant risks that they would not otherwise face if they chose to train alone. These risks could be countered by additional government subsidy.

SECTION I INTRODUCTION

Successive governments have argued that increasing the number of skilled technicians in the UK workforce, especially in sectors such as science, engineering and IT, is essential for improving the performance of the UK economy (see, for example, Department of Business, Innovation and Skills 2009, 2010). Since apprenticeship training programmes are one of the main means of training technicians, it is unsurprising that the goal of increasing technician numbers has led governments to attempt to raise the number of apprentices being trained in the UK (BIS 2010a: 7, 15; HM Treasury and Department of Business, Innovation and Skills 2010: 18-19; House of Commons Library 2011: 4-6; National Apprenticeships Service 2011).

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 2013). Apprenticeship training, which is usually formally certificated, equips people with intermediate-level skills of the kind required by people who fill roles typically described as 'Skilled Trades' and 'Technicians/Associate Professionals and Technical Occupations.' It may – but need not – take place as part of a government-supported training programme. The combination of formal education and workplace learning provided by an apprenticeship promises distinct educational benefits: by demonstrating the practical relevance of technical knowledge, it can encourage young people, especially those unhappy with full-time schooling, to learn; and by introducing them to the practices and disciplines of actual workplaces, using what is often better equipment than is found in schools and colleges, it promises to bolster the quality of what they learn. Moreover, as apprentices see their skills and knowledge develop and become recognised in the work-place, they acquire a sense of self-worth and professional/occupational identity. Hence, apprenticeship promises to ease young people's transition from the world of school to that of full-time work, its beneficial effects being seen both at the level of the individual, in the form of improved access to employment and higher rates of pay, and also at the aggregate or macroeconomic level (in the form of lower youth unemployment) (Ryan 2001; McIntosh 2007; Wolter and Ryan 2011: 551-53).

While there are undoubtedly examples of well-developed, high-quality apprenticeship training programmes in the UK, problems are readily apparent: only 8% of British employers offer apprenticeships (UKCES 2010: 7, 57); and Britain trains far fewer apprentices per 1000 employers than countries such as Australia, Switzerland and Germany (Steedman 2010: 2).¹ The demand for places on apprenticeship training courses typically far exceeds the supply of such places, with a recent report on vocational education and training commenting that, 'For the country as a whole, there is a clear under-supply of apprenticeship places ... All the evidence ... is consistent with the picture of very high excess demand [for apprenticeships]' (Wolf 2011: 167; also see pp. 34, 51). Small and medium-sized enterprises (SMEs) in particular tend to have little involvement in apprenticeship

¹ The involvement of employers in government-funded apprenticeship is also limited in the sense that, of those employers who do take apprentices, only a minority act as the prime contractor with the Skills Funding Agency and so take formal responsibility for organising the training. In most cases, the prime contractor holder is a private training provider, with employers acting only as the sub-contracted provider of on-the-job training and work experience (Lewis and Ryan 2009: 48-50; Neild 2012: 15).

training (Sims *et al.* 2000; Kitching and Blackburn 2002; UKCES 2010: 57-58; CBI 2011: 15-16; Institution of Mechanical Engineers 2011: 3; Holt 2012: 4, 9). A major challenge confronting policy-makers who wish to increase the number of STEM-related apprentices, therefore, is that of increasing the supply of places on high-quality apprenticeship training programmes in STEM subjects, both in order to make such training available to more of the young people who want it, and also to help SMEs in particular to take on apprentices and thereby acquire the skilled technicians they need.

The reasons for the low supply of high-quality apprentice training places in STEM subjects are complex. The immediate or proximate causes arguably include, to name but a few of the relevant factors, the relatively high wages paid to apprentices in the UK, the particular product market strategies adopted by UK firms, and the ready availability of alternative sources of skills, perhaps most notably in the form of graduates. Underlying and giving rise to those proximate causes is the institutional framework within which decisions about apprenticeship training take place. The relevant set of institutions includes but is not exhausted by the following: the legal system, which determines whether or not 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 employers who take on apprentices; the institutions that govern the appraisal and certification of trainees' skills, which shape whether qualifications clearly and reliably attest to their bearers' skills; labour market regulations, which determine whether particular qualifications are required to enter certain occupations; and the presence – or absence – of employer organisations with the capacity to deter poaching and thereby encourage training (see, for example, Fuller and Unwin 2003: 9-10, Marsden and Ryan 1990, Ryan 2000, Ryan and Unwin 2001, Keep 2005, Keep *et al.* 2006, Brockman *et al.* 2010, and Ryan and Wolter 2010: 553-69).

While acknowledging the profound importance of underpinning institutions, and the potential limitations of policies that work within the existing institutional framework (Keep and Mayhew 2010), this paper leaves aside such broader institutional questions to focus on one initiative that is currently gaining attention in the UK as a possible means of increasing the number of high-quality apprenticeship places on offer. The initiative in question involves the over-training of apprentices by large employers (see, for example, DIUS 2008: 38-39; CBI 2011: 16-17; UKCES 2011: 3, 27-28; ADS Group 2012: paragraph 5.2; Rolls Royce 2012: points 8, 9, 12-15; Royal Aeronautical Society 2012: point 8). 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 business needs, with the extra apprentices being employed by other firms in their sector and/or supply chain (often, though not always, SMEs). However, as the vagueness of the term 'playing a role' indicates, the precise meaning of the term 'over-training' is unclear, with different organisations using it to denote rather different degrees of involvement on the part of large employers in the training of apprentices for other firms. In some cases, as we shall see, 'over-training' involves the larger employer carrying out virtually all of the training received by the apprentices, so that the latter spend little time with the SMEs that formally employ them until they have completed their training. In other cases, 'over-training' is said to involve larger organisations taking other firms' trainees into their own workshops and training them for the first nine months of their apprenticeship, so that the apprentices acquire basic hand skills, before the apprentices return to the

SMEs that employ them for the remaining two years of their training. Both of these instances of over-training contrast with approaches that have borne that title in the past: whereas over-training traditionally saw larger firms, perhaps 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 programme, leaving them to find an employer for themselves, almost all of the 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 (cf. Marsden and Ryan 1991: 264).

It was against the background provided by this renewed interest in, but lack of clarity about, over-training that the project reported here was carried out. The project's goals were threefold. The first was to explore the extent to which over-training is already being carried out today and to examine the different approaches to over-training that have been, or are currently being, developed. In exploring the different models of over-training in particular, the focus was on issues such as: the precise contribution to training and assessment made by the firm carrying out the 'over-training'; the number of apprentices being over-trained; the employment status of the apprentices; who pays the apprentices' wages; and the financing of the over-training (including the role, if any, played by government funding, whether the firms for whom the training is being done pay any fees to the organisation carrying out the over-training, and the extent to which the latter enjoy indirect benefits from over-training, perhaps because doing so enables them to build a stronger supply chain for their own business).

In addition to the lack of clarity over precisely what over-training entails, uncertainty also remains about the strengths and weaknesses of over-training as a means of increasing the supply of high-quality apprenticeship training places. This leads on to the second set of issues investigated by this study, which concern the merits and potential pitfalls of over-training as a means of increasing the number of apprentices being trained. Issues explored under this heading centre on the reasons why involvement in over-training might persuade more SMEs to take on apprentices – perhaps most notably the opportunity to have the training of their apprentices managed by an established employer-provider that is familiar with current industry practices and standards – and also potential pitfalls (such as the danger that apprentices being over-trained might develop a greater bond with the firm that is over-training them than with their 'real' employer).

The third set of issues concerns policy, and centres on the question of what grounds there are, if any, for additional government financial support to be given to large firms that over-train, above and beyond the usual subsidy for training an apprentice. If the organisations carrying out the over-training hold the Skills Funding Agency (SFA) contract for the apprentices in question, then they will be entitled to receive the standard government subsidy for training those apprentices. The question that arises in the case of over-training is: is there any reason why this approach to increasing apprentice numbers warrants extra financial support, beyond that which is normally provided for organisations that train apprentices?

Overall, then, the goal of the research is to ascertain whether there is a realistic prospect of over-training, in any of its forms, making possible a significant increase in the number of apprentice training places on offer to young people and, relatedly, whether there is a case for government to support over-training in any way.

The structure of the report is as follows. Section 2 briefly sets out the approach adopted in the empirical part of the research. The results are presented in Section 3. Section 4 sets out the economic theory of investment in human capital in imperfectly competitive labour markets; this is used first in Section 5 to provide a framework for analysing the financial decisions made by the firms that over-train, and then in Section 6 for considering whether government should support over-training via additional funding. Section 7 summarises and draws conclusions.

