

Apprenticeship and Training in Premodern England

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Abstract:

This paper re-examines the economics of premodern apprenticeship. It argues that existing accounts of apprenticeship as a two-stage training regime, in which the apprentices' training was followed by them repaying training costs, fail to explain empirical evidence of frequent non-completion and fit poorly with how skills are acquired. I present new data on apprentice quit rates in seventeenth century London that confirms earlier suspicions based on rates of becoming freemen. I then propose a new account of how the costs of training were distributed over the term of the contract in such a way that neither master nor apprentice risked significant loss from breach of contract. This new account fits with evidence of high levels of apprentice quits and other characteristics of premodern apprenticeship, as well as with what is known about the acquisition of tacit knowledge in modern and premodern societies.

Word count:

Abstract and text: 10,800

Notes: 2213

Apprenticeship was one of the most important means by which training was transmitted in pre-modern Europe. In England, non-agricultural apprentices made up between 7.5 and 10 percent of the labour force even in the eighteenth century.¹ Elsewhere in Europe, apprenticeship had a comparable level of importance as the main route into skilled manufacturing, service and mercantile occupations. However there is little consensus among historians about the structure and effects of premodern apprenticeship. Recently, Stephan Epstein has suggested that apprenticeship was essential to the supply of technical training across Europe, pointing to the role of the guilds in enforcing contracts between masters and apprentices.² Jane Humphries has put forward the argument that that the apprenticeship ‘contributed to the premature exodus of labour out of agriculture that is the hallmark of English exceptionalism’, emphasising the effectiveness of several self-enforcing aspects of the apprenticeship contract, including but not limited to guilds.³ Less optimistically, Sheilagh Ogilvie has argued that apprenticeship was in fact mainly a device to exclude competition and guilds were ‘neither necessary nor sufficient for ensuring craft skills’, extending a critique that goes back to Adam Smith and beyond.⁴

In this paper I re-examine the economics of premodern apprenticeship. I argue that the standard account of apprenticeship training used in nearly all work in this field is incompatible with our knowledge of how apprenticeship and training operated in practice. The standard account describes apprentices initially receiving training and then retrospectively repaying their masters’ investment through subsequent labour services at below-market wages. While this two-stage model is a useful simplification for some purposes, and may even come close to the reality of training in the late nineteenth and twentieth centuries, it is seriously flawed as an account of premodern apprenticeship. First, it bears little resemblance to our understanding of how occupational skills are acquired. Second, it is inherently unsustainable if apprentices’ quit early. Yet apprentices in premodern England do indeed seem to quit in large numbers. I therefore suggest an alternative model of apprenticeship that could be sustainable in these circumstances. This is based on a longer distribution of less intensive training that runs alongside, rather than precedes, apprentices’ engagement in profitable labour services for their masters. I argue that this allows a closer matching between the timing of the master’s expenditure on training and the

apprentice's repayment of these costs. Thus, both parties are less exposed to loss in case of default. In this form, apprenticeship can survive in an environment in which quits are commonplace. Lastly, I sketch out the consequences this has for our understanding of the effect of guilds on apprenticeship.

My discussion of apprenticeship and guilds is largely focused on England in the sixteenth to mid-eighteenth century. That said, the argument about the economics of apprenticeship is, I think, generally applicable for preindustrial Europe, even though the particular forms of apprenticeship and its relationship to family, trade and guild varied.⁵ One finding that should be emphasised at the outset is the significant divergence that appears to have existed between premodern and modern apprenticeship structures. As briefly indicated already, the standard account of the economics of apprenticeship appears to fit better the evidence for nineteenth and twentieth-century training. This suggests that shifts in employment structures, possibly the growth of large firms with its attendant shifts in expectations among skilled workers about their likely contract duration, allowed employers to move to a more efficient training schedule in this period.

1.

Apprenticeship was a system of training in which young men worked with established craftsmen and merchants in order to learn a trade. Its general characteristics varied little in medieval and early modern Europe. Apprenticeships were normally formal arrangements in which apprentice and master entered into a contract, the 'indenture'. This generally specified that the apprentice was to serve and obey his master, and behave well – not gambling, drinking, marrying and so on. In exchange, his master undertook to teach him his trade and provide him with keep and lodging, normally as part of his household. In towns, these contracts were often registered, 'enrolled', by the guild and/or urban authorities. Failing to enrol apprentices within a certain time (after a trial period) might lead to them being ejected if discovered, their master fined, and would exclude them from the freedom. Beyond these broad commonalities, the terms of service and the manner of its arrangement differed. In seventeenth and eighteenth England, apprentices' families often paid a fee, the 'premium', to the master at the time of binding. It was also common for apprentices' family or friends to

enter bonds for their behaviour and honesty. In the first years of service, apprentices' board and clothing might even be subsidised by their parents.⁶ Apprentices rarely received wages, although some were given payments on completing their terms or had their freedom fees paid by their masters.⁷ Wages might even be illegal in some cities: London freemen were banned from paying apprentices in 1527, a policy restated as late as 1744.⁸ Moreover, the length of apprenticeships varied, although in England a term of seven years was set as a legal minimum in 1563 and became the norm across the country.⁹ When the terms of indentures were broken, guild, civic and other legal bodies could intervene to resolve disputes. Some impression of the significance of apprenticeship can be gained from the numbers involved. Rappaport has estimated that roughly 10% of London's population in 1550 (7,250 of 70,000) were apprentices, and two-thirds of all adult men in London had served apprenticeships.¹⁰

At the centre of the debate on whether this system of apprenticeship was a good or bad thing is what might be termed the 'standard account' of the economics of apprenticeship. This is shared by all modern commentators who explicitly consider the question of how apprenticeship training was paid for. In this formulation, masters recoup the costs of training *retrospectively* by having the skilled apprentice work at below-market wages for a sufficient period to equal the expense of their training – these are the opportunity costs of time spent on instruction not work, the costs of materials and space used, and the apprentices' board and keep.¹¹ An early version of this analysis was given basic graphical form in the 1930s (figure 1), a time when *contemporary* apprenticeship did seem to take this form.¹² As this shows, in the early years of the contract the master's investment in the apprentice is greater than the value of labour they receive. The value of the apprentice increases with training until at point H he becomes an asset.¹³ As R. B. McKerrow, the author of the diagram noted, his 'initial value is the area FHDB minus the area CHE. (This ignores risk of death, &c.)'. This standard account is clearly similar in many respects to Becker's analysis of human capital, and several authors explicitly analyze apprenticeship as an example of workers funding their acquisition of general skills.

[INSERT FIGURE 1 near here]

The sequential distribution of training costs and repayment envisaged in the standard account of apprenticeship present obvious risks for both masters and apprentices. At the outset, apprentices were vulnerable to exploitation by masters who failed to provide sufficient or appropriate training. Yet, once trained, apprentices who moved to new employers could capture the returns on their skill at their masters' expense. As a result, recent studies of apprenticeship have focused on how contracts could be written and enforced in such a way that the system would not collapse under the weight of opportunistic defaults. So, Epstein has suggested that guilds acted to prevent opportunism, while Humphries has identified various reasons why indentures could work, particularly the reputational and institutional enforcement mechanisms of family, guild and law, and the potential advantages that completion gave apprentices in future earnings and settlement rights.¹⁴ As she comments, 'perhaps most important of all the completion of an apprenticeship marked a man out as trustworthy and dutiful'.¹⁵ Both suggest that apprenticeship contracts worked, at least in the sense that opportunism was restrained and training was provided effectively. Yet there is remarkably little empirical evidence that apprenticeship contracts were in fact enforced.

Apprenticeship contracts seem in practice to have frequently ended early. One reason for this is the 'death &c' which McKerrow glossed over, for premodern apprenticeship inevitably coexisted with a significant risk of death and disability. More surprising are the high levels of early departure by apprentices. This presents a fundamental problem for the standard account of apprenticeship. It suggests that indentures did not stop many apprentices leaving before the end of their terms, despite the available informal or formal enforcement mechanisms of family, community, guild or law; given that indentures continued to be used, they did presumably serve a function in legitimating and defining the terms of service.¹⁶ Similarly other elements of apprenticeship contracts that have been sometimes interpreted as incentives for completion – payoffs at the end of terms, for example – were not enough to keep most at work throughout their term of service.¹⁷

The first indication that many apprentices did not complete their terms of service comes from the large numbers who failed to become freemen or craft masters in the town or city where they had trained (table 1).¹⁸ The freedom brought significant

benefits –settlement and its associated poor relief, and the right to work at a trade in the town or city.¹⁹ Yet studies of a wide variety of guilds and towns across England and parts of Europe have repeatedly found the same picture. With rates of entry to the freedom as low as 40% in many English cities in the sixteenth and seventeenth century, it is clear that apprenticeship was hardly the ‘direct route to mastership’, Farr envisages.²⁰ The contrast with completion rates of over 90% in England in the 1920s and 90% in Wurttemberg in the early eighteenth century is dramatic.²¹

[Insert table 1 near here.]

These data are far from perfect. They obviously only capture apprentices who entered the freedom of their guild or town, rather than directly measuring completion rates. The process of becoming a freeman involved various costs – feasts, gifts or other payments to guilds alongside city fees – which, while not always large, served as a disincentive. Even if they completed their apprenticeships, many aspirant freemen would then have to struggle to gather the resources to establish an independent business. Unsurprisingly, entry to the freedom normally occurred several years after the end of apprenticeship. Most former apprentices presumably filled the gap by working as a journeyman while they saved. Hence, freedom rates group together apprentices who quit, those who complete but remain as journeymen, and those who complete and then migrate.²² Nonetheless, it seems likely that a significant proportion of apprentices had left before the end of their term.

