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Why did (pre-industrial) firms train? Premiums and apprenticeship contracts in 18th century England

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ABSTRACT

Despite poor information flows, high levels of uncertainty, and low completion rates, training through apprenticeship provided the main mechanism for occupational human capital formation in pre-industrial England. This paper demonstrates how training premiums complemented the formal legal framework surrounding apprenticeship to secure training contracts. Premiums compensated parties for the anticipated risk of default, but in most trades were small enough to allow access to apprenticeship training for youths from modest families.

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Introduction

The contribution of human capital to economic development is well established. Apprenticeship was the leading formal source of vocational skills in outside the agricultural sector in pre-modern England -circa 1700, roughly nine per cent of the English adult male population had served an apprenticeship in London alone (Minns and Wallis, 2011). But why did masters train? As a system of on-the-job training, apprenticeship involves skill transmission over an extended period. The long-term contracting this requires presents a fundamental problem for all parties involved. Most explanations of apprenticeship's success therefore centre on contract enforcement by formal institutions (van Zanden 2009; Epstein 1998). Yet studies of attrition among pre-industrial apprentices find high rates of departure by the middle of the contract, indicating that contract enforcement was weak in practice (Minns and Wallis 2011; Ben-Amos 1994). This paper provides a new explanation for how sustainable long-term contracts for human capital were written in a condition of high uncertainty.

At first glance, apprenticeship in pre-industrial England fits well with a stylised model of general human capital acquisition (Becker 1964): masters had ample opportunity to recover costs from trained apprentices over long indentures lasting seven years or more. However, in its pre-modern form, apprenticeship lacked many of the internal career incentives that generate commitment among its equivalents today. Indentures were private contracts between individuals – apprentices (and their families) and masters who were in effect proprietors of small enterprises. Apprenticeship rarely led to a career within a firm: successful apprentices became masters. The consequence was predictable: defaulting was widespread, despite the presence of formal institutions. Nonetheless, defaulting does not appear to have undermined the willingness of masters and apprentices to enter into lengthy apprenticeship contracts.

In this paper, we explain how training could be contracted for in eighteenth century England. Using a new dataset of apprenticeship records, we provide the most comprehensive study to date of the economics of training in a pre-industrial economy. Our analysis focuses on an arrangement that was common in apprenticeship agreements in the 18th century, but has largely disappeared from training schemes since – the payment of a premium to masters when training began. Historians of pre-industrial apprenticeship have argued that premiums were large and ubiquitous, limiting economic mobility through apprenticeship. We show instead that the financial barrier presented by premiums has been overstated, varied widely between occupations and individuals, and was in many cases dwarfed by the cost of starting a business following a successful apprenticeship. As we show, premiums were responsive to apprentices' expected productivity, and the likely availability of economic rents following training. One of the main purposes of premiums was to solve the problem of potential holdups in the training market due to the high risk of default. Premiums allowed masters to accept apprentices readily and invest in training their apprentices despite high rates of attrition.

Understanding how training was secured has implications for the ongoing debate regarding the role of formal institutions in generating economic growth. While England's precocity in human capital formation has been identified as a key engine of early economic growth, the restrictive legal framework surrounding craft apprenticeship in pre-industrial England gave masters and apprentices few degrees of freedom with which to form mutually agreeable contracts. Evidence of high rates of attrition suggests that some aspects of these contracts were in any case unenforceable. Premiums were a private-order arrangement that allowed training to be adjusted to individual circumstances and secured training despite high levels of uncertainty, limited information flows, and the rigidities present in formal legal arrangements.

Training contracts in pre-Industrial England: theory and history

The specification of apprenticeship contracts is problematic, with both parties struggling to commit to incomplete contracts over a long period (Grubb 1997; Humphries 2003). Masters may shirk on training or wages. Apprentices may quit prematurely once the wage they could obtain in the outside labour market exceeds that received from the master. We use a simple model of apprenticeship to illustrate the difficulties of securing training contracts in pre-industrial England. Our baseline model features a competitive training market, where in equilibrium the price paid by apprentices to train is equal to the costs borne by masters who provide training. Apprentices who secure training receive a wage (subsistence payment) (*w*) in every training period, and may receive a post-training benefit on completion (*B*). Masters receive the product of apprentice labour in each period (*v*), pay training costs (*c*) in the form of instruction or supervision, and may receive a training premium (*P*) from the apprentice. Our baseline model also includes the probability of apprentice attrition (). With r as the discount rate and T as the length of the indenture, Equation (1) illustrates equilibrium in present value terms[1]:

$$\sum_{t=0}^{T} \rho^t \frac{w_t}{(1+r)^t} + B = \sum_{t=0}^{T} \rho^t \frac{v_t - c_t}{(1+r)^t} + P \qquad (1),$$

Equation (1) suggests several ways in which contracts could be varied to account for the heterogeneity of masters and apprentices. As is sometimes observed in present-day apprenticeship, training wages (*w*) can be varied to offset planned training inputs (*c*) and apprentices' anticipated productivity (*v*). The length of the indenture term (*T*) can also be adjusted; several historical studies of indenture contracts find that productivity and length of term were inversely correlated.[2] Post training incentives (*B*) can be used to make contracts self-enforcing. Today, this may include ongoing employment in the firm providing training.[3] Historically, part of the apprentice or servant's compensation was sometimes received on completion (Hamilton 1995, Galenson 1981). Attrition (ρ) could be reduced by formal and informal contract enforcement mechanisms, such as social sanctions or the recapture and punishment of runaway apprentices.

These explanations fail to offer a sufficient account for how apprenticeship contracts were secured in the institutional environment of pre-industrial England. Apprentices and masters had little freedom to vary most elements of their contracts. Local and national laws fixed the main terms of apprenticeship across England until 1813. Nationwide, the minimum contract duration was seven years. The payment of money wages to apprentices was illegal in many places (including London), though some did receive payments or perquisites. Pre-industrial England did offer distinctive post-training incentives to apprentices that some have suggested made contracts self-enforcing (Humphries 2003). Most importantly, completing an apprenticeship was a legal requirement before practicing a trade (Davies 1956). Apprenticeship also conferred local economic privileges through guild membership and

[1] This model used is an extended version of that found in Hamilton (1995).

[2] See Kaplan (1993) and DeMunck (2007) for apprenticeships in Paris and Antwerp, Hamilton (1995) for Montreal apprentices, and Galenson (1981) for indentured servants bound for the Americas.

[3] Market imperfections may give training firms some monopsony power in setting wages for generally trained employees: see Acemoglu and Pischke (1998).

citizenship in incorporated cities, and positive effects on reputation.[4] Masters and apprentices who breached contracts could be pursued at law. However, the impact of these incentives is questionable, particularly for apprentices who did not envisage establishing an independent business. They left open several important outside options for ex-apprentices, including agricultural and military employment, as well as work as journeymen.[5] The best indicator of their (in)effectiveness is that completion rates were low in pre-industrial England (Minns and Wallis 2011; Ben Amos 1991).