SECTION 2 SCOPE AND METHOD

In the absence of a large dataset detailing aspects of employers' involvement in over-training, a case study method was adopted. The goal was to shed light on the nature of, and the rationale for, over-training by carrying out case studies of employers with well-established apprenticeship training schemes in STEM disciplines who had seriously considered becoming involved in training more apprentices than they needed for their own purposes. The use of the term 'seriously considered' is deliberate, because it implies that actual involvement in over-training, or a serious commitment to becoming involved, was not a criterion for inclusion as a case study. Of course, the fact that the research project was focused on over-training implied that the inclusion of case study employers that were either involved in some form of over-training, or were planning to become involved, was essential for the research. However, the views of organisations that had considered the possibility over-training, but had ultimately rejected the idea, are also a valuable source of information on the strengths and weaknesses of over-training. Hence, as we shall see below, the case study organisation include several that have chosen not to become involved in training apprentices for other employers in any way.

The empirical component of the research saw data on over-training being collected via semi-structured interviews. Two sets of interviews were conducted. The first involved ten interviews with various national or 'sector-level' organisations, including government departments (e.g. DBIS), sector skills councils (e.g. SEMTA), learned societies and professional bodies (the Royal Academy of Engineering, the Royal Aeronautical Society, the Institute of Mechanical Engineers), the National Apprenticeships Service, trade bodies (e.g. ADS, the Society of Motor Manufacturers and Traders), and National Skills Academies (e.g. the National Skills Academy for Railway Engineering). The goal in those interviews was twofold: first, to obtain background information on the rationale for over-training and on the different models of over-training that are in use or being considered; and second, to gain ideas for, and contacts in, the case study employers. Primary and secondary documentation was also collected where available (see, for example, ADS and SEMTA 2011, ADS Group 2012, The Royal Aeronautical Society 2012).

The second set of interviews involved the case study employers themselves. Twenty-four companies were invited to participate in the project, of which twenty-one agreed to be interviewed. In keeping with the project's focus on technicians in STEM subjects, the case study employers were drawn from sectors where employers make extensive use of STEM skills, including aerospace, automotive, chemicals, (general) engineering, energy, and ICT. Table 1 lists the case study organisations, which are given pseudonyms to ensure confidentiality, along with a number of their key attributes.

Table 1 Attributes of case study organisations

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 over-train
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 over-train
Aero1	Aerospace manufacturing	5000	2830	150	Aerospace engineering	Yes	None
Aero2	Aerospace manufacturing	16,000	7000	850	Electrical, electronic, mechanical engineering	Yes	Yes
Aero3	Aerospace manufacturing	30,000	Unknown	1000	Aeronautical engineering, mechanical engineering	Yes	Planning to over-train
Aero4	MRO	39,000	1500	220	Aerospace engineering	No	Planning to over-train
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 engineering, maintenance engineering	No	No
Auto2	Car manufacturer	3300	300	100	Engineering and technology, Engineering maintenance	Yes	Planning to over-train
Auto3	Car manufacturer	3000	550	85	Electrical and mechanical engineering, tool-making	No	No
Chem1	Chemical manufacturing	1400	890	43	Mechanical, electrical, and instrumentation engineering	No	No
Chem2	Chemical manufacturing	1250	300	60	Mechanical and electrical/instrumentation engineering	Yes	Yes
Chem3	Chemical manufacturing	12,000	1500	35	Mechanical, electrical, and 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 company	10,000	3000	120	Electrical engineering	Yes	None
Steel1	Steel-maker	2200	550	56	Mechanical and electrical engineering	Yes	Yes

Geographically, the cases were drawn primarily, though not exclusively, from England. The decentralization of training policy within the United Kingdom has meant the differentiation of public training programmes across the country's national units. We emphasize England, as the largest and best documented national unit.

Information was collected from the case study organisations via 23 semi-structured interviews with a total of 24 interviewees, whose ranks 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 case study organisation, the frameworks in which those apprentices were being trained, the number of apprentices being trained and over-trained, and the way in which the over-training was organised – the interview questions were also designed to explore the influences that shaped firms' decisions about whether or not to become involved in over-training. Accordingly, the schedule contained questions that invited interviewees to discuss the strengths and weaknesses of over-training as a means of increasing the supply of places on high-quality apprentice training schemes. It also contained questions designed to encourage interviewees to reflect on how, if at all, the factors that economic theory² indicates are likely to shape employers' decisions about whether or not to train technicians in-house – such as the wages paid to apprentices, the availability of government funding to cover part of the cost of training and assessment, and the amount of productive work carried out by trainees – had influenced their decisions about whether or not to over-train.³ The interviews were carried out between July 2012 and January 2013 and averaged a little over forty-five minutes in length. Notes were written up and, where gaps became apparent, these were filled by email follow-up.

The research has limitations. Cases were identified on the basis of the author's own knowledge, the trade press, policy documents, and the suggestions of informed parties, with a view to covering a broad enough range of industries and employers to facilitate an accurate picture of attitudes to over-training. The great majority of the organisations that we approached agreed to participate. Notwithstanding these efforts, however, the representativeness of the cases remains uncertain. In addition, various biases may result from the dominance of managerial perspectives, including in particular some exaggeration by training-related managers of the merits of training relative to recruitment. Biases may also arise from the predominance of managerial perspectives in our evidence. Senior HR, training and learning and development managers proved unfailingly to be thoughtful and well informed, but they cannot be expected generally to express the varied, and possibly contested, views of apprenticeship in general, and over-training in particular, present in their organisations. Nor can their views always reasonably be expected to be grounded in evidence and analysis rather than impression and belief.

² In particular, the economic theory of human capital under imperfect competition (see Section 4 below).

³ The full interview schedule is available upon request from the author.

SECTION 3 RESULTS

In this section we begin to present the findings of the study, by considering first of all which of the case study organisations are involved in some form of over-training and then, second, outlining the nature of their involvement in the training of other firms' apprentices. The following two sections of the report will go on to consider how, in the light of economic theory, the involvement of these firms in over-training can be explained.

Of the twenty-one organisations considered here, seven currently participate in some form of over-training, while five are planning to do so. The remaining nine organisations are not currently involved in over-training and have no intention of becoming involved. In what follows, the organisations that are involved in providing apprentice training for more young people than they themselves need for their own business, or are planning to do so, will be described as 'over-training firms'. The organisations that make use of such services will be referred to as the apprentices 'home' firms. They are usually, but not invariably, SMEs.

3.1 ORGANISATIONS THAT CURRENTLY OVER-TRAIN

Consider first, then, the seven organisations that currently over-train. The organisations in question are listed anonymously, and key aspects of their involvement in over-training, are summarised in Table 2.

Table 2 Employers currently involved in over-training, and attributes of their over-training programmes

Name	Apprentice employed and paid by?	Apprentices currently being over-trained		Involvement in provision and assessment of on-the-job training			
		Absolute number	As a share of total number of apprentices in training at the organisation	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)
AM2	Home firm	3	11%	No	Yes	Yes, if 'home' firm wants it	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 wants it	Yes
InfEng1	Home firm	40	6%	Yes	Yes	Some	Yes
Steel1	Home firm	8	14%	Yes	Yes	No	No

Notes

a: In organisation Aero2, 100 apprentices are being over-trained, divided equally between two different over-training programmes (denoted P1 and P2). See main text and footnote 5 for details.

Details of the firms are as follows: three are drawn from the aerospace sector (Aero2, Aero5 and Aero6); one is a general advanced manufacturing firm (AM2); one manufactures chemicals, another steel (Chem2 and Steel1 respectively); while the seventh is an engineering firm involved in the maintenance and repair of major pieces of transport infrastructure (InfEng1). All seven organisations have well-established apprenticeship training schemes of their own, which they use to train apprentices for their own needs.⁴ Six of the seven have their own training workshops in which apprentices receive their initial hand-skills training.

The total number of apprentices currently being over-trained averages around 25 across the seven employers that train apprentices both for themselves and also for other organisations, with the absolute number ranging from a low of 3 to a high of 100. On average, apprentices from other firms account for about 13% of all the apprentices being trained across the seven organisations. All seven would like to increase the number of apprentices they train for other employers.

The way in which the over-training is organised is similar, though not identical, across the seven case studies (see Table 2). All seven organisations currently run over-training schemes whereby the apprentices are employed and have their wages paid by their home company. In each case the apprentices spend the first year of their apprenticeship being trained alongside the over-training firms' own apprentices, either in the training workshops of the firm that is carrying out the over-training, in the case of the six organisations that have such facilities, or – in the case of the advanced manufacturer (AM2) – on block release in the local college that provides the hand skills training for the organisation's own apprentices. During this first year, the apprentices acquire basic practical skills, certificated via an NVQ2 in Performing Engineering Operations (PEO2), and a knowledge of the requirements of workplace health and safety.⁵

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 employed by other firms return to the latter at the end of the first year of their training, so that it is their home company that provides them with the on-the-job training for the final two years of their apprenticeship. However, the three aerospace firms continue to manage and oversee that training. This is done in two main ways: first, by advising the home company about what the apprentices need to do in order to satisfy the requirements of the competence-based part of the apprenticeship framework (most notably, by 'translating' the requirements of the NVQ assessment framework into terms that staff at the 'home' firm – who are often reported to find the language of NVQs hard to comprehend – can understand); and, second, by assessing apprentices' practical skills (as required for the award of an NVQ3). An almost identical approach is adopted by the organisation involved in the maintenance and repair of major pieces of infrastructure (InfEng1), the only difference being that – in addition to

⁴ See Table 1, column 6, for a list of the frameworks under which apprentices are trained.