We have limited amounts of more precise information about how many apprentices’ left their masters early and when they did so. The only published evidence on the timing of departure comes from Bristol, where Ben Amos found that most apprentices for whom a time of departure was recorded left in the first two years (59 of 99). This sample is likely to be distorted, however. Departure dates were recorded for only 5% of Bristol apprentices, whereas roughly 60% of them failed to become freemen.²³ For London carpenters’ apprentices between 1540 and 1590, the guild’s book of apprenticeship enrolments records their fate, but not the point at which it occurred: only 39.7 % were freed. Of the rest, 14.6% died. This level of mortality fits with modern estimates, according to which mortality can explain the fate of roughly 10% of apprentices.²⁴ Only 1.1% wed, and thus voided their indenture, but this is also

representative of wider patterns. Unfortunately, the remaining 44.6% were simply described as ‘Gone’, leaving the timing of departure and its relationship to the term of service undefined.²⁵

For London apprentices in the 1690s, it is possible to get a better sense of the point in their term at which apprentices left. By linking tax and guild records, I identified a sample of freemen whose households were recorded in detail in a 1695 tax assessment.²⁶ The apprentices these freemen had taken over the period before 1695 were obtained from guild records.²⁷ I then examined the listings in the assessment to identify which of those apprentices whose contracts overlapped with the 1695 tax date were actually in residence; in this period apprentices still lived in their masters’ households.

Figure 2 shows the percentage of apprentices still resident in their original masters’ household, broken down by the time elapsed since their apprenticeship began, for a sample of 187 apprentices bound to 117 masters in several London guilds. Overall, 56% of apprentices were resident with their masters at the time of the tax. The decline over time in the percentage of apprentices who were still in service with their original master is clear from figure 2. It is also noticeable that even in the first year of their service a quarter of apprentices were missing. By the seventh year of their term, only 38% of apprentices were resident. The scale and timing of their departure suggests that apprentices quit *throughout* their term. Apprentices were not remaining with their master but simply not taking the freedom. Nor is there an obvious cusp, which we might expect if they were leaving after a definable training period had passed. Freedom records confirm the significance of the pattern of absences in the assessment listings.²⁸ Overall, 40% of apprentices in the sample were later freed. This rises to 51% among apprentices who were resident whereas only 25% of missing apprentices later became freemen.

[Insert figure 2 near here]

The levels of absence in figure 2 are, it should be emphasised, a lower bound estimate. As we have seen, some of those absent did later become freemen. Some of these apprentices may have been temporarily absent when the tax assessment was taken, or

deliberately concealed to reduce the tax payable. Others would have been working on their master's behalf elsewhere. Apprentices could also be 'turned over' to new masters during their term, moving rather than quitting. This was only occasionally recorded in guild apprenticeship registers. To obtain some sense of the scale of turning over and temporary absences all non-family members listed as resident in masters' households were compared with lists of apprentices. This identified 18 individuals who had been indentured to different masters but who had since moved.²⁹ As table 3 shows, these apprentices were as likely to be in their first year of service as their sixth; turning over could occur at any stage in the term. From this, a rough estimate suggests that 22% of absent apprentices had been turned over rather than quit, which fits the freedom rates discussed above.³⁰ Given these limitations, it would be inappropriate to attempt to estimate the real rate of departure. The upper bound is the 90% of apprentices who might survive the disease burden of the city and the lower is the 40% who were later freed. Within this range, the 1695 data can only indicate that departures were likely to be significant in number and early.

[insert table 3 near here]

Inevitably, not all apprentices are captured by this exercise. The status and role of male servants present in the household listings is an obvious gray area. In addition, there were also another ten people described as 'apprentices' by the tax assessors who could not be identified in the records as being bound in that company. These may have been apprentices who were present 'on liking'; the trial period of between a month and a year that was common before formally contracting an apprenticeship. More definite evidence of this practice is apparent in the five apprentices who were present in their masters household before they were officially bound, one nearly four years in advance of his enrolment.

What explains apprentices' early departures is hard to establish.³¹ Some apprentices slipped into vagrancy or a marginal existence. Yet others departed when their masters' businesses could no longer support them. A number left after a breakdown in relations with their masters.³² City courts frequently heard cases in which apprentices sought to be released from their indentures because of problems with their master; their petitions cited a limited range of failings by masters, generally excessive

correction or abuse, not giving training, and failing to supply necessities, such as food or clothing. Conversely, masters complained about apprentices' deserting and refusing to return to their service, being drunkards, attacking them or their family, or embezzling money from the shop. Some masters pursued runaway apprentices and succeeded in forcing them to return or else had them punished.³³ Such formal, and relatively costly, interventions are rare and many ended with an attempt at reconciliation. These cases, while striking, are likely to have been a small proportion of the total of departures. No trace would be left when master and apprentice agreed on ending the contract, which was probably the most common way in which a term ended early. In such situations, legal intervention was not required to end an apprenticeship: 'the agreement of the master and apprentice, and under his master's hand' was sufficient, as Dalton pointed out in a guide for Justices of the Peace.³⁴ For many masters and apprentices, it must have made sense to end contracts consensually rather than struggle to enforce the original terms. Court cases only occurred when apprentice or master resisted the ending of the contract. Unsurprisingly, a number of them clearly relate to attempts to recover a portion of the premium paid on binding. That said, it is likely that the grievances participants described were not unusual.

Leaving their masters was probably a positive decision for many apprentices. The chance to learn a more suitable or advantageous trade, opportunities elsewhere, inheritances, marriage: all could draw an apprentice onto a different path. In larger cities, in particular, it seems likely that many apprentices always intended to curtail their term after acquiring skills. A few descriptions of their decisions survive. As Ben-Amos describes, one London shoemaker's apprentice, Benjamin Bangs quit after three years because he 'understood [his] business pretty well'; similarly a Bristol weaver's apprentice, John Mayes, left after three years to work in the countryside.³⁵ As centres of skill, training in a large city offered a good basis on which to establish a business elsewhere. The apprentice could then move to another area where they might have connections who could help them establish a business, or perhaps simply face a less competitive market.³⁶ It is suggestive in this regard that where a craft could not legally be practiced elsewhere, as was the case for printing in England, which was restricted to London, and Oxford and Cambridge Universities, apprentices were significantly more likely to become freemen, with 60% taking the freedom, compared to an average of 45% for London apprentices at that time.³⁷ Laws in England to

prevent people practising most other trades without serving an apprenticeship were enforced patchily, particularly outside corporate towns with strong guilds, and might be circumvented through inherited rights or purchase.³⁸

The implications of the high levels of mortality, morbidity and early departure of apprentices for the standard account of how training costs and labour services are distributed across their terms are obvious. If an apprentice did not finish their term, then they did not pay off the costs of their training retrospectively; there was no transfer mechanism so that the loss suffered by one master might be offset by benefits provided by those apprentices who do finish their terms, nor did masters in general take enough apprentices over their own careers that they could offset the losses from one against gains from another. In short, if apprenticeship worked as the standard account suggests, premodern master artisans were making a loss on many apprentices. The outcome should, surely, have been a breakdown in the system of training. Yet still apprenticeship persisted.

2.

How did apprenticeship operate in such a way that it survived? How did masters and apprentices deal with the reality of opportunistic early departure? In deciding about investments in training, the central issue faced by an employee and employer is how to distribute the costs involved so that they match the respective benefits each receives; the key factors influencing the decision are the nature of the training, whether general, specific, or transferable, and the closely related question of the competitiveness of the labour market. The first step in constructing an alternative analysis of apprenticeship must therefore be to identify the relative costs and benefits involved, for which we need some understanding of the nature of skills and the organisation of employment and production.

In the standard model, it was assumed that training was general, and that it was therefore paid for by the apprentice since they will capture the returns through their later earnings, as suggested by standard human capital theory. This assumption seems plausible, but given that the skills apprentices' learn are mostly particular to a trade it seems more accurate to regard them as transferable skills of use to a large number of

firms. In this situation, the incentives to invest in transferable skills approximate those for general skills.³⁹ Production in most crafts was highly fragmented into small workshops producing similar goods, giving a wide range of possible employers, in addition to which many artisans would later establish independent businesses. In addition, labour was mobile, and there was little likelihood that those apprentices would continue in long-term employment with the same master except in a handful of larger enterprises. Apprentices therefore had good reason to invest in their training.

For master craftsmen, by contrast, there was little, if any, individual incentive to invest in training apprentices, despite their collective need for skilled employees. It is often suggested that the primary motivation of masters in taking apprentices was their need for labour. However, a workshop's demand for skilled employees could likely be met from the pool of travelling journeymen, just as their need for unskilled labour could be answered by the employment of servants or labourers. One possibility is that demand for apprentices may have only been sustained because guild restrictions on the labour market stopped masters freely using journeymen or servants. Some of the advantages to modern apprenticeship explored in the literature do not apply. With small firms the norm and little job security, employers could monitor the productivity of workers on-the-job making it unlikely that the benefits of private information about productivity gathered during training would justify the costs of training during apprenticeship.⁴⁰ Indeed, we know that a significant proportion of master craftsmen in some occupations did not take apprentices, indicating that they were not integral to economic survival.