High levels of attrition presented a serious challenge to training arrangements in preindustrial England. If the outlay of masters (w+c) was front-loaded relative to the recovery of surplus from apprentices (v), masters risked being unable to recover their investment in apprentices if the complete indenture term was not served. Masters could alternatively contract on the anticipated term for a given rate of attrition. One way to compensate for early departure would be to lower the outlay on apprentices by reducing w or c. It is unclear how realistic it was for masters to do this. Lowering w below subsistence would affect productivity. Reducing c raised the risk of apprentice default.[6] Alternatively, masters could only accept apprentices with a high initial v. The use of trial periods suggests that masters sought information about an apprentice's productivity.[7] However, screening was costly in an early modern environment, and there is little evidence that training was constrained by masters being especially choosy about the quality of their apprentices. Another alternative would be to alter the sequence of training investments and wage payments (Wallis 2008). By placing a significant share of the outlays towards the end of the contract, masters would limit losses from apprentices who quit early, while providing an incentive for others to remain attached to the indenture. Altering the sequence of training investments would have implications for apprentice output over the term, and the skills acquired by apprentices who completed indentures as well as those that left early.

While there is some evidence that masters pursued some of the solutions to apprentice attrition listed above, a fourth option appears prominent given what is known about contracting for pre-industrial apprenticeship: the use of up-front training premiums (P). Premiums allowed masters to charge apprentices in advance for the direct costs of training. As we will show, however, both the size of premiums and the frequency with which they were charged varied widely between and within guilds and occupations, and even among apprentices indentured to the same master. These variations suggest that premiums had an important role in dealing with the heterogeneity of apprentices and masters entering into training contracts. By acting as side payments that gave masters advance compensation for potential attrition, premiums made it feasible for apprentices to receive their desired c and w, despite modest initial productivity and the risk of attrition. This solution resolved the classic problem of credible commitment in firm-provided general training without creating incentives for masters to further constrain training opportunities beyond those imposed by guilds.

If premiums were fulfilling this function, they should reflect the anticipated probability of attrition in any particular contract. Some of the reasons for attrition, such as mortality, and master-apprentice match quality, were difficult to observe in advance. But attrition also depended on the intentions of masters and apprentices, which may have been partly predictable.

The decision to enter or leave an apprenticeship would depend on the expected present value of future income during training and following completion (Yc) relative to the expected present value of

[4] Humphries (2009) observes an effect of completion on income among early industrial apprentices. Rights to poor relief are sometimes cited, but in law serving 40 days of an apprenticeship conferred rights.

[5] Journeywork technically required a completed apprenticeship, but this was variably enforced in different trades.

[6] There is evidence that masters economised on training costs by providing little direct instruction (Wallis 2008).

[7] See Minns and Wallis (2011) for evidence on the presence of trials.

income in alternative employment (*Yo*). *Yc* and *Yo* are functions of match quality (*Mc* and *Mo*), apprentice skill (*v*) and remuneration of skill in the local labour market, and the resources (*R*) that the apprentice brings to post-training activity:

$$Yc = f(Mc, v, R) \qquad (2)$$

$$Yo = f(Mo, v, R) \qquad (3),$$

$\partial Yc/dv$ and $\partial Yo/dv$ are the return to "skill" in both markets. Apprentices' resources (R) include family specific attributes, such as financial and social capital, and potential inheritances. Social capital and family resources should affect both the inside and outside options, but high transportation costs and poor communications imply that these would matter more for *Yo* than for *Yc,* with $\partial Yo/dR > \partial Yc/dR$ [8]

The inclusion of R in equations (2) and (3) implies a significant deviation from simple, competitive labour markets. This appears plausible given post-training opportunities in an economy without large firms. Establishing a business required significant capital unavailable to the credit-constrained majority; many "failed" apprentices returned to positions that made direct use of family resources in a similar manner.

Accounting for the costs of exiting an apprenticeship (*Cx*), youths should leave indentures if $Yo - Yc > Cx$ for the balance of the term. Initially, apprentices would have better information about *Yo* than *Yc*. As they learned more about *Yc* over their term, departure would become attractive for some apprentices with better outside options. Masters would know less about their apprentices' outside option, but received some signal about *R* from the occupation or social origins of the apprentices' father and their location. All else being equal, masters would anticipate a higher probability of departure for apprentices with better relative outside options (*Yo-Yc*) at the outset, and charge higher premiums as a consequence.[9] The identification of productive attributes more valuable in outside activities than in apprenticeship would have a similar effect.[10] Risk adverse masters should also condition premiums on uncertainty surrounding apprentices' productivity. This would imply masters charging higher premiums when it was more costly to collect information about *v*, *R*, and *Mc*

Following equation (1), premiums should also have been responsive to signals about the productivity of apprentices, their expectations about treatment while contracted, the quality of training likely to be provided by masters, and any end payment, whether financial or in the form of long-run economic rents. This interpretation is supported by most theories of premium payment and premium size put forward by historians, which generally link premiums to the net costs or returns from training.[11]

One further argument in the literature is that premiums produced self-enforcing contracts by operating as bonds that raised the cost of default (Epstein 1998; De Munck 2007). This would imply that significant *P* on the right-hand side of equation (1) was matched by a similar *B* on the left-hand side. This

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[8] See Minns and Wallis (2011) for evidence on this point.

[9] Apprentices from poor families suggest ambiguous predictions. At face value, they have fewer outside options, but conversely, the lack of family capital may have reduced the benefit of completed apprenticeship by reducing the likelihood of establishing an independent business.

[10] Differences in departure costs (*Cx*) should also matter for this assessment. We do not have firm evidence on this, but expect that the costs of running away may have been lower for migrant apprentices, who could find family members to take them on outside of their training location.

[11] In returns, a number of accounts include prestige and economic rents from guild or city privileges, as well as greater productivity. On profit, see Earle (1989). On prestige, see Kaplan (1993, p. 449); Brooks (1994); De Munck (2007, p.42).Reith (2007, p. 183) suggests fees were only charged for weaker youths by Augsburg bakers. De Munck (2007) claims that fees reflect teaching costs.

does not fit with recent evidence showing that premiums were partially returned when contracts ended prematurely -even when the apprentice was at fault (Wallis 2011) – but were not usually reimbursed upon completion.[12] As we will show below, many apprentices paid no premium (Table 2), and it is not obvious why a standard bond against default would not be used if required, as they were often given to guarantee masters' against losses through fraud (Earle 1989).

Two final issues need to be addressed. First, is the competitive training market described in equation (1) a useful portrayal of pre-industrial reality? Guilds generally restricted the number of apprentices their members could train, often to one or two at a time. This "soft cap" on availability would sustain high premiums when demand for training was high. Guild members were not the only suppliers of training, however. No restrictions applied outside guild towns, and even in guild towns, by the eighteenth century apprenticeships were increasingly offered by people outside guilds. Nonetheless, masters in trades where guild constraints were effective could potentially use premiums to capture economic rents, while their apprentices might expect to gain access to some of these rents after training.

Second, using premiums to secure apprenticeship contracts under high attrition has a large potential impact on training and economic mobility. The typical English family had little ability to save, and access to long-term, unsecured credit was extremely limited in pre-industrial England (Muldrew 1998). Many would struggle to raise the funds to pay a training premium. Premium size thus presents itself as an important variable for the wider economic performance of the economy – it could present a significant barrier to training, with implications for productivity, economic mobility and the extent to which aptitude and opportunity were matched (Ben-Amos 1994; Brooks 1994; de Munck, 2007. See also: Ogilvie 1997; Ogilvie 2004).