⁵ In addition to over-training apprentices along the lines just described, one of the aerospace firms – namely Aero2 – currently also runs a second, rather different over-training programme. The scheme – which is listed as programme P2 in Table 2 in order to differentiate it from the firm's other over-training programme (P1) – involves the aerospace firm employing and paying the wages of apprentices for the first year of their training, during which time the apprentices do PEO2. (The firm receives government funding to cover the cost of paying the apprentices.) The over-training firm then seeks to 'place' the apprentices in local engineering firms, ideally in its supply chain but otherwise drawn from the wider engineering community, where they will be employed and hopefully be able to move on to complete their level 3. The firm reports that it has enjoyed almost 100% success in placing apprentices so far.

their progress towards their NVQ3 being guided and assessed by the over-training firm – the apprentices who are being over-trained will as a matter of routine return to the over-training firm's training school for several 2-3 week blocks during the second and third years of their apprenticeship in order to receive additional technical training in the relevant branch of engineering. Matters are a little different again in the case of the advanced manufacturer (AM2) and the chemical firm (Chem2). Both of those organisations are willing to play a role similar to that taken by the three aerospace firms, whereby their involvement in the training of other firms' second and third year apprentices is limited to providing advice and NVQ assessment to apprentices that have returned to their home employer. However, both are also willing to continue to host other firms' apprenticeship at their own facilities for the second and even the third year of their apprenticeship if the apprentices' employers wish them to do so. In those cases where apprentices' home employers have taken up this offer, the over-training firm provides the on-the-job training as well as the assessment required for the award of the NVQ3 part of the apprenticeship framework.

3.2 ORGANISATIONS THAT ARE CURRENTLY DEVELOPING OVER-TRAINING SCHEMES

The second group of firms considered here do not currently over-train, but are planning to do so, and are currently engaged in devising their over-training programmes. A list of the organisations in question, along with a summary of how they plan to be involved in training apprentices for other firms, can be found in Table 3.

Table 3 Employers planning to over-train, and features of their over-training schemes

Name	Apprentice employed and paid by?	Apprentices currently being over-trained		Involvement in provision and assessment of on-the-job training			
		Absolute number	As a share of total number of apprentices in training at the organisation	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	Currently undecided	Currently undecided	Yes	Yes	No	Unknown
AM4	Year 1: Over-training firm Year 2: Mixed (see main text) Year 3: home firm	30	4%	Yes	Yes	Year 2: Yes Year 3: No	Yes
Aero3	Home firm	50	5%	Yes	Yes	Some, possibly	Yes
Aero4	Year 1: student (not employed status) Year 2-3: Home firm	Currently undecided	Currently undecided	No	No	Yes	Yes
Auto2	Home firm	Currently undecided	Currently undecided	Yes	Yes	Some	Yes

Only two of the firms in question are yet certain about the exact numbers of apprentices they will over-train (AM4, Aero3). In these two 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.

Of the five firms that are currently planning to over-train, the three most straightforward cases are provided by an aerospace manufacturer (Aero3), a vehicle manufacturer (Auto2) and by a firm involved in advanced manufacturing (AM1), all of which have long-standing, highly successful apprenticeship programmes (see Table 3). The aerospace firm is planning to over-train along the same lines as the aerospace firms described in the previous section of the report: apprentices will be employed, and have their wages paid, by their home firms; they will do PEO2 in the aerospace firm's own training school; and, with the possible exception of some brief stints in the over-training firm to work on specialist equipment, they will return to their home firms for the final two years of their apprenticeships, working towards their NVQ3 under the guidance of their over-training firm's assessors. The vehicle manufacturer (Auto2) has a similar approach in mind: apprentices will be employed and paid by firms in its supply chain; they will acquire basic hand skills, along with the associated NVQ2, in the automotive firm's training facility; but, leaving aside some short spells of specialist training, they will complete most of the rest of their apprenticeship back at their home company, being guided towards their NVQ3 by the over-training firm's own NVQ assessors. At the time of writing, the advanced manufacturer (AM1) had just approached two SMEs in its supply chain to discuss the possibility of its helping to train their apprentices; one firm has responded favourably, the other has yet to make a decision. Whilst the details of the over-training scheme have yet to be fully worked out, the emergent plan appears to be for apprentices employed by the SME(s) to spend the first year of their training on block release in the local college that provides the hand-skills training and introduction to workplace health and safety requirements for the over-training firms' own apprentices, with their training being overseen and managed by the advanced manufacturer's HR team. Apprentices are likely to return to their home company for the remainder for their on-the-job training. It is not yet clear whether the over-training firm's own NVQ assessors will support the apprentices through to the acquisition of their NVQ3.

A somewhat different approach is taken by the second advanced manufacturing firm that is planning to over-train (AM4). The first distinguishing feature of this approach to over-training is that the organisation carrying out the over-training intends to employ the apprentices itself for the first two years of the programme. In the first year, the apprentices work towards PEO2 in the over-training firm's dedicated training facilities, during which period their wage will be paid by the over-training company. In the second year, while the apprentices will still be employed by the over-training firm, they will undertake 2-3 placements at SMEs ('partner companies') that deal with the advanced manufacturer. The SMEs in question include not only firms in the advanced manufacturer's supply chain but also companies that buy its products for use in their own manufacturing facilities. The SMEs will pay part of the apprentices' salaries during this second year, while the advanced manufacturer will pay the rest. The intention is that, at the end of their second year, the apprentices who are being over-trained will decide which of the advanced manufacturer's partner companies they wish to join. Once they have been successfully matched, they will be employed by that partner company for the third year of their apprenticeship and will do an NVQ3 that is appropriate for that

business. The advanced manufacturer will continue to provide NVQ assessment during the final year of the apprenticeship. The goal is for around 30 apprentices to be trained via this approach. AM4's apprenticeships scheme, like that of many of the over-training firms considered here, is highly over-subscribed. The firm hopes to divert some of the many good candidates whom it cannot take on itself to SMEs in its supply chain, and then to help train them, along the lines just suggested. The same is true of firm Aero3.

The second of the two aerospace firms that is in the process of establishing an over-training scheme for firms in its supply chain has a large apprenticeship training programme through which it is currently training over 100 apprentices per year in aerospace engineering (Aero4). The training programme is notable not only for its size but also because the apprentices spend their first year of their training as *students*, rather than as employees of the aerospace firm, working towards an NVQ2 in Performing Engineering Operations and studying for a diploma in aerospace engineering at one of a network of colleges with which the firm is partnered. At the end of their first year, the aerospace firm decides which of the apprentices will be taken on as employees, after which the apprentices will be paid a wage and will receive on-the-job training at the firm's own facilities as they work towards their level 3 qualifications over the remaining two years of their training. The firm is planning to open up this programme to organisations in its supply chain, a process that will involve: the content of the first year of training at one or more of the aerospace firm's partner colleges being tweaked so as to suit the needs of the firms in the supply-chain; the supply-chain firms employing some of the trainees from the end of their first year onwards and beginning to pay them a wage; the supply chain firms providing most of the on-the-job training for the young people during the second and third years of their apprenticeship, but with the aerospace firm providing supply-chain apprentices with a 6-month placement in its own facilities as part of their on-the-job training; and with the aerospace firm also running the apprentice training programme on behalf of the SMEs, providing guidance and NVQ assessment for the apprentices in their second and third years.

3.3 ORGANISATIONS THAT ARE NOT, AND DO NOT INTEND TO BECOME, INVOLVED IN OVER-TRAINING

We consider finally those employers that have decided not to become involved in over-training. There are nine such organisations: one advanced manufacturer (AM3); one aerospace manufacturer (Aero1); two car manufacturers (Auto1, Auto3); three chemical companies (Chem1 and Chem3); two ICT firms (ICT1, ICT2); and one organisation from the energy industry (Energy1). The organisations adduce a variety of reasons for their reluctance to over-train.