In addition, masters good reason to avoid taking apprentices. Productive units, and the resources to spend on training, were small. Masters remained responsible for the upkeep of apprentices even during downturns in business or if an apprentice fell ill. Given that many apprentices aspired to establish independent workshops, artisans were more often training future rivals than employees, even revealing their client, credit and supplier networks to them. Yet few could impose an obligation on their apprentices not to work in the same place, as one Genoese blacksmith and farrier did in the thirteenth century.⁴¹ Indeed, the range of risks that went along with taking apprentices mean that masters may have demanded substantial inducements from apprentices if they were to bother with them at all. This fits with what we know of the

widely varying size of premiums paid by apprentices entering the same trade or craft. The differences in average premiums paid between crafts are not likely to be explained by the different costs of the training received. Rather it seems that access to the best masters was subject to competitive bidding by apprentices and their families, implying an excess of demand for training.⁴²

To be fair, some advantages did accrue to masters who trained apprentices. Some apprentices did become trusted journeymen. Former apprentices might remain part of their masters' social and economic networks, providing credit, collaborators and support. Ex-apprentices and their masters sometimes formed partnerships or informal quasi-firms together. Informal networks of this kind are increasingly identified as important parts of preindustrial economies.⁴³ Former apprentices could also feature in the lifecycle strategies of masters, taking over a business when they became old or infirm. A cadre of former apprentices could be politically useful for a master seeking advancement. In Bristol, apprenticeship ties were one of the links between members of the governing Common Council.⁴⁴ However, the extent to which these potential advantages might justify an investment in training are unclear when only a limited proportion of apprentices remained in the area.

3.

If the benefits from apprenticeship did largely accrue to apprentices not masters, then apprentices should in theory be paying for this in some way. If this was the case, how did masters recover the costs of the training they supplied? As already suggested, the standard account of retrospective repayment seems incompatible with our evidence of early departures. The problem, then, is to identify an alternative schedule of training and repayment that can fit with low expectations of completion.

What does an alternative model of apprenticeship that could thrive amidst high levels of contractual default look like? I want to suggest that premodern apprenticeship had four characteristics: (1) Apprentices provided some useful labour services throughout their term, rather than repaying their masters' investment just in the later years of service. (2) Training was only likely to begin after the apprentice had provided payments through labour and/or cash—the premium—that would offset the master's

costs and risks. (3) Training costs varied but were low enough that they could not be covered by less-skilled apprentices' work (at times in combination with a premium). (4) Any explicit instruction was likely to be delivered in fragments over a long duration, and most learning would be through observation, imitation and practice by the apprentice while they were engaged in useful labour. Thus, even apprentices' learning could even be useful rather than costly to the master.

Premodern apprenticeship was not a two-stage process of training followed by repayment through service.⁴⁵ Training was distributed over the apprentice's term. As a result the master was never at risk of significant loss in the case of default. Rather than being a net cost in the first part of their term, then a net benefit for the rest, apprentices' value to their masters' businesses fluctuated, depending on the level of training they received at any point and the value of their labour. At no point was it likely to expose the master to a high risk of a significant loss. This alternative account of the distribution of benefits and costs across the term of an apprenticeship is less vulnerable to opportunism, and is much closer to our evidence about the experiences of premodern apprentices and our understanding of how tacit skills are acquired.

Within the bounds of this description, the timing and intensity of training and the size and importance of the premium do not seem to have been stable between different individuals, crafts or periods. It is possible to construct (at least) three obvious pathways in which training and labour services could be distributed that would meet the characteristics just outlined and be viable in the context of frequent quits. These are illustrated in figures 2 to 4 which show the cumulative cost and benefits of taking apprentices to masters under different sets of conditions and training schedules.

In all three, C_t represents the total cost of the apprentice's training and other expenses to the master. The two components of C_t can be separated. The apprentice's keep and lodging, K , is assumed to be a uniform charge over the term; it increases at rate α . Similarly, it is assumed that the fragmented distribution of training costs, I , averages to a constant rate, β .

V_t represents the total value of the apprentice's labour services to the master, plus the value of any initial premium, P , paid with the apprentice. The rate of growth of V_t , ϕ ,

increases over time as the apprentice becomes more productive. The value of an apprentice's labour services is a function of their skill level, S , and the time they spend working. At the start of training, S_0 is the level of pre-existing general skills they possess. As they learn, this increases to S_t . Note that when fully employed at their initial skill level (S_0) all apprentices are able to provide labour services equivalent to a subsistence wage (i.e., at $t=0$, $\varphi \geq \alpha$). The growth of S , and hence the size of φ , will be in part a function of the rate of investment in training, β .⁴⁶ This makes sense: if a master spends more time on training then, *ceteris paribus*, the apprentice's productivity should increase more quickly. However, in the short-run, this effect will depend on the mode of training and its impact on the time the apprentice spends in productive labour: if time spent learning is not also productive, an increase in β may produce a short-term fall in φ .

The training period is assumed to be of length T . An apprentice's net value to his master is $V_t - C_t$. The apprentice is assumed to receive no wage from their master. If they can obtain a market wage elsewhere, their incentive to quit will increase at a rate related to the speed at which they are trained (β). This fits with the data on departure rates described earlier. If the apprenticeship contract term is longer than the training period, then the net value of the apprentice after time T is V_t . As the apprentice is skilled after time T , φ will be constant. The possibility of contracts exceeding time T is discussed in the final section.

[insert figure 3 near here]

Figure 3 shows the simplest pathway. Here V_t is always greater than C_t . No premium needs to be paid. The implications of this pathway depend on the size of the master's surplus. It seems likely that $V_t - C_t$ is often small, particularly in the early years of the term, otherwise the master's profit would be very large. In these cases, as $\varphi \geq \alpha + \beta$ throughout the term, this represents a low rate of training, β , and therefore also a low rate of growth of S . The apprentice will spend more time working at less productive unskilled or low-skilled tasks and receive relatively less instruction than in the next two pathways. This may nonetheless be the optimal pathway for a master engaged in a trade that is relatively easy to learn, or whose trade demands a higher ratio of unskilled to skilled labour in a workshop.

In figures 4 and 5, we assume that the rate of instruction, β , is higher and so C_t is steeper than in figure 3. As a result in the first part of the apprenticeship term $\phi < \alpha + \beta$. This situation loosely approximates to the conditions described in the standard account, but as discussed earlier it is unlikely to be resolved through deferred repayment. Figure 4 illustrates one way in which this was addressed: through the premium given at binding. The apprentices' value at time 0, V is now defined by the premium. The apprentices' net value falls during the early period when the value of their labour is low. At t_1 they have received sufficient training that $\phi = \alpha + \beta$. Their net value then begins to rise again.

[insert figure 4 near here]

As drawn in figure 4, $V_t - C_t$ is always greater than 0. It is possible that this would not be the case at all times during the apprenticeship. As long as the probability of the apprentice quitting was low enough, a master could choose to risk investing in the apprentice's training if the anticipated benefits from their greater productivity were large enough. The master's profit in this case would be defined by:⁴⁷

$$\Pi = P + \sum_0^T p_q (V_t - C_t)$$

Where q_t is the probability of the apprentice quitting at time t . As discussed earlier, Π must be greater than 0 by some value sufficient to give the master an incentive to take the apprentice.

[insert figure 5 near here]

Figure 5 illustrates a version of this pathway without a premium. Now training is deferred until t_1 , the point at which the apprentice has in effect built up their own premium with their master. The value of V_t at t_1 will define the rate of training, β , to meet the master's expectations about profit. In figure 5, T will of course be greater than figure 4, which fits with suggestions that poorer children might serve longer to compensate for low premiums.⁴⁸ In figures 4 and 5 the trade may be one that is relatively harder to learn, demanding either more time practising (so reducing the apprentice's productive hours) or relatively more intensive instruction (increasing

master's costs). Alternatively, in figure 4, the trade may be one in which there is relatively less use for low-skilled labour.

This alternative interpretation rejects three of the key assumptions about the timing and allocation of costs and benefits in the standard model. These are: (1) Apprentices are in need of training before their labour is valuable. (2) Training is concentrated in the initial period of apprenticeship. (3) Training costs are high relative to the value of a new apprentices' labour, and that they are therefore born, at least initially, by masters. Each of these assumptions is suspect; in showing why, the empirical and theoretical basis of the alternative model just presented should become clear.

First, it is clear that regarding apprentices as callow youths, of little worth to a business until instructed, is misguided for most of our period.⁴⁹ Where we can identify the ages at which apprentices between the fourteenth and seventeenth centuries were bound, we generally discover that they were in their mid to late teens or early twenties, with the average age rising over time.⁵⁰ From the outset, apprentices could be put to a variety of unskilled tasks in their masters' businesses – such as cleaning, carrying, deliveries, shop-watching and simple preparatory or processing jobs. They might also have some useful skills. As David Nicholas has emphasised, 'virtually all urban children worked in some capacity as soon as they were physically able'.⁵¹ Most would have been engaged in productive work in the household or their parent's workshop, farm or shop for years prior to entering service, giving them the chance to acquire skills that would later be useful to their new master.⁵² The most extreme example of this was youths from families involved in the same trade. Contemporaries' recognition of the value of new apprentices' labour is also apparent in official wage assessments from the sixteenth and seventeenth centuries. These often included wages for apprentices in the building trades. Although paid to their masters, they underline the point that apprentices' work could have value throughout their term.⁵³ For example, London tilers' apprentices earned 11d a day without food in 1589, well above the 2.56d. necessary to provide a basic diet at that time.⁵⁴ Apprentices' neophyte status should not be confused with their ability.⁵⁵

The second and third assumptions of the standard model, about the early concentration of training and its high costs, are best addressed together. Underlying discussions of apprenticeship are differing views of the expense and difficulty of training in preindustrial crafts and trades. Epstein, for example, maintains that craft skills were complex and hard to learn. He criticises Adam Smith's assumption that training was quick and simple – a view that Farr and many others share.⁵⁶ I want to suggest that both views are partially correct. Roughly put, *training was quick and easy for masters, but learning was hard and long for apprentices.*

The grounds for this claim can be seen if we consider the process of learning craft skills. This is, as many have noted, essentially an effort to acquire a blend of tacit and propositional knowledge, with the emphasis on the former. Acquiring tacit knowledge is normally achieved through modelling, observation and practice. Didactic instruction is insufficient and sometimes ineffective.⁵⁷ Learning manual skills in particular involves the repetition of actions and immersion in practice – imitation and experience as well as analysis. Of course, the time this process takes varies between crafts, but the speed of learning should not be exaggerated, particularly as apprentices also needed to learn many commercial skills in negotiation, management, and service if they were to become more than a workman. The persistence of annual cycles in many trades, would have further drawn out the learning process. It is also important to emphasise that this does not mean that learning a skill occurs at a fixed rate. It is clearly possible to quicken or slow the rate of acquisition of skills by offering instruction, advice, time to practice and so on: a quickening of the training rate by precisely this mechanism appears to occur in nineteenth and twentieth century apprenticeship.