New evidence on apprenticeship: premiums and indentures

Our evidence derives from two sources recording the indenture characteristics of large numbers of apprentices, masters and the premiums paid. The first details 300,000 apprenticeships on which masters paid Stamp Tax. From 1710 to 1804, apprenticeship premiums were taxed at 2.5 per cent on fees up to £50, and 5 per cent over £50.[13] The Commissioners of Stamps recorded the payments, noting the name, address, and trade of masters, the name and sometimes the family background of the apprentice, and the date of indenture.[14] We have digitised a typescript abstract of the registers from 1710 and 1774. For over 30,000 apprentices information on all characteristics survives.[15] We then linked a sub-sample of apprentices to baptismal records in the International Genealogical Index (IGI), for which we calculate their age when apprenticed.[16] The Stamp Tax data does have flaws. The records are affected by lags in registration and occasional losses where provincial records were not properly registered: for a few years almost no premiums are recorded. Under-counting and under-reporting of premiums may have occurred as Masters' sought to minimize tax liabilities. Perhaps the most important shortcoming is that they omit apprentices who paid no premium.

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[12] Apprentices sometimes received a modest exit payment, but these were small relative to premiums and became rarer over time (Grubb 1997). Unfortunately our source material provides no evidence on completion payments.

[13] After 1804 this tax structure was replaced by a simpler banded tax.

[14] The records of the Commissioners of Stamps continue record late payment of premiums until 1811.

[15] Information on apprentices' father's occupation and place were only recorded intermittently.

[16] The linkage is discussed in Wallis, Webb, and Minns (2010).

The second series consists of apprenticeship contracts registered by seven London livery companies. After the introduction of the Stamp Tax, some guilds began to record premiums alongside the information they gathered about apprenticeships. These records offer several advantages. Masters had little incentive to under-report premiums, as guild records were not used by authorities involved in tax collection. Guild registration was probably more accurate that stamp duty registers; guilds possessed local monitoring systems, and the system had been in place for several centuries. A crucial aspect for our analysis is that guilds noted when no premium was paid. Guild data, however, is often unclear about masters' occupations. Although many no longer followed the guild's nominal trade, precise occupations are rarely recorded. Our data covers only a minority of guilds, and many apprentices were trained (and paid premiums) outside of the guild system in this period.

Premiums and access to apprenticeship

The Stamp Tax data suggest stable flows into apprenticeship between the 1710s and the 1770s. (Figure 1). The annual fluctuations apparent in the second quarter of the century mainly reflect record survival. We find no sign of the reported decline in apprenticeship during the eighteenth century, despite falls in the numbers of apprentices registered by guilds (Minns and Wallis 2009; Snell 1996; Walker 1986).[17] Premiums rose gradually in London until the 1740s; outside of London payments were much lower (Figure 2).[18] Much of the difference between London and the provinces was due to the concentration of prosperous trades that charged high premiums within the metropolis.[19]

Historians have suggested that premiums were large and ubiquitous. For apprentice merchants, Grassby suggests large sums of about £100 in 1700 and £200 to £300 in the early 19th century were usual (Grassby 1995, pp. 67-9). In trades, Brooks suggests premiums of £20 to £30 were common (Brooks 1994). Such figures are often based on fragmentary data, often from London (for example, Earle 1989, p.84).[20] We find that premiums were generally more modest. In most crafts and trades, including clothing, footwear, textiles, and metal manufacturing, fees below ten pounds were typical (Table 1). Professionals typically charged around 50 pounds, and there was more heterogeneity in prices for these occupations. Despite large difference in mean premiums between occupations, the distribution for specific occupations overlapped substantially (Figure 3). London guild records match the Stamp Tax data (Table 2). While some aspirant merchants or professionals paid large sums, they made up a small minority of apprentices. Nationwide, only 8 per cent of apprenticeships cost over 50 pounds, and 5 per cent exceeded 100 pounds; even in London, the figures were only 17 per cent and 8 per cent.

London guilds also recorded when no premium was paid. In relatively low prestige guilds (Blacksmiths, Plasterers, Vintners) only a minority paid premiums. The companies which noted the master's occupation mainly contained prosperous trades, but even here we see large differences: the majority of plasterers' apprentices paid nothing, as did a quarter of druggists and grocers.[21] All bookbinders, booksellers, printers, and stationers in the sample were charged premiums. Some of those

[17] The rate of entry into apprenticeship also appears fairly constant over the period (Minns and Wallis, 2009)

[18] Figure 2 presents nominal apprenticeship premiums. Adjusting for the trend in consumer prices (Allen, 2001) implies a gentle rise in real terms.

[19] Average premiums in the city of London were about 35 percent greater than in the largest 11 provincial towns in England (DeVries 1984).

[20] Van der Beek (2010) offers more comprehensive evidence of premium size from a sample of Stamp Tax premium payments.

[21] London companies incorporated a range of different occupations. For several companies, the occupation is recorded in the eighteenth century, allowing us to focus our evidence.

escaping premiums were masters' sons, or local associates. The probability of paying a premium was higher in occupations where premiums were larger.

Were premiums a barrier to entry? While premiums were smaller than the literature suggests for those that did pay, they were not trivial sums. Unskilled workers in the building sector in provincial England earned roughly £12 a year. Families would require several months' income to pay £5 to £10 for an apprenticeship with a mason or weaver.[22] The larger premiums paid to access some occupations equalled several years' income. For youths without family backing, raising a premium would have been an onerous task. It would take roughly 2 years of agricultural service to raise the funds to pay a premium of £5.[23] Compared to alternative human capital investments, premiums were expensive. Schooling a child, for example, cost around one pound per annum.[24] There is little evidence that families used credit to pay premiums. In the 18th century, the English credit market supplied short term credits or secured loans, not the unsecured long-term loans required for training (Muldrew 1998).

Premiums did create a threshold that poor families struggled to cross. Near the bottom of the income distribution, labourers made up around 24% of workers in this period (Shaw-Taylor, 2010), but supplied just 4% of those apprentices who paid premiums. Mercantile masters recruited primarily from the top of society, and the majority of apprentices in the professions were sons of professionals or gentlemen (Table 6). However, boys from poorer families in agriculture and manufacturing could enter those crafts where premiums were smaller or less frequent. In clothing and footwear, about ten per cent of apprentices were labourers' sons. Moreover, premiums were often only a small part of the investment required to develop a career as an independent craft worker. The opportunity costs associated with foregone income dominated premiums for most would-be craft apprentices.[25] Opportunity costs do not require up-front financing as did premiums, but poorer families may have struggled to subsist without access to the income of teenage boys. A cost that often dwarfed premiums was that of the capital required to set up an independent business after training was completed. In prosperous trades, this cost was perhaps ten or twenty times that of the premium levied (Campbell 1747, pp. 331-340).

Premiums and indenture characteristics

We use OLS regression analysis to test our predictions on the roles of premiums in the indenture contract. For the nationwide Stamp Tax data, regressions are used to estimate the determinants of (log) premium size (Table 3). All specifications include a full set of guild, occupation and year dummies. Because only positive premiums were recorded, selection into the population is an issue, but we have little capacity to deal with this in a formal manner. We estimated a similar series of regressions for

[22] Provincial wages are the average for building labourers, 1710-1772 (Clark, 2005). Days worked are from Voth (2001), p. 1076 (1750 estimate).

[23] Kussmaul (1981): 38. Average wage for servant in husbandry under 15 was £2 10s, rising to £5 15s at 20.

[24] At a fee of 6d per week, and 45 weeks teaching a year, school would cost £1 2s 6d per annum. Humphries finds an average of three to four years of schooling among eighteenth century autobiographies: Humphries 2009: 314.