The most common reason, mentioned by six organisations (the exceptions being Auto1 and Auto3), concerns the fact that, due to the nature and location of their businesses, there are few if any local supply-chain firms for whom these organisations might train. This militates against involvement in over-training in two ways: first, the absence of local firms drawn from the same industry as the established providers was said to imply that the kind of skills taught by the latter are not relevant to the needs of local employers; and, second, the fact that, if they were to over-train apprentices, the six established providers would not be doing so for firms in their supply chain, implies that they would not enjoy any of the benefits, in terms of improved quality of inputs, that (as we shall see below) serve

to encourage other firms to participate in over-training. As one interviewee, from ICTI put it, 'We're too disconnected from our supply chain' for over-training to yield noticeable benefits. Similarly, a seventh organisation argued that over-training was not appealing because, 'We haven't heard from our supply chain that they have issues [of the kind that over-training might help solve]' (Auto3). Nor does the rationale for over-training invoked by the second category of over-training firms distinguished below, namely that involvement in over-training helps them to ensure the financial viability of their training schools, apply in the case of the six non-participants: only two of the six have their own training workshops; and in both of those cases, the workshops are already full, leaving little scope or need to take on trainees from outside to help cover the fixed costs of running the facilities in question (Aero I and Energy I). The upshot of these considerations is that none of the six organisations believe that over-training is financially viable for them: the expense of training apprentices, coupled with the limited benefits to be had either from supplying skilled workers to their supply chain or from having additional trainees pass through their facilities, meant that it simply does not make financial sense for these firms to over-train. As one interviewee put it, 'We struggle to see how the books would balance ... [and therefore] can't see a compelling reason for doing it' (Auto3).

Two additional considerations were also mentioned by some of the non-participants. First, three of the non-participants associated over-training with the (reputedly) traditional practice of large firms training more apprentices than they need, with no involvement or prior commitment to employ them at the end of their training having been made by another organisation, and then simply leaving the surplus apprentices to fend for themselves – by finding a job with another employer – at their end of their training programme (Aero I, Auto3 and Energy I).⁶ The three employers argued that such an approach was irresponsible and, as a result, was not something with which they wanted to become involved. The policy implication of such views, of course, is that – if attempts are to be made to encourage established providers of apprenticeships to become involved in over-training – it will be important to alleviate their concerns about the job prospects of those apprentices who are being over-trained, by making clear to them that newer models of over-training exist which involve apprentices being employed right from the outset by another firm that is committed to employing them upon satisfactory completion of their training.

A variation on this theme arises in the case one of the automotive companies that has no plans to over-train (Auto I). Unlike the other organisations that do not over-train, this car manufacturer does have firms in its supply-chain that might benefit from over-training. Moreover, it does think that it would benefit from having workers it had trained in its supply-chain firms, because their presence would lead to a better understanding amongst the supply chain of its needs. ('You wouldn't have to educate your suppliers as much.') However, like the aerospace and energy companies mentioned in the previous paragraph, it associates over-training exclusively with large firms employing, paying and training more apprentices than they need, taking the best for themselves and then placing the rest in its supply chain. That is an approach that, in the current financial climate, and given the substantial cost of training apprentices (quoted at over £100,000 per apprentice), it cannot countenance. As the interviewee put it, at least so far as the traditional model is concerned, 'there is no appetite for over-training ... it's too expensive.'

⁶ In the past, firms expressed similar reservations about taking on trainees under the YTS scheme, on the grounds that they would be unable to offer jobs to the young people when they completed their training (Lee *et al.*, 1990: 49).

Two employers mentioned another issue that added to their reluctance to become involved in over-training, namely the way that their apprenticeship programmes were intended not just to equip young people with particular skills but also to inculcate in them certain values and attitudes they wished their workers to possess (AM3, Energy 1). Both employers thought that this aspect of the apprenticeship might lead to problems in the case of over-training, partly because the values and attitudes in question might not be the ones desired by the firms for whom apprentices are being over-trained, and also because one of the values in question is loyalty to the firm actually providing the apprenticeship training. There arises, therefore, the possibility that apprentices might feel more loyal to the over-training firm than to their 'home' employer, leading to the potential for problems if that loyalty becomes so pronounced that apprentices decide that they would prefer to remain with the over-training firm when the time comes to return to their home firm (and if the over-training firm also finds itself wishing to retain those apprentices for itself).⁷ While this was not the primary reason why these two employers were reluctant to over-train – both were amongst those firms who felt that there was little if any way that firms in their supply chain might benefit from over-training – this issue reinforced their belief that over-training was not a worthwhile option for them.

The potential for such problems to arise has not gone unnoticed by those firms that are, or are planning to be, engaged in over-training. These firms are acutely conscious of the need to differentiate the apprentices who are being over-trained from their own apprentices, so as to ensure that the over-trained apprentices do not begin to identify more with the over-training firm than with their real employer. As the training manager of one automotive company that intends to begin over-training for firms in its supply chain put it, 'We'll need to make clear [to apprentices who're being over-trained] from day one that: "You're not ours; you're an employee of the supplier, and that is where you're going in the end"' (Auto2). Over-training firms attempt to underline this point in a number of more concrete ways, for example: by ensuring that apprentices who are being over-trained have inductions not only at the over-training firm but also at their home firm (Aero3); by having apprentices who are being over-trained wear different overalls and caps (AM2, Aero3, Steel 1); by putting up posters from the home firms in the over-training firm's workshops 'to remind apprentices from other firms where they come from' (Steel 1); and by having informal agreements with home firms not to poach the latter's apprentices (AM2, Steel 1).⁸

3.4 REASONS WHY 'HOME' FIRMS TAKE APPRENTICES VIA 'OVER-TRAINING' SCHEMES

Eleven of the twelve firms that are, or are planning to be, involved in over-training gave an indication of why, in their view, the home firms who sent, or were planning to send, apprentices to them to be trained had decided to do so. The most oft-cited reason, mentioned by eight of the over-training organisations, was that the home firms lacked the training infrastructure – human resource managers

⁷ This difficulty is, of course, more likely to arise the greater the contribution that the over-training firm makes to the training of the apprentices. Thus, it seems plausible to think that home firms that have their apprentices spend just the first year of their training programme at another firm are less likely to experience problems with apprentices wishing to leave for that other firm than those that have their apprentices stay at the over-training firm for two or more years. The problem also seems less likely to arise in the case of those firms that are training workers for their supply chain, the reasons being of course that in such cases the over-training firm will be aware that, if it succumbed to the temptation to 'poach' the apprentices it was supposed to be over-training, it would harm firms in its supply chain and thereby damage its own business.

⁸ In the words of the training manager of one over-training firm, 'We are very sensitive to not poaching ... We have a gentleman's agreement with [the home firms]. We'd lose all credibility if we [took one of their apprentices]' (Steel 1).

conversant with apprenticeships, NVQ assessors, and experienced training instructors – to be able to manage and deliver the apprentice training effectively in-house. Moreover, the number of apprentices each home firm wanted to train was insufficient to justify the investment of resources required to develop the requisite infrastructure themselves. (As the apprenticeship manager of one organisation involved in over-training put it, 'It's tough for SMEs to get critical mass.')

Recognising this, the home firms sought outside assistance, in this case in the form of over-training.

One question that arises from this account concerns why the home firms should select another employer, rather than a further education college or private training provider, to manage the training of their apprentices. This brings us to the second major reason why home firms were said to turn to over-training, namely the quality of the training offered by the over-training firms, in particular 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 for part of their apprenticeship, because the training offered at such facilities involved the use of up-to-date materials and equipment and saw apprentices taught current best practice techniques to current industry standards (Aero2, Aero5, Aero6, Auto2, Chem2, InfEng I, Steel I). All of these, interviewees reported, were qualities that home firms had struggled to obtain from other local training providers.⁹

The third and final reason why home firms were said to be interested in becoming involved in over-training was to help them to acquire better-quality apprentices. Several interviewees mentioned that the home firms with whom they dealt had sometimes struggled to attract adequate quality 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-quality 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. In this way, it was argued, there could be a better matching of potential apprentices with suitable training places, the upshot being that the home firms benefit from having higher calibre apprentices (AM4, Aero2, Aero3, Auto2, Steel I).

9 For similar points, see Wolf (2011: 105, 126-27), Holt (2012: 5, 11) and Lewis (2012a:31-32, 2012b: 31).

SECTION 4

A THEORETICAL PERSPECTIVE

In this section, a broad theoretical framework will be outlined that will draw attention to issues that are relevant to firms' decisions about whether or not to engage in over-training. The framework is drawn from economics.

Contemporary economics tends to view employers' 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 in which – either 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 for workers is insufficiently fierce 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. In such circumstances, employers have an incentive to bear some of the costs of training, because, although they have to pay newly trained workers a higher wage in order to retain them, the increase in the wage will be less than the rise in the workers' marginal product, so that employers obtain a positive share of the returns from training (Stevens 1994a; Acemoglu and Pischke 2000; Wolter and Ryan 2010: 524-38).¹⁰

It will be useful for understanding why established providers of apprenticeships might become involved in over-training to elaborate briefly on how the apprentice's marginal product and his/her wages varies over time. An illustration of a typical case is provided in Figure 1.