Nonetheless, within this kind of learning the master might provide very little time-consuming *direct* instruction if they chose. Instead they can teach by simply acting as models to be imitated. The burden of acquiring a skill is put on the apprentice practising their new art. To an extent, Smith recognised this in admitting the importance of 'much practice and experience' in learning a skill, although his optimism about the possibility of learning basic rules quickly, perhaps even from printed accounts, seems misplaced.⁵⁸ Some element of instruction was, it seems, expected by some apprentices, who did complain about masters who failed to provide

training. But what they meant by this is unclear and should probably not be taken as implying intensive instruction. This account of how skills are acquired has a further obvious implication for apprenticeship: the distinction often drawn between periods of learning and periods of production becomes hard to maintain. There are few points at which apprentices were not learning, even if they were not conscious of it themselves.⁵⁹

Identifying such a process in the past is innately difficult. Few accounts of apprenticeship survive, tacit learning is by definition non-verbal, and it was sufficiently universal as to attract little comment. Those accounts we have – mostly from the eighteenth and nineteenth centuries – do seem to fit this pattern of apprentices gradually acquiring skills in their trade, often beginning with a period of unskilled or only loosely occupationally-related menial labour. Using diaries, court records and other sources, Peter Earle and Joan Lane have each revealed apprentices experiencing years of shop openings, deliveries, making drinks, and cleaning, followed by assisting skilled workers – shoemakers apprentices ‘closing’ boots for example, or ribbon weavers apprentices helping to change patterns – and only then moving on to more skilled tasks.⁶⁰ This array of menial as well as craft-specific tasks that apprentices undertook would have extended the time it took them to learn skills, but increased their immediate value to their master. Throughout their term, apprentices were combining useful work with learning, and only gradually moving up a hierarchy of labour, from unskilled to skilled.

It is at least suggestive that this analysis fits with the work of modern anthropologists on apprentice-type learning in traditionally organised crafts today.⁶¹ These find that apprentices are heavily engaged in productive work for the beginning, with little time given to training. Knowledge gained by apprentices might even be seen as ‘stolen’. When learning pottery in Japan, one apprentice found herself spending hours cleaning the workshop and preparing clay, literally ‘earning the right to observe and learn by doing the menial scutwork of the master and the workplace’; direct tuition was almost non-existent, instead she was allowed to observe, practice on a very small scale, and only attempt more complex techniques after a long time in the workshop.⁶² This reliance on a ‘benign community of neglect’ to supply instruction is a common experience.⁶³ Among apprentice minaret builders in Yemen, for example, ‘much of

learning process involves little or no verbal communication, the apprentice must rely on his/her eyes, ears, and sense of touch to incorporate their Master's skill into the reproduction of bodily representations of knowledge'.⁶⁴ Instruction is implicit and fragmented. Questions are rarely posed, and reprimands rather than correction form the majority of feedback to apprentices.

In the alternative account of apprenticeship set out above, neither apprentice nor master was likely to loose out substantially should training end or apprentice depart prematurely. The risks for masters are limited to the chance of theft, misbehaviour or later competition that are inherent in any employee. The risks for apprentices were higher, particularly when substantial premiums were paid before any training was received. It therefore seems likely that large premiums were accompanied by a quickening of the training schedule, along the lines illustrated in Figure 4 earlier, in that they provided an advance that could substitute for the period spent in purely menial work by the new apprentice. Premiums, as Defoe explained in the early eighteenth century, exempted apprentices 'from such and such menial offices, which were wont to be required of younger apprentices'.⁶⁵ This can be observed in medieval Flanders and France. For example, apprenticeship in the desk-makers of Paris in the fourteenth century lasted eight years if a 40s fee was paid, and ten years otherwise.⁶⁶ Similar trade-offs are also implicit in agreements to repay all or part of the premium if an apprentice or master dies or moves; these generally indicates that repayment was normally only expected if this occurred during the early years of the term.⁶⁷

Clearly, however, this slow training schedule does come at a cost to masters. By putting little effort into apprentices' training and obliging them to do useful but not instructive tasks, such as deliveries, cleaning, watching shops and the like, the time in which apprentices are most skilful and are thus most productive is reduced. As Epstein predicted 'in the absence of credible bans against apprentice opportunism which took the shape of early departure...training would have been less then optimal and would have constrained output.'⁶⁸ This loss of productivity was the price of the systematic failure to prevent opportunistic departure (although it would be to some extent offset by the supply of very cheap labour for unskilled or semi-skilled tasks). One consequence of this was that when masters *could* enforce apprenticeship contracts then they should in theory advance the training schedule. This seems to have

occurred in nineteenth century Britain, in parallel with the growth of employment by large firms who could collectively police completion of terms through their hiring policies.⁶⁹

This analysis deals, obviously, only with the basic costs of apprenticeship. It is important to emphasize that apprenticeship served a social as well as a training function. It was a period of socialization, of transition from youth to adulthood, and often from country or small town to city. Often, apprentice terms were in practice or theory determined by the age of majority, rather than the training needs of the individual.⁷⁰ Kaplan and Farr have emphasised that apprentice regulation served to reinforce the status and authority of masters, while formal apprenticeships underlined the importance of skill as the central aspect of the artisan's identity.⁷¹ Thus, apprenticeships in London characteristically lasted until the apprentice was twenty-four and could claim the freedom of the city.⁷² Similarly, a concern with controlling potentially disorderly youths seems also to have encouraged state sanction for long terms.⁷³ These factors will cloud any attempt to calculate training values and labour costs.

4.

What of the guilds? I have suggested that premodern apprenticeship operated in such a way as to survive high levels of opportunistic early departure among apprentices. Together with the evidence of low rates of completion discussed earlier, this suggests that guilds did not primarily exist in order to monitor apprenticeship contracts. This finding is reinforced by the fact that apprenticeship existed and continues to exist where guilds do not, both in preindustrial Europe and in other times and places.⁷⁴ As Thrupp noted: 'medieval artisan apprenticeship was a product not of gild monopoly, but of the family workshop'.⁷⁵ Of course, guilds did *attempt* to enforce apprenticeship contracts. In particular, they attempted to limit departed apprentices' opportunity for alternative employment within the town where they had been trained, through rules against poaching apprentices. These measures were, however, limited to the area over which a guild had authority. It is hard to avoid the conclusion that guilds are not necessary for apprenticeship: co-existence does not imply dependence in this case.

However, this raises two questions. If apprenticeship can survive without the intervention of guilds, why did they seek to become involved? And, second, what effect did they have on its operation? It is, of course, very hard to find evidence for the impact of guilds on apprenticeship or their motives. However, it seems likely that guilds involvement in arbitration and in the regulation of the terms of service would have distorted the operation of apprenticeship in favour of masters. We may therefore conclude, albeit tentatively, that guilds' intentions in this area were oriented toward rent seeking, as some historians have suggested.

As Smith recognised, guilds' collective concerns with apprentices largely centred on restricting their numbers to limit the workforce available to each master and reduce future competition.⁷⁶ Many artisans worried that an increase in apprentices would eventually critically reduce the volume of work available. For this reason, the English Statute of Artificers set restrictions on who could become apprentices so that an increasing number of craftsmen did not 'eate oute and consume another'.⁷⁷ One consequence of guild efforts to limit apprentice numbers was the incentive this gave masters to default and take additional apprentices in secret.⁷⁸ Such illegal apprentices were a major anxiety for many guild members, and often became a focus of guilds' regulatory activities.

Guilds had an impact on the operation of apprenticeship which went beyond policing numbers. First, guilds generally reserved the right to arbitrate disputes between masters and apprentices, which probably produced a persistent structural inequality in guild arbitration in favour of masters.⁷⁹ Second, they imposed minimum terms on apprentices, arbitrarily extending apprentices' term of service. Despite the varying needs of different crafts or different apprentices, terms seldom varied substantially between crafts with similar political clout in a region; variation across regions was, by contrast, more pronounced and underlines the rent-seeking aspect.⁸⁰ In these situations, those apprentices who did serve full terms spent the later years giving their labour at below market rates without compensatory training. Without these regulations, it seems likely that negotiation of terms to match the age and prior skills of apprentices would have produced a more equitable system. In early nineteenth century Paris, for example, Sonenscher found that 'the length of an apprenticeship could vary from six months to six years in exactly the same trade'.⁸¹ Similarly, as guilds weakened in

England in the later eighteenth century, terms declined from an average of six or seven years to four years across a large range of trades.⁸² It is likely that through these activities guilds gave an advantage to individual masters which went some way to compensating them for the limitations on their freedom to take apprentices as they liked.

The attractions of this system to masters are obvious, but this account does raise the question of why apprentices accepted these disadvantages rather than seeking training elsewhere. The answer to this is two-fold: first, because guilds existed in most of the major towns there were few alternative centres of production where high-quality skills could be learned; second, the full burden of the additional years of apprenticeship was only born by those who sought to work legitimately in the area controlled by the guild, others could and did avoid these costs by departing early.