[25] Assuming that youths would earn a rising fraction of adult income with age (20% at age 14, 40% at age 15, 60% at age 16, 70% at age 17, 80% at age 18, 90% at age 19, and 20% at age 20 – see Van Zanden 2009. p. 160), a provincial adult unskilled wage of 1s per day, that youths works 228 days per year (Voth 2001), and a discount rate of 7.5 per cent, the present value of lost earnings during an apprenticeship, relative to a subsistence income of £5 per annum, was about 26 pounds.

premium size for the smaller London guild sample (Table 5, column 3 and 4).[26] These models have limited information on the master's occupation, although we do use detailed occupations for a sub-sample for which these were recorded (column 5). This sample allows us to discern between apprentices who paid premiums and those who did not. In addition to OLS regressions of premium size, we use a linear probability model to explain the presence of a premium (Table 4, column 1 and 2).[27]

The regressions offer support for the key hypothesis that premiums offered compensation for limited information and higher risks. Distance offers one proxy for information: masters were likely to know less about migrant apprentices. We find that in the London guild sample, 'remote' apprentices (from a county not bordering London or Middlesex) paid significantly higher premiums.[28] In the Stamp Tax sample, apprentices who moved county to train paid just over eight per cent more.[29] The London sample shows no apparent difference between remote and local apprentices in the likelihood that a premium was levied (Table 4 column 1): better information might produce discounts, but not waivers. Family connections, which carried information but also social obligations, had the biggest impact on the likelihood of avoiding a premium. As this underlines, information is often embedded in social networks that can themselves reduce risk or produce alternative reasons for discounts through mutual obligations. The loss of networks can be costly: apprentices whose father was dead were somewhat more likely to pay, and to pay more (Table 4).

Masters lacked reliable information about apprentices' probable commitment to their contract. In other work, we find that boys from wealthy and professional backgrounds who were apprenticed in London were significantly more likely to quit prematurely, perhaps to exploit their families' connections elsewhere; poor migrants, with fewer outside options, generally stayed (Minns and Wallis 2011). Here, when we include interaction terms between 'remoteness' and parental occupation (Table 3, columns 1-3, Table 4, column 4), we find the interactions are positive, significant, and large for migrant sons of most backgrounds. Premiums were largest for those likely to have the best outside options: the sons of gentlemen, traders or professionals. Conversely, migrant apprentices from low-status backgrounds paid less than locals. Apprentices appear to have paid extra to compensate masters for the increased probability of early departure: for gentlemen's sons, premiums were as much as 20 per cent higher.

A further test for the argument that these interactions reflected anticipated risk of departure is provided by comparing trades with differing levels of prosperity. The impact of premature departure would depend on the compensation bundle the apprentice offered to the master. Large premiums, as demanded by merchants and professionals, reduced the relative importance of the apprentices' labour. Where apprentices' paid low premiums, their labour was a larger share of masters' compensation, and masters were more likely to end up out of pocket if an apprentice left early or was unproductive. In a further set of regressions, we distinguish two broad groups of occupations in the Stamp Tax data and

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[26] The censored nature of the data is an important issue in estimating regressions of premium size. Various econometric solutions have been proposed to deal with this type of censoring. In the specification used in column 1, we adopt the crude approach of using a left hand side variable equal to ln(premium + £1). Tobit regressions that formally account for the censoring (not reported here) give marginal effects that are similar to the findings in Column 2 of Table 3.

[27] We have also used a probit estimator for this regression (results not reported), giving marginal effects that are extremely close to those reported here.

[28] We also estimated this model with a "neighbouring counties" variable for counties bordering London or Middlesex (Berkshire, Buckinghamshire, Essex, Hertfordshire, Kent, and Surrey), with similar results.

[29] This result comes from a regression without the full set of father occupation and different county interaction terms. We have not included this specification in Table 4 to conserve space, but results are available on request.

compare the sensitivity of premium size to apprentice characteristics in each (Table 5). In low-premium occupations (textiles, footwear, and clothing trades), premiums were highly responsive to the interactions of family background and migration discussed above: masters charged much higher premiums for those with a high probability of early departure. In more prosperous trades, by contrast, these interactions had smaller and generally insignificant coefficients, as we would expect.

Limited information about contractual risks affected apprentices as well as masters. The results show that apprentices valued demonstrable training quality. The Stamp Tax allows us to reconstruct the training and premium histories of around 9,000 masters by linking masters' names, places and occupations. We then computing their total number of apprentices and average premium, and identified each apprentice's position in their master's training history. Adding this information to the regression models suggests little relationship between the total number of apprentices taken by a master and their premiums. However, masters' experience of training did matter. Masters were able to charge higher premiums with each apprentice they took, with the fourth apprentice paying over 20 per cent more than the first (Table 3, column 3).[30]

We can extend this approach to get some sense of the effect of other, unobservable characteristics of masters. We include the log of the average premium each master charged, for masters who trained at least two identifiable apprentices (Table 4, column 4). Unsurprisingly, an apprentice's premium is highly correlated to that paid by other apprentices to the same master. This is perhaps the clearest indication of how master-specific attributes determined premiums even within well-defined occupations. In this model, apprentice characteristics and master experience still affect premiums, with positive and significant coefficients on the usual parental background and apprentice rank variables. That premiums varied with these characteristics among apprentices with the same master offers compelling evidence that the apprenticeship market was highly responsive to differences in information, expectation and experience.

The regressions also show how premiums were used to respond to the heterogeneity of apprentices and masters in terms of differences in anticipated productivity (v), subsistence expectations (w), and institutional rents (B). The analysis establishes a clear link between productivity and premiums. Apprentices with relevant prior experience through exposure to the occupation received a discount: those whose fathers' occupations matched their master's paid premiums that were 9 per cent lower (Table 3). Age offers a more surprising result. As physical maturity would affect apprentices' productivity, one would expect younger apprentices to pay more. Instead, premiums peaked around the age of 17 (Table 3, column 4), even in craft occupations, before falling for the small group of older apprentices who likely had prior skills.[31] Very young apprentices may have been serving longer terms.[32] It is possible that the rising age-premium profile reflects the increased risk of attrition among older apprentices who were more likely to succumb to the temptations of marriage and wage labour.

The results also show that, even within occupations, premiums reflected apprentices' backgrounds (Tables 3 and 4). The relationship between parental occupation and premium appears broadly similar in both samples. Premiums were larger, and more common, for the children of more prosperous fathers, such as gentlemen, professionals and those in commerce and trade, while the

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[30] Unfortunately we do not know how successful previous indentures may have been. The measure of number of apprentices and their rank that we use will suffer from downward bias, as we miss any apprentices for whom no premium was paid or recorded.

[31] If we estimate this regression for the construction sector alone, premiums peak at age 18, controlling for all other characteristics.

[32] See Reith (2007), and De Munck (2007). Galenson (1982) finds that younger indentured servants had longer terms, all else equal.

children of primary-sector fathers, husbandmen and labourers paid less. For London, this was not driven by occupational variation within guilds: when we use master's occupation (Table 5, column 5), parental background variables remain large and statistically significant.[33] Due to the large numbers of buyers and sellers in the British market for training it seems unlikely that masters were able to price discriminate and charge the wealthy more. More plausible is that wealthier families paid more for better conditions: they supplied a larger *P* so their children enjoyed a greater *w* while indentured. This explanation had prominent advocates in the period: Daniel Defoe (1752, p. 12, p. 148) thought that high premiums were because parents' 'unreasonable fondness and partiality' for their children led them to save them from menial work.