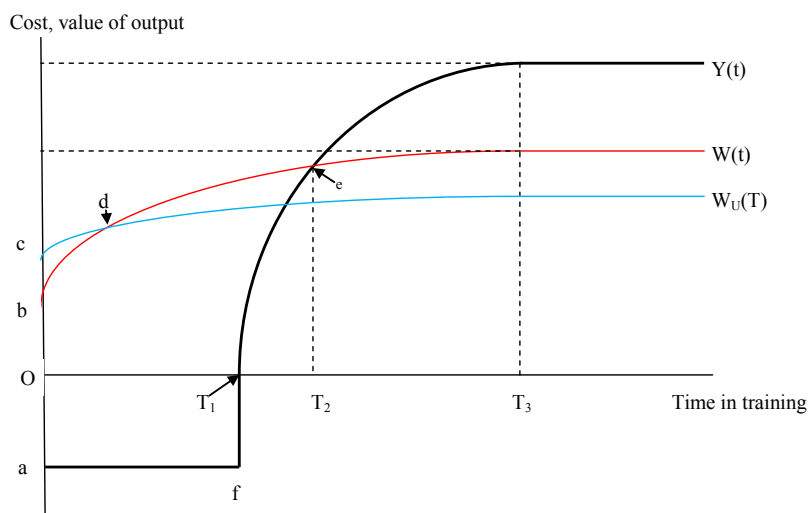


Figure 1: The time paths of net output and wages for apprentice training. Based on Ryan (1980: Figure 1).

¹⁰ Were the market for skilled workers perfectly competitive, by contrast, as would be the case if skills were completely general – in the sense of being just as valuable to (many) other employers as to the one in which they were learned – then employers would have no incentive to invest in training. The reason is straightforward. Any employer that made a financial contribution to equipping workers with general skills and then attempted to recoup its investment by paying workers less than their post-training marginal product would soon find those workers being lured away ('poached') by rival firms. (Since the skills in which the firm invests are embodied in people, the firm cannot acquire a property right over them and so cannot prevent the loss of the asset in which it has invested.) Those other firms, having not incurred any of the costs of training the workers in question, and knowing that their skills are just as valuable to them as to their current employer; would be willing to pay them a slightly higher wage than the firm that trained them. In order to retain workers whose training it financed, therefore, an employer would have to pay them a wage equal to their post-training marginal product, preventing it from earning a positive return on its initial investment in training and deterring it from making such an investment in the first place. In this scenario, 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 (Becker 1993: 33-40).

The time-path of the value of the trainee's net output – that is, the value of what (s)he produces less the value of the raw materials (s)he uses and the output that his/her instructors and assessors could have produced had they not been working with him/her – is given by the curve $Y(t)$. The $Y(t)$ curve is drawn in Figure 1 for the following case

- first, trainees spend an initial period (OT_1) either in a company training school or on block release at a further education college; followed by
- second, a spell of on-the-job training in the workplace (T_1, T_3); after which
- third, they become fully productive (skilled) workers (time T_3 onwards).

The $Y(t)$ curve lies below the horizontal axis initially, denoting the period when the trainee's net output is negative (because, being in a training school or at college, their gross output will be zero, so that – once the costs of raw materials, the opportunity cost of the time their instructors and NVQ assessors spend advising and assisting them by the firms' skilled workers, etc., are taken into account their net output will be negative). Over time, as (s)he becomes more skilled – and, therefore, more productive – the value of the trainee's net output rises, as indicated by the upward-sloping portion of the $Y(t)$ curve, becoming positive after time T_1 and reaching a plateau at time T_3 , at which point the trainee has become a skilled worker. As noted above, the fact that after time T_3 the worker's marginal product exceeds his/her wage enables the firm to recoup its investment in the worker's skills.

The division of the costs of training between the trainee and the employer depends on the wage that the apprentice is paid and, more specifically, on how that wage compares with the trainee's net output. The trainee wage is given by the curve $W(t)$. The cost of providing training is borne by the firm to the extent that it pays the trainee a wage that exceeds value of his or her net output, and by the trainee to the extent that the wage (s)he obtains whilst in training is less than the wage that (s)he could have earned by spending her time on some other activity (e.g. by working as an unskilled labourer, for which job wages are assumed to be given by the wage curve $W_u(t)$). In the case illustrated in Figure 1, the trainee's wage exceeds the value of his or her net contribution to output until time T_2 , implying that in this case the employer makes an investment in training whose value is represented by the area $abef$. This is an investment which, as noted earlier, the employer hopes to recoup in virtue of the fact that after time T_2 the worker's net output exceeds his/her wage. By accepting an apprenticeship position rather than working as an unskilled labourer, the trainee incurs a cost in the form of forgone earnings whose value is depicted by the area cbd , an investment that the worker believes will pay dividends because the pay of a skilled worker exceeds that of an unskilled labourer. Other things being the same, the lower is the initial apprentice wage (Ob), and the flatter the wage curve $W(t)$, the larger will be the area bcd , the smaller the area $abef$, and the greater will be the share of the cost of training borne by the apprentice.

We shall consider in Section 7 below the important question of whether the incentives confronting firms and workers encourage them to finance as much training as would be ideal from the point of view of society as a whole. Before doing so, however, we shall examine – in the light of the analysis presented above – the reasons why those firms who are (planning to be) involved in over-training have made that decision.

SECTION 5

ANALYSIS OF EMPLOYERS' DECISIONS TO OVER-TRAIN

The purpose of this section is to consider the pattern of participation, and non-participation, in over-training described in Section 4 in the light of the economic theory of human capital under imperfect competition. The aim is to analyse the pattern of costs incurred, and benefits received, by firms that are (planning to become) involved in over-training and to explain the rationale for this decision. The analysis will proceed in two stages: first, in Section 5.1, the costs of over-training will be considered; second, the benefits enjoyed by firms that over-train will be explored. As we shall see, so far as the rationale for their decision to participate in the training of firms' apprentices is concerned, over-training firms may be categorised according to the kind of benefit they expect to gain from doing so. Two categories of benefit may be distinguished, each of which is associated with over-training for a particular type of home firm. First, over-training firms may work primarily with firms drawn from the same value-chain of activities of which it forms a part, viewing over-training as a means of improving the fortunes of their own core manufacturing business. This possibility is considered in Section 5.2. Alternatively, over-training firms may help in training apprentices for firms lying outside their own value chain, in which case over-training is – as we shall see – viewed primarily as a means of helping to sustain the financial viability of the over-training firms' own training infrastructure. This second possibility is considered in Section 5.3. Later, in Section 6, we will explore what case there is, if any, for *additional* government financial support – over and above that normally made available to firms that train apprentices – to encourage large firms to assist other employers in training apprentices.

5.1 THE COSTS OF OVER-TRAINING

In considering the costs incurred by firms that over-train, the first point to note is that, in twelve of the thirteen cases where over-training is taking place, or is being planned, the apprentices in question are employed and have their wages paid by their home firm, so the over-training firm does not incur their wage costs (as given in Figure 1 by the area under the $W(t)$ curve for the relevant time period in Figure 1). In the majority of cases, therefore, the over-training firm is spared the biggest cost involved in training apprentices, namely their wage costs.

Over-training firms do incur costs, however, when it comes to the provision of the basic hand skills training which is, as we have seen, a prominent feature of a majority of the over-training schemes considered in this study. More specifically, where the firms carrying out the over-training take the apprentices into their own workshops for an initial period of training in basic hand skills and workplace health and safety, the over-training firms will incur the cost of equipping, staffing and running those facilities (where the running costs include the wages of the instructors and assessors, administration costs, and the costs of the raw materials used in the training) (OaT_1 in Figure 1) (nine cases: AM4, Aero2, Aero3, Aero5, Aero6, Auto2, Chem2, InfEng1, Steel1).¹¹ Equally, in those cases where the over-

¹¹ However, as we shall see in Section 6.3 below, most of these costs will be incurred irrespective of whether the firms in question become involved in over-training, since they arise as a result of the need to train apprentices for their own businesses. Hence, as the representative of one firm that is planning to over-train for its supply chain put it, the extra cost of over-training is 'marginal' (AM1).

training firm sends its apprentices on block release to a local college of further education for that initial period of training in basic engineering skills (two cases: AM1 and AM2), it will incur the cost of paying the relevant college fees.¹² Firms currently engaged in, or planning to begin, over-training typically (intend to) recoup those costs in a variety of ways: by claiming the government (SFA) grant awarded for the delivery of the PEO2 and the associated NVQ assessment (AM4, Aero2, Aero3, Aero5, Aero6, Auto2, Chem2, InfEng1, Steel1); by charging a fee to cover the cost of the materials used in the course of training the home firms' apprentices (AM2, Aero2, Aero3, Aero5, Aero6, Auto2, Steel1) and, in some cases, also for the cost of the training instructors' time (Aero 3, InfEng1, Steel1). Three organisations have also received additional government funding to cover the administrative costs of setting up and administering their over-training programmes (AM4, Aero2 and Aero3).