This analysis also explains two other aspects of apprenticeship that are often confusing. First, it makes it clear why apprenticeship was a concern of all masters, and thus the guild. All masters are affected by decisions about the limitation of labour concentrations in a craft. However, apprentice taking was not ubiquitous or smoothly distributed in guilds. It was concentrated among particular craftsmen, while a number of other craftsmen never took apprentices.⁸³ Second, it suggests that guild involvement in apprenticeship might diminish or change in nature in several situations: where their ability to impose limits on apprentice numbers breaks down; if the scale of trade is no longer seen as fundamentally constrained; or if membership of guild becomes so diverse in trade that members are more worried about external than internal competitors. This may suggest one reason for the relationship between the decline of guilds and apprenticeship.⁸⁴

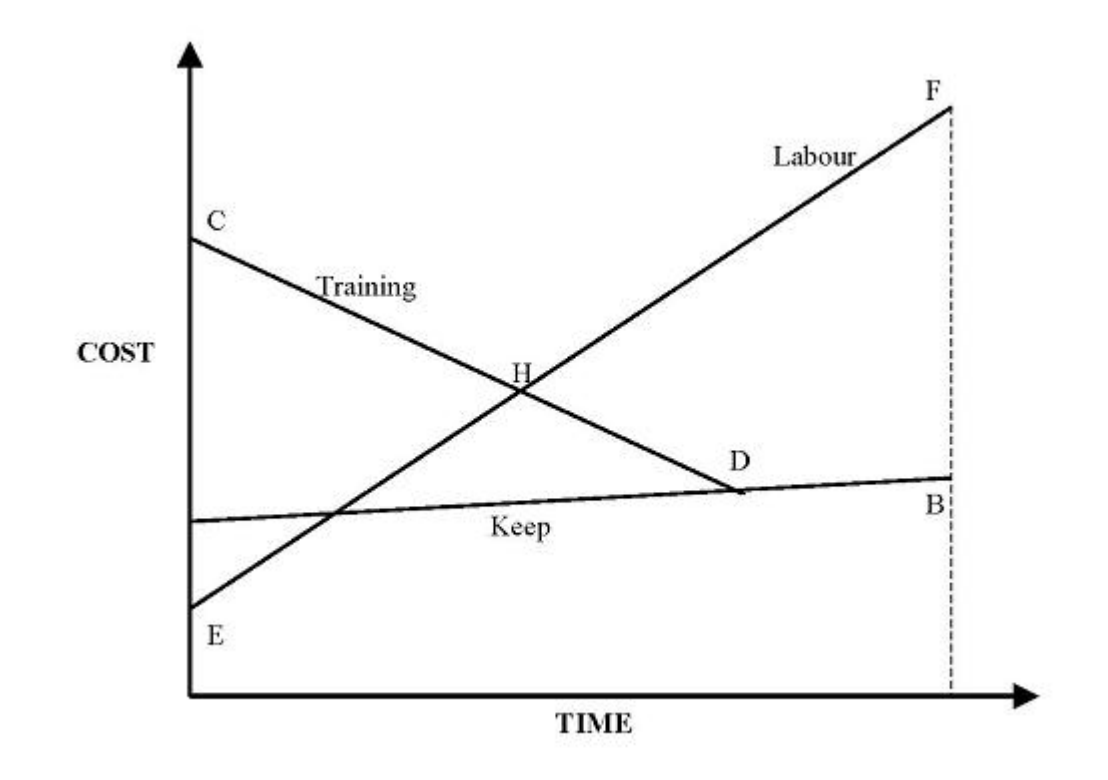
Conclusion

This essay has sought to further the discussion Epstein opened by pointing out that ‘the economics of preindustrial apprenticeship has been virtually ignored’ since Adam Smith. It proposes a revised model of apprenticeship in which training costs are distributed differently to traditional approaches, apprenticeship is interpreted as training in general skills, and there is a market for training in craft skills. I have

suggested that the delivery of training is kept in balance with payments in labour or money from the apprentices. Both were distributed across apprentices' terms so that high rates of early departure did not impose heavy penalties on masters. The effect of the guilds on this was to extend terms and restrict numbers of apprentices. This produced rents for masters and limited competition.

This approach offers an alternative to both Epstein and Humprhies' optimism about apprenticeship as a necessary and useful means of transmitting skills and Smith and Ogilvie's suspicion of it as an oppressive practice. If apprenticeship was as wasteful for the apprentice as Smith thought it is hard to see it surviving. Equally, it is hard to reconcile very low completion rates and extensive non-guild apprenticeship with a view that guild apprenticeship was an effective system to prevent opportunism. The very high demand for apprenticeship apparent in the willingness of apprentices and their sponsors to pay high premiums and enter lengthy contracts suggests that preindustrial apprenticeship was viewed positively. Yet the very high rates of non-completion suggest that it was undertaken as a more flexible period than the formalities of contracts would suggest. Our analysis of the economics of apprenticeship must take these facts into account.

Preindustrial apprenticeship of this kind did not seem to survive the economic transitions of the eighteenth and nineteenth centuries. One factor in this in England was the extension of systems of parish pauper apprenticeship, which placed apprentices in a far more dependent and obviously exploited position. But informally structured apprenticeship, without employers concerning themselves greatly in training, will also tend to fail in larger organisations, where the scale of operation is greater, specialization is more extensive, and the distance of master and apprentice extends. This is apparent in some of the ways apprenticeship developed in the later nineteenth century.⁸⁵ Apprenticeship in large firms took on quite different characteristics.⁸⁶ These later changes in the context, form and structure of apprenticeship are perhaps also the explanation of why preindustrial apprenticeship has – with the exception of a few contrary voices - received such a bad press.

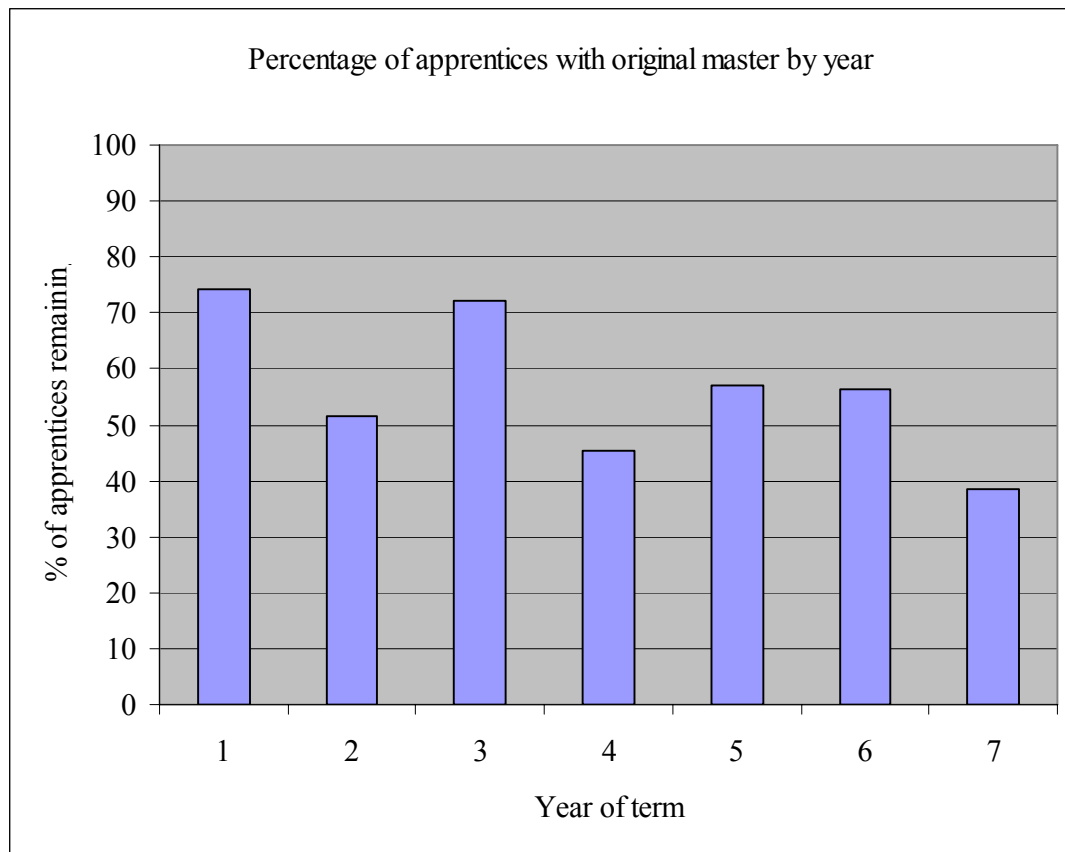
FIGURE 1. The standard account of apprenticeship

Source: Adapted from: Greg & Boswell, *Stationers' Company*, p. xliii, n.1. I am grateful to Ian Gadd for drawing my attention to this figure

TABLE 1: Percentage of apprentices who became freemen in England

Location	Date	% becoming Freemen
London	c.1450 ¹	43
	1490-1599 ²	41
	1633-1660 ³	41
Bristol	c.1500-c.1650 ⁴	24-35
	late 17c ⁴	c.50
Norwich	c.1600 ⁶	44
	1510-1700 ⁷	17
Chester	1558-1625 ⁸	c.50
Sheffield	1624-1814 ⁹	47

Sources: ¹ Average of three guilds: Merchant Tailors, 1425-45, 1453-58: Davies, 'Tailors', p. 194; Goldsmiths, 1444-1500: Hovland, 'Apprentices'; Mercers for 1391-1464: Imray, 'Les Bonnes Gentes'. ² A sample of 44,000 London apprentices bound in 15 different companies from 1490-1599: Rappaport, *Worlds*, pp. 311-12. ³ Average of five guilds: Masons, Carpenters, Stationers, Cordwainers, Drapers: Smith, 'Social and Geographical Origins', pp. 196-8. Boulton finds the same completion rate for Southwark: *Neighbourhood and Society*, p. 104. ⁴All guilds: Ben-Amos, 'Failure'. ⁶ All guilds: Pound, 1988. ⁷ All guilds: Patten, 'Patterns', p. 122. ⁸ All guilds: Woodward, 1971. ⁹ Cutlers: Unwin, 'Apprenticeships', p. 197.