As we suggested earlier, formal institutions did not secure apprenticeship contracts. However, many apprenticeships who completed terms would expect to capture institutional rents. Elsewhere we have shown that the tranche of apprentices who did complete contracts sought to comply with formal regulations, even if this meant returning to their master after an absence (Minns and Wallis 2011). Here, the regressions indicate a substantial price differences between masters who were citizens of London (and therefore guild members) and those who were not. Apprentices paid over fifteen per cent more to train with a citizen (Table 3 column 5, London apprentices only). If we compare masters with specified occupations in the guild sample to London masters who were not citizens in the Stamp Tax data we find that among grocers, booksellers, stationers and printers, citizens received significantly larger premiums: a 118% difference for grocers (£119 versus £45), 59% for booksellers (£74 versus £46), 70% for stationers (£56 versus £33), and 20% for printers (£21 versus £17.5). For plasterers, however, the premium was virtually identical: 6.8 pounds with a citizen and 7.0 with a non-citizen.[34] The variation between occupations above fits well with the historiography of these different trades. Guild membership as a plasterer meant little, with any guild rents permanently diminished following the sector's de-regulation to encourage rebuilding after the Great Fire of 1666. The Grocers' Company showed little interest in defending monopolies in this period, but it did possess prestige and the possibility of useful networks. The Stationers' Company was an unusually strong and homogenous guild, and asserted its authority over the printing and book trades throughout this period. This pattern confirms that apprentices training in guilds with significant market power were willing to pay larger premiums in anticipation of post-completion rents and further economic privilege.

Conclusion

Apprenticeship was the main source of general and specific training in pre-industrial England. The scale and continuity of the practice suggest that it was a success, despite small firm size, limited information flows about prospective training partners, and low completion rates. Masters and apprentices were heterogeneous, but England's rigid labour laws gave them little room to acknowledge this through their contracts. Our analysis shows that training premiums were used to address the core tensions in securing pre-industrial training contracts. Premiums compensated apprentices and masters for anticipated risks of default and limited information about training quality, supplying a crucial degree of freedom that allowed masters and apprentices to reach long-term indenture agreements. Premiums

[33] The coefficients on gentleman, distribution/sales, and professional father are larger in this sub-sample (column 5) than in the broader sample (columns 3 and 4), with or without controls for master occupation.

[34] For London citizens, company not occupation was recorded. Thus, here we compare those company records that separately record occupation to non-citizens in the Stamp Tax for whom only an occupation is available.

also reflected occupational returns and residual corporate privileges. A consequence of this practice was an increase in the price of entrance into apprenticeship. This had consequences for access to training among the credit constrained, but premiums were typically small relative to opportunity costs and the capital required for a business. Apprenticeship premiums were not ubiquitous, and even in occupations where they were charged more frequently they were modest relative to expected incomes.

Premiums do not represent the only potential solution to the hold-up problem in a preindustrial training market. For example, labour laws could have been altered to allow shorter, more flexible terms of indenture, as in other markets for bound labour in the period. Changes to existing labour law faced strong opposition (Rule 1981; Berlin 2008), and neither the state, which taxed premiums, nor masters who received them had strong incentives to change the system. While many economic historians have argued that English pre-industrial institutions were the foundation stone upon which modern economic growth was built, it is striking that a private-order, informal mechanism was a necessary complement to formal rules in the crucial area of human capital formation.

References

Acemoglu, D., and J.-S. Pischke (1999). "Beyond Becker: Training in Imperfect Labour Markets." *Economic Journal* 109(1), pp. 112-142.

Allen, R. C. (2001). "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War." *Explorations in Economic History* 38(4), pp. 411-447.

Becker, G. (1964). *Human Capital*. New York, National Bureau of Economic Research.

Ben-Amos, I. K. (1991). "Failure to Become Freemen: Urban Apprentices in Early Modern England." *Social History* 16(2), pp. 155-172. Ben-Amos, I. K. (1994). *Adolescence and Youth in Early Modern England*. New Haven: Yale

University Press. Brooks, C. W. (1994). "Apprenticeship, Social Mobility, and the Middling Sort, 1550-1800", in J. Barry and C.W. Brooks, eds., *The Middling Sort of People: Culture, Society and Politics in England, 15501800*. Basingstoke: Macmillan, pp. 52-83.

Campbell, R. (1747). *The London Tradesman, Being a Compendious View of All the Trades, Professions, Arts, Both Liberal and Mechanic, Now Practised in the Cities of London and Westminster*. London: T.Gardner.

Clark, G. (2005). "The Condition of the Working Class in England, 1209-2004." *Journal of Political Economy* 113(6), pp. 1307-1344.

Conley, T. G. and D. G. Galenson (1994). "Quantile Regression Analysis of Censored Wealth Data." *Historical Methods* 27(4), pp. 149-165.

Davies, M.G. (1956). The *Enforcement of English Apprenticeship, 1563-1642 : a Study in Applied Mercantilism, 1563-1642*. Cambridge: Harvard University Press.

Defore, D. (1726). *The Complete English Tradesman*. London: Charles Rivington.

DeMunck, B. (2007). *Technologies of Learning: Apprenticeship in Antwerp Guilds from the 15th Century to the End of the Ancien Regime*. Turnhout: Brepols.

de Vries, J. (1984). *European Urbanization 1500-1800*. London: Taylor & Francis.

Dunlop, O.J., and R.D. Denham (1912). *English Apprenticeship & Child Labour*. London: Macmillan.

Earle, P. (1989). *The Making of the English Middle Class: Business, Society, and Family Life in London, 1660-1730*. Berkeley: University of California Press.

Epstein, S.R. (1998). "Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe. *Journal of Economic History*, 58 (3) pp. 684-713.

Galenson, D. G. (1981). "Market Evaluation of Human Capital: The Case of Indentured Servitude." *Journal of Political Economy*, 89(3), pp. 446-467.

Grassby, R. (1995). *The Business Community of Seventeenth-century England*. Cambridge: Cambridge University Press.

Grubb, F. (1997). "Does Bound Labor Have to be Coerced Labor? The Case of Colonial Immigrant Servitude Versus Craft Apprenticeship and Life-Cycle Servitude-in-Husbandry" *Itinerario* 21(1), pp. 28-51.

Hamilton, G. (1996). "The Market for Montreal Apprentices: Contract Length and Information." *Explorations in Economic History*, 33(4), pp. 496-523.

Humphries, J. (2003). "English Apprenticeship: a Neglected Factor in the Industrial Revolution" in P.A. David and M. Thomas, eds., *The Economic Future in Historical Perspective*.)Oxford: Oxford University Press) pp. 73-102.

Humphries, J. (2009). *Through the Mill: Child Labour in the British Industrial Revolution*. Cambridge: Cambridge University Press.

Kaplan, S. L. (1993). "L'Apprentisage au XVIIIe Siècle: Le Cas de Paris." *Revue d'histoire moderne et contemporaine* 40(3) pp. 436-479.

Kussmaul, A. (1981). *Servants in Husbandry in Early Modern England*. Cambridge: Cambridge University Press.

Lane, J. (1996). *Apprenticeship in England, 1600-1914*. London: Routledge.