So far as the benefits of over-training are concerned, it is worth noting first of all one benefit that is rarely enjoyed by the firms carrying out over-training. Where firms train their own apprentices, the costs of training borne by firms may be partially offset by the contribution that apprentices make to the firm's output during their training. While that contribution might be small during at the start of the apprenticeship, it may become significant towards the end of the training programme, by which point the apprentices' skills will have developed sufficiently that they are close to becoming fully skilled workers. This possibility is illustrated in Figure 1 by the fact that, during the (later) period of their training between times T_2 and T_3 , the value of the typical apprentice's net output, as given by the curve $Y(t)$, exceeds his/her wage, as given by the $W(t)$ curve, so that the apprentice is adding (net) value to the employer's business (Oulton and Steedman 1994: pp. 61-63). However, in most of the cases considered here, it seems unlikely that this will be a major consideration, simply because in most if not all instances the apprentices who are being over-trained will have returned to their home firms by the time they are likely to make a positive net contribution to the business. In all cases, the apprentices spend their first year either in a training school or on block release at a local college, in which case their productive contribution to the over-training firm will be zero. Apprentices might make a productive contribution to the over-training firm in those cases where they receive some on-the-job training during the second and third years of the training from the over-training firms (AM2, AM4, Aero4, Chem2, InfEng1). However, in two cases that on-the-job training is provided back at the over-training firm's specialist training workshops rather than on the shop floor, so again it seems unlikely that the apprentices' productive contribution will be significant (Chem2, InfEng1). Apprentices' productive contribution also seems likely to be low in two of the other cases, where the period of time they spend at the over-training firm during the latter period of their apprenticeship is limited to what is required to learn relatively specific techniques (AM4, Aero4). The only case where the over-training firm enjoys a significant net productive contribution to its output from the apprentices it is over-training is to be found in the case of the advanced manufacturer AM2, whose involvement in the over-training of apprentices for other small advanced manufacturers extends to providing the second and third years of their on-the-job training. In that case, the interviewer from AM2 reported that his organisation did enjoy a positive net contribution from the apprentices being over-trained during the final year of their training.

¹² The exceptions to this general picture is the aerospace company (Aero4), whose apprentices are students rather than employees during the first year of their training and whose college studies are therefore directly funded by the state.

If it is indeed true that, in the majority of cases, over-training firms do not enjoy a positive net contribution to their output from the apprentices they are over-training, wherein lies the source of the benefits that encourage them to over-train? As we shall see, the potential sources of benefit are twofold, differing according to whether the over-training firm is assisting in the training of apprentices drawn from firms inside or outside the value chain of business activities of which it forms a part.

5.2 ORGANISATIONS THAT OVER-TRAIN, OR ARE PLANNING TO DO SO, AS A MEANS OF BENEFITTING THEIR MANUFACTURING BUSINESS

The first group of firms distinguished here consists of seven organisations, two of which currently over-train (Aero2, InfEng1) and five of which are planning to do so (AM1, AM4, Aero3, Aero4 and Auto2). These organisations are united in viewing over-training primarily as a vehicle for improving the fortunes of their core manufacturing business. In particular, as we shall see, the members of this second group tend to believe that, by training apprentices for other firms situated in the same value chain of business activities, they can improve the prospects for their own businesses.

Broadly speaking, two kinds of benefit are possible, differentiated according to the relative positions of the over-training and home firms in the value chain. First, if the home firms lie upstream of the over-training firm, so they form part of the latter's supply-chain, then the over-training firm may benefit because the presence of technicians it has trained working in firms in its supply chain may help to improve the quality and reliability of the inputs it receives. Second, if the home firms lie closer to the final consumer than the firm carrying out the over-training, so that they use the over-training firms' products as inputs for their own production process, then the over-training firm may enjoy increased sales if there are technicians it has trained in those downstream firms. The reasons for this are twofold: such technicians will be more familiar with the over-training firms' products and so more likely to buy them in the first place, thereby directly increasing the over-training firms' sales; and those technicians will also be able to use those products to better effect than they otherwise could to produce goods that consumers want to buy, thereby increasing their own sales and, as a result, raising their demand for the product made by the over-training firm, thereby (further) increasing its sales as well.

Of the seven firms that fall into this first category – of organisations that are over-training, or are planning to do so, because they believe it will benefit their core manufacturing business – six believe that the benefits arise through the impact of over-training on their supply-chain (AM1, Aero2, Aero3, Aero4, IngEng1, Auto2), while one anticipates that over-training will benefit it because of its favourable impact both on its supply chain and also on downstream firms that use the goods it makes (AM4).

Organisations that train primarily for firms in their supply chain report that they expect to enjoy two main benefits from doing so. First, they expect more reliable input supplies, because the supply-chain firms are less likely to have problems producing the quantity of inputs required by the over-training firms because of shortages of suitably skilled workers. As one aerospace manufacturer (Aero3) that is about to begin over-training apprentices for its supply chain noted, its own manufacturing 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 helping ameliorate that problem. In a similar vein, an automotive firm (Auto2) that has suffered problems with unreliable suppliers

whose production lines 'suffer chronic breakdowns they can't fix fast enough' is planning to respond by over-training maintenance technicians for those supply-chain firms so as to 'strengthen the supply chain with capable maintenance personnel.' Second, the firm carrying out the over-training also hopes it will help supply-chain firms to offer higher-quality inputs, because workers in supply chain firms who have received some of their training in the over-training firm are more likely to understand, and therefore more able to satisfy, the latter's requirements (cf. Streeck 1992: 257). In the words of an interviewee from an MRO – that is, an aerospace firm involved in the maintenance, repair and overhaul of civil aircraft put it (Aero4) – over-training makes it possible for workers in supply chain firms to 'gain front line experience of what we do with the components' so that they acquire a better understanding of the aerospace firm's requirements and therefore are better placed to ensure that the components they manufacture are well suited to the aerospace firm's needs. In short, as the interviewee argued, through over-training the supply-chain firms 'get more understanding of our business so we get a better product from our supply chain.'¹³

The organisation which expects over-training to yield benefits through its impact on companies that lie downstream from it in the value chain believes that over-training will enable it to sell more of the products it manufactures. Case study firm AM4 manufactures electronic devices that other, downstream manufacturers use to operate their production lines. AM4 contends that it will benefit from having apprentices whom it has trained, at least in part, in those downstream firms because they will be familiar with and favourably disposed towards its products. Once again, therefore, the rationale for over-training is that the associated costs will be more than offset by greater anticipated benefits.

Whether they arise through the impact of over-training on firms that lie upstream or downstream of the organisations that over-trains, the benefits that accrue to the latter serve to compensate them for the (net) costs they incur (after government funding and any fees paid by the home firms have been taken into account) from doing so, thereby providing a rationale for their involvement in over-training. As the training manager of one aerospace firm that over-trains for organisations in its supply chain put it, its involvement in over-training 'is driven by self-interest ... It's why we do it and how I justify it [to the company's board of directors]' (Aero2).

5.3 ORGANISATIONS THAT TRAIN ON A SEMI-COMMERCIAL BASIS

The members of the second group of organisations distinguished here engage in over-training, not because their primary manufacturing business gains from having technicians that they have trained, in whole or part, working for firms elsewhere in their value chain, but rather because doing so helps them to sustain the financial viability of their in-house training programmes. 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 needs for technicians. All but one, namely AM2, has its own dedicated apprenticeship training facility.

¹³ Such arrangements nicely 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 sub-optimal even from the perspective of the individual firm ... [The upshot is that] 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 ... [For example,] we do see in a number of countries today that competing firms are beginning to set up joint, cooperative training centres for their workforces.' As the representative of one case study firm that over-trains for its supply chain put it, there is a 'mutual interest' in over-training because the supply chain firms obtain more skilled workers than they could attract and train if they operated alone, while the over-training firm obtains a more reliable, higher-quality supply of inputs (Aero3).

These organisations over-train apprentices on what might best be described as a semi-commercial basis. The over-riding reason why they have an apprenticeship training scheme is to supply technicians to their own business. In no case does over-training account for more than 20% of the total number of apprentices being trained by the organisation in question. And none of the firms in question has any intention of becoming a specialist commercial training provider. (Indeed, several explicitly disavowed the idea.) Nevertheless, as already noted, these organisations are all involved in training apprentices for other firms, not because doing so has a beneficial impact on their core manufacturing business, but rather because it helps them to cover some of the overheads associated with running an apprenticeship programme, thereby helping to make the programme financially viable. And it is to the latter aspect of the rationale for over-training in these cases that the use of the term 'semi-commercial' is meant to draw attention.