Figure 2: Percentage of apprentices with original master by year

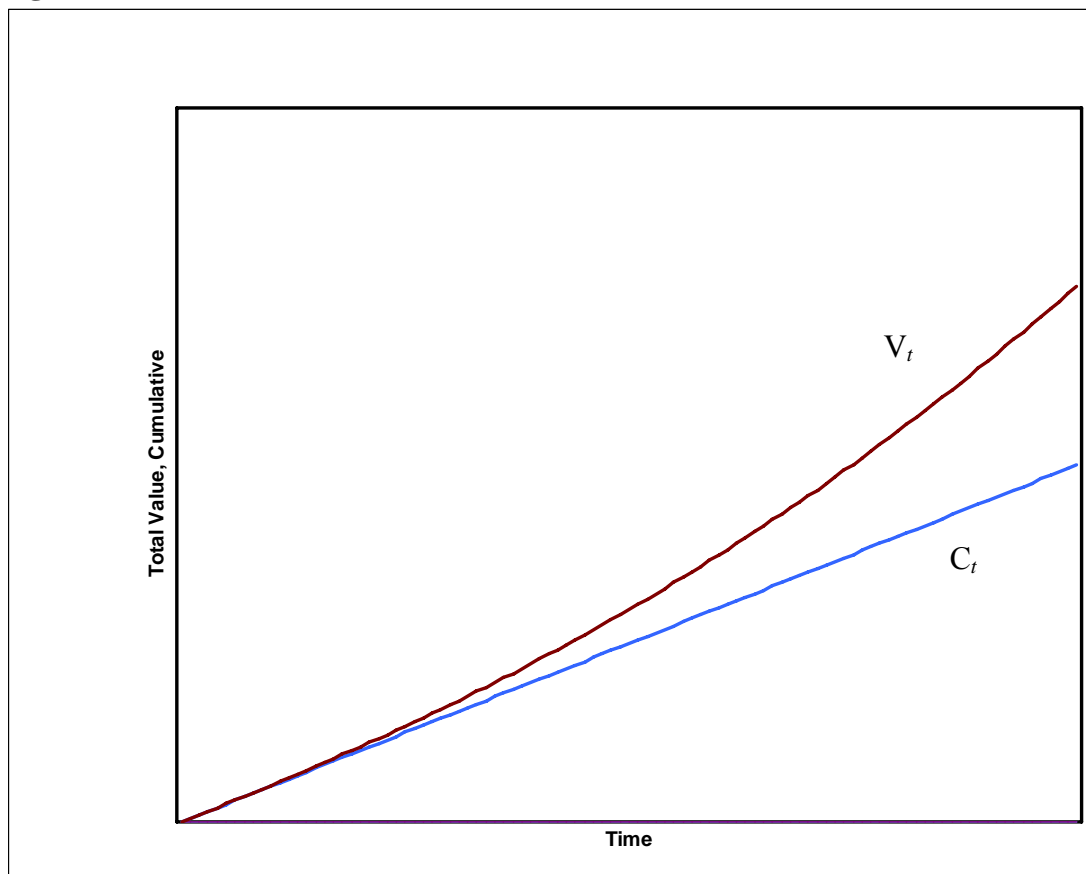
Source: see text.

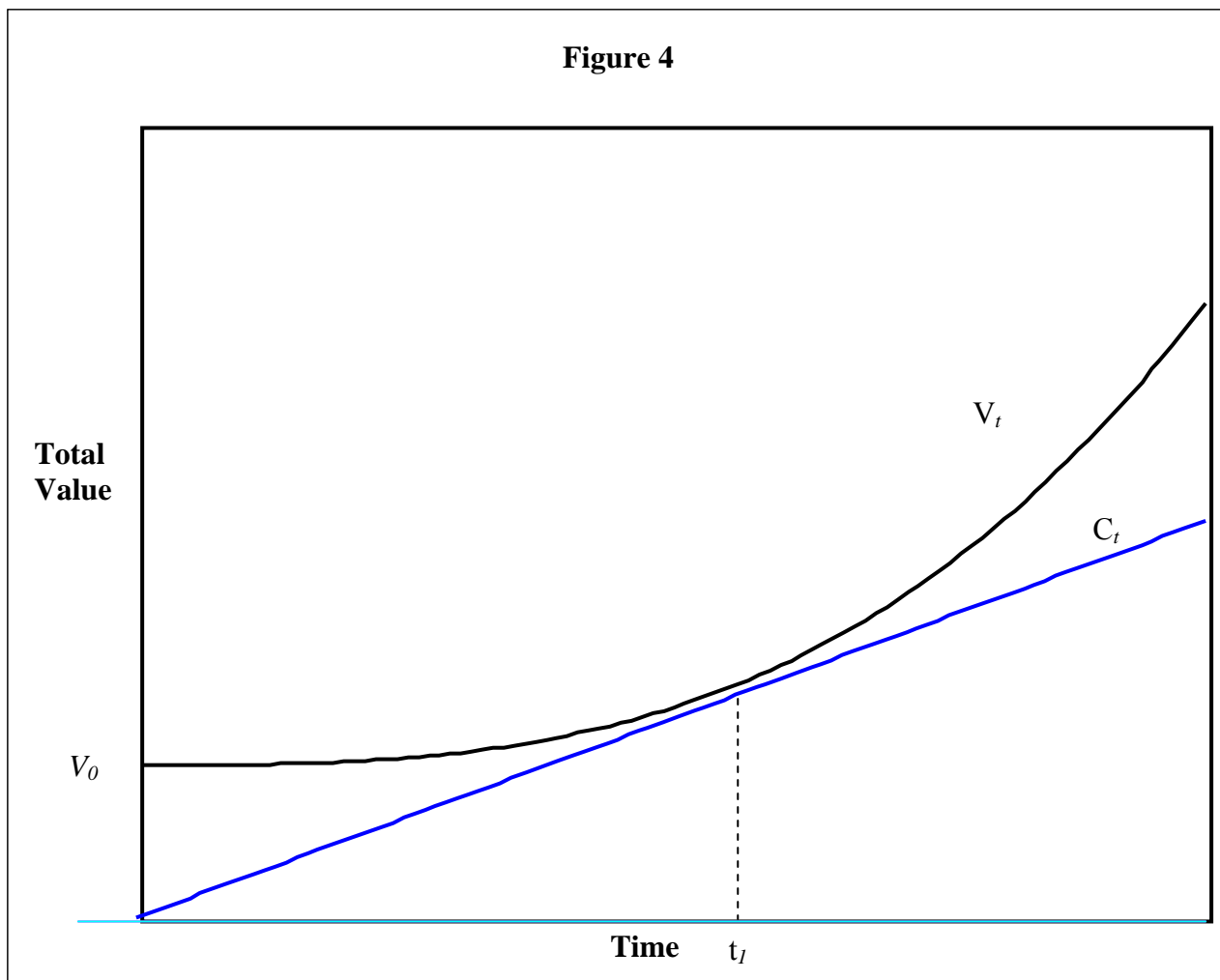
Table 3: Years of service of turned-over apprentices resident with new masters

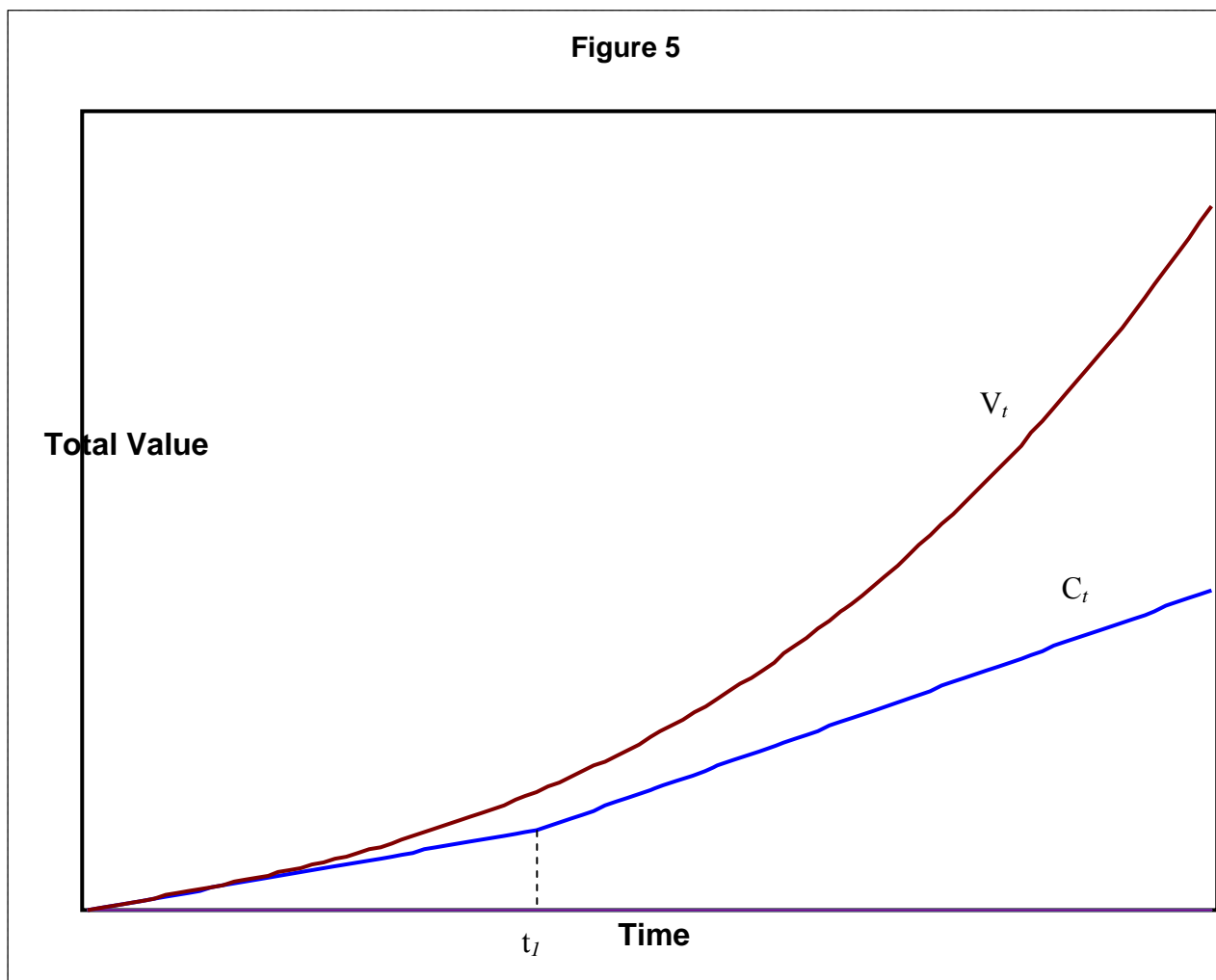
years elapsed	N	%
1	3	17
2	3	17
3	4	22
4	3	17
5	1	6
6	4	22
7	0	0
total	18	100