Leunig, T., C. Minns, and P.H. Wallis (2011). "Networks in the pre-modern economy: the market for London apprenticeships, 1600-1749." *Journal of Economic History*, 71(2), pp. 413-443.

Mathias, P. (1957). "The Social Structure in the Eighteenth Century: A Calculation by Joseph Massie", *The Economic History Review* 10(1), pp. 30-45.

Minns, C., and P. Wallis (2011). "Rules and reality: quantifying the practice of apprenticeship in early modern England." *Economic History Review*, forthcoming.

Minns, C. And P. Wallis (2009). "Apprenticeship and Skill in Eighteenth century England: the Decline of Apprenticeship in London." Paper presented at the 2009 World Economic History Congress.

Mokyr, Joel (2009). *The Enlightened Economy: an Economic History of Britain, 1700-1850*. New Haven: Yale University Press.

Muldrew, C. (1998). *The Economy of Obligation: The Culture of Credit and Social Relations in Early Modern England*. (Basingstoke: Palgrave Macmillan)

Ogilvie, S. G. (1997). *State Corporatism and Proto-Industry: the Württemberg Black Forest, 15801797*. Cambridge: Cambridge University Press.

Ogilvie, S. G. (2004). "Guilds, Efficiency, and Social Capital: Evidence from German Proto-Industry." *Economic History Review* 57(2), pp. 286-333.

Reith, R. (2007). "Apprentices in the German and Austrian Crafts in Early Modern Times: Apprentices as Wage Earners?" in B. DeMunck, S.L. Kaplan and H.Soly, eds., Learning on the Shop Floor: Historical Perspectives on Apprenticeship. (New York: xxx), pp. 179-203.

Rule, J., (1981). *Experience of Labour in Eighteenth-Century Industry*. London: Croom Helm.

Schwarz, L. (1985). "The Standard of Living in the Long Run: London 1700-1860." *Economic History Review* 38(1), pp. 24-36.

Shaw-Taylor, L, (2010). "The Occupational Structure of England c. 1750-1871: A Preliminary Report." Unpublished Working Paper, Cambridge University.

Snell, K.D.M. (1996). "The Apprenticeship System in British History: the Fragmentation of a Cultural Institution." *History of Education* 25(4), pp. 303-322.

van der Beek, K. (2010). "Technology-Skill Complementarity on the Eve of the Industrial Revolution: New Evidence from England (1710-1772). Unpublished manuscript, Ben-Gurion University.

van Zanden, J.L. (2009). "The Skill Premium and the `Great Divergence'" *European Review of Economic History*. 13(1), pp. 121-153.

Voth, H.J. (2001). "The Longest Years: New Estimates of Labor Input in England, 1760-1830." *Journal of Economic History* 61(4) pp. 1065-1082.

Walker, M.J. (1986). "The Extent of Guild Control of Trades in England C. 1660-1820: A Study Based on a Sample of Provincial Towns and London Companies." Cambridge Universty PhD Thesis.

Wallis, P.H. (2008). "Apprenticeship and Training in Premodern England." *Journal of Economic History* 68(3), pp. 832-861.

Wallis, P.H. (2011). Labour, law and training in early modern London: apprenticeship and the city's institutions." LSE Economic History Working Paper 155.

Wallis, P.H., C. Webb, and C. Minns (2010). "Leaving Home and Entering Service: the Age of Apprenticeship in Early Modern London." *Continuity and Change* 25(3), pp. 377-404.

Wrigley. E.A., R.S. Davies, J.E. Oeppen, and R.S. Schofield (1997). *English Population History from Family Reconstitution, 1580-1837*. Cambridge: Cambridge University Press.

Table 1: Apprenticeship premiums, selected occupations 1710-1773

	Mean	Median	Standard Deviation	N
Food industries	10.0	9	13.5	21627
Clothing	11.5	7	18.1	32560
Footwear	6.5	5	8.4	27436
Textiles	15.7	5	35.7	19863
Wood industries	15.6	10.5	17.5	13504
Iron and steel manufacture	9.4	5	19.4	11649
Building and construction	10.9	10	12.5	34684
Other services	16.1	10	33.0	8655
Professions	73.6	52.5	60.6	16767

***Notes*:** Stamp Tax sample. Occupation groups using Wrigley's P.S.T codes to the second digit

Table 2: London training premiums, companies, and selected occupations

	% paying premium	average	sd	median	P10	P90	N	Insured wealth (med.)
Companies								
Apothecaries	84	73	36	63	40	105	589	
Blacksmiths	20	10	10	6	4	20	2105	
Grocers	59	84	80	30	8	200	380	
Plasterers	31	8	4	5	4	13	400	
Stationers	100	32	44	15	5	92	330	
Turners	54	12	12	10	4	21	401	
Vintners	32	16	22	10	5	21	823	
All companies	43	36	46	15	5	100	5028	
Occupations								
Bookbinder	100	9	5	6	5	20	58	
Bookseller	100	74	56	63	5	150	42	800
Druggist	73	175	46	200	105	210	15	
Grocer	78	119	78	100	50	200	32	500
Haberdasher	95	67	71	40	5	150	20	500
Instrument maker	94	9	7	6.3	3	20	31	
Plasterer	42	7	4	6	4	13	85	
Printer	100	20	17	20	5	40	107	400
Stationer	100	56	60	37	5	105	46	500

Notes: Sample of seven London companies; see text for more sample details. N is the total number of observations, not the number of observations for which we have reported premiums. Median insured wealth is from Schwarz (1992)

Table 3: Apprenticeship Premium determinants, Stamp Tax

	(1)	(2)	(3)	(4)	(5)
Gentleman father	.65 (.02)***	.65 (.02)***	.279 (.04)***	.61 (.06)***	.61 (.03)***
Professional father	.47 (.03)***	.47 (.03)***	.23 (.05)***	.54 (.07)***	.45 (.05)***
Primary father	-.04 (.02)**	-.04 (.02)**	-.01 (.04)	-.05 (.05)***	-.14 (.04)***
Distribution/Sales father	.44 (.02)***	.44 (.02)***	.21 (.03)***	.34 (.04)***	.45 (.02)***
Service father	-.01 (.02)	-.01 (.02)	-.07 (.04)*	.01 (.05)	-.09 (.03)***
Labourer father	-.33 (.03)***	-.33 (.03)***	-.16 (.09)*	-.22 (.09)**	-.56 (.07)***
Father and Master in same occupation	-.09 (.02)***	-.09 (.02)***	-.06 (.04)	-.08 (.05)*	-.06 (.03)**
Remote*Gentleman father	.20 (.02)***	.19 (.02)***	.12 (.04)**	.18 (.08)**	.26 (.03)***
Remote*Professional father	.10 (.04)***	.09 (.04)**	.01 (.08)	.03 (.11)	.12 (.06)**
Remote*Primary father	.07 (.02)***	.07 (.02)***	.01 (.05)	-.18 (.07)**	.14 (.05)***
Remote*Dist./sales father	.10 (.03)***	.09 (.03)***	.03 (.06)	.08 (.08)	.08 (.04)*
Remote*Service father	.07 (.03)**	.07 (.03)**	.10 (.06)	-.03 (.09)	.10 (.04)**
Remote*Labourer father	-.09 (.06)	-.09 (.06)	-.28 (.18)	-.24 (.17)*	.02 (.10)
Remote*Craft father	.04 (.02)**	.04 (.02)**	-.02 (.04)	.01 (.05)	-.02 (.02)
# of apprentices ever taken by master		.01 (.01)	-.02 (.01)***		
Second apprentice		.12 (.02)***	.13 (.02)***		
Third apprentice		.18 (.03)***	.17 (.03)***		
Fourth apprentice		.21 (.05)***	.19 (.05)***		
Fifth or higher apprentice		.06 (.07)	.26 (.06)***		
Ln(av.premium, other indentures)			.64 (.01)***		
Age 13-15				.18 (.05)***	
Age 16-18				.36 (.06)***	
Age 19-30				.18 (.06)***	
Master citizen					.16 (.02)***
Constant	1.9 (1.2)	1.9 (1.2)	.35 (.93)	2.1 (0.9)**	.96 (1.2)
Year Dummies	Y	Y	Y	Y	Y
County Dummies	Y	Y	Y	Y	N
Occupation Dummies	Y	Y	Y	Y	Y
R-square	.53	.53	.69	.51	.42
N	32575	32575	4545	4752	16091