The home firms that send apprentices to be over-trained at the five organisations considered in this section tend to be SMEs that are: drawn from outside the over-training firm's supply chain; located in the same geographical area as the organisations offering to over-train; wishing to recruit apprentices, but lacking the infrastructure – the workshops, the HR staff, the NVQ assessors and mentors – to provide and manage the training themselves; and struggling to find good college provision, especially training in hand skills, in their local area. Faced with such difficulties, the SMEs have turned to the larger, established providers of apprenticeships considered here as a source of high-quality training and mentoring for their apprentices. For example, small local food and chemical manufacturers who have struggled to find good training provision now send their apprentice maintenance technicians to Chem2, which has long trained mechanical, electrical, and control and instrumentation technicians to work in its own chemical processing plant. The same holds in the case of Steel I, whose engineering school now provides training in basic hand skills and workplace health and safety not only for its own mechanical and electrical apprentices, but also for aspiring maintenance technicians from several local engineering firms, which had previously struggled to source high-quality training tailored to the requirements of advanced engineering and manufacturing. The story is similar both in the case of AM2, which helps train apprentices for other advanced manufacturers in its local area who had struggled to get high quality training from local providers, and also with Aero5 and Aero6, who provide hand skills training for apprentice aircraft mechanics drawn from local aerospace firms which had hitherto struggled to find a college that could provide 'aerospace standard' training in hand skills. It is also perhaps telling that two of the organisations considered here, namely Aero6 and Steel I, have opened their own training facilities within the past five years, precisely because – like the SMEs to which they now offer training – they had struggled to find hand-skills training of the quality they needed their apprentices to receive.

The reason why taking apprentices from other employers bolsters the financial viability of the apprentice training programmes in the over-training firms is as follows. In all five cases, the over-training firms employ their own specialist instructors and NVQ assessors to manage and deliver training to their own apprentices. In addition, as noted above, four of the five organisations also have their own dedicated training workshops. Since the organisations in question must incur the fixed costs of running those facilities, and of employing the instructors and assessors, in order to train their own apprentices, and given also that – after taking into account the need to train apprentices for their own organisation –

they have the capacity to take on additional trainees, they can benefit from over-training because doing so: (i) adds little if anything to their costs (most of which will have been incurred anyway¹⁴); and (ii) enables them to access the SFA funding for delivering and assessing the NVQ2, which they can use to offset some of the fixed costs of running their training school. As the manager of one training facility that employs two instructors, but which has small class sizes and therefore excess capacity, put it, 'The more people who get into it [i.e., sending their apprentices to his facility for the first year of their training] the lower the costs to myself ... It's in our own interests [to over-train]' (Steel1). So, as in the case of the organisations that over-train for firms in their supply chain, involvement in over-training is viewed, not as an act of charity, but rather as something that is in the interests of the organisation providing it.

14 Moreover, as already noted, the over-training organisations in this category typically seek to recoup any additional costs they incur by over-training, with four of the five cases all charging home firms a fee to cover the cost of the materials which apprentices use during their training (AM2 Aero5, Aero6, Steel1).

SECTION 6

IS THERE A CASE FOR ADDITIONAL GOVERNMENT SUPPORT FOR OVER-TRAINING?

We consider in this section the question of whether there is a case for additional government support for firms that over-train, over and above what is provided for firms that train apprentices for themselves. We consider first the general case for government financial support for apprenticeships, before moving on to consider the specific case of over-training.

We saw in Section 4 that employers who face an imperfectly competitive market for skilled labour have an incentive to invest in equipping workers with transferable skills. However, market-based incentives alone may be insufficient to encourage them to undertake the socially optimal level of investment in training. The root cause of the problem is that the asset which is created when an employer invests in training, namely a skilled worker, is one over which the employer cannot establish a property right. (Anti-slavery laws prohibit the employer from owning the worker in whom the skills are embodied.) Consequently, the workers in question are free to move to other employers, who may tempt them away from the employer who initially trained them by offering higher wages than the latter can afford given the need to earn a return on its investment. The upshot of such labour mobility is that the potential benefits from training accrue not only to the firm that financed the training, and to the workers who acquire the skills, but also to other employers to which those workers might move in the future (Stevens 1996: 29-30).

The prospect of losing its skilled workers implies that the employer who made the initial investment in training them will discount the return it expects to earn from its investment, reducing its willingness to finance training. And while the organisations that subsequently recruit the workers in question benefit from their skills, the employer who made the initial investment will not take those broader social benefits – or (positive) externalities, as they are known – into account when deciding how much to invest, focusing only on the (truncated) private returns that it expects to enjoy. In this way, the prospect that skilled workers will be poached by other firms drives a wedge between the private and the social returns to training and therefore deters employers from investing as much in training as would be optimal from the point of view of society as a whole. More specifically, from the point of view of society as a whole, too few workers will be trained.¹⁵

Overall, therefore, while it is true that firms in imperfectly competitive labour markets have reason to invest in training their workers, the incentives they face may be insufficient to motivate them to carry out the socially optimal amount of training. Potentially, therefore, there may be scope for government policy to remedy the problem of under-investment in transferable skills by sharpening the incentives

¹⁵ Ultimately, the extent to which equipping trainees with transferable, reliably certificated skills leads to increased labour turnover and thereby deters employers from training apprentices is an empirical matter. There are some grounds for believing that, far from increasing labour turnover, apprenticeship training might even make skilled workers less likely to leave the firm that trained them. The reason is that, if such training is coupled with opportunities for promotion up through the firm in question, 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 quite satisfactorily by remaining with that firm rather than by moving elsewhere. In this way, apprenticeship training might promote loyalty and commitment, reducing turnover (see, for example, Ryan and Marsden 1995: 71; Ryan *et al.* 2007: 140-41; Lewis 2012a: 29). This process of loyalty-building via apprenticeship training might, might, however, be more likely to take place in larger firms with well-developed internal labour markets, and therefore ample opportunities for promoting young people, than with the smaller 'home' firms that make use of over-training, where opportunities for promotion may be more limited.

for firms to train. In particular, the granting of subsidies to employers that train apprentices can increase the private return that employers expect to earn from their investment in transferable skills until it equals the social return, thereby giving employers an incentive to train more workers, as the socially optimal outcome requires (Streeck 1989: 93-94; Chapman 1993: 95-105; Stevens 1999; BIS 2010b: vii, 35-36, 2010c: 43-49, 73).

The question that arises in the case of over-training is: is there any reason why that approach to increasing the number of apprentices warrants extra financial support, beyond the usual subsidy offered to organisations that train apprentices? The answer to that question hinges on whether the divergence between the private and the social returns to training, the existence of which provides the justification for the subsidy, is likely to be greater in the case of over-training than in more conventional forms of apprenticeship. It is not immediately obvious why the mere fact of over-training should increase the magnitude of the externality. While the two employers must agree on how the costs and benefits of training are to be shared between them, given the share borne/enjoyed by the workers, the need for such an agreement does not in-and-of-itself imply that there must be a greater divergence between the (joint) private and the social returns to training, as would be required to justify a higher subsidy. After all, such a situation appears – at first glance – to be little different from that in which the home firm contracts, not with another (over-training) employer, but with a college of further education to provide its apprentices with, say, their training in basic hands skills.

Nor does the fact that the over-training firms typically offer higher-quality training than is otherwise available to home firms justify a higher subsidy. Just as the over-training firm is willing to incur the higher costs of providing better-quality training for its own apprentices because of the benefits it enjoys from having more skilled workers, so too should home firms be willing to pay more for the superior training given to those of their apprentices who are being over-trained (on account of the benefits they will enjoy from having more skilled workers at their disposal). Hence, viewed in isolation, the superior quality of training offered by over-training firms warrants, not higher government subsidies, but rather the payment of a fee by the home firms to those carrying out the over-training to cover the cost of providing higher-quality training, a fee which the home firms would expect to recoup via the benefits of having a more skilled workforce. Indeed, something like this already happens in some of the cases considered in this study, with the over-training firms charging home firms a fee for providing parts of their training programme that exceed the minimum requirements of the relevant apprenticeship framework, such as outward bound courses designed to build soft skills such as teamwork and leadership amongst the apprentices (AM2, Aero2, Aero3, Auto2).