Source: see text.

Figure 3







Acknowledgements

Earlier versions of this paper were much improved by comments from audiences at the LSE, the EHA Annual Conference in 2005 and the IEHA conference in 2006. I would like to thank Rosie Blau, Nick Crafts, Larry Epstein, Dan Raff and Nuala Zahedieh for particular input. Keith Webb was incredibly generous in sharing his hard-won data on London apprentices and guilds, as was Ian Galbraith in supplying this in the form used by the British Origins website. Olwen Myhill supplied the 1692 dataset created originally by James Alexander in a wonderfully usable form. Tim Leunig provided vital technical and intellectual advice. I would also like to thank Catherine Wright and Carlos Brando for their research assistance.

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¹ Humphries, 'English apprenticeship', p. 81.

² Epstein, 'Craft guilds'. See also: *idem*, 'Power, Resistance and Authorities', pp. 46-63; *idem*, 'Apprenticeship' in Mokyr, *Oxford Encyclopedia of Economic History*.

³ Humphries, 'English apprenticeship', p. 99

⁴ Ogilvie, 'Guilds, efficiency', p. 312. See: Smith, *Wealth of Nations*, pp. 222-7; Rothschild, *Economic Sentiments*, pp. 87-112; Swanson: *Medieval Artisans*, p. 115; Earle, *Making of the English Middle Class*, p. 85.

⁵ After the mid-eighteenth century, English apprenticeship changed noticeably: Snell, 'Apprenticeship system', 313-321. I am also not considering the closely related, but distinct institution of pauper apprenticeship here. This appears to have often occurred earlier and with much less emphasis on acquiring a skill: Sharpe, 'Poor Children'. Colonial American apprenticeship seems also to have taken on somewhat different characteristics: Grubb, 'Statutory Regulation', 62-63.

⁶ Apprenticeship terms are discussed in: Dunlop, *English Apprenticeship*; Brooks, 'Apprenticeship'; Nicholas, 'Child and Adolescent Labour'; Epstein, *Wage Labor*; KAPLAN; Lane, *Apprenticeship*.

⁷ Merson & Willis, *Southampton Apprenticeship*; Ralph and Hardwick, *Calendar*. Stephanie Hovland has found that such pay-offs were often equivalent to the sum required to obtain the freedom of a town (personal communication). Wages were more common in the eighteenth century and in medieval Flanders: Rushton, 'Matter in Variance', 96; Nicholas, 'Child and Adolescent Labour', pp. 1123-4; Epstein, *Wage Labor*, pp. 75-6, 110.

⁸ Bohun, *Privilegia Londini*, p. 105; Welch, *Pewterers*, ii, 191. See also: Dunlop, *English Apprenticeship*, pp. 178-9.

⁹ Dunlop, *English Apprenticeship*, p. 166-7.

¹⁰ Rappaport, *Worlds*, pp. 232, 294. See Schwartz, 'London apprentices' on the range of estimates and their problems.

¹¹ Epstein, 'Craft Guilds', pp. 690-91; Hamilton, 'Enforcement', pp. 572-3; Elbaum & Singh, 'Economic Rationale', p. 603; Rappaport, 'Reconsidering', p. 260; Hamilton, 'Decline', pp. 642-3.

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¹² Another formal description, based on similar assumptions about the distribution of costs and training, but with board and keep represented as a constant wage, is given in Hamilton, 'Market', p. 504 and *idem*, 'Enforcement', pp. 572-3. This model of apprenticeship training may well approximate better to practice in the nineteenth and twentieth century: Elbaum & Singh, 'Economic Rationale', p. 597, 598; Elbaum, 'Apprenticeship', p. 343-4.

¹³

¹⁴ Epstein, 'Guilds, apprenticeship'; Humphries, 'English apprenticeship'.

¹⁵ Humphries, 'English Apprenticeship', p. 90.

¹⁶ Desertion was a common complaint in suits by masters against apprentices, but the total volume of such law suits was tiny compared to the number of quits: Rushton, 'Matter in Variance', 94.

¹⁷ Grubb convincingly interprets payoffs as limiting shirking by masters, however: 'Statutory Regulation', 61-2.

¹⁸ For comparable rates elsewhere in Europe: Stabel, 'Guilds', pp. 200-201; Nicholas, 'Child and Adolescent Labour', pp. 1128-9.

¹⁹ Rules seeking to prevent non-freemen working in English towns were widespread: Dunlop, *English Apprenticeship*, pp. 78-82. See also: Ogilvie, *State Corporatism*, pp. 148-9, 157-8.

²⁰ Farr, *Artisans*, p. 34.

²¹ Elbaum, 'Apprenticeship', p. 340; Ogilvie, *State Corporatism*, pp. 157-8.

²² On these transitions: Ben-Amos, 'Failure', 159; Dunlop, *English Apprenticeship*, pp.46-47, 168-171; Unwin, 'Apprenticeships', 200-201; Stabel, 'Guilds'. Examples of post-apprenticeship migration are given in: Ben-Amos, 'Failure', pp. 164-5.

²³ Ben-Amos, 'Failure', p. 167

²⁴ Estimates of 10% include Rappaport, *Worlds*, p. 313; Ben Amos, 'Failure', p. 155. Schwarz, 'London apprentices'. On sickness: Pelling, 'Apprenticeship'; Pelling, *Common Lot*.

²⁵ Rappaport, *Worlds*, p. 313.

²⁶ 6 & 7 Wm. & M., c. 6. The details of the tax are discussed in Glass, *London Inhabitants*; the listings are: '1695 Marriage Assessment', London Metropolitan Archive. This was linked to the 1692 Poll Tax assessment database and the Association Oath Roll of 1695 so that occupations could be identified and

potential duplicates among guild members removed: J. Alexander, '1692 Poll Tax database', Centre for Metropolitan History; Webb, *Association Oath* (Sussex Record Society, electronic database supplied by author). Each stage of linking used at least two identifiers from name, parish and occupation/company. The dataset only covers parishes within the walls.

²⁷ Masters in the sample came from a 24 different London companies. They were not equally distributed, because an initial trial run using manual linkage identified a large number from one company, the Apothecaries, who hence provide 34% of the masters and 31% of apprentices in the final sample. The effect of this on the argument is limited, as apothecaries' apprentices were more likely to be present (66%) than the overall average. The other companies in the sample were the Blacksmiths, Brewers, Farriers, Needlemakers, Pinmakers, Spectaclemakers, Cooks, Feltmakers, Founders, Masons, Pattenmaker, Tinsplateworkers, Glassmakers, Ironmongers, Plumbers, Curriers, and Poulterers: Webb, *London Apprentices* (online edition: British Origins, electronic database supplied by author).

²⁸ Freedom registers were checked for the four companies which provided the largest numbers of apprentice (123 of 187) in the sample: the Apothecaries, Vinters, Fishmongers and Carmen. 14 of 55 absent apprentices later became freemen.

²⁹ The assessors often classed apprentices and servants together as 'servants'. All servants were therefore checked against the apprenticeship lists to see if they had been bound to another master.

³⁰ Assuming that inward and outward flows were the same, $18 \div 83 = 0.216$.

³¹ I am intending in the future to carry out a full analysis of an expanded sample to see what light this can shed on this question.

³² Archer, *Pursuit*, p. 15; Beier, 'Social Problems', p. 215.

³³ Ben Amos, 'Service and the Coming of Age', 63; Rushton, 'Matter in Variance'; Morgan and Rushton, 'Magistrate', pp. 64-5.

³⁴ Dalton, *The Country Justice* (1618), 59-60. Quoted in Ben-Amos, 'Failure', p. 167.

³⁵ Ben-Amos, 'Failure', p. 170. See also: Nicholas, 'Child and Adolescent Labour', p. 1125.

³⁶ The possible reasons and timing of apprentice departure are discussed in: Ben-Amos, 'Failure', 161-166; Thrupp, 'Gilds', p. 268; Rappaport, *Worlds*, pp. 314-5; Lamour, 1967, 479 (Paris).

³⁷ Gadd, 'Corporate Identity', p. 72

³⁸ Davies, *Enforcement* remains the only serious analysis of the enforcement of apprenticeship laws. Even in Middlesex, including the margins of London, prosecutions of artisans for working without apprenticeships were few in number (about twenty-four a year) in the later seventeenth century: Shoemaker, *Prosecution and Punishment*, pp. 131-2.