Notes: Occupation dummies are defined using Wrigley's PST codes to the third digit. Standard errors in parentheses. Coefficients marked *, **, and *** are significant at the 10 per cent, 5 per cent and 1 per cent level.

Table 4: The determinants of London training premiums, 1710-1800

	Premium paid (LPM)		Ln premium size (OLS)		
	(1)	(2)	(3)	(4)	(5)
Remote apprentice	.00 (.01)		.10 (.04)***		.05 (.11)
Father citizen	-.03 (.02)*	-.03 (.02)	-.09 (.05)*	-.07 (.05)	-.33 (.14)
Father deceased	.04 (.01)***	.04 (.01)***	.05 (.03)	.06 (.03)*	.07 (.09)
Kin apprentice	-.24 (.03)***	-.24 (.03)***	-.71 (.10)***	-.70 (.10)***	- -
Gentleman father	.23 (.02)***	.21 (.02)***	.94 (.06)***	.89 (.07)***	.99 (.17)***
Professional father	.06 (.02)***	-.01 (.03)	.43 (.06)***	.15 (.08)**	.82 (.17)***
Primary father	.04 (.02)**	.04 (.02)*	.08 (.05)	.01 (.09)	.03 (.14)
Distribution/sales father	.09 (.02)***	.05 (.02)***	.35 (.05)***	.23 (.06)***	-.05 (.13)**
Service father	.09 (.02)***	.08 (.02)***	.14 (.05)***	.15 (.05)***	-.03 (.16)
Labourer father	-.01 (.02)	.00 (.03)	-.11 (.07)*	-.11 (.08)	-.13 (.20)
Remote*Gentleman		.03 (.04)		.18 (.10)*	
Remote*Professional		.18 (.04)***		.76 (.12)***	
Remote*Primary		-.03 (.03)		.01 (.09)	
Remote* Dist./sales		.15 (.04)***		.63 (.12)***	
Remote*Service		.01 (.04)		-.20 (.13)	
Remote*Labourer		-.07 (.05)		-.08 (.15)	
Remote*Craft		-.06 (.02)***		-.06 (.06)	
Bookbinder					-.35 (.28)
Bookseller					1.1 (.30)***
Druggist					.99 (.43)**
Grocer					1.4 (.27)***
Haberdasher					.82 (.37)**
Instruments					-.25 (.31)
Plasterer					.26 (.16)
Printer					.18 (.25)
Stationer					.74 (.30)
Company Dummies	Y	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y	Y
Constant	.55 (.12)***	.57 (.12)***	2.7 (.35)***	2.7 (.35)***	1.3 (.95)
R-square	.26	.26	.38	.39	.49
N	7575	7575	7575	7575	1006

Notes: Log premium is equal to ln(Premium +£1), as described in the text. Standard errors in parentheses. ***, **, * indicate coefficients significant at the 1%, 5% and 10% level. Father craft worker is the excluded parent occupation group. All other occupations are the excluded master occupation group.

Table 5: Apprenticeship Premium determinants, Stamp Tax, selected occupations

	(1) professions	(2) clothing, textiles, footwear
Gentleman father	.59 (.06)***	.89 (.05)***
Professional father	.36 (.07)***	.71 (.07)***
Primary father	.06 (.10)	-.05 (.03)*
Distribution/Sales father	.51 (.08)***	.85 (.06)***
Service father	.09 (.10)	-.02 (.05)
Labourer father	-1.8 (.35)***	-.24 (.04)***
Father and Master in same occupation	-.21 (.12)*	-.07 (.04)
Different county*Gentleman father	-.09 (.11)	.39 (.08)***
Different county*Professional father	-.06 (.12)	.20 (.12)*
Different county*Primary father	.04 (.16)	.09 (.06)
Different county*Dist./Sales father	-.06 (.12)	.34 (.12)***
Different county*Service father	.07 (.20)	.14(.10)
Different county*Labourer father	3.4 (.84)***	-.29(.09)***
Different county*Craft father	.13 (.10)	-.04 (.04)
# of apprentices ever taken by master	.07 (.02)***	.06 (.02)***
Second apprentice	.03 (.06)	.08 (.04)*
Third apprentice	-.02 (.11)	.17 (.10)*
Fourth apprentice	-.07 (.19)	.38 (.17)**
Fifth or higher apprentice	.05 (.02)	-.28 (.24)
Constant	4.9 (1.1) ***	2.8 (.99)***
Year Dummies	Y	Y
County Dummies	Y	Y
Occupation Dummies	N	N
R-square	.27	.32
N	2248	7170

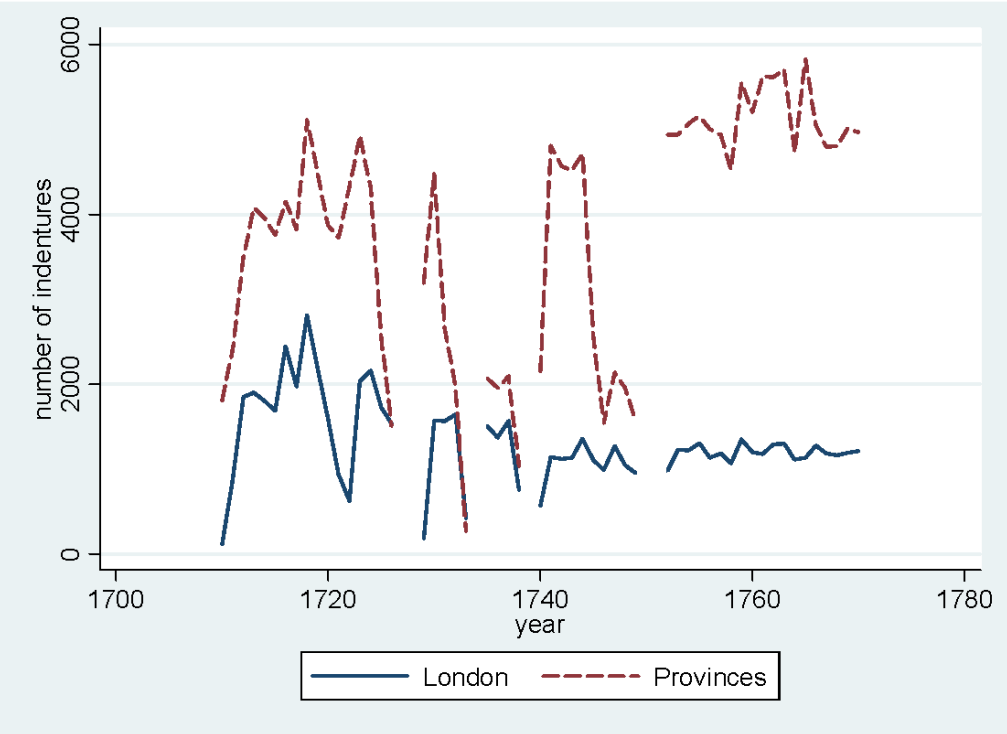
Notes: Occupation dummies are defined using Wrigley's P.S.T codes to the third digit. Standard errors in parentheses. Coefficients marked *, **, and *** are significant at the 10 per cent, 5 per cent and 1 per cent level.