However, there are at least two reasons why the divergence between private and social returns might be greater in the case of over-training than in more conventional approaches to apprenticeship. First, the fact that apprentices who are being over-trained typically spend some of their time at the training facilities of the over-training firm, and interact with apprentices from the latter over an extended period of time, will broaden their horizons by giving them a sense of the facilities, kind of work, pay and the career prospects available to workers at firms other than their home employer. In many cases, interviewees argued, that comparison may not be favourable to the home firm which, being an SME, might offer poorer facilities, lower pay, less interesting work, and poorer career prospects than the over-training

firms (which in many cases are large, well-known firms with good reputations for pay, careers, etc). If the broadening of the apprentices' horizons leads to a higher propensity to quit their home firm, because the over-trained apprentices are more aware of the kind of opportunities available elsewhere, then the shortfall between the expected private return that accrues to the home firm from its investment in training and the social return on that investment will be even greater in the case of over-training than in the case of more conventional forms of apprenticeship, reducing the home firm's willingness to finance over-training even further below the socially optimal level and therefore justifying a larger subsidy.¹⁶

Second, in those cases where apprentices who have been over-trained at an employer with a good reputation for training, their association with that employer's training will make it more likely that firms other than their home employer will recognise their skills and be willing to compete to attract them away from their home firm. And the higher probability of losing their skilled workers thereby engendered will reduce the expected return that the home firm expects to receive from its investment in training, relative to what it would be under more conventional forms of apprenticeship, while the social return would remain unchanged, so the gap between the (expected) private and social returns would increase. A higher rate of subsidy would then be needed to close the gap so as to give the home firm an incentive to (over-)train the socially optimal number of apprentices.

To put these points slightly differently, recall that the economic theory of human capital under imperfect competition suggests that employers have an incentive to invest in equipping workers with transferable skills because, thanks to imperfect competition for skilled labour, they are able to retain trained workers whilst paying them a wage is less than their marginal product. The labour market is imperfect in the sense that, either because workers have a limited awareness of the opportunities available at other employers, or because those employers are uncertain about the precise (quality of the) skills the workers possess, competition for skilled labour is insufficiently fierce to drive up wages until they equal the workers' marginal product. And, as we have seen, it is that gap between the wages of skilled workers and their marginal products that makes it possible for firms to earn a return on their investment in training, thereby giving them an incentive to finance training in transferable skills. However, both because it makes apprentices more knowledgeable about the kinds of opportunities available at other employers, and also because the association with the over-training firms' training programmes makes it more likely that those other firms will recognise the true worth of the apprentices' skills, the effect of over-training may be to increase the fierceness of labour market competition for over-trained workers, forcing home firms to pay them a higher wage and therefore reducing the expected private (but not the social) return on training. The magnitude of the externality would be higher, relative to the situation where apprentices were not over-trained, so a higher rate of subsidy would be warranted.

It appears, therefore, that there may be reasons why the magnitude of the externality or divergence between the private and the social returns on training may be greater where over-training takes place than where only more conventional forms of training are used. A higher subsidy for apprenticeships may therefore be

¹⁶ Several interviewees, including representatives both of case study organisations that (plan to) over-train (e.g. AM2, AM4, Aero3, Aero4 and Auto2) and also of those that do not (e.g. AM3, Auto3), expressed concerns that pay differentials between the apprentices who the over-training is training for other firms and those who it is training for itself would become known to the apprentices and lead to discontent.

in order for the case of over-training.¹⁷ And while the fact that the purpose of the subsidy is to increase the willingness of home firms to take on apprentices might seem to imply that the subsidy ought to be given direct to the home firms in question, it might also be given indirectly, in the form of a grant to the over-training firm that would enable the latter to reduce the fees it charges prospective home firms, thereby sharpening their incentives to over-train.

17 Two other points, both of which I owe to Paul Ryan (personal communication), are worth noting. The first is that the analysis presented in this section assumes that the current rate of subsidy for apprenticeships is appropriate. If that is not the case – if, say, the current level of subsidies for the kind of STEM apprenticeships offered by the firms discussed in this paper is too low – then a higher subsidy would be warranted not just in the case of over-training but more generally. Second, the case for a larger subsidies presented in the main text presupposes that the per capita external benefit associated with apprentices will not decline so rapidly – as the number of apprentices being trained increases – that it falls below the level that justified the usual government subsidy. If the magnitude of the externality were to fall below the level that justified the normal subsidy, as might happen for example if so many apprentices were over-trained that a small, local labour market became 'saturated' with skilled workers, then the argument for a higher level of subsidy would obviously not go through.

SECTION 7 CONCLUSION

The research reported in this paper indicates that over-training does indeed take place in advanced manufacturing in the UK. The form that the over-training takes is, however, rather different from that seen in the past. More specifically, the term 'over-training' has traditionally been associated with an approach that saw large firms, often nationalised industries, employ, pay and train more apprentices than they knew they would want to retain, and then dispense with the services of the surplus apprentices at the end of the programme, the latter simply being left to find a job with another employer. The evidence gathered for this study suggests that current practice is rather different. In the cases considered here, the 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 employer. The precise degree of involvement of the over-training firm varies between cases. The most common approach involves the over-training firm providing basic hand-skills and workplace health and safety training during the first year of the apprenticeship as well as managing the apprenticeship and providing NVQ assessment during the subsequent two years of the training. So far as policy is concerned, the fact that at least some employers have inaccurate views about what over-training involves implies that it would potentially be useful to make clearer to large employers the fact that over-training comes in many forms, not all of which resemble the approach adopted by the nationalised industries and other large firms a few decades ago. In that way, such employers would be able to make better-informed decisions about whether or not to participate in over-training.¹⁸

The evidence reported above indicates that there are two broad categories of reason why organisations engage in over-training. First, some large employers perceive that they will benefit from having more highly skilled workers employed by other firms located in the same value-chain of business activities. The benefits may involve a more reliable source of higher quality inputs, in the case of firms that over-train for organisations in their supply chain, or greater sales, for those organisations that help to train apprentices for firms located downstream – or closer to the consumer – from them in the value-chain. A second category of organisations over-train, not because they think that doing so will benefit their manufacturing business, but rather because participating in the training of apprentices for other firms promises to help them to sustain the financial viability of their in-house training programmes, essentially by helping them to cover the overheads or fixed costs associated with running the latter. The factors that motivate over-training in the two categories of firm just distinguished are, however, typically absent from the case study organisations that do not over-train: the latter do not perceive that they will benefit from training for their supply chain; and nor do they discern a financial imperative to train in order to sustain their own in-house facilities. The home firms that send their apprentices to be trained, in whole or part, at the larger over-training organisations do so primarily because of the difficulties they have had in obtaining high-quality training and support from other kinds of provider.

The evidence documented in this report suggests that over-training can make

¹⁸ The evidence about over-training gathered here is, of course, partial. It would be helpful for efforts to gain a better understanding of over-training for questions about the nature and extent of employers' involvement in training apprentices for other firms to be included in surveys such as the National Employer Skills Survey. I owe this point to Geoff Mason (personal communication.)

a contribution to increasing the supply of places on high-quality apprenticeship training programmes in STEM subjects in two main cases. The first arises where larger employer-providers of apprenticeships are concerned about the skills available to firms in their supply chain, in which case over-training can help both the over-training firm, which can be more confident of obtaining high-quality inputs when it needs them, and also the home firms, for which over-training holds out the prospect of access to higher-quality training and advice and also to better quality candidates for apprenticeship training places. As one report on vocational education and training has recently put it:

Economic growth is often held back by skills shortages and skills gaps, particularly in supply chains. In the initial stages of recovery from a recession, larger companies may recruit experienced workers from supply chain companies in order to meet new orders, restricting longer term growth overall. Now is the time to invest in the 'pipeline' – so that strong colleges and providers with good employer partnerships can prepare people for future skilled employment. (CAVTL 2012: point 13.)

The second case where over-training may be of benefit occurs, as we have seen, when established providers of high-quality training, in particular those with their own training schools, have spare capacity to train and open up their facilities to apprentices from other firms, who can often receive better training than would otherwise be available to them.

Over-training is not, of course, a panacea. Where large, established employer-providers are unavailable, alternative ways of improving the quality of training available must be examined, such as – for example – the use of Group Training Associations. Moreover, even when over-training is possible, it brings with it risks, especially for the home firms, who may be more likely to lose their skilled workers to other firms. For this reason, it was argued, a higher level of government financial support may be warranted in the case of over-training than when apprenticeship training is organised along more conventional lines, essentially as a means of giving risk-averse 'home' firms an incentive to take on apprentices for over-training. Designing such a scheme so as to avoid 'deadweight' – that is, to avoid paying subsidies to firms that would over-train apprentices anyway – would also be a challenge. But as one possible way of extending the provision of high-quality apprenticeship training to a broader array of firms, and apprentices, it has its place, especially in decentralised approaches to skills policy that attempt to build on and leverage local training capacity in the most effective way possible.

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