³⁹ Stevens, 'Theoretical Model'; idem, 'Transferable training'. Epstein has suggested that because craft skills are transferable some of the costs of training will be born by the employer in the expectation of capturing some of the returns: Epstein, 'Craft', p. 690. This seems to me unlikely, in that it understates the generality of the skills that apprentices acquired, and requires that craft industry be organised into oligopsonistic firms. Humphries also argues for general skills, 'English apprenticeship', pp. 74-5

⁴⁰ Cf. the scenario discussed in Acemoglu & Pischke, 'Why do firms train?'. To some extent, the importance of the informational monopsony they propose is a moot point given premodern rates of non-completion: as they note, in their formulation, high quit rates among apprentices will produce low levels of investment by firms in general training, approximating to Becker's model. Quit rates and the low probabilities of future hiring also make the approach in Malcolmson et al, 'General training', inappropriate for this period.

⁴¹ Epstein, *Wage Labor*, p. 108.

⁴² Ben-Amos, *Adolescence*, pp. 87-9; Rappaport, *Worlds*, p. 311.

⁴³ Kaplan; Sonenscher, *Hatters*; Sacks, *Widening*, p. 117.

⁴⁴ Sacks, *Widening Gate*, pp. 167-8.

⁴⁵ The problems of a two-stage training and work model in a competitive market are discussed in Acemoglu & Pischke, 'Beyond Becker', 118-119.

⁴⁶ Other factors will of course have an effect, including the apprentice's growing experience, their commitment to learning, their innate ability, and their investment in private practice.

⁴⁷ I owe this point to my colleague, Tim Leunig.

⁴⁸ Willis and Merson, *Southampton Apprenticeship Registers*, xix.

⁴⁹ It may, of course, be more applicable for pauper apprentices in eighteenth century England, when those bound were often young children who may have had little experience of work.

⁵⁰ In late 16c London, the average age was 17.7 years: Rappaport, *Worlds within Worlds*, pp. XXX. In the fourteenth century, new apprentices were on average 14 years; by 1400 they were 15 or 16 years old: Hanawalt, *Growing Up*, p. 113. The Sheffield Cutlers were exceptional in fixing a minimum age of twelve, in 1728: Hey, *Fiery Blades*, p. 140. In French cities, NZ Davis suggests an age of 12 in the

16c, and later in the 17c, becoming a journeyman in mid to late teens, but Nicholas suggests 14 or older was normal: Davis, 'The Reasons of Misrule', 41-75. (based on Geremek, *La Salarariat*, 1968, pp. 31, 54; Hauser, *Les ouvriers du temps passes* (1927), p. 22; Mousnier, *Paris au XVIIe siecle* (1962), p. 235), Nicholas, 'Child and Adolescent', p. 1108. Age of binding was to some extent determined by the existence of city rules preventing freedom before the age of twenty four. The rise in age might be related to the cost of premiums, and changes in education before binding.

⁵¹ Nicholas, 'Child and Adolescent Labour', p. 1104.

⁵² Ben-Amos, *Adolescence and Youth*, pp. 39-48; Ben-Amos, 'Failure to Become Freeman'; Pelling, *Common Lot*, pp. 110-111. Many were also literate: Rappaport, *Worlds*, pp. 298-99.

⁵³ Basic budget calculated from Boulton, 'Food prices', tables 4, 6; Hughes and Larkin, *Tudor*, iii 40 - 42. Wages varied between crafts and locations. Some specify apprentices over an age or level of experience; others include all apprentices. See: Knoop and Jones, 'Masons and apprenticeship', p. 358; Minchinton, *Wage Regulation*, 25.

⁵⁵ Smith, 'London Apprentices'.

⁵⁶ The relative ease of training in some crafts has also been emphasised by: Farr, *Artisans*; Ogilvie, 'Guilds, Efficiency'.

⁵⁷ Polanyi, *Personal Knowledge*, p. 49.

⁵⁸ Smith, *Wealth*, pp. 226-7.

⁵⁹ Apprentices also sought to use alternative forms of training, sometimes independently from their masters, such as schooling, attending lectures, reading advice books or almanacs, or spending time with other masters. On schooling: Ben-Amos, *Adolescence*, p. 112. Lectures on chemistry at the Jardin du Roi were attended by Parisian apothecaries' apprentices in the seventeenth century; the related books produced by professors were widely translated and circulated: Brock, *History of Chemistry*, p. 46; on almanacs: Curth, 'Medical Content', pp. 72-3. For an example of an apprentice surgeon spending four months with an apothecary learning how to make medicines: Poynter, *Journal of James Younge*, p. 52.

⁶⁰ For a good brief summary of descriptions from the 18c and 19c: Lane, pp. 76-79. Earle discusses material from the Mayors Court Interrogatories on apprentices' learning experiences in the 17c.

⁶¹ Dilley, 'Ways of Knowing', pp. 33-4; Marshall, 'Structural Constraints', 42-46; Coy, *Apprenticeship*; Lave and Wenger, *Situated Learning*; Simpson, 'Apprenticeship', pp. 158-161.

⁶² Singleton, 'Introduction', p. 14. The description has striking parallels with apprenticeship in Roman Egypt, where one potter's apprentices were not to try and make pots until they had watched the process for a long time; in the meantime, they were to work as servants in the shop: Westermann, 'Apprentice contracts', p. 306.

⁶³ Lave & Wenger, *Situated Learning*, p. 93.

⁶⁴ Marchand, *Minaret Building*, p. 138.

⁶⁵ Defoe, *Complete English Tradesman* (1738), p. 148, quoted in Dunlop & Denman, p. 209.

⁶⁶ Nicholas, 'Child and Adolescent Labour', p. 1117.

⁶⁷ Willis and Merson, *Southampton Apprenticeship Registers*, xvii-xvii.

⁶⁸ Epstein, 'Guilds, Apprenticeship', p. 691.

⁶⁹ On nineteenth and twentieth century apprenticeship: Elbaum, 'Apprenticeship', p. 342, REFS. Given premodern non-completion, 'custom' may be a less powerful explanation for the survival of apprenticeship in England than has been suggested, cf: Elbaum, 'Apprenticeship', pp. 340-342. The reverse seems to occur in 19c Canada, where a decline in the enforceability of contracts accompanied a steepening of the pay curve such that it matched apprentice productivity more closely: Hamilton, 'Decline', pp. 652-3; Hamilton, 'Enforcement'.

⁷⁰ This does of course also present a further problem for the traditional analysis of term lengths, in which duration is determined by training costs.

⁷¹ Farr, *Artisans*, pp. 25-9, 33-4. Farr, 'Cultural Analysis', 64. **Kaplan**. Some recent anthropological work has similar concerns: Simpson, 'Apprenticeship'; Marchand, *Minarets*.

⁷² Similar provisions are found in Canada: Hamilton, 'Enforcement', p. 561. In 13c Bologna, tailors apprentices served for five years if less than ten years old, and three years if more than ten: Epstein, *Wage Labor*, p. 83.

⁷³ On apprenticeship and socialisation: Brooks, 'Apprenticeship', 74-8; Yarborough, 'Apprentices as Adolescents'; Snell, 'Apprenticeship system', 303-6

⁷⁴ Loats, 'Gender', pp. 17-18; Nicholas, 'Child and Adolescent Labour', p. 1107; Clark, 'Medieval Labor Law', p. 1108; Epstein, *Wage Labor*, p. 78. Howell, 'guild effect'. Apprenticeship without guilds was also widespread in colonial North America: Hamilton, 'Market for Montreal', p. 498.

⁷⁵ Thrupp, 'The guilds', p. 264.

⁷⁶ Dunlop, *English Apprenticeship*, pp. 45-46, 89; Rappaport, *Worlds*, p. 104-10; Thrupp, 'Gilds', p. 264; Nicholas, 'Child and Adolescent Labour', pp. 1108-9, 1114-5; Ogilvie, *State Corporatism*, 140-143; Ben-Amos, 'Failure', 168; Crossley, *Oxford*, IV, 315; Unwin, 'Apprenticeship', p. 202; Archer, *Pursuit of Stability*, pp. 127-8; Ashton, *City and the Court, 1603-1643*, p. 57; Farr, *Hands of Honor*, p. 8. Lis & Soly, 'An Irresistible Phalanx', p. 28.

⁷⁷ 'Memorandum on the statute of artificers, 1573', in Tawney & Power, *Tudor Economic Documents*. I, 355, 358-9. Swanson suggests that in fifteenth century York, guild masters and city officials similarly agreed on limiting labour numbers: Swanson, *Medieval Artisans*, p. 114.

⁷⁸ Secret apprentices are, it is worth noting, a further reason to doubt Epstein's view of guilds role in apprenticeship. If guilds were a positive regulatory force, then apprentices and masters had an incentive to register agreements with them.

⁷⁹ Humphries also notes this bias: 'English Apprenticeship', p. 86.

⁸⁰ Ogilvie, *State Corporatism*, p. 140; Nicholas, 'Child and Adolescent Labor', pp. 1120-21.

⁸¹ Sonenscher, *Hatters*, p. 35.

⁸² Snell, *Annals*, p. 235.

⁸³ On numbers of apprentices taken by masters: REFS. For distribution of apprentices in Turin tailors (shows most have few): Cerutti, 'Group Strategies', 114-5.

⁸⁴ Smaller more homogenous guilds experienced smaller falls in apprentice numbers than larger guilds in early eighteenth century London: Kahl, *Development of the London Livery Companies*, pp. 28-9.

⁸⁵ Aldrich, 'Apprentice in History', pp.20-21. See also SNELL.

⁸⁶ Elbaum & Singh, 'Economic Rationale'.