Table 6: Parental background of apprentices in selected occupations, 1710-1772

	Clothing	Footwear	Textiles	Other Services	Professions
Median premium	7	5	5	10	52.5
% father occupation group					
Primary	25.2	31.5	22.9	17.0	76.0
Manufacturing	40.1	42.1	42.6	38.0	15.7
Distribution	3.2	1.5	4.6	4.7	7.8
Sales	3.5	2.3	5.4	5.7	4.6
Labourer	10.7	9.9	4.6	1.7	0.3
No occupation	0.1	0.1	0.3	0.1	0.1
Service	5.4	10.0	4.7	14.3	5.4
Professional	3.6	1.2	4.2	6.0	18
Gentleman	8.2	1.6	10.6	12.5	41.4
N	3295	2235	2569	1845	2438

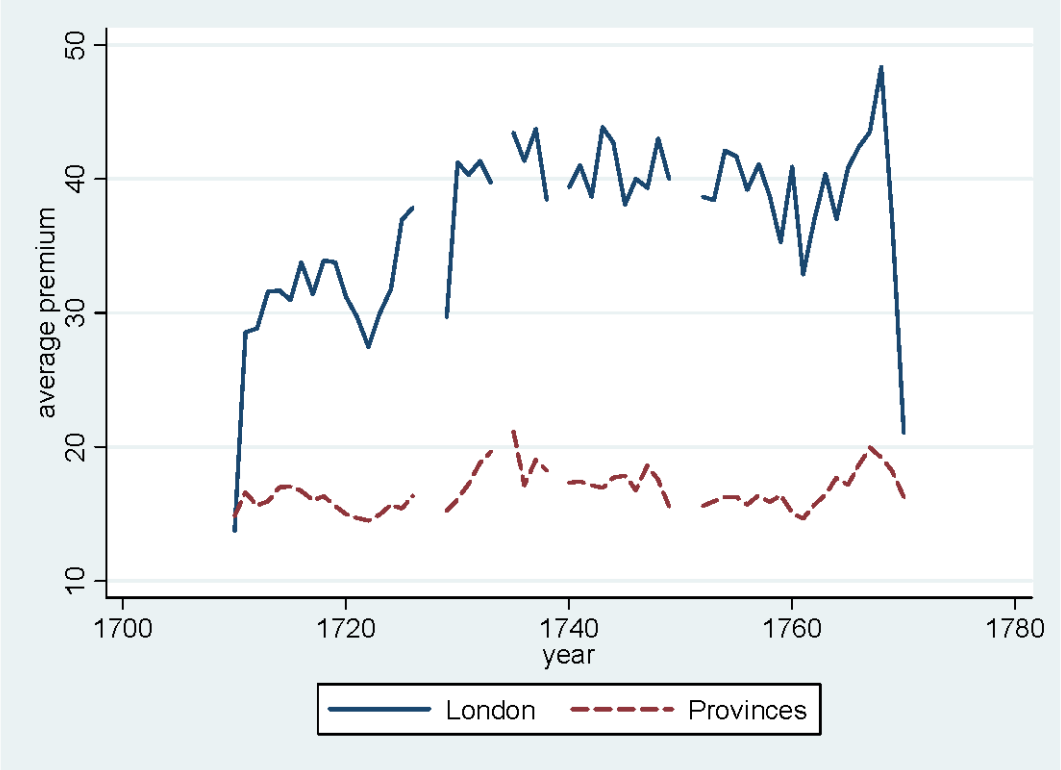
Notes: Stamp Tax sample; see text for further details.

Figure 1: Stamp Tax Indentures, 1710-1773



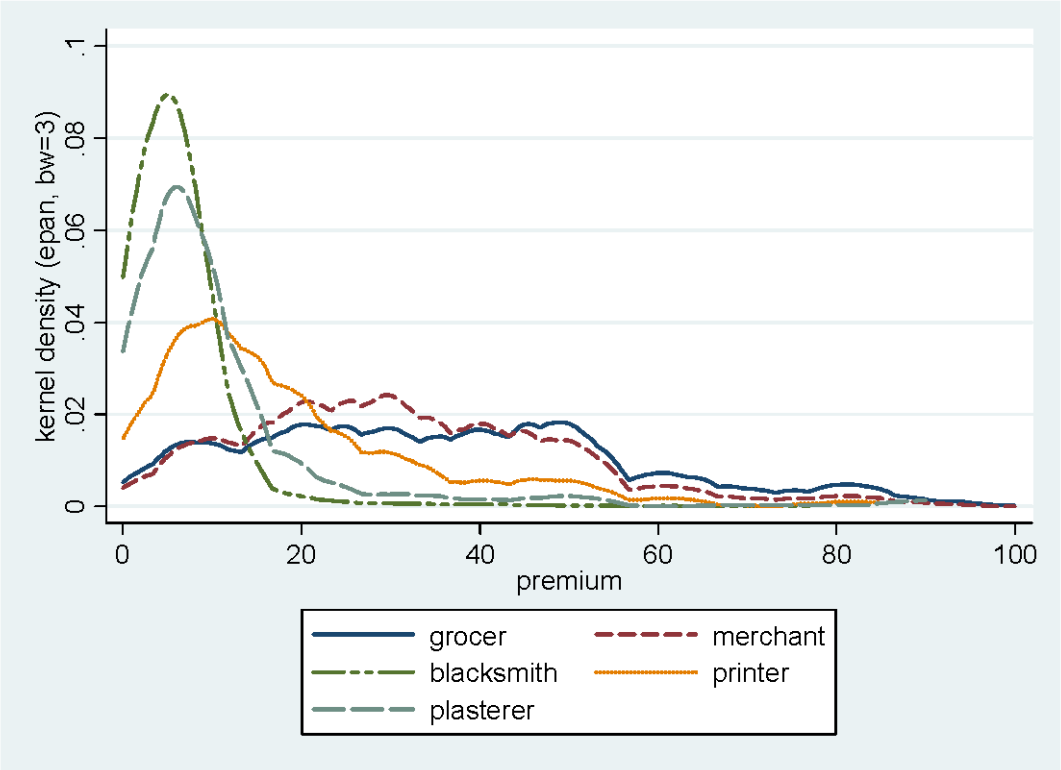
Notes: Stamp tax sample; see text for further details

Figure 2: Apprenticeship Premiums, 1710-1773



Notes: Stamp tax sample; see text for further details

Figure 3: Premium Distributions, Selected Occupations



Notes: Distributions are kernel density estimates. The Epanechikov kernel is used, with a bandwidth of 3.